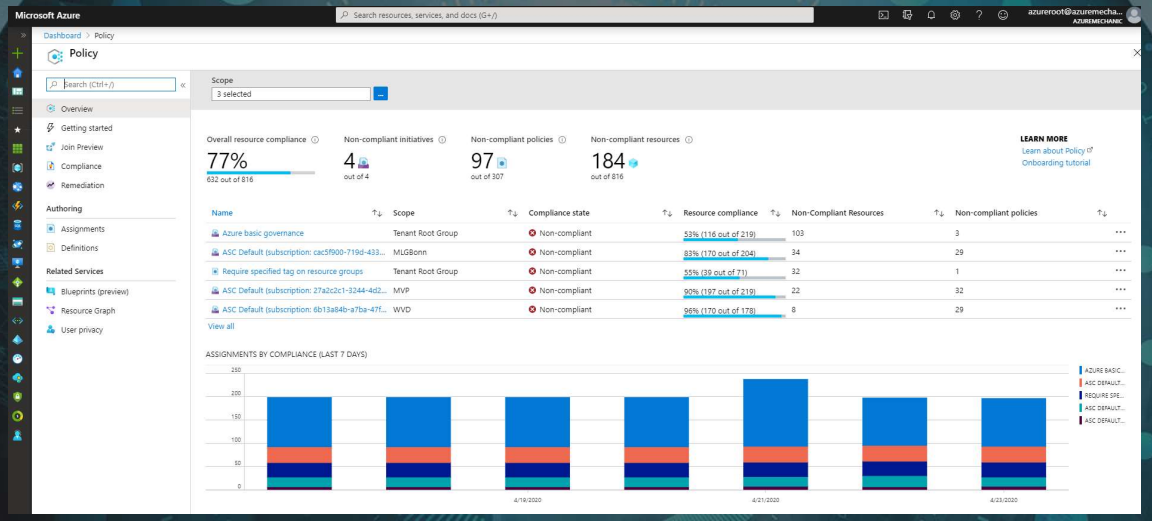

Azure Governance Best Practices

by Thomas Naunheim & Gregor Reimling

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www.cloud-architekt.net

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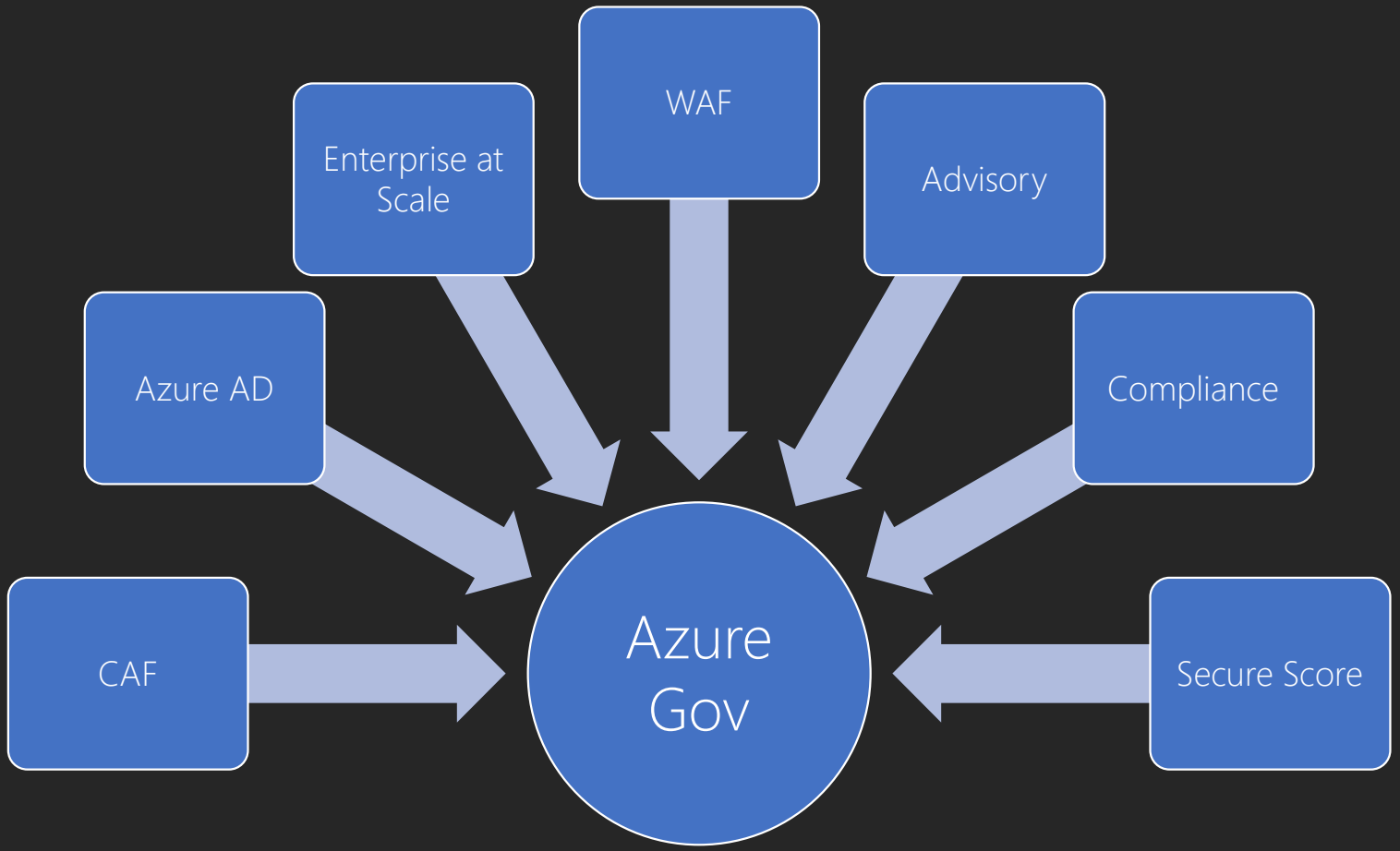
Agenda

- Overview of Cloud Adoption Framework and Well-architecture Framework
- Management of Compliance and Security Status
- Azure Enterprise-Scale Landing Zone
- AzOps: "Operationalize" Azure environment at scale

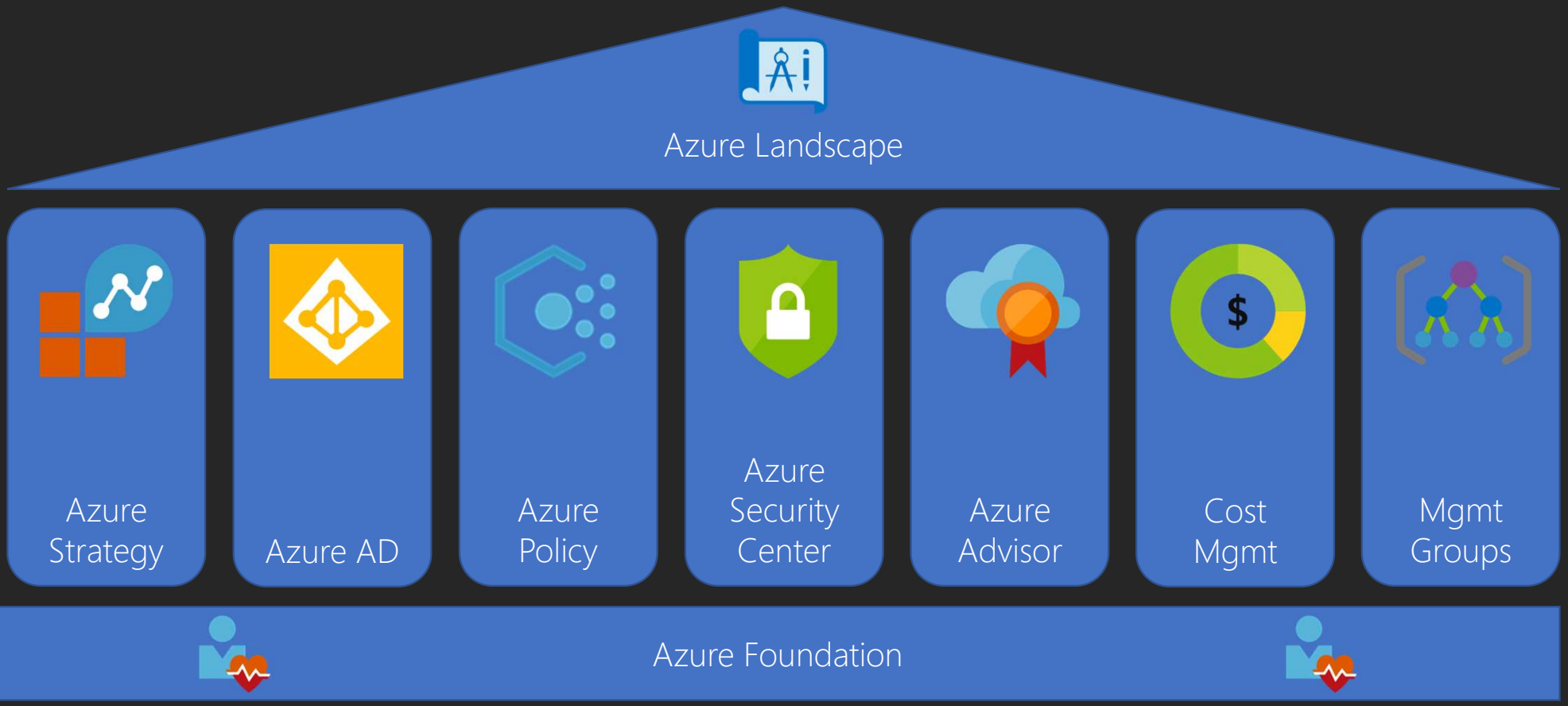
Lot of DEMOs

Topic Overview



Overview of CAF

Azure Governance House



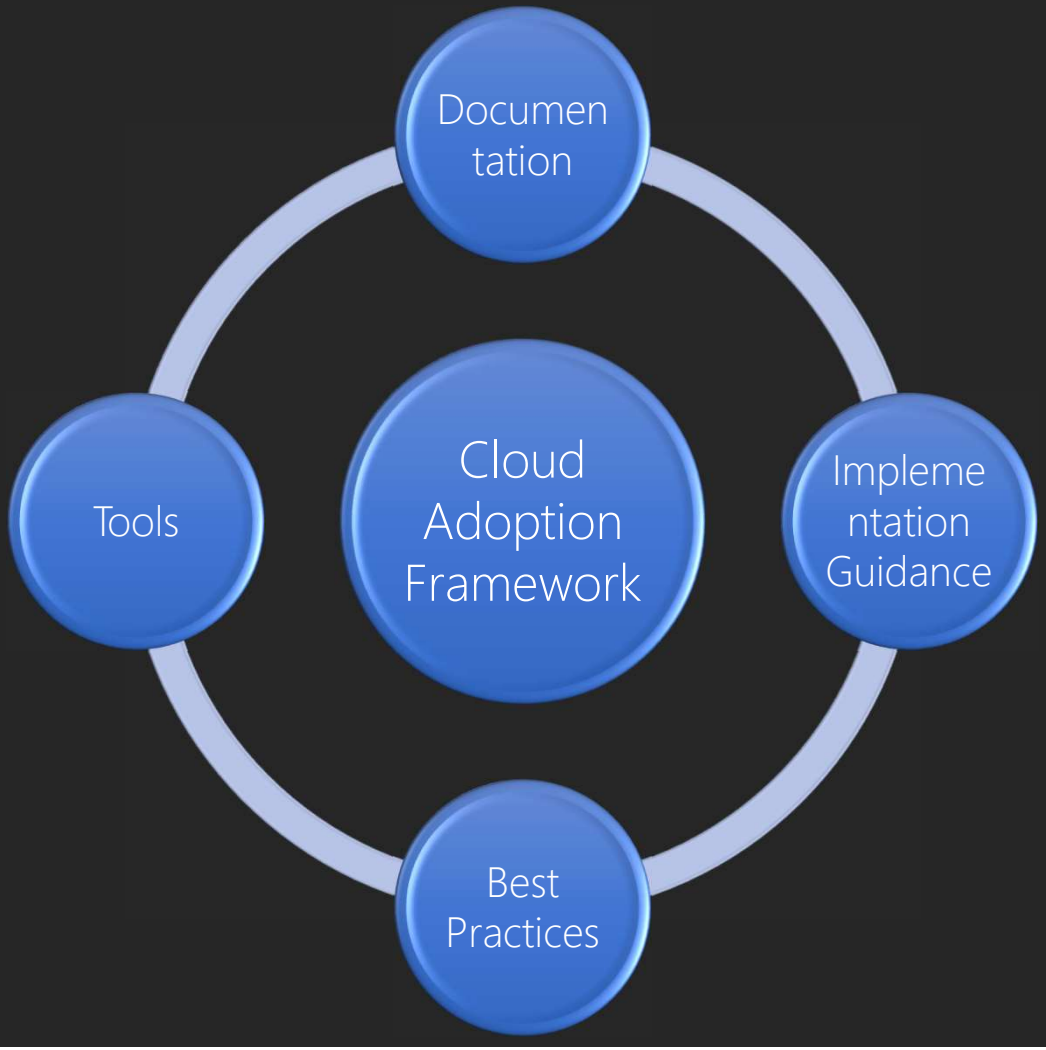
Azure Cloud Adoption Framework (CAF)

„The Cloud Adoption Framework is a collection of documentation, implementation guidance, best practices, and tools that are proven guidance from Microsoft designed to accelerate your cloud adoption journey."

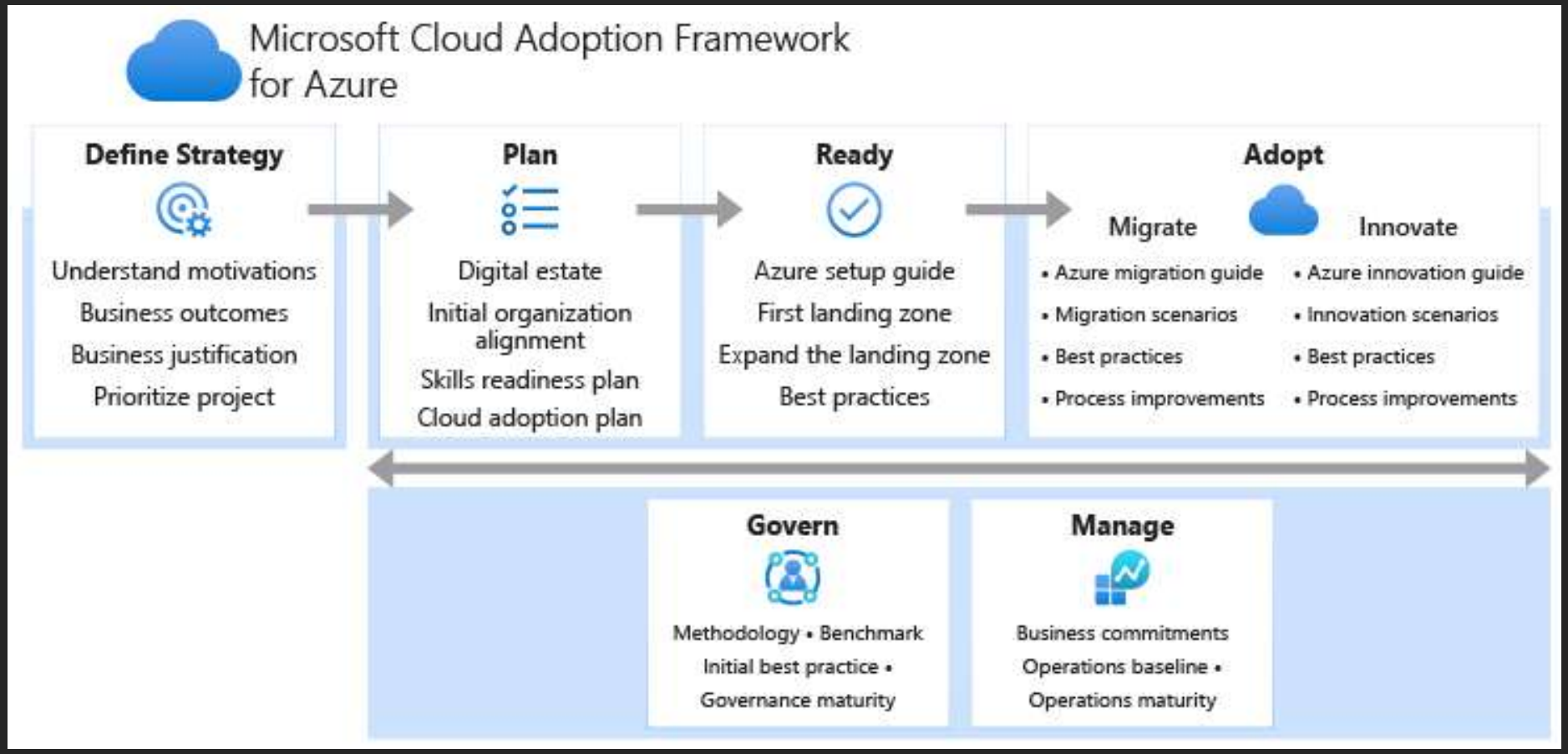
Azure Well-Architected Framework (WAF)

"The Azure Well-Architected Framework is a set of guiding tenets that can be used to improve the quality of a workload."

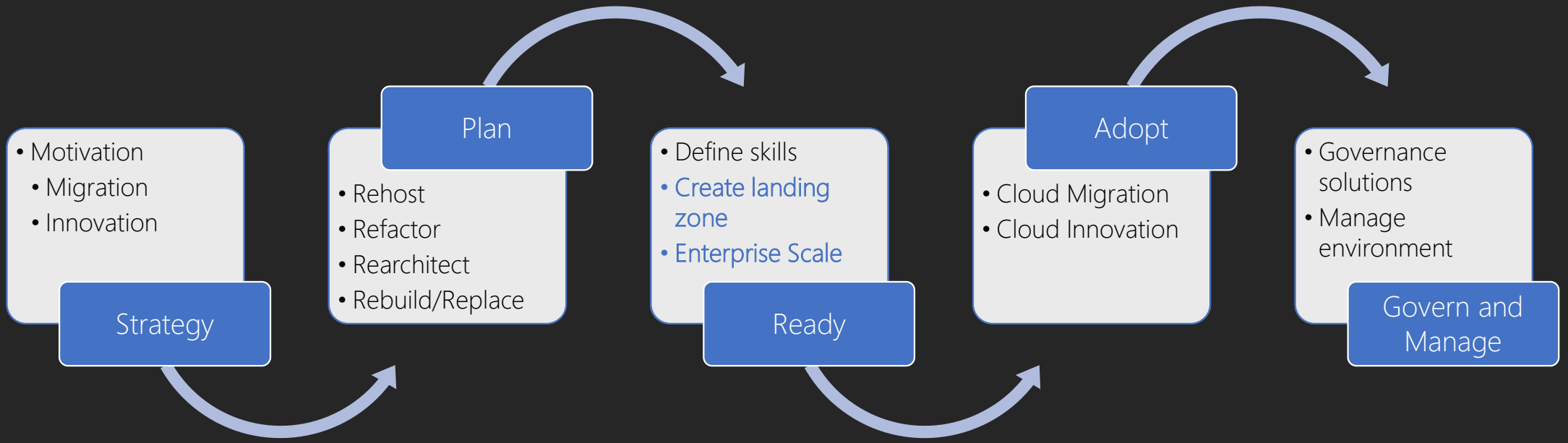
Cloud Adoption Framework



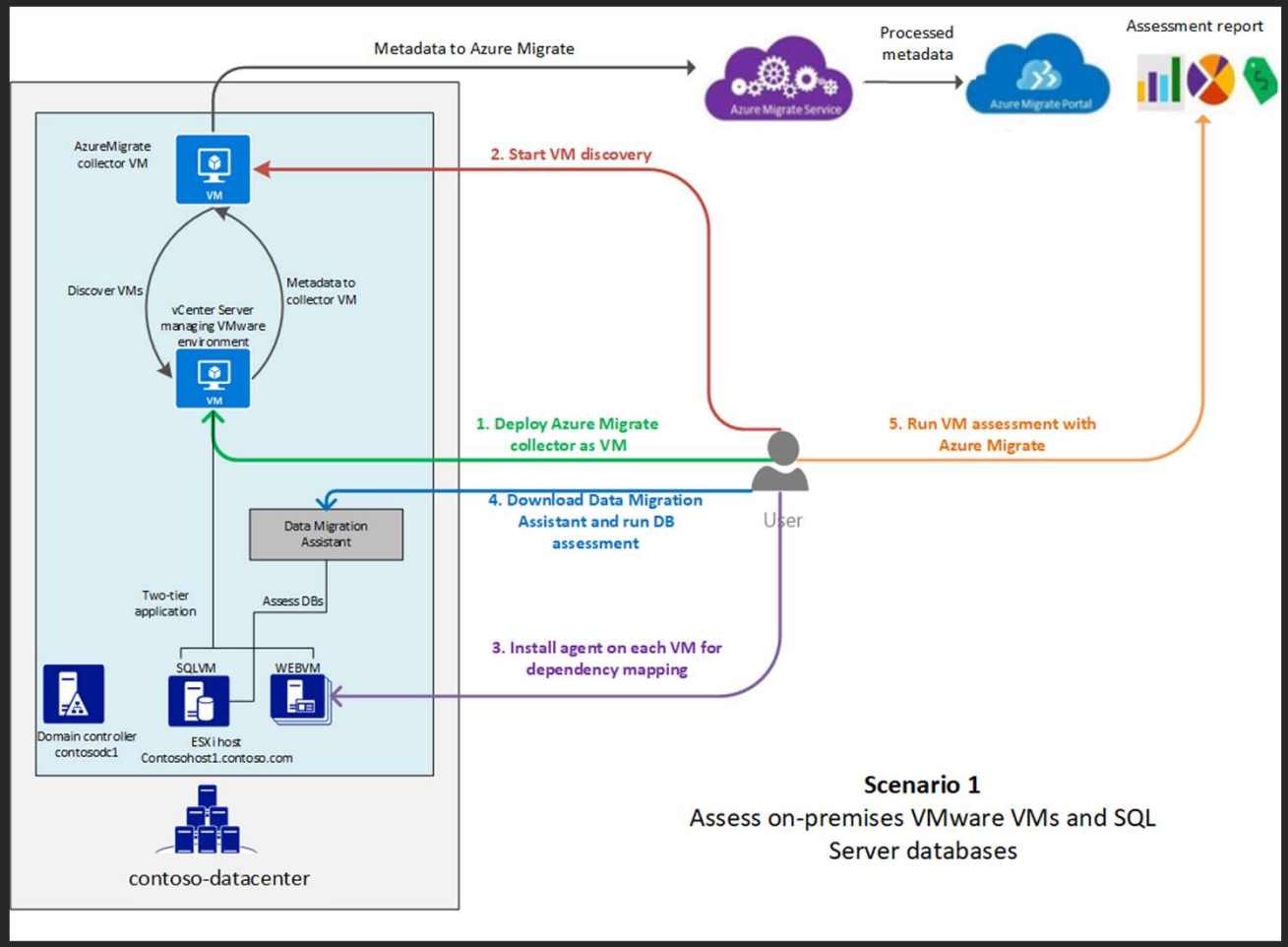
CAF Overview



CAF Flow

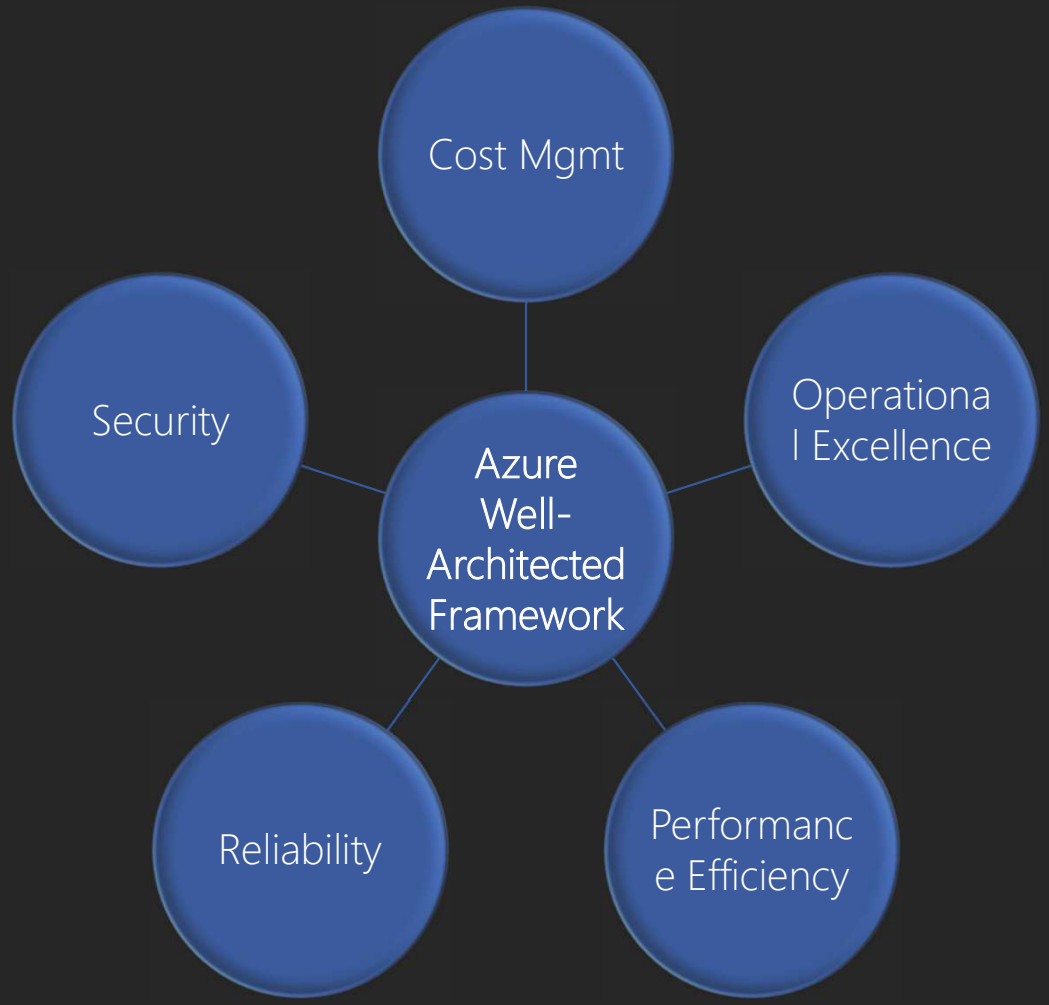

• Motivation
• Migration
• Innovation
Strategy
Plan
• Rehost
• Refactor
• Rearchitect
• Rebuild/Replace
• Define skills
• Create landing zone
• Enterprise Scale
Ready
Adopt
• Cloud Migration
• Cloud Innovation
• Governance solutions
• Manage environment
Govern and Manage

CAF Assessment example



Overview of WAF

"The Azure Well-Architected Framework is a set of guiding tenets that can be used to improve the quality of a workload."



https://docs.microsoft.com/en-us/azure/architecture/framework/

Security

- What design considerations did you make in your workload in regards to security?
- What considerations for compliance and governance do you need to take?
- How are you managing encryption for this workload?
- How are you managing identity for this workload?
- How have you secured the network of your workload?
- What tradeoffs do you need to make to meet your security goals?
- * How are you ensuring your critical accounts are protected?

Microsoft Assessments Azure Well-Architected Review

Examine your workload through the lenses of reliability, cost management, operational excellence, security and performance efficiency [20 minutes].

Assessment name *

Microsoft Azure Well-Architected Review - Aug 24, 2020 - 7:43:58 PM

Choose your interests

- [ ] **Cost Optimization**

  An effective architecture achieves business goals and ROI requirements while keeping costs within the allocated budget.

- [ ] **Operational Excellence**

  To ensure that your application is running effectively over time, consider multiple perspectives, from both an application and infrastructure angles. Your strategy must include the processes that you implement so that your users are getting the right experience.

- [ ] **Performance Efficiency**

  Prioritize scalability as you design and implement phases. Scalability leads to lower maintenance costs, better user experience, and higher agility.

- [ ] **Reliability**

  In a cloud environment you scale out rather than buying higher-end hardware to scale up. While it's always desirable to prevent all failure, focus your efforts in minimizing the effects of a single failing component.

- [x] **Security**

  Security is one of the most important aspects of any architecture. It provides confidentiality, integrity, and availability assurances against deliberate attacks and abuse of your valuable data and systems. Losing these assurances can negatively impact your business operations and revenue, as well as your organization's reputation in the marketplace. In the following series of articles, we'll discuss key architectural considerations and principles for security and how they apply to Azure.

Next →

Cloud Adoption Framework
Well Architecture Framework

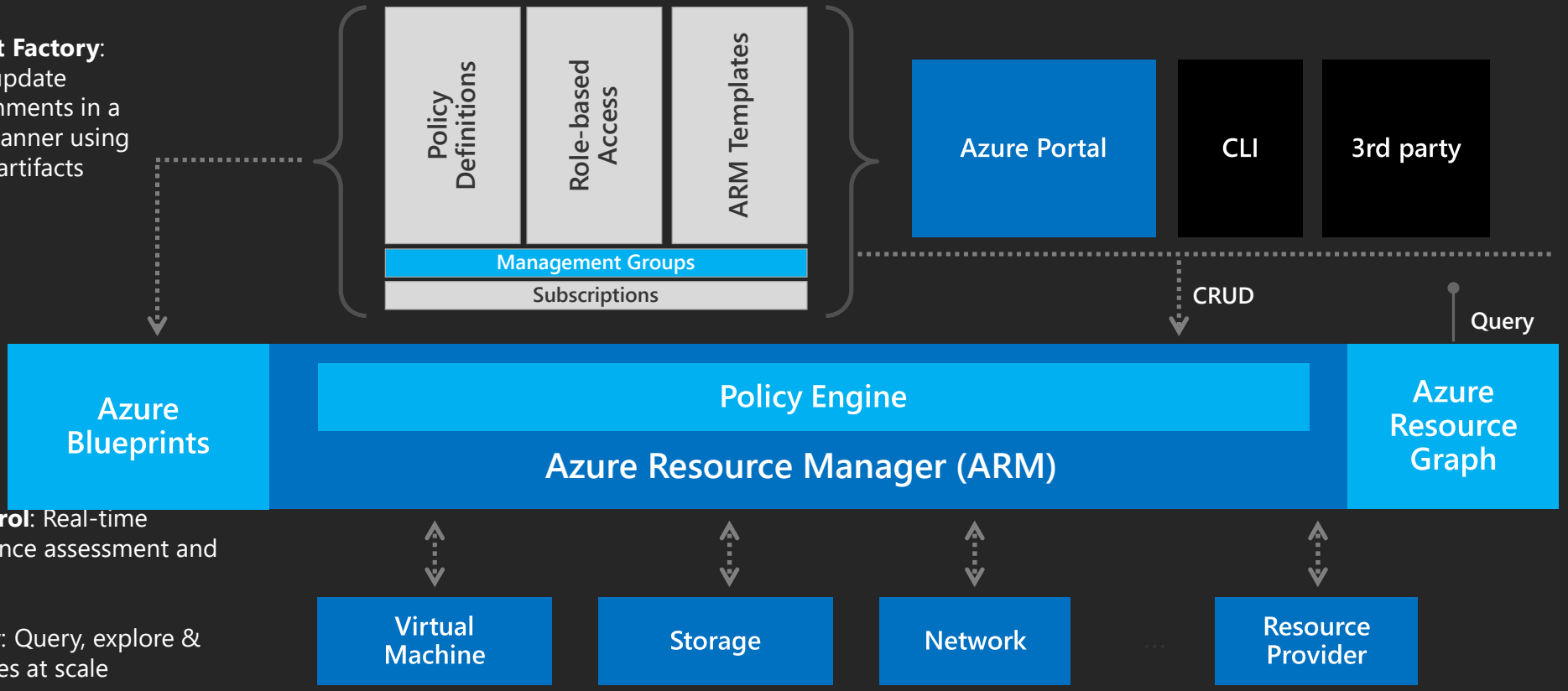
DEMO

Management of Compliance and Security Status

Azure Governance Architecture

providing control over the cloud environment, without sacrificing developer agility

1. Environment Factory: Deploy and update cloud environments in a repeatable manner using composable artifacts



2. Policy-based Control: Real-time enforcement, compliance assessment and remediation at scale

3. Resource Visibility: Query, explore & analyze cloud resources at scale

Azure Policy Concepts 

- Part of CAF to support WAF
- Create, assign and manage policies
- Enforce rules to ensure your ressoures are compliant
- Focus on ressource properties for new and existing deployments
- A definition is a set of conditions in audit or deny mode
- An assignment is a policy definition placed on a specific scope
- An initiative is a collection of policies

Azure Policy

Azure Meetup BONN

- Turn on built-in policies or build custom ones for all resource types
- Real-time policy evaluation and enforcement
- Periodic & on-demand compliance evaluation
- VM In-Guest Policy (**NEW**)

Enforcement & Compliance

- Apply policies to a Management Group with control across your entire organization
- Apply multiple policies and & aggregate policy states with policy initiative
- Exclusion Scope

Apply policies at scale

- Real time remediation
- Remediation on existing resources (**NEW**)

Remediation

Leverage built-in initiative & policies

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Security	Regulatory Compliance	Tags	Resource standardization	Cost
Azure Security Center	NIST SP 800-53 R4	Require specified tag	Allowed/ not allowed RP	Allowed VM SKUs
Guest Config baselines	ISO 27001:2013	Add or replace a tag	Allowed locations	Allowed Storage SKUs
Key Vault certificate	CIS	Inherit a tag from the RG	Naming convention	
NSG rules	PCI v3.2.1:2018	Append a tag	Back up VMs	
AKS & AKS Engine	FedRAMP Moderate		Allowed images for AKS	
RBAC role assignment	Canada Federal PBMM			
	SWIFT CSP-CSCF v2020			
	UK Official and UK NHS			
	IRS 1075			

Policy

- 250 policy definitions per scope
- 100 policy set definitions per scope
- 1000 policy set definitions per tenant
- 100 policyDefinition references per policySetDefinition
- 100 policy assignments per scope
- 250 notScopes per policyAssignment
- https://github.com/Azure/azure-policy

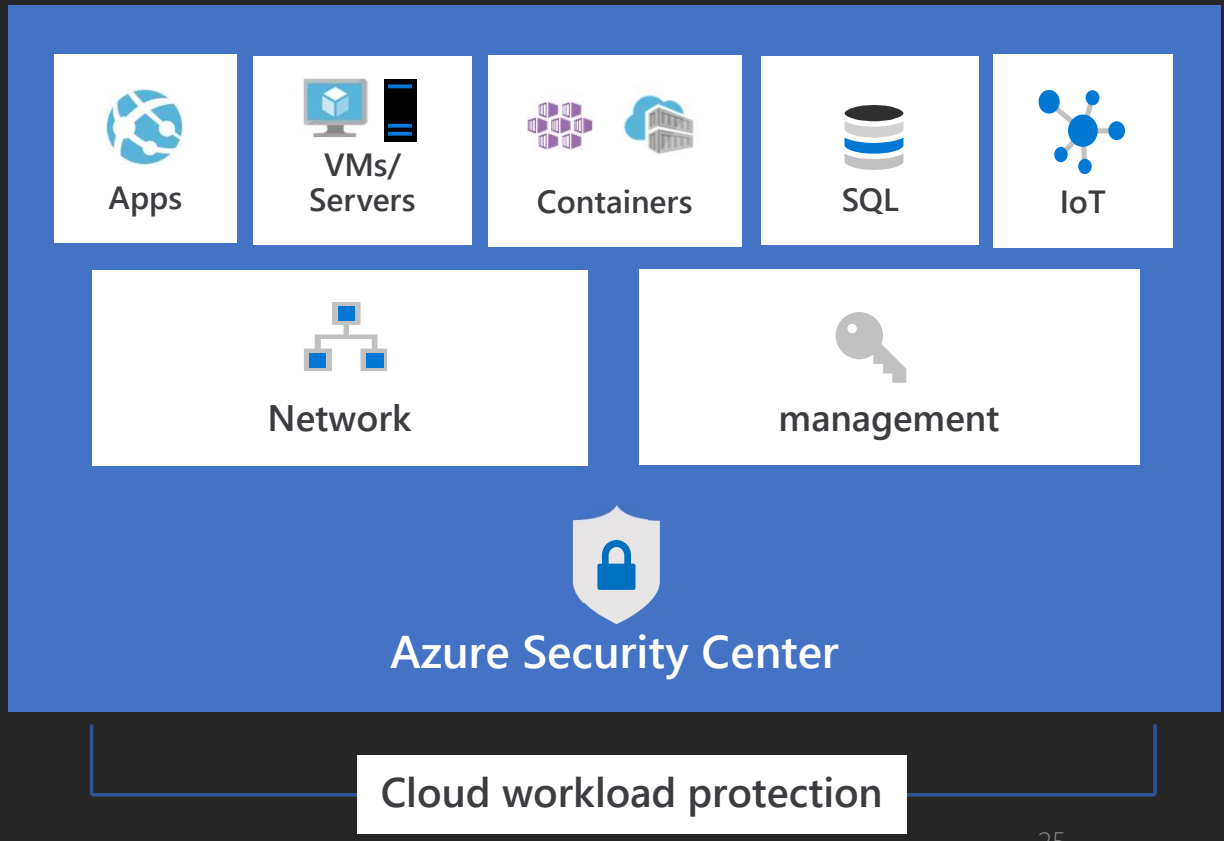
Azure Security Center

Azure Security Center

- A service to strengthen your security posture
- Available in two Tiers – Basic and ~~Standard~~ -> changed to Azure Defender
- Basic -> Free – Activated by default for all subscriptions
- Based on an security score – scope based
- Available for all workloads (Server, Container, SQL, IoT and more)

Protect your workloads

- Detect & block advanced malware and threats for Linux and Windows Servers on any cloud
- Protect cloud-native services from threats
- Protect data services against malicious attacks
- Protect your Azure IoT solutions with near real time monitoring
- Service layer detections: Azure network layer and Azure management layer (ARM)



Azure Policy & Azure Security Center

DEMO

How it works together

- All Azure Security Center recommendations based on Azure Policy
- Secure score is result of Azure Policy settings
- Recommendations are a result of Azure Policy
- All Azure Policies are defined in Compliance mode

Azure Policy Recap

- Powerful solution to define Cloud Guards for own Tenant
- Start with an audit effect instead of a deny effect
- Define Management Groups to group subscriptions and set RBAC, Policies and more at Higher level
- Use Deny effect for Production workloads with wisdom
- Creating initivatives even for single policy definition
- Integrate Azure Policy in your regulary Azure check

Azure Security Center

START WITH ASC TO GET A SECURITY OVERVIEW

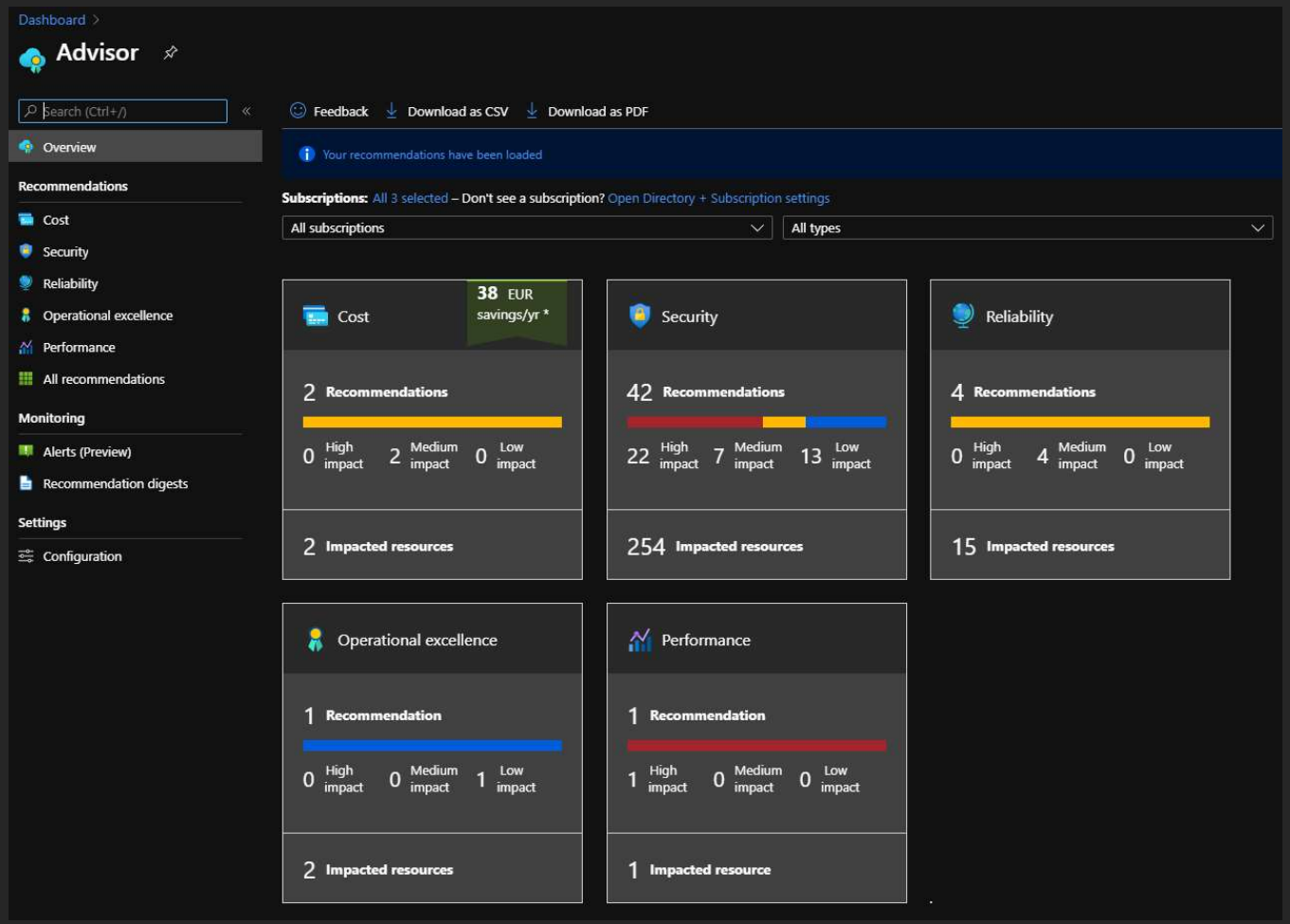
USE ASC TO STRENGTHEN YOUR INFRASTRUCTURE

CHECK THE STATUS IN ASC REGULARLY

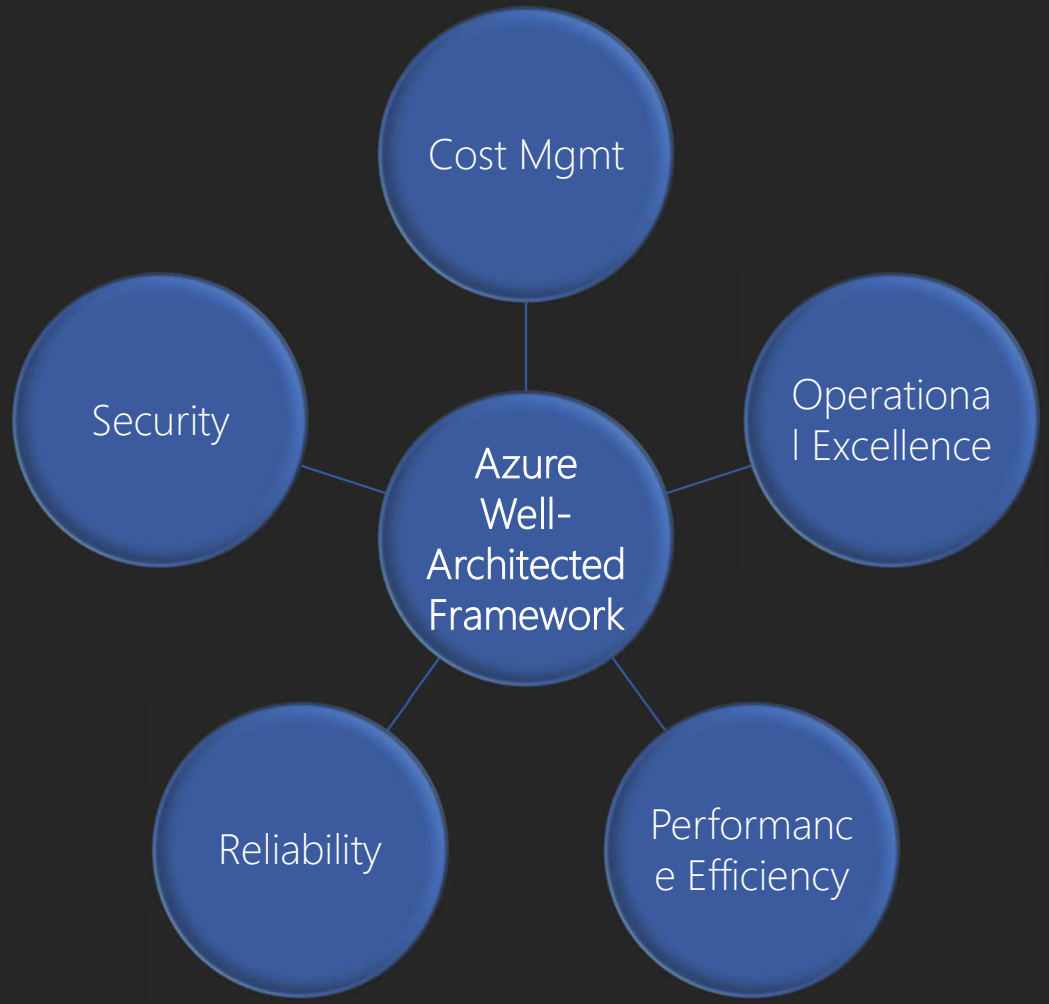
CREATE OWN SECURITY POLICIES FOR SECURE SCORE

USE ASC TO PROOF YOUR INFRASTRUCTURE

INTEGRATE AZURE POLICY IN YOUR REGULARY AZURE CHECK


Dashboard
Advisor
Search (Ctrl+/)
Feedback
Download as CSV
Download as PDF
Overview
Your recommendations have been loaded
Recommendations
Cost
Security
Reliability
Operational excellence
Performance
All recommendations
Subscriptions: All 3 selected – Don't see a subscription? Open Directory + Subscription settings
All subscriptions
All types
Monitoring
Alerts (Preview)
Recommendation digests
Settings
Configuration
Cost
38 EUR savings/yr *
2 Recommendations
0 High impact 2 Medium impact 0 Low impact
2 Impacted resources
Security
42 Recommendations
22 High impact 7 Medium impact 13 Low impact
254 Impacted resources
Reliability
4 Recommendations
0 High impact 4 Medium impact 0 Low impact
15 Impacted resources
Operational excellence
1 Recommendation
0 High impact 0 Medium impact 1 Low impact
2 Impacted resources
Performance
1 Recommendation
1 High impact 0 Medium impact 0 Low impact
1 Impacted resource

"The Azure Well-Architected Framework is a set of guiding tenets that can be used to improve the quality of a workload."



https://docs.microsoft.com/en-us/azure/architecture/framework/

Azure Enterprise-Scale Architecture

Introduction and Implementation

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What is Enterprise-Scale?

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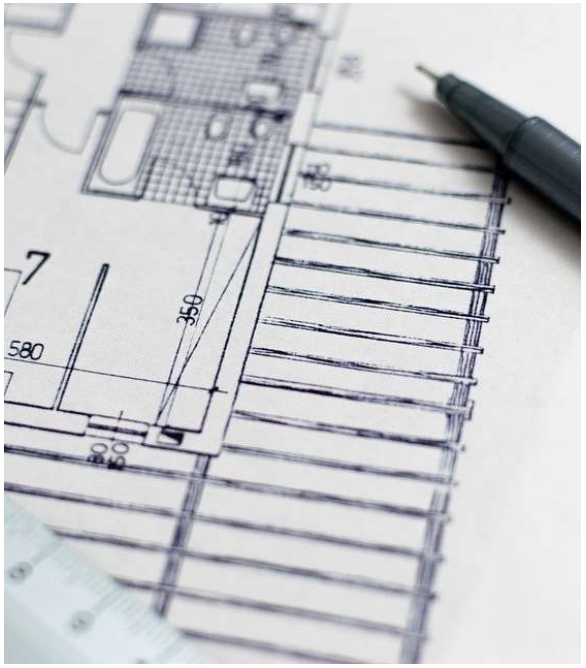


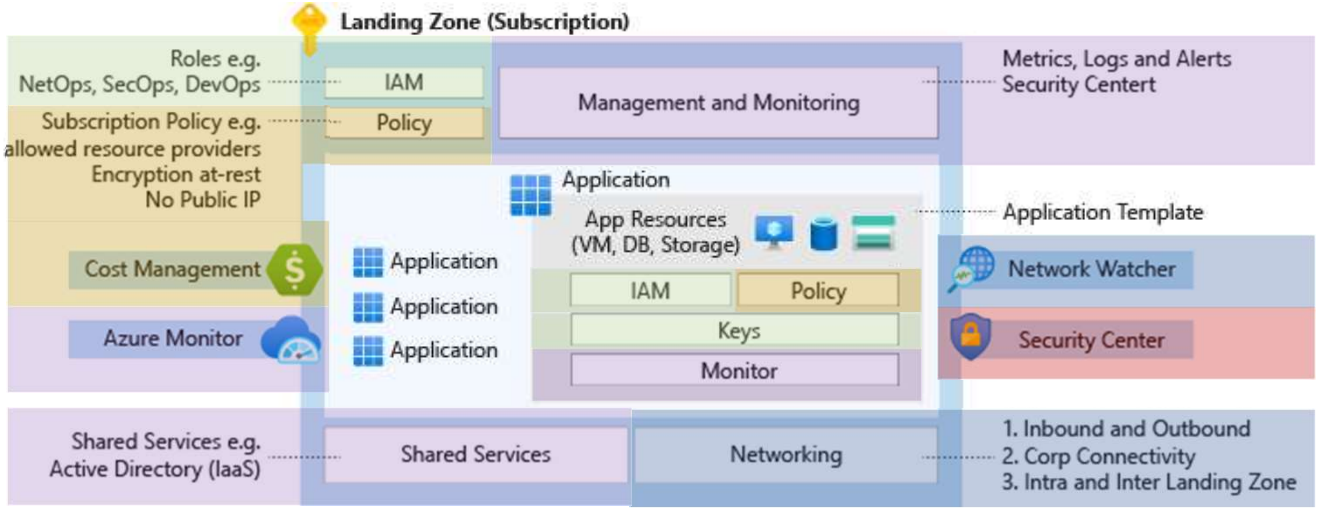
What is Enterprise-Scale?

„Azure landing zones help customers set up their Azure environment for scale, security, governance, networking, and identity."

„Draw on Microsoft's proven technical guidance, resources, and templates, to guide your customers through iteration and learning as they gain confidence and successfully adopt Azure."

Source: Cloud Adoption Framework enterprise-scale landing zone architecture

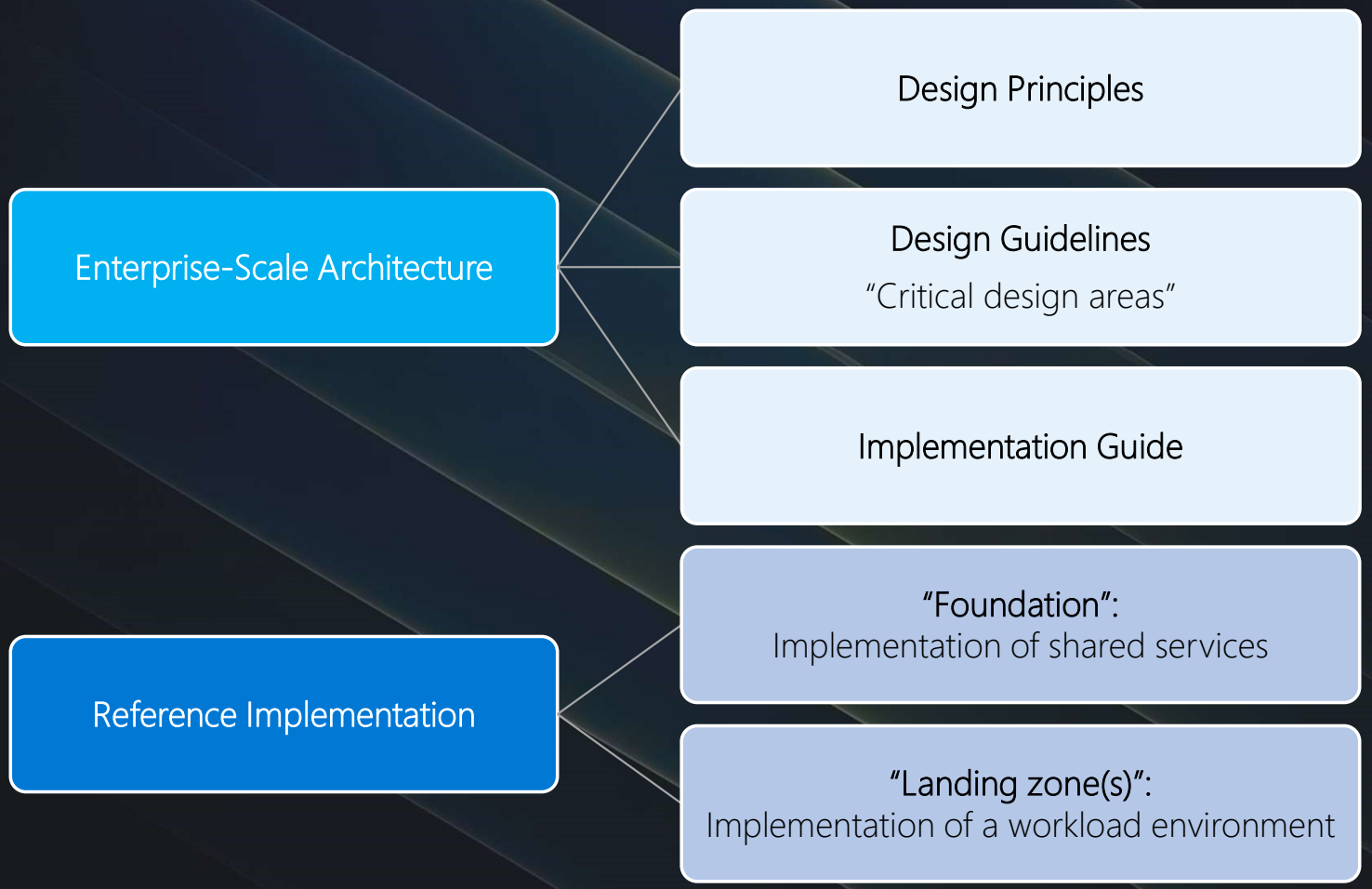
Design areas of Landing Zone(s)



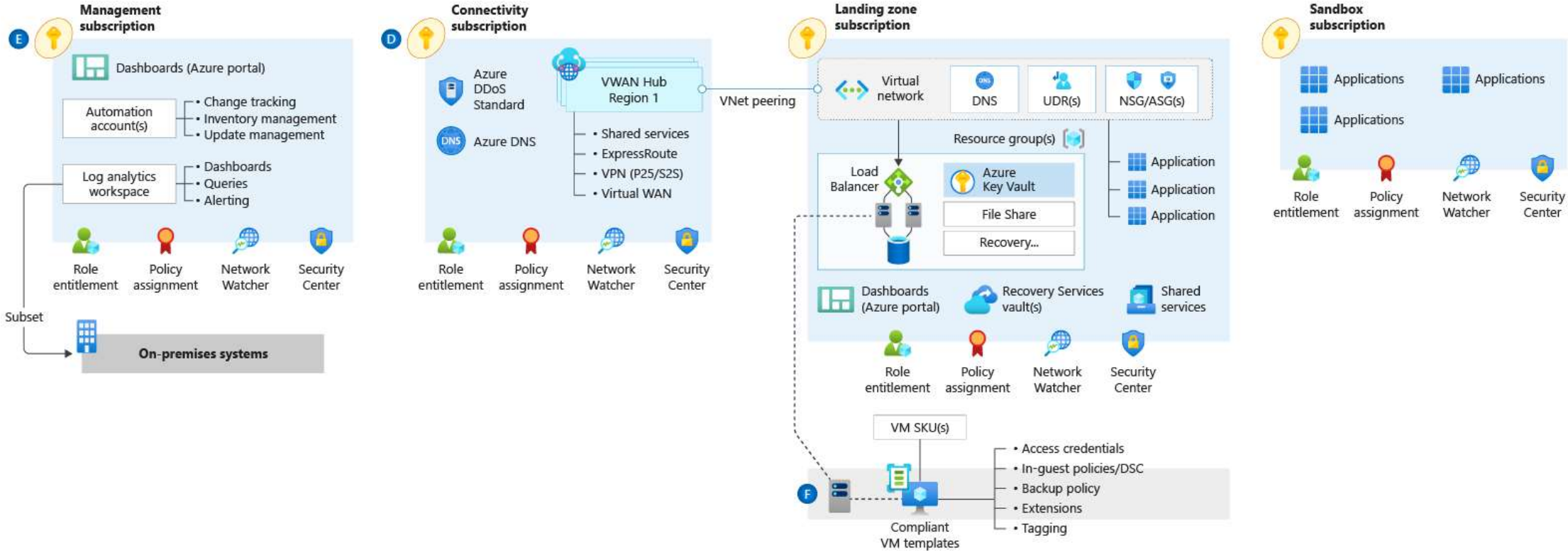
Connectivity, Identity, Governance, Operations and Security

Source: Cloud Adoption Framework enterprise-scale landing zone architecture

Enterprise-Scale Architecture & Reference

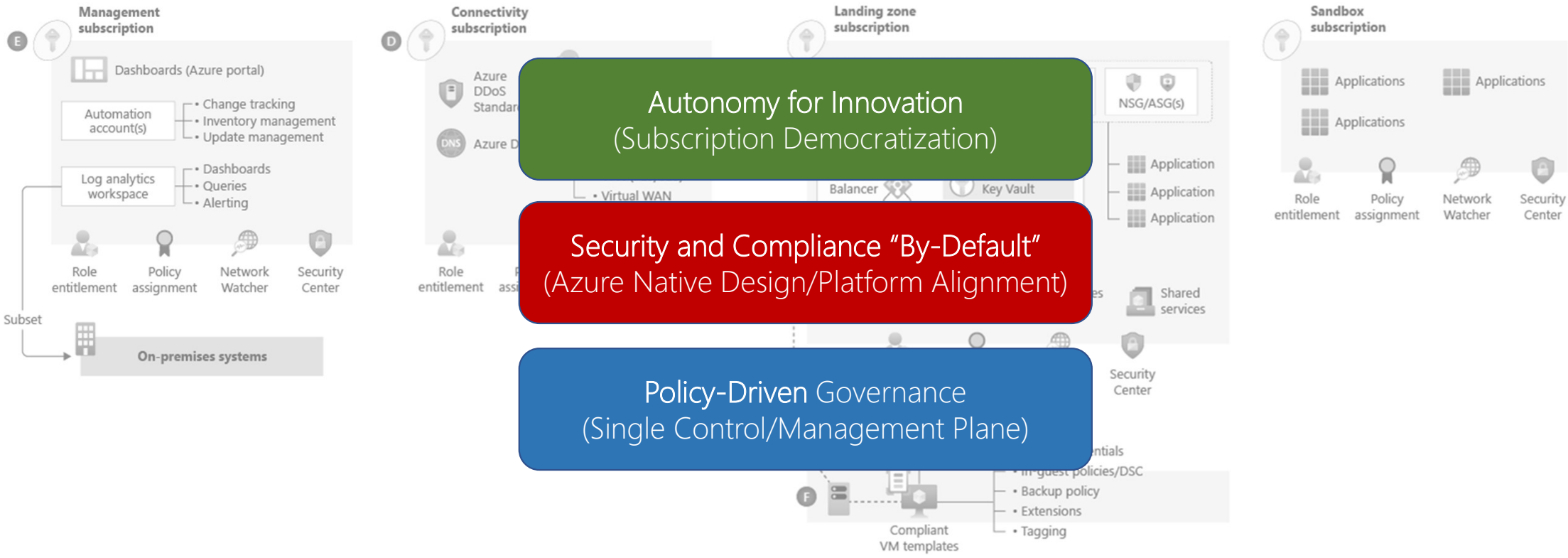


Enterprise-Scale Implementation



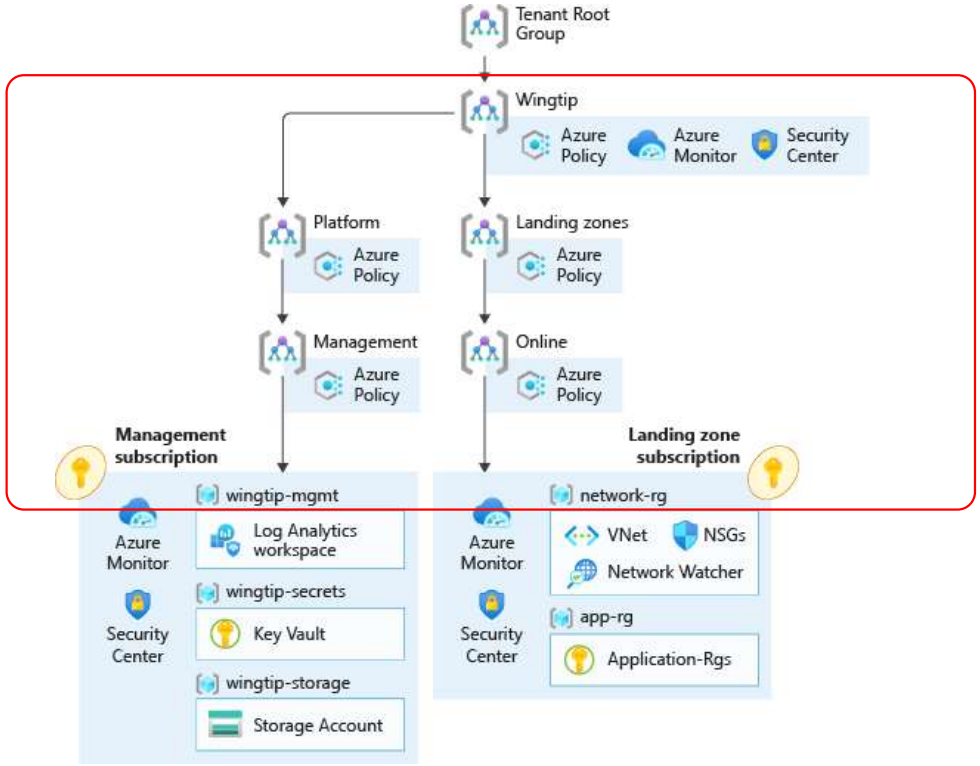
Source: GitHub-Repo "Azure/Enterprise-Scale" - Deploy Enterprise-Scale foundation

Enterprise-Scale Design Principles



Source: GitHub-Repo "Azure/Enterprise-Scale" - Deploy Enterprise-Scale foundation

Enterprise-Scale Reference Implementation
Foundation without hybrid connectivity



Source: GitHub-Repo "Azure/Enterprise-Scale" - Deploy Enterprise-Scale foundation

Enterprise-Scale Reference Implementation
Foundation with Hub and Spoke Connectivity

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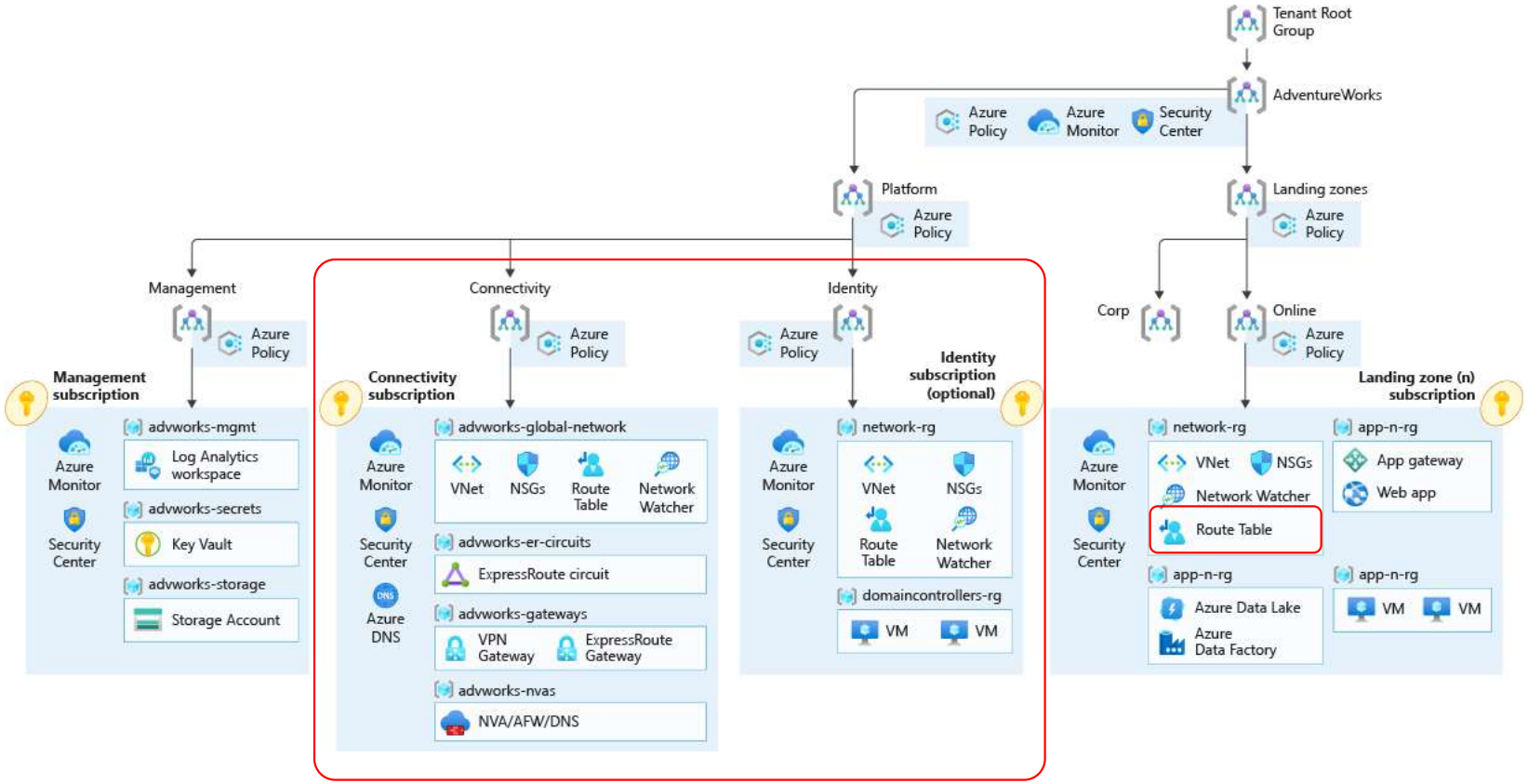

Source: GitHub-Repo "Azure/Enterprise-Scale" - Deploy Enterprise-Scale with hub and spoke architecture

Enterprise-Scale Reference Implementation
Foundation with Azure VWAN Connectivity

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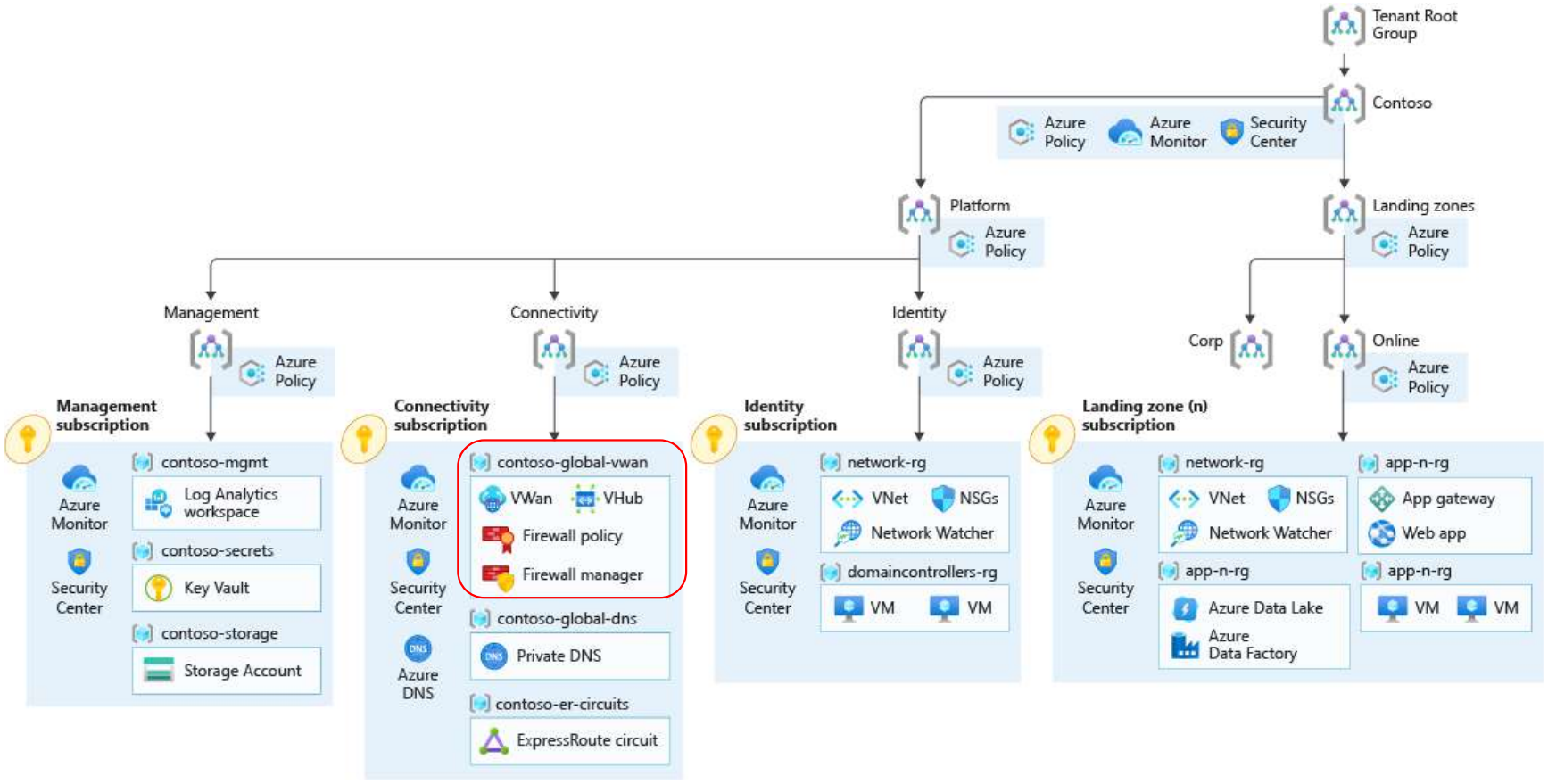

Source: GitHub-Repo "Azure/Enterprise-Scale" - Deploy Enterprise-Scale with hub and spoke architecture

Enterprise-Scale
Deployment and Policies

DEMO

Enterprise-Scale and AzOps

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Git->Clone->Azure/Northstar
Git -> Commit is new "az deploy"
Git repository scoped at customer AAD tenant for all Azure infrastructure
Discover existing Azure environment as-is
Turn-on the lights for existing resources and configuration

ARM as orchestrator to declare Goal-state at all 4 scopes: Tenant -> MGs -> Subs -> RGs
E2E orchestration for "North Star" to create Landing Zones
Integrated CI/CD pipeline with File->New Regions and Landing Zones i.e. subscriptions
Autonomous Landing Zones - enforced by Azure Policy in platform
Azure Engineering and platform roadmap aligned

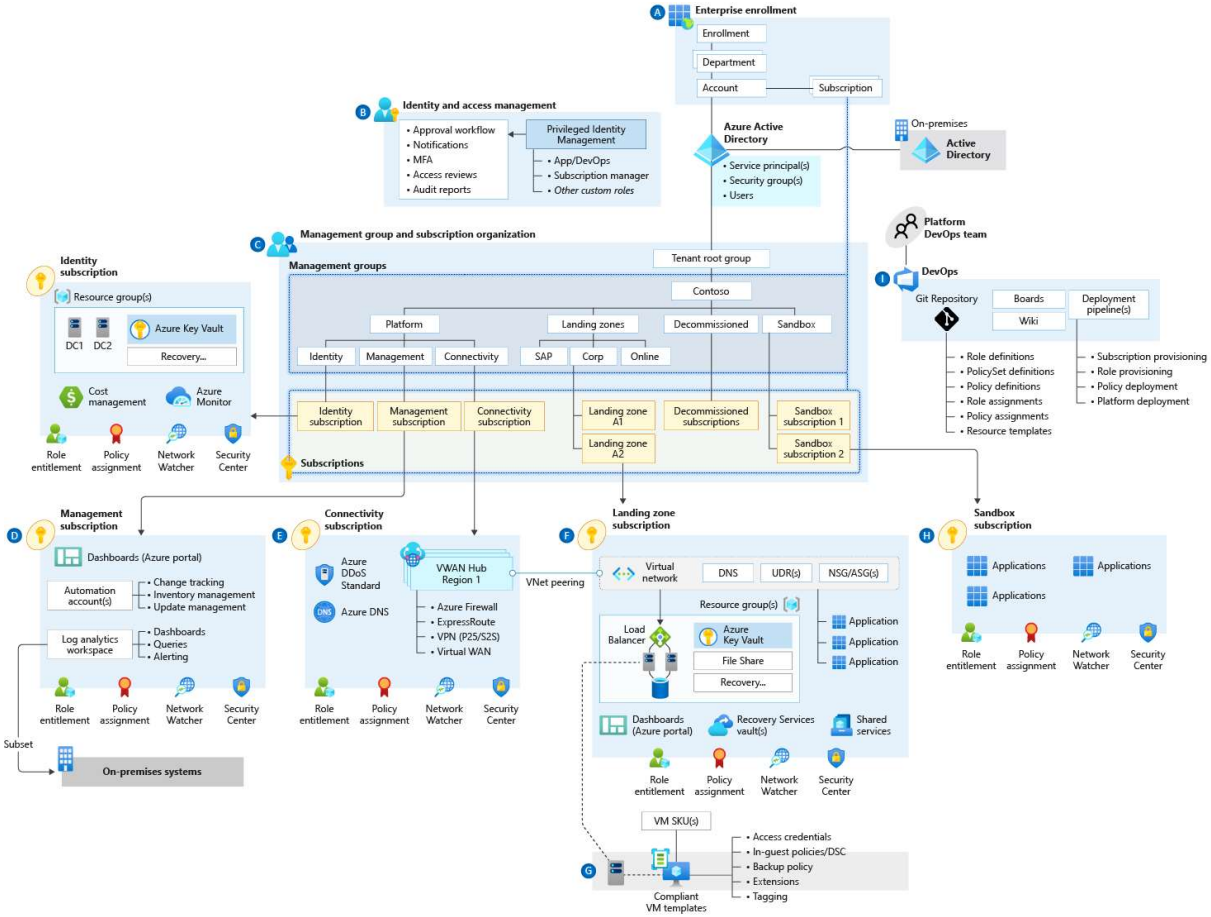
Operationalize: Configuration Drift and Reconciliation
Azure-Native immutable configuration in Git
Native platform capabilities for what-if, rollback, rollforward and complete mode
Inclusive of DevOps (Git) and ITPros (Portal)
Consistent export of all resources at all scopes across the tenant with implicit dependencies

Source: GitHub-Repo "Azure/Enterprise-Scale" - Deploy Enterprise-Scale foundation

AzOps
Repository and CI/CD Pipelines

DEMO

Enterprise-Scale Architecture



Source: GitHub-Repo "Azure/Enterprise-Scale" - Deploy Enterprise-Scale foundation

Enterprise-Scale **Critical Design Areas**

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Enterprise Enrollment & Azure AD Tenants

Identity & Access Management

Management Group & Subscription Organization

Network Topology & Connectivity

Management & Monitoring

Business Continuity & Disaster Recovery

Security, Governance & Compliance

Platform Automation & DevOps

Source: GitHub-Repo "Azure/Enterprise-Scale" - Deploy Enterprise-Scale foundation

Critical Design Areas: Enrollment and Tenants

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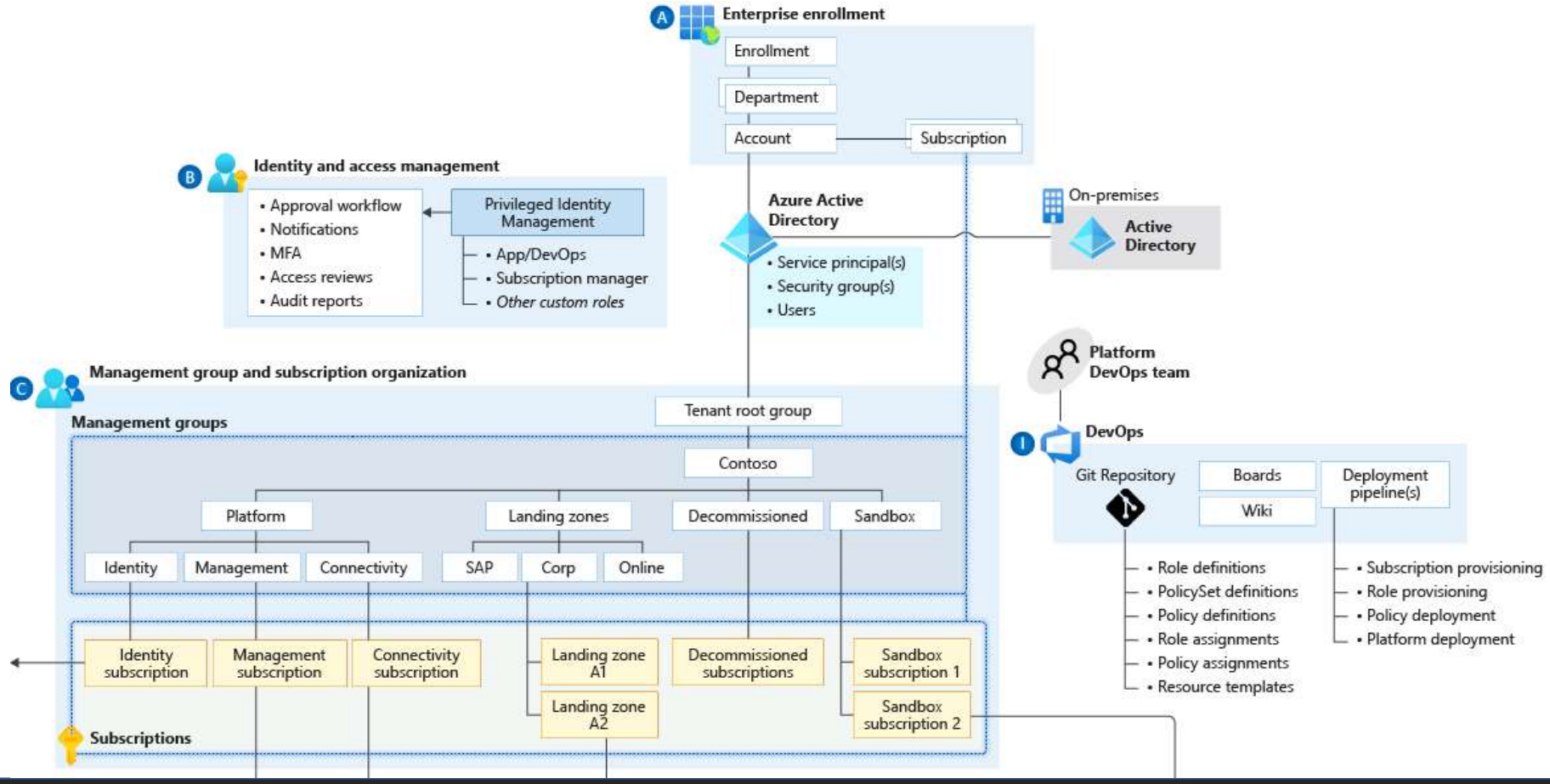
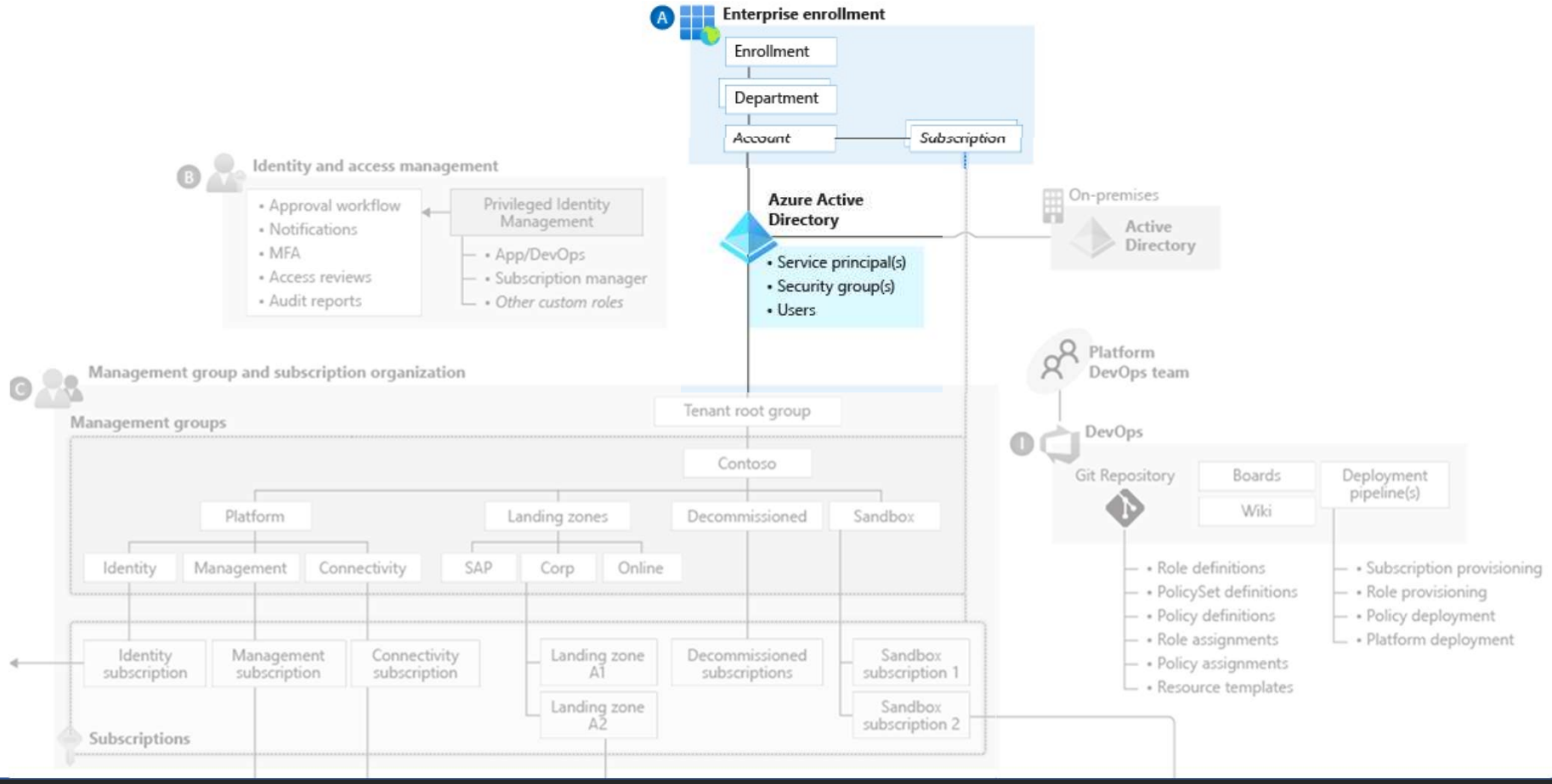


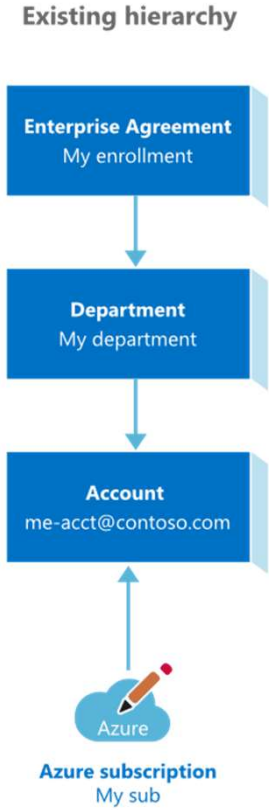
Source: Start with Cloud Adoption Framework enterprise-scale landing zones

Critical Design Areas: Enrollment and Tenants



Source: Start with Cloud Adoption Framework enterprise-scale landing zones

Critical Design Areas: Enrollment and Tenants
Customer and Enterprise Agreement Hierarchy

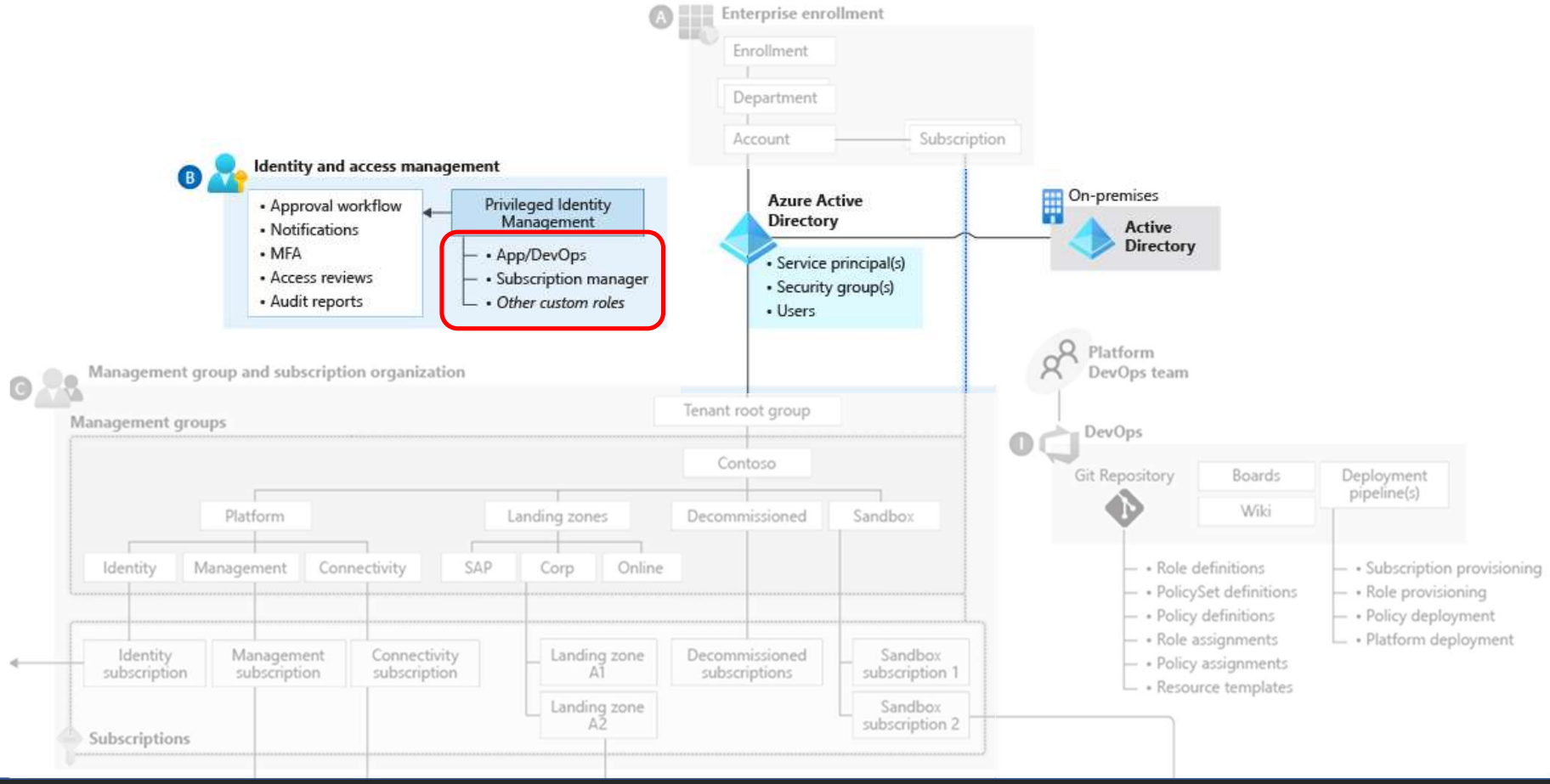


- Account Owner can manage subscription permissions
  Restrict and minimize the number of account owners within the enrollment
- No Auditing and PIM integration
  Periodically audit the EA portal to review and avoid "manual management"

→ Automation (as part of AzOps) and Account Owner as "Break Glass"

Source: Complete Enterprise Agreement tasks in your billing account for a Microsoft Customer Agreement

Critical Design Areas: Identity and Access



Source: Start with Cloud Adoption Framework enterprise-scale landing zones

Critical Design Areas: Identity and Access
Tiered Administration & Least Privilege

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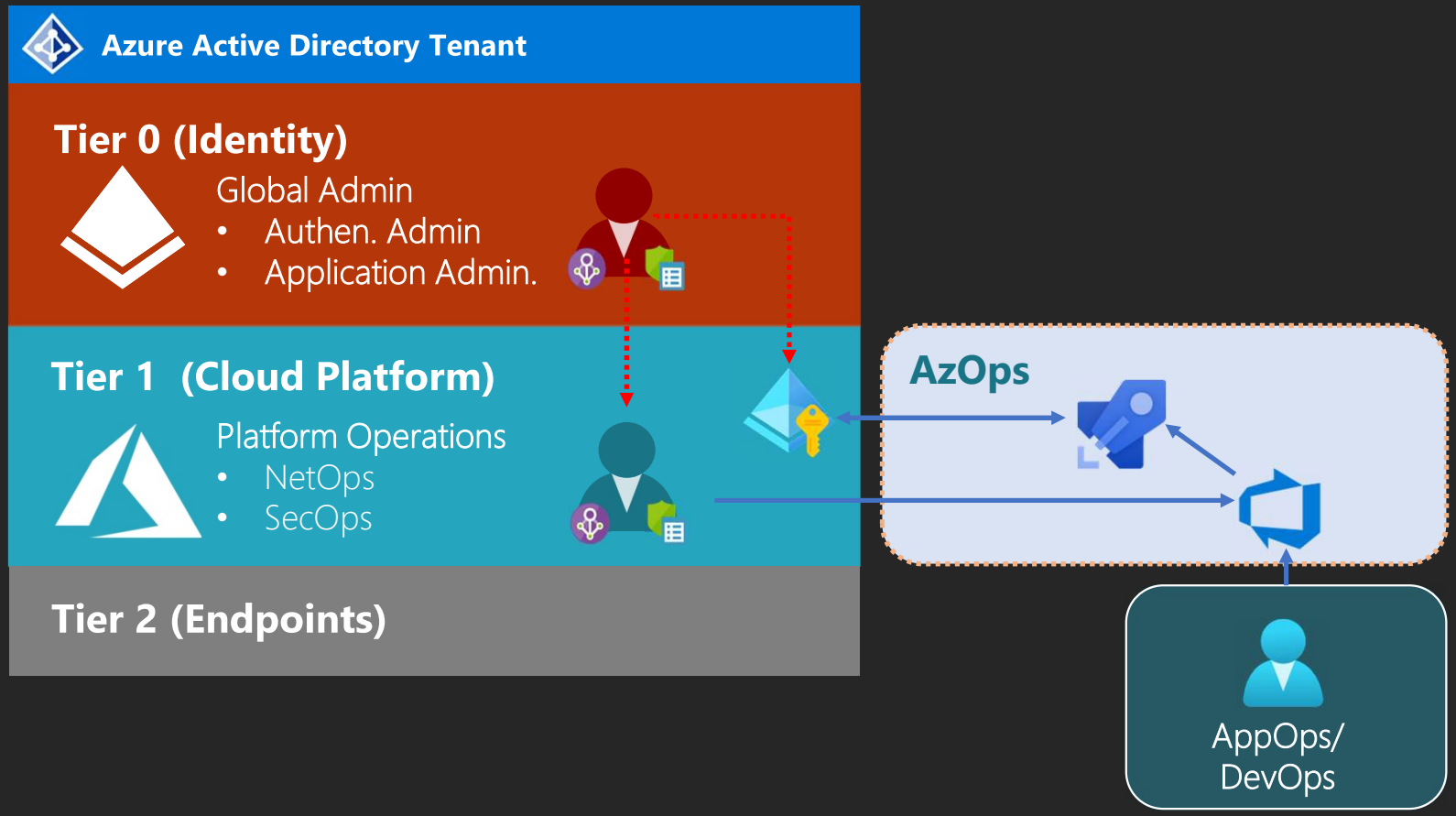
„To mitigate risk of identity compromise, or bad actors, implement tiered administration and ensure that you follow principles of least privilege for Azure AD Administrator Roles."

Source: „Securing Azure Environments with Azure AD (Architecture and Design Guide)", Page 8

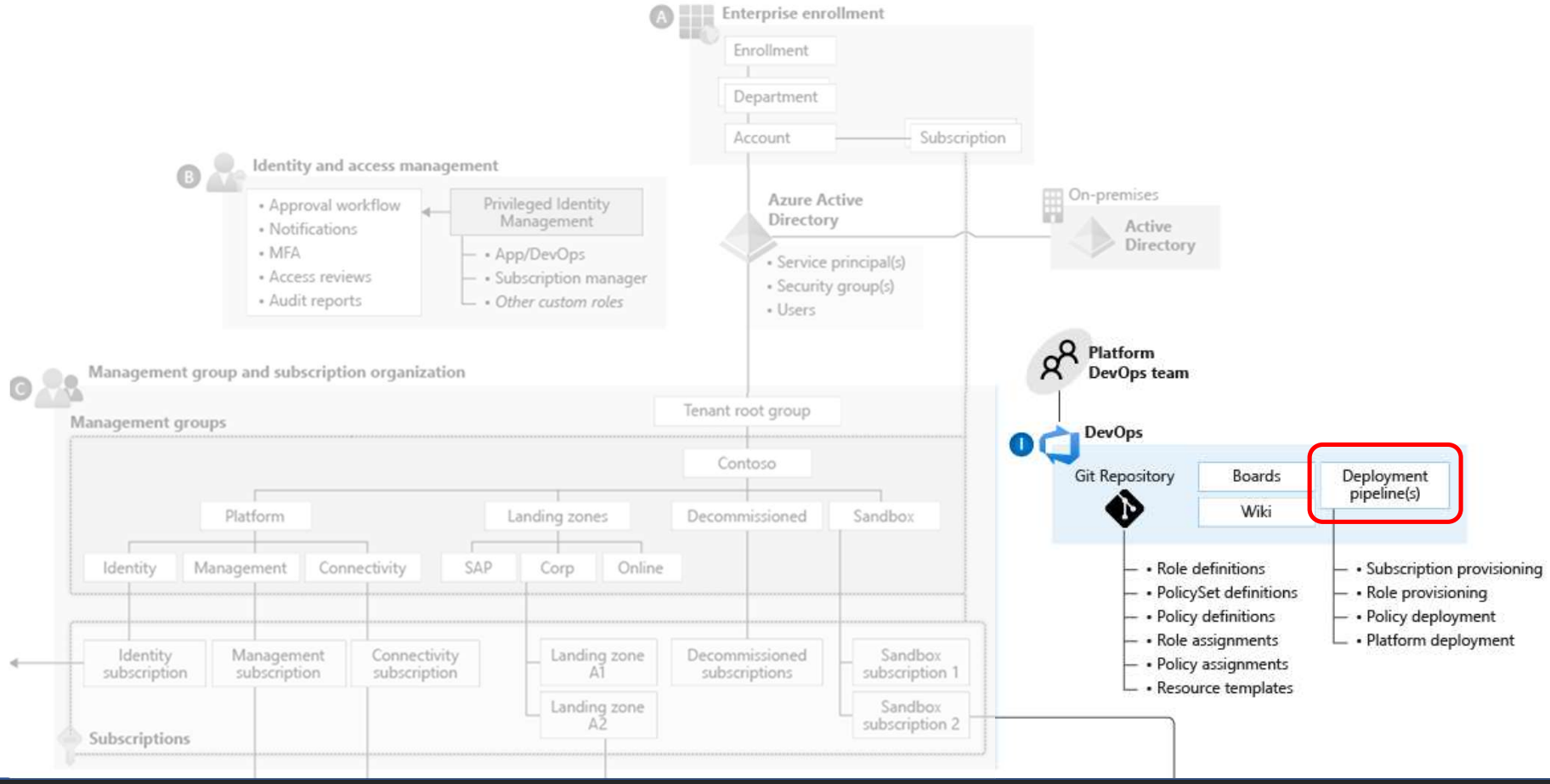
Source: Securing Azure environments with Azure Active Directory

Securing Azure Environment with Azure AD
Example of Tiered Administration Model



Managing access to AzOps
with RBAC, PIM and Entitlement Management

Critical Design Areas: Identity and DevOps



Source: Start with Cloud Adoption Framework enterprise-scale landing zones

Auditing and Security in Azure DevOps

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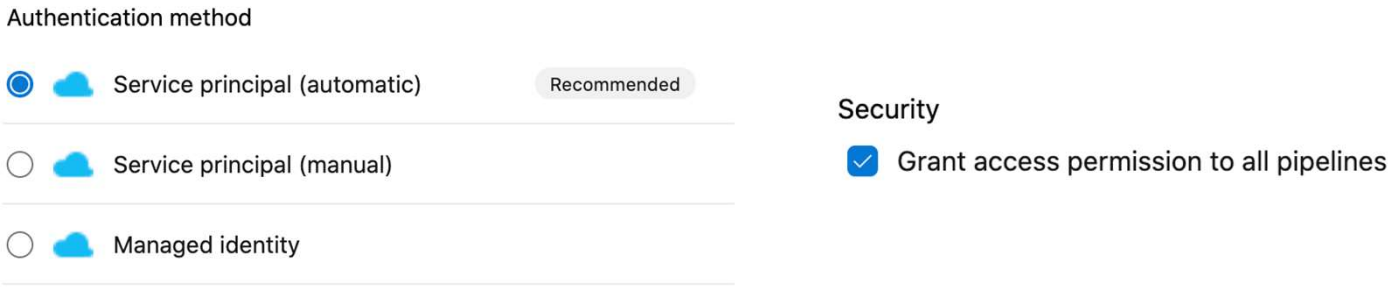
- Secrets and Service Principals in Pipeline
  - Service Principal or Managed Identities in Service Connections



- Review of DevOps Orga-Settings and integration in your Conditional Access Strategy
- Audit in Azure DevOps
  - Monitoring of Sensitive Changes or Suspicious Activities (Generate PAT, Public Repo)
  - Streaming of "Auditing Logs" → *EventHub, Log Analytics*
    - No correlation between Azure Activity and Pipeline Events → *My feature request*

Protection of AzOps in GitHub Enterprise

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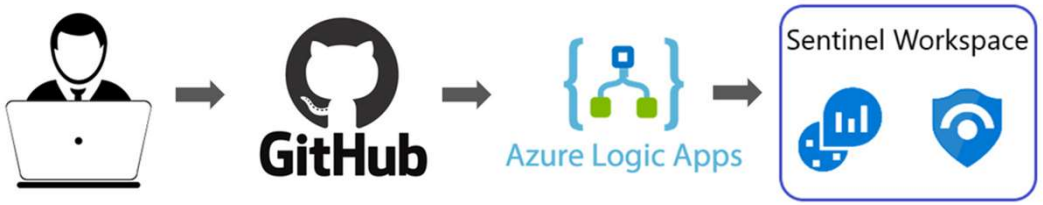
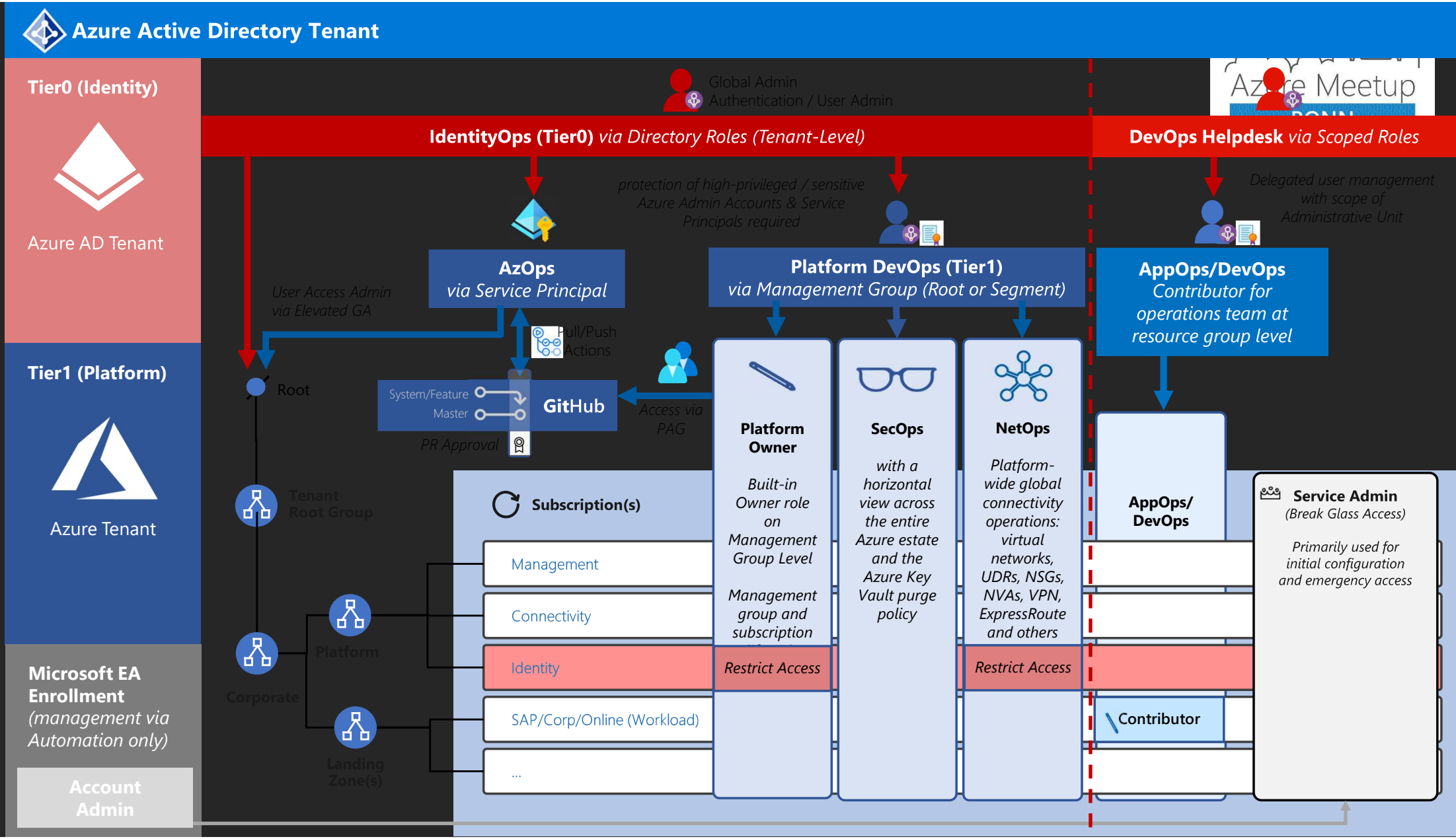
- Control Access via Azure AD (Users, Groups and SSO)
- Secure your GitHub deployment using Microsoft Cloud App Security
  - Detection of OAuth App Creation and Data Leakage (high rate of download)
- Conditional Access (App Control) → Restrict activity from unmanaged device

➢ Protecting your GitHub assets with Azure Sentinel

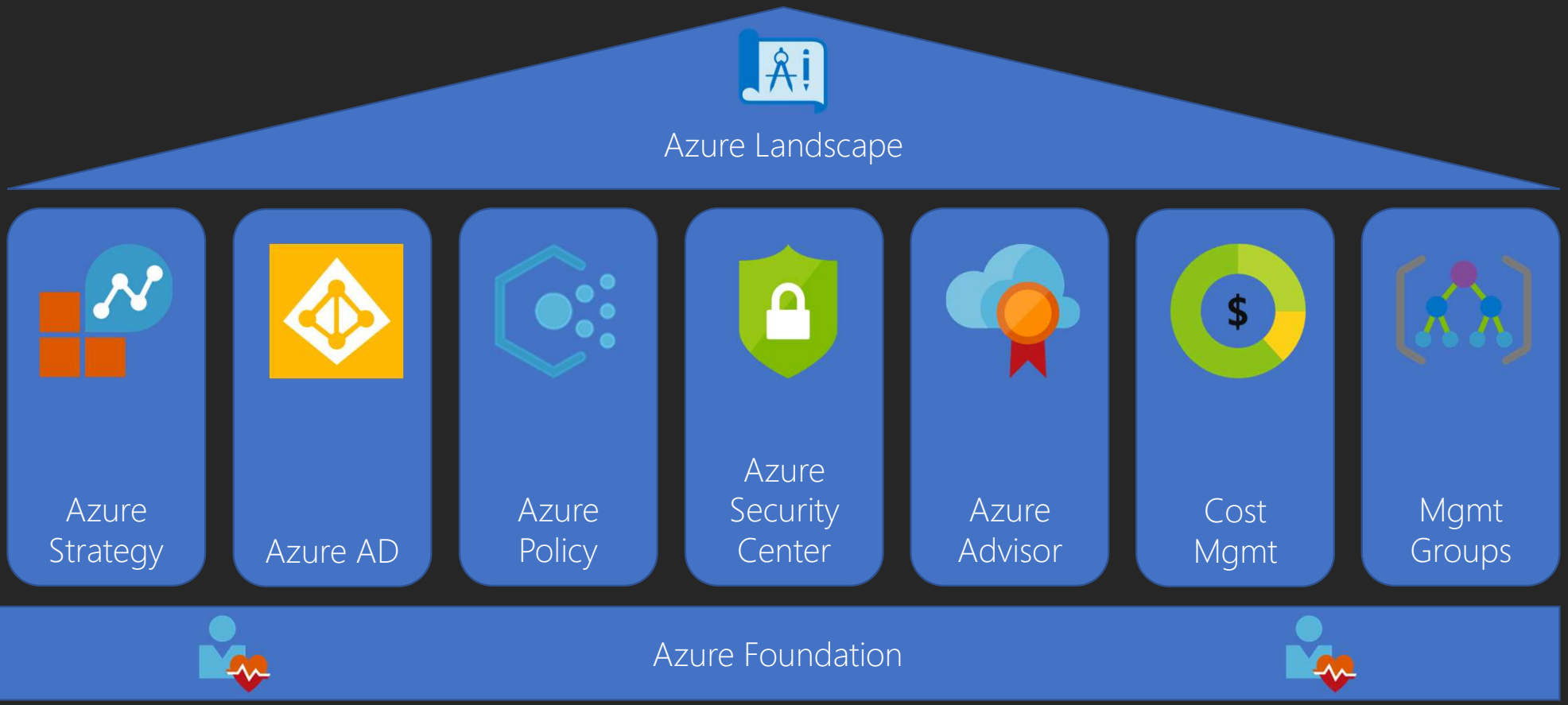



Azure Active Directory Tenant
Tier0 (Identity)
Azure AD Tenant
Tier1 (Platform)
Azure Tenant
Microsoft EA Enrollment
(management via Automation only)
Account Admin
Global Admin
Authentication / User Admin
IdentityOps (Tier0) via Directory Roles (Tenant-Level)
DevOps Helpdesk via Scoped Roles
protection of high-privileged / sensitive Azure Admin Accounts & Service Principals required
Delegated user management with scope of Administrative Unit
AzOps
via Service Principal
Platform DevOps (Tier1)
via Management Group (Root or Segment)
AppOps/DevOps
Contributor for operations team at resource group level
User Access Admin
via Elevated GA
Pull/Push
Actions
Root
System/Feature
Master
GitHub
PR Approval
Access via PAG
Tenant Root Group
Platform
Corporate
Landing Zone(s)
Subscription(s)
Management
Connectivity
Identity
SAP/Corp/Online (Workload)
...
Platform Owner
Built-in Owner role on Management Group Level
Management group and subscription
Restrict Access
SecOps
with a horizontal view across the entire Azure estate and the Azure Key Vault purge policy
NetOps
Platform-wide global connectivity operations: virtual networks, UDRs, NSGs, NVAs, VPN, ExpressRoute and others
Restrict Access
AppOps/ DevOps
Contributor
Service Admin
(Break Glass Access)
Primarily used for initial configuration and emergency access

Links

- https://docs.microsoft.com/en-us/azure/cloud-adoption-framework/
- https://docs.microsoft.com/en-us/azure/architecture/framework/
- https://docs.microsoft.com/en-us/azure/azure-portal/azure-portal-quickstart-center
- https://docs.microsoft.com/en-us/azure/advisor/
- https://docs.microsoft.com/en-us/azure/governance/policy
- https://www.reimling.eu/2019/03/azure-management-groups-und-blueprints-ueberblick-und-einrichtung-teil-1/
- https://aka.ms/SecurityCommunity
- https://blog.azureandbeyond.com/2020/04/24/mastering-azure-security-my-latest-adventure/

How brings it to Azure?



Our Recommendations

- Define a Cloud Strategy
  - Use the available Tools and Guidelines
  - Define the added value of the cloud
- Create a Team for Cloud Services of different people
- Evaluate guidelines and best practices
- Organize a regulary meeting/call for Cloud news
- Get in touch with Partners and Community for help and support

Questions? ->
Reach us via Twitter ☺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