

A man in a dark suit and glasses stands in a modern office, pointing at a large digital screen. The screen displays a line graph with a yellow area under the curve, set against a background of a city skyline. The x-axis of the graph is labeled with months from March to December. In the foreground, several people are seated at a long, dark conference table, looking towards the screen. The table is set with water bottles, glasses, and some papers. The office has large windows that look out onto a city with tall buildings.

# Azure Governance

## Eric Berg



Lead Architect – Team Azure



Azure, Datacenter and Modern Workplace



Azure, System Center, Windows Server and Client



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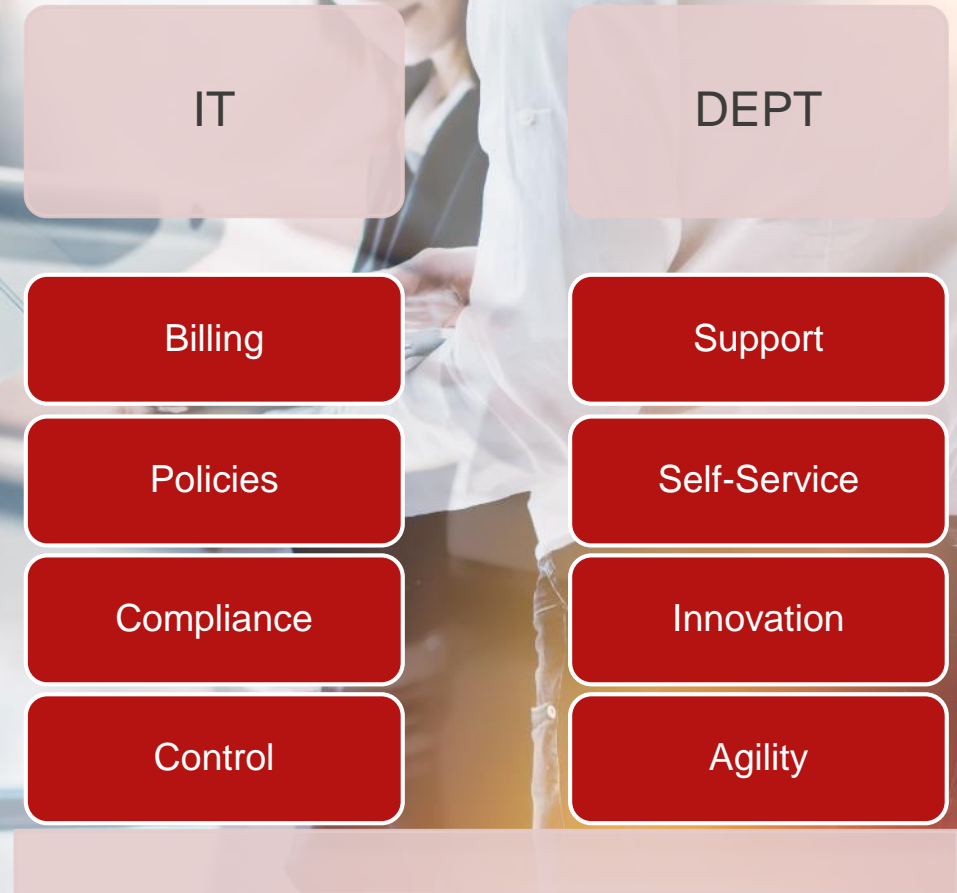
## Cloud Governance

**ESTABLISHMENT** of **POLICIES** and  
continuous **MONITORING** of their proper  
**IMPLEMENTATION**, by the members of  
the governing body of an organization

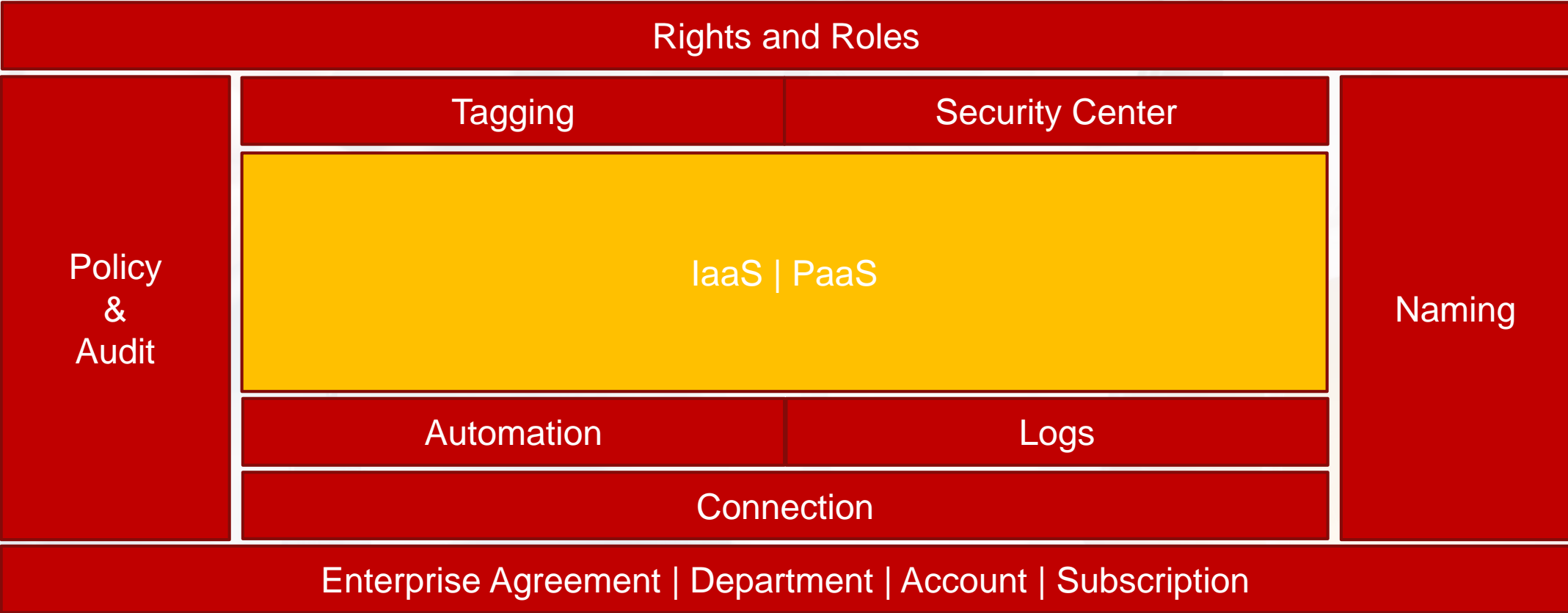
[...]

## Requirements

- Cloud is (not) an IT topic
- Cloud usage is already there
- IT as trusted advisor in business
- Avoid shadow cloud
- Achieve more with business



# Azure Governance



# Azure Security & Management



NEW

## Governance

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Proactively apply policies and optimize cloud spend



## Security

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Industry leading Security with Advanced Threat Protection



## Resiliency

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High availability and protection for VMs, apps and data



## Monitoring

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Deep operational insights with rich intelligence



## Automate

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Powerful scripting, configuration and update management

Built-in Azure services options to keep your Azure and hybrid resources secure and well-managed



# Azure Governance Capabilities



## Policy

Real-time enforcement, compliance assessment and remediation

**Control**



NEW

## Blueprints

Deploy and update cloud environments in a repeatable manner using composable artifacts

**Environment**

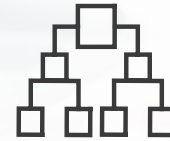


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## Resource Graph

Query, explore & analyze cloud resources at scale

**Visibility**



## Management Group

Define organizational hierarchy

**Hierarchy**



## Cost

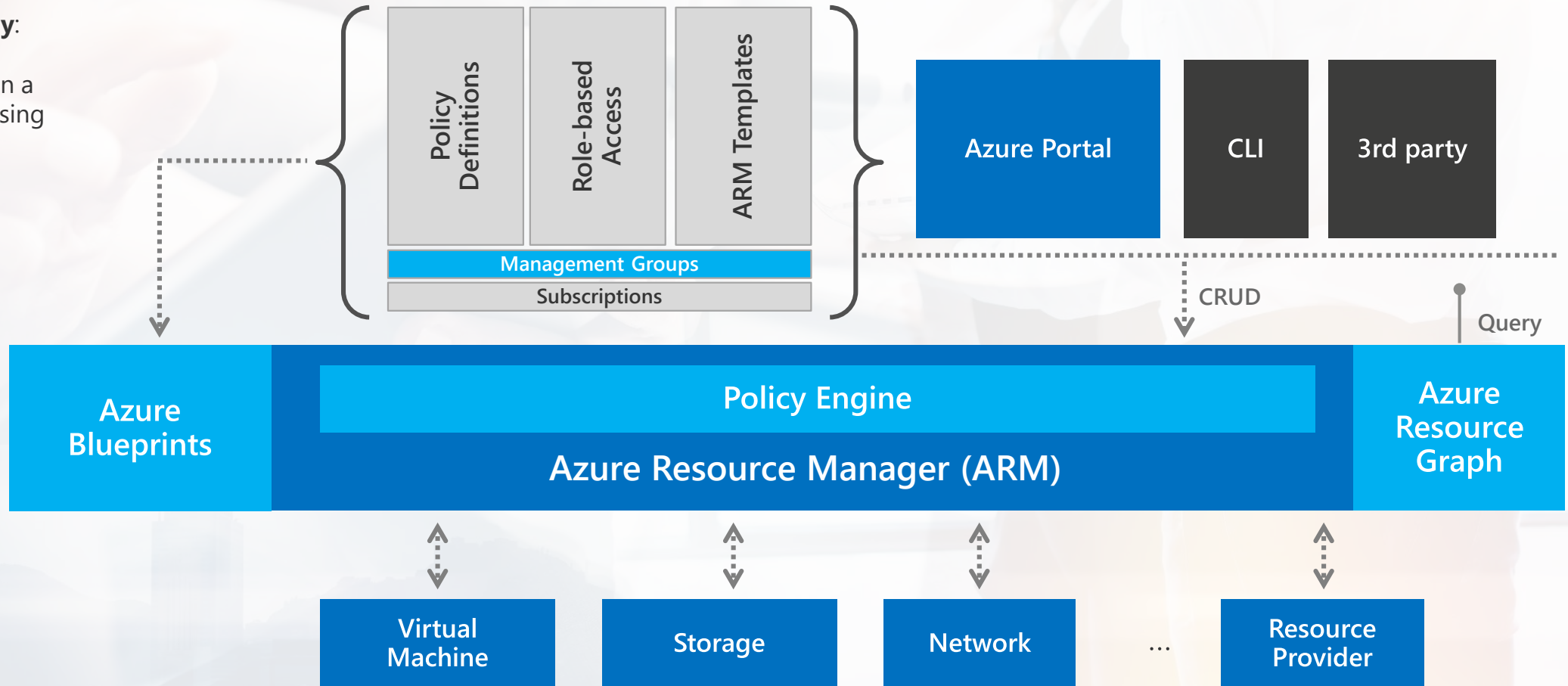
Monitor cloud spend and optimize resources

**Consumption**

# Azure Governance Architecture

## 1. Environment Factory:

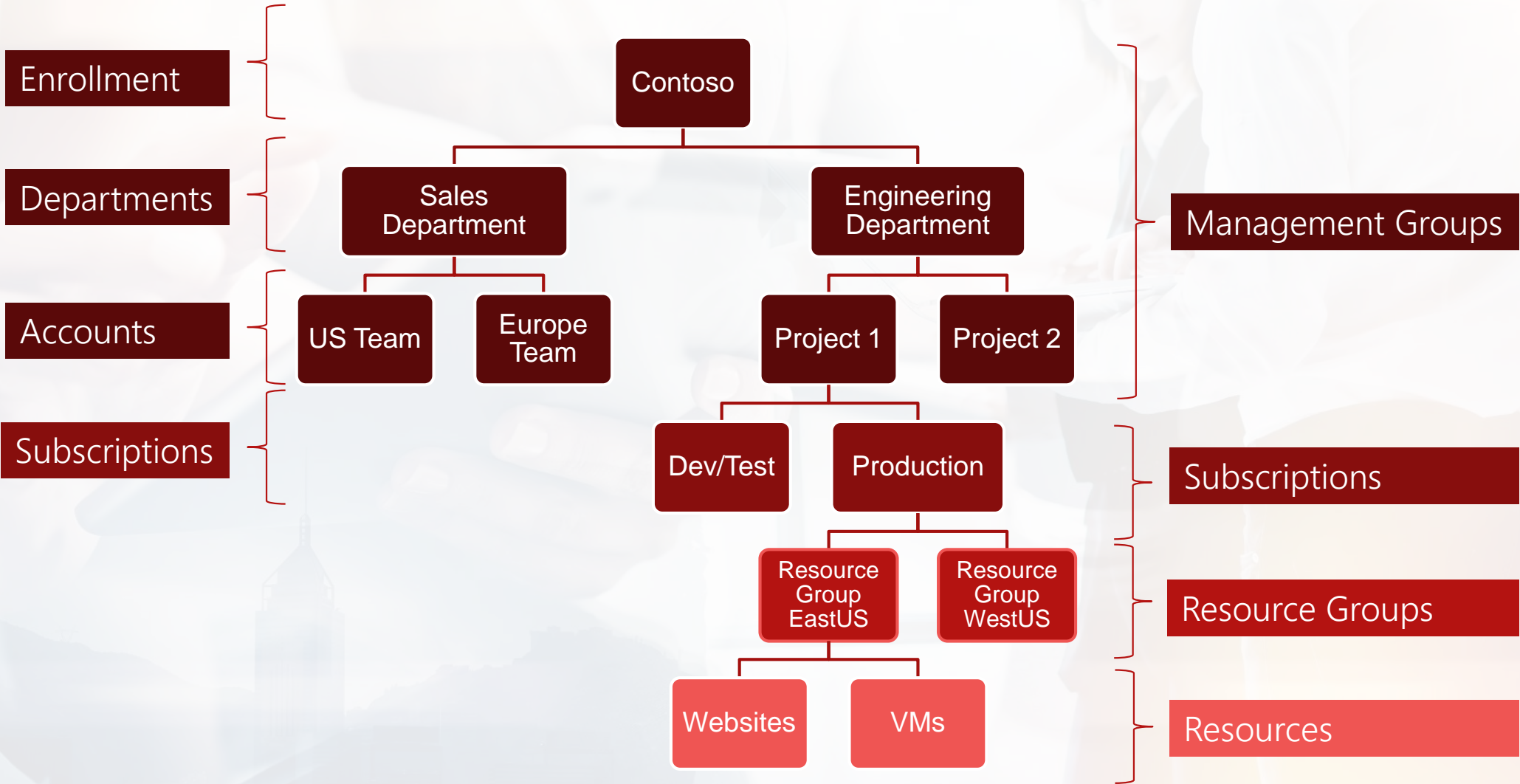
Deploy and update cloud environments in a repeatable manner using composable artifacts





Enterprise Portal

Azure Portal



# Resource Groups

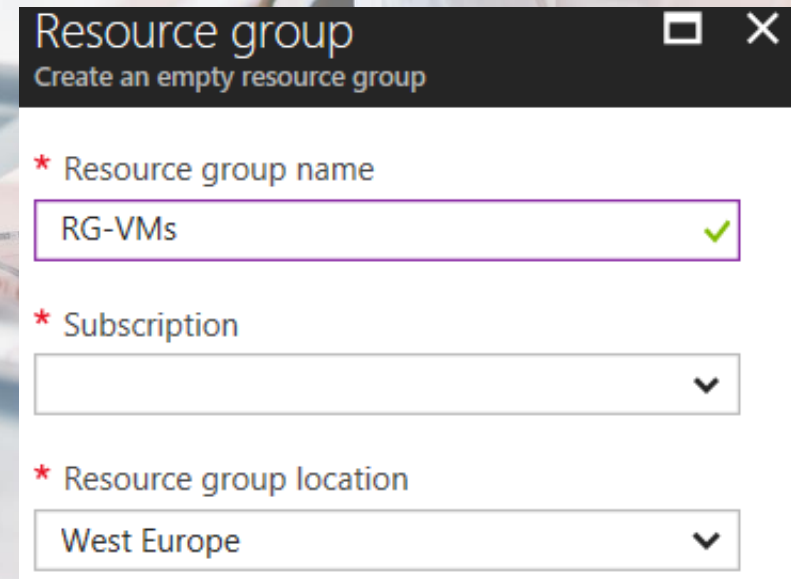
*“It is good to collect things, but it is better to go on walks.”*

*- Anatole France*



## Resource Group

- RGs = container for resources
- Every resource is member of a RG
- Every resource has only one RG
- RGs cannot be encapsulated
- RGs stick to a region



Resource group □ ✕

Create an empty resource group

\* Resource group name  
RG-VMs ✓

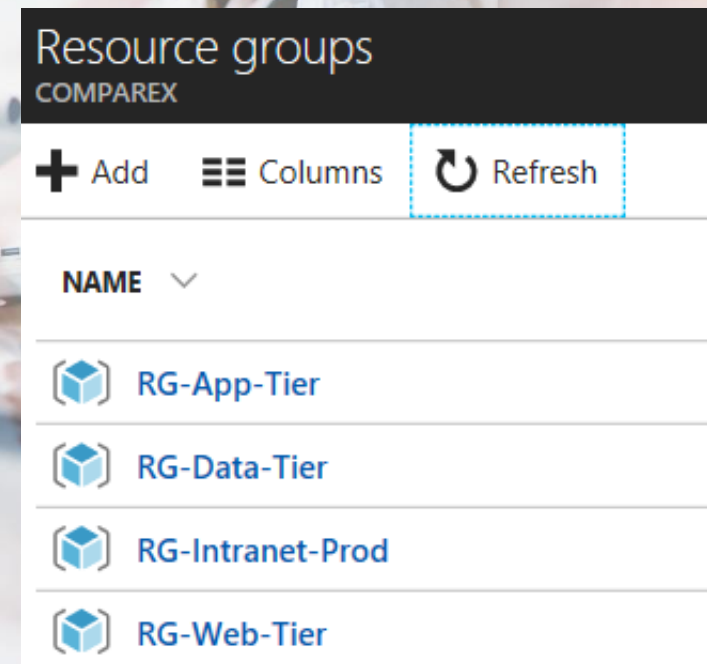
\* Subscription  
▼

\* Resource group location  
West Europe ▼



## Resource Group

- Decide when to create a RG
- Traditional
  - Same lifecycle
  - APP-Management
- Agile
  - Deployment-Layer
  - Web, App, DB
- Decide and stick through



# Resource Tags

*“Decide that you want it more  
than you are afraid of it.”*

*- Unknown*



## Azure Governance

- Billing in Azure difficult
- List of resource cost

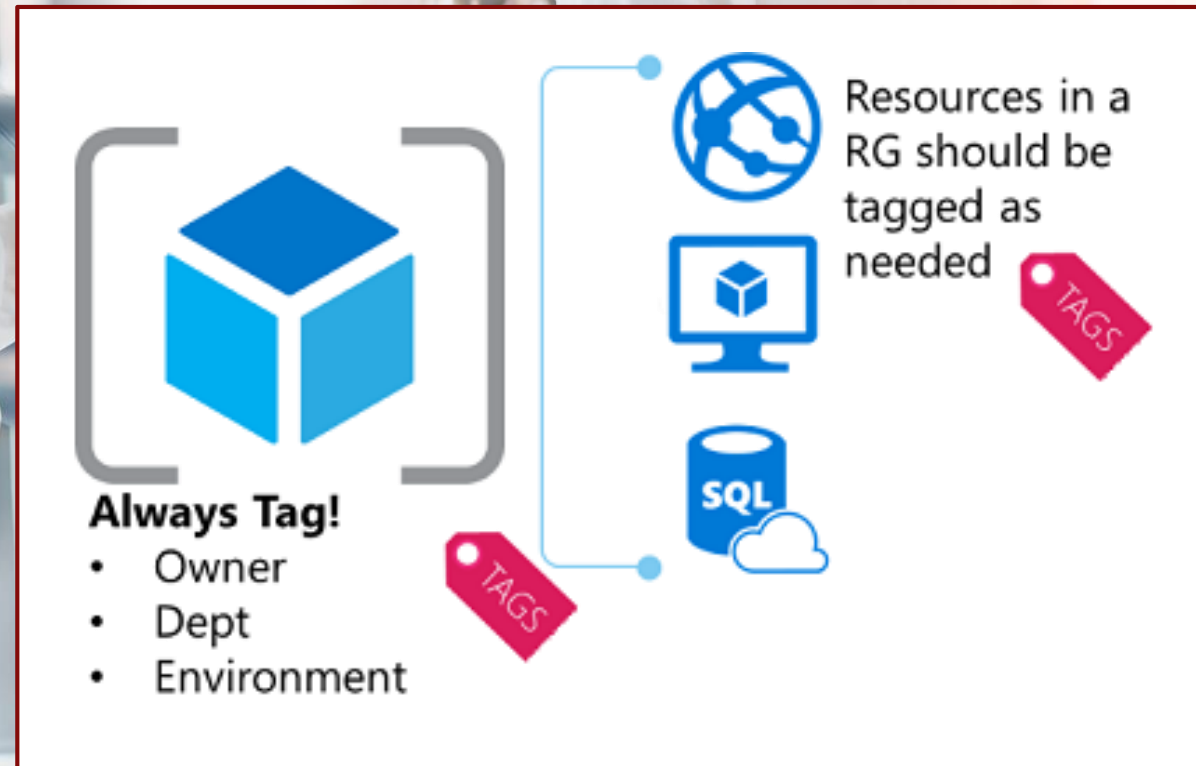
# Resource Tags

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	IJ	JK	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PQ	PR	PS	PT	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ
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## Resource Tags

- Property : Value
- Tags help to assign cost / responsibility
- Always tag RGs
  - Owner
  - Department
  - Environment
- Other resources as required
- Tags are your friends!
- Define tags in advance!
- Tag in Template!



# Resource Policies

*“You are remembered for the rules  
you break.”*

*- Douglas MacArthur*



# Azure Policy



- 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



## Resource Policies

- Set of rules for Subscriptions or RGs
- Policy is the Allow System
- If-then conditions
- Created via JSON
- Actions:
  - Deny
  - Audit
  - Append

### Policy - Definitions

Search (Ctrl+ /)

- Overview
- Getting started
- Compliance
- Remediation

#### Authoring

- Assignments
- Definitions

#### Blueprints

- Blueprints (preview)

#### Resources

- Resource Graph (preview)

#### Privacy

- User privacy

+ Initiative definition + Policy definition Re

Scope

COMPAREX - Micros...

Definition type

Policy

NAME

↑↓

DEFINITION LOCA

[Preview]: Audit that Linux VMs d...

[Preview]: Deploy VM extension t...

Allowed locations

Allowed locations for resource gr...

Allowed resource types

Allowed storage account SKUs

Allowed virtual machine SKUs

Not allowed resource types

## Resource Policies

- Define Subscription Policies for:
  - Geo-compliance/data sovereignty
  - Cost management
  - Required tags
- Audit Activities and Log them
- Use Log Analytics

### Assign policy

\* Policy definition

Allowed locations

\* Assignment name ⓘ

Allowed locations

Description

- ☐ West Central US
- ☐ West Europe
- ☐ West India
- ☐ West US
- ☐ West US 2

0 selected

## How does the processing work?





## How does the processing work?



User



Code

ARM – Centralized Control Plane

Azure Policy



Cloud  
Resource



- 4. DeployIfNotExists
- 5. AuditIfNotExists

## Policy limits

- 100 Policy Definitions per Scope
- 100 Policy Set Definitions per Scope
- 1000 Policy Set Definitions per Tenant
- 100 Policy Definition references per policySetDefinition
- 100 Policy Assignments per scope
- 10 notScopes per policyAssignment

## Resource Graph (Preview)

- Query opportunity for resources based on a Query language
- Evaluation of the scope of the use of a policy
- Examples of queries would be:
  - Counting Azure Resources
  - Listing all resources sorted by name
  - List the resources that consume storage
  - Listing resources with a specific day
  - List of all public IP addresses
  - List of all tags



### Welcome to Azure Resource Graph **PREVIEW**

Azure Resource Graph preview enables you to get full visibility into your environments by providing high performance and powerful querying capability across all your resources.

[Azure Resource Graph Overview](#)  
[Report an issue or provide feedback](#)

#### Experience the power of Resource Graph Preview

1. Resource Graph powers the new 'All resources' browse experience. It has easy to use filtering and search tools. Visit the new '[All Resources](#)' page now or 'opt-in' to join the preview by clicking 'All resources' from portal [settings](#).
2. Cloud Shell also provides extensive access to Resource Graph and it's flexible query language. [Launch Cloud Shell with Resource Graph](#).

#### Launch Cloud Shell

Azure Resource Graph can be queried through Azure Cloud Shell. Launch Cloud Shell and try out some queries from the samples below. For more query samples, check out [this page](#). To learn more about the query language, see [this documentation](#).

If you need assistance authoring queries for your specific scenario, contact us by submitting your scenario in the [Portal Feedback](#). Please check the 'Microsoft can email you about your feedback' so we can reach out to assist and support.

 **Launch Cloud Shell**

#### Run through some examples

Enable the extension (Bash) or module (PowerShell) and then run your first query:

Bash

PowerShell

```
1 # Enable Azure Resource Graph (Preview) extension
2 az extension add --name resource-graph
```

Run your first Azure Resource Graph query by using the "graph" extension and the "query" command and count all resources in your environment. Please note that all



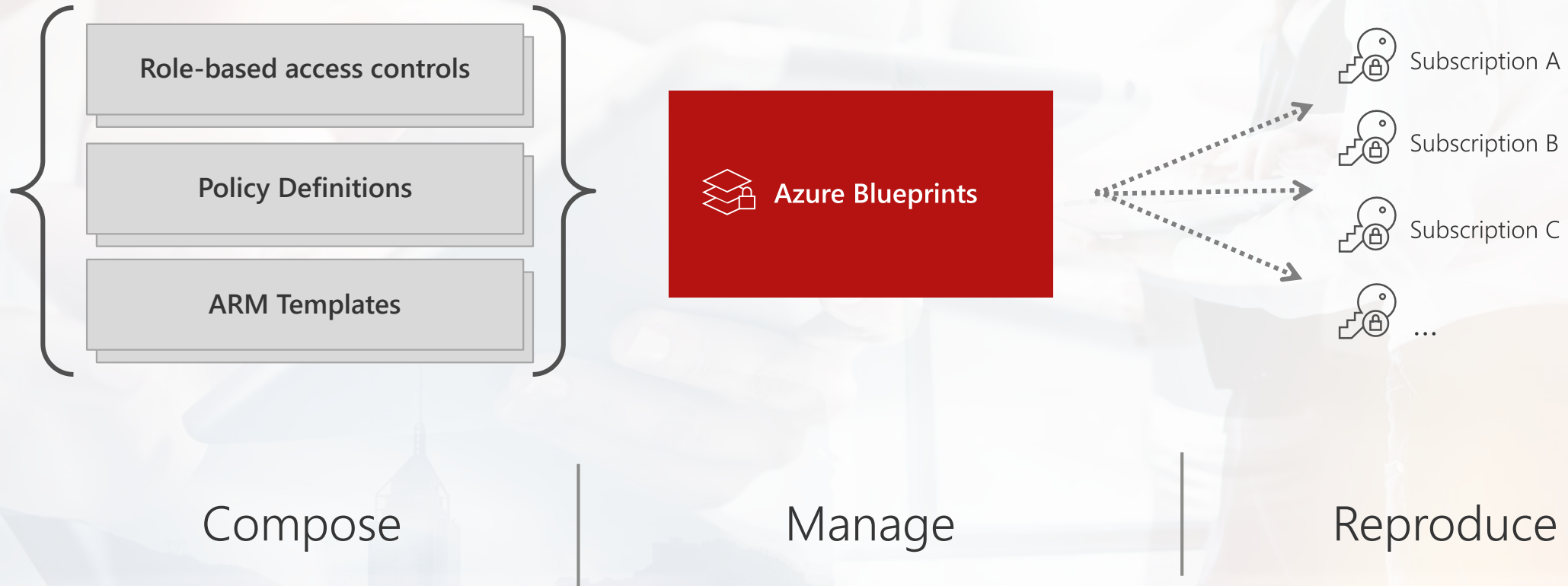
# Blueprints

*“The prepared man has  
already won the half battle”*

*- Spanish statement*



# Azure Blueprints



# Resource Locks

*“I guess what scares me the most now is the thought that I won't be able to protect you”*


*- Julia Hoban*






# Resource Locks

- Resources in Azure can be deleted easy
- Protection from Accidental Deletion
- Known from Active Directory

 Are you sure you want to delete "RG-NW"? ×



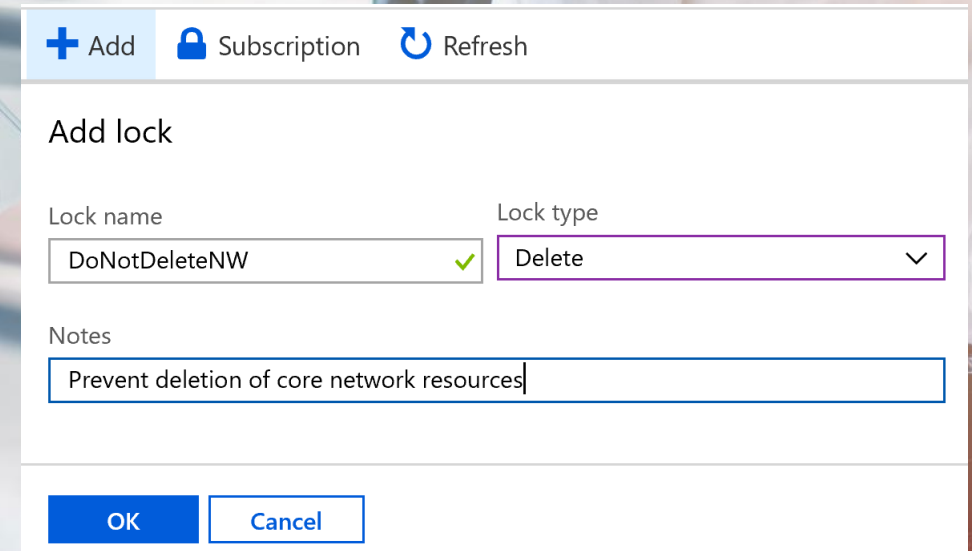
Warning! Deleting the "RG-NW" resource group is irreversible. The action you're about to take can't be undone. Going further will delete this resource group and all the resources in it permanently.

TYPE THE RESOURCE GROUP NAME:

Please enter 'rg-nw' to confirm delete.

## Resource Locks

- Restrict resource access:
  - CanNotDelete
  - ReadOnly (ATTENTION)
- Set by Owner and User Access Admin
- JSON: { "properties": { "level": "CanNotDelete", "notes": "Optional text notes." } }
- PowerShell: **Set-AzureRmResourceLock**
- Locks protect!
- Define locks in advance!
- Locks in Template!



+ Add    Subscription    Refresh

### Add lock

Lock name      Lock type

DoNotDeleteNW      Delete

Notes

Prevent deletion of core network resources

OK    Cancel

# Role-Based Access Control

*“Anything out there is vulnerable to attack given enough time and resources.”*

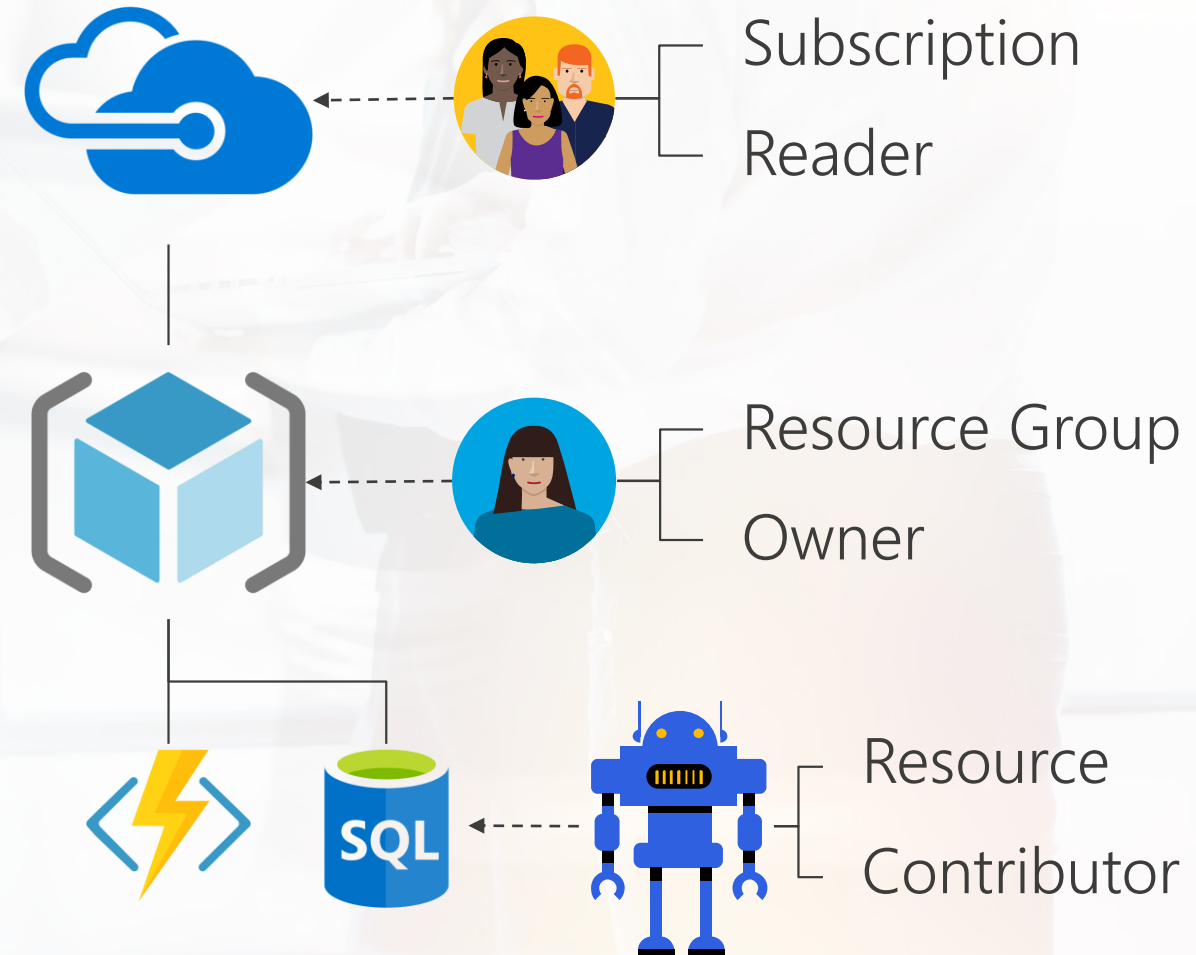
*- Kevin Mitnick*





## Role Based Access Control

- Connection between Azure AD and Subscription
- Default roles depend on
  - Owner
  - Contributor
  - Reader
- Advanced Roles
  - Automation Operator
  - DevTest Labs User
  - ...
- Own roles



# RBAC

- IAM can be set at all levels

RG-App-Tier - Access control (IAM)  
Resource group

Search (Ctrl+ /)

Overview  
Activity log  
Access control (IAM)  
Tags

SETTINGS  
Quickstart  
Resource costs

+ Add    Remove    Roles

Name ⓘ  
Search by name or email

Group by ⓘ  
Role ▼

1 items (1 Users)

NAME

OWNER

Berg, Eric  
Eric.Berg@comparex.cc

Add permissions

Role ⓘ  
Backup Operator

Select ⓘ  
norman.punge@comparex.com

Punge, Norman  
Norman.Punge@comparex.com

Selected members

## Role Based Access Control – assigning rights

Users in local  
Active Directory

Nesting in Active  
Directory global  
security group

Synchronisation in  
Azure Active  
Directory

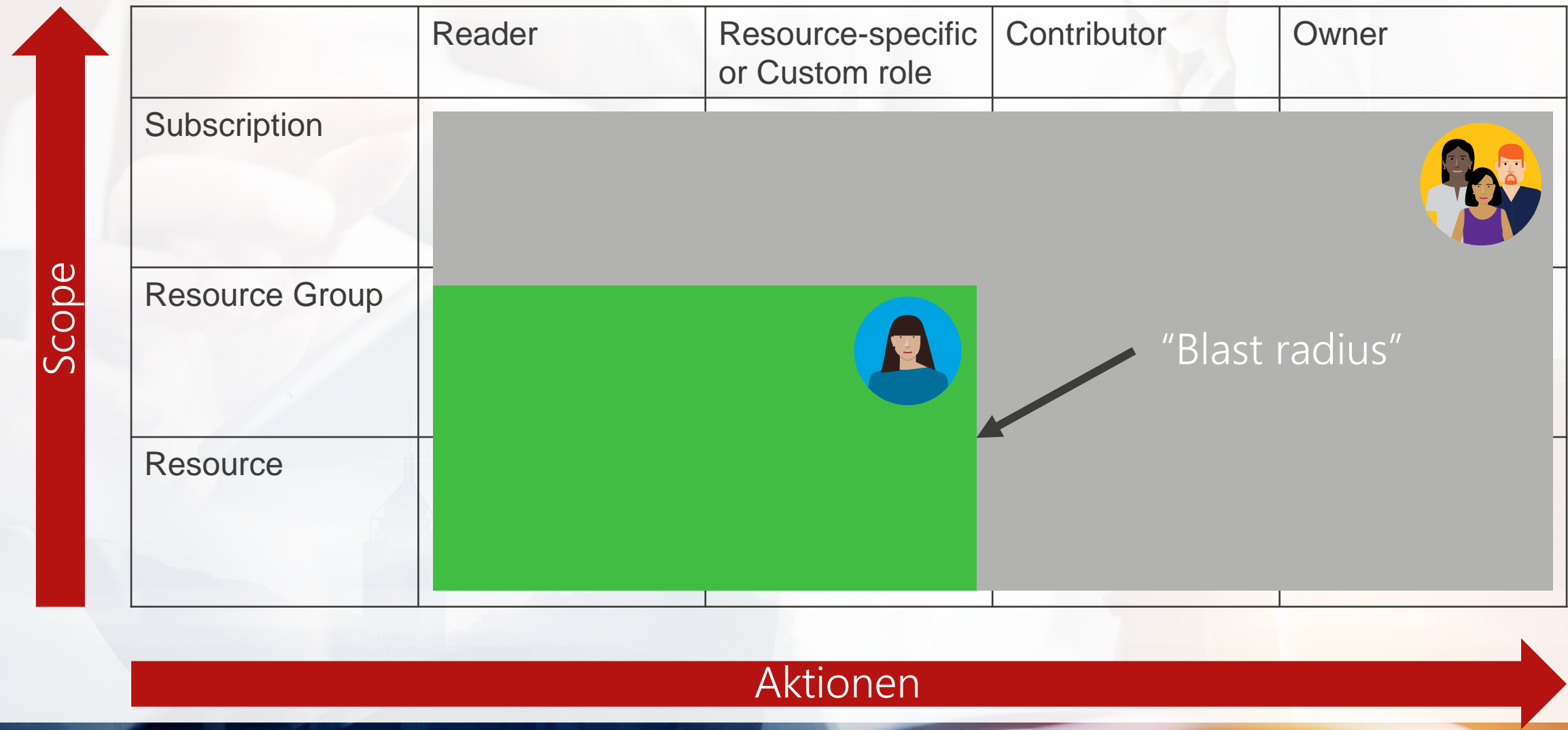
Scope rights are  
granted through  
the role

Assigning the  
role to a scope

Nesting the  
Active Directory  
group in the role



# Role Based Access Control – Blast Radius

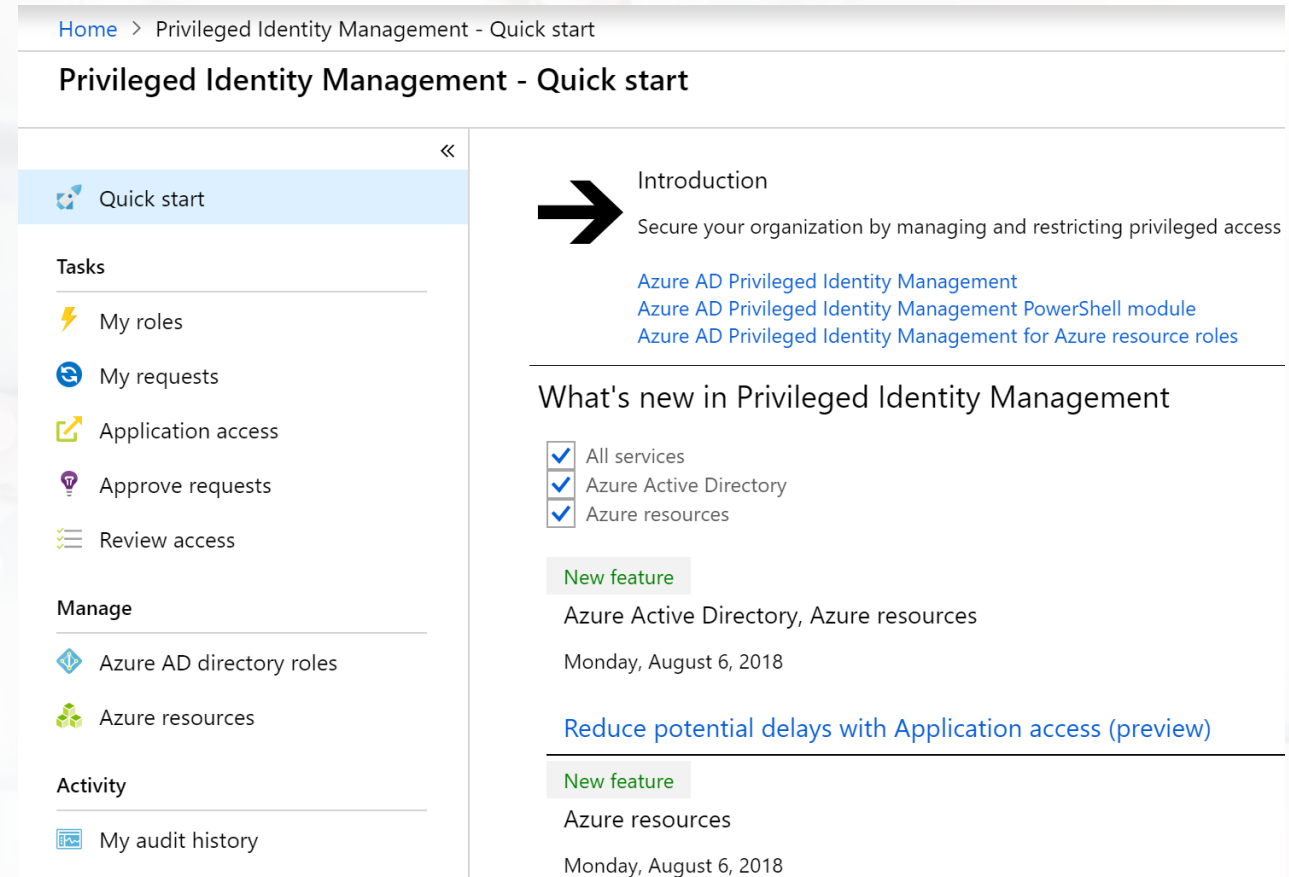


# Role Based Access Control – Least Privilege Prinzip

	Reader	Resource-specific or Custom role	Contributor	Owner
Subscription	Observers	People who work in the subscription		Emergency account (like Domain Admin)
Resource Group				
Resource	Account for debugging or special services account for individual systems			

# Azure AD Privileged Identity Management

- Used to monitor highly privileged accounts
- Just in Time Access for Azure VMs
- Access goes off automatically
- Assigning temporary rights for special tasks
- Generating alerts when assigning rights to new or other resources than usual
- Generation of alarms when permanent rights are set for specific resources



The screenshot shows the 'Privileged Identity Management - Quick start' page in the Azure portal. The breadcrumb trail at the top is 'Home > Privileged Identity Management - Quick start'. The main heading is 'Privileged Identity Management - Quick start'. On the left, there is a navigation pane with a 'Quick start' link highlighted. Below it, the 'Tasks' section includes 'My roles', 'My requests', 'Application access', 'Approve requests', and 'Review access'. The 'Manage' section includes 'Azure AD directory roles' and 'Azure resources'. The 'Activity' section includes 'My audit history'. On the right, the 'Introduction' section features a large arrow icon and the text 'Secure your organization by managing and restricting privileged access'. Below this are three links: 'Azure AD Privileged Identity Management', 'Azure AD Privileged Identity Management PowerShell module', and 'Azure AD Privileged Identity Management for Azure resource roles'. The 'What's new in Privileged Identity Management' section shows a list of checked items: 'All services', 'Azure Active Directory', and 'Azure resources'. Below this, a 'New feature' box highlights 'Azure Active Directory, Azure resources' with the date 'Monday, August 6, 2018'. Another link 'Reduce potential delays with Application access (preview)' is present. A second 'New feature' box highlights 'Azure resources' with the date 'Monday, August 6, 2018'.

Home > Privileged Identity Management - Quick start

## Privileged Identity Management - Quick start

Quick start

Tasks

- My roles
- My requests
- Application access
- Approve requests
- Review access

Manage

- Azure AD directory roles
- Azure resources

Activity

- My audit history

Introduction

Secure your organization by managing and restricting privileged access

[Azure AD Privileged Identity Management](#)  
[Azure AD Privileged Identity Management PowerShell module](#)  
[Azure AD Privileged Identity Management for Azure resource roles](#)

### What's new in Privileged Identity Management

- ☒ All services
- ☒ Azure Active Directory
- ☒ Azure resources

**New feature**

Azure Active Directory, Azure resources

Monday, August 6, 2018

[Reduce potential delays with Application access \(preview\)](#)

**New feature**

Azure resources

Monday, August 6, 2018



# Naming Conventions

*“Fear of a name increases fear of the thing itself.”*

*- J. K. Rowling*



# Names

- All resources require names
  - NIC
  - Public IP
  - NSG
  - ...
- Naming conventions in Azure per resource
- Prefixes or suffixes help

Category	Service or Entity	Scope	Length	Casing	Valid Characters	Suggested Pattern
Resource Group	Resource Group	Global	1-64	Case insensitive	Alphanumeric, underscore, and hyphen	<service short name>-<environment>-rg
Resource Group	Availability Set	Resource Group	1-80	Case insensitive	Alphanumeric, underscore, and hyphen	<service-short-name>-<context>-as
General	Tag	Associated Entity	512 (name), 256 (value)	Case insensitive	Alphanumeric	"key" : "value"
Compute	Virtual Machine	Resource Group	1-15	Case insensitive	Alphanumeric, underscore, and hyphen	<name>-<role>-vm<number>
Storage	Storage account name (data)	Global	3-24	Lower case	Alphanumeric	<globally unique name><number> (use a function to calculate a unique guid for naming storage accounts)
Storage	Storage account name (disks)	Global	3-24	Lower case	Alphanumeric	<vm name without dashes>st<number>
Storage	Container name	Storage account	3-63	Lower case	Alphanumeric and dash	<context>
Storage	Blob name	Container	1-1024	Case sensitive	Any URL char	<variable based on blob usage>



A man in a dark suit and glasses stands in a modern office, pointing at a large digital screen. The screen displays a line graph with a title 'Variation' and a horizontal axis labeled with months from March to December. The graph shows a fluctuating line. In the foreground, several people are seated at a long, dark conference table, looking towards the screen. The table has various items on it, including water bottles, a small plant, and papers. The background features large windows with a view of a city skyline and a bridge. The overall atmosphere is professional and collaborative.

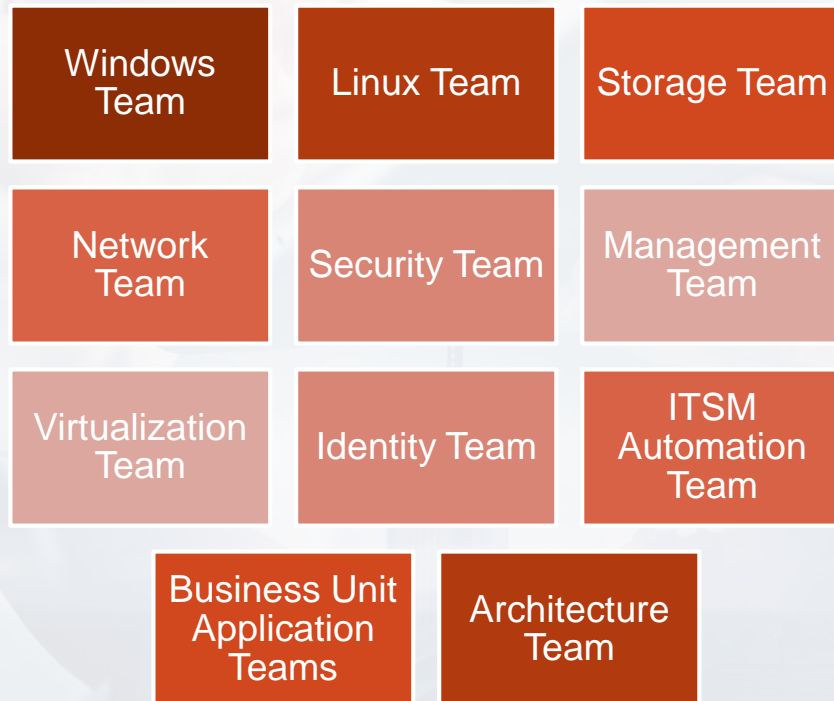
# Azure Governance



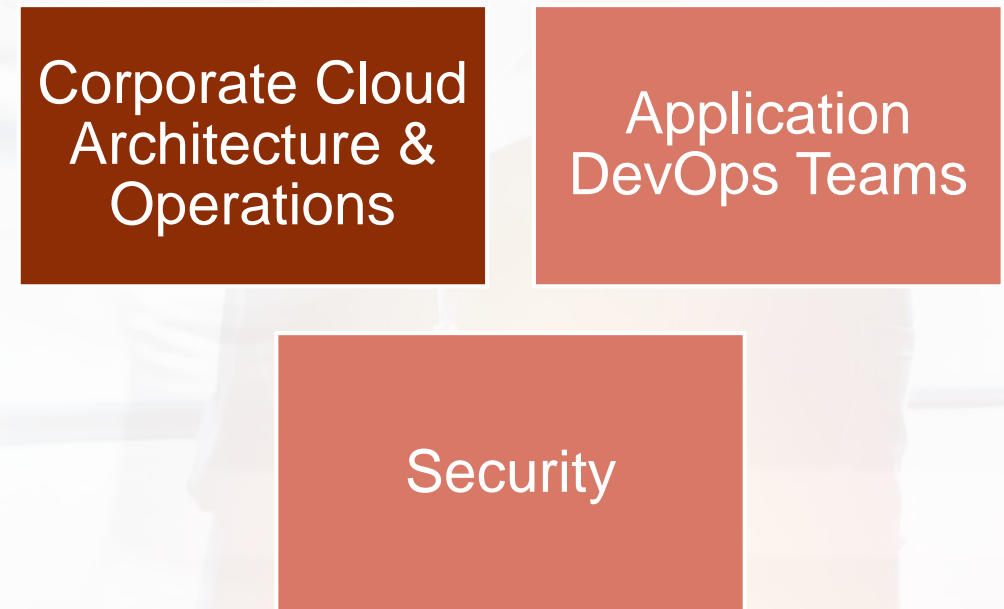
# Employee Organizational Change and Operations

- Transformation of organization, tied to DevOps
  - Increased **multi-skill** frameworks
  - Emphasis on **code, repeatability, automation**

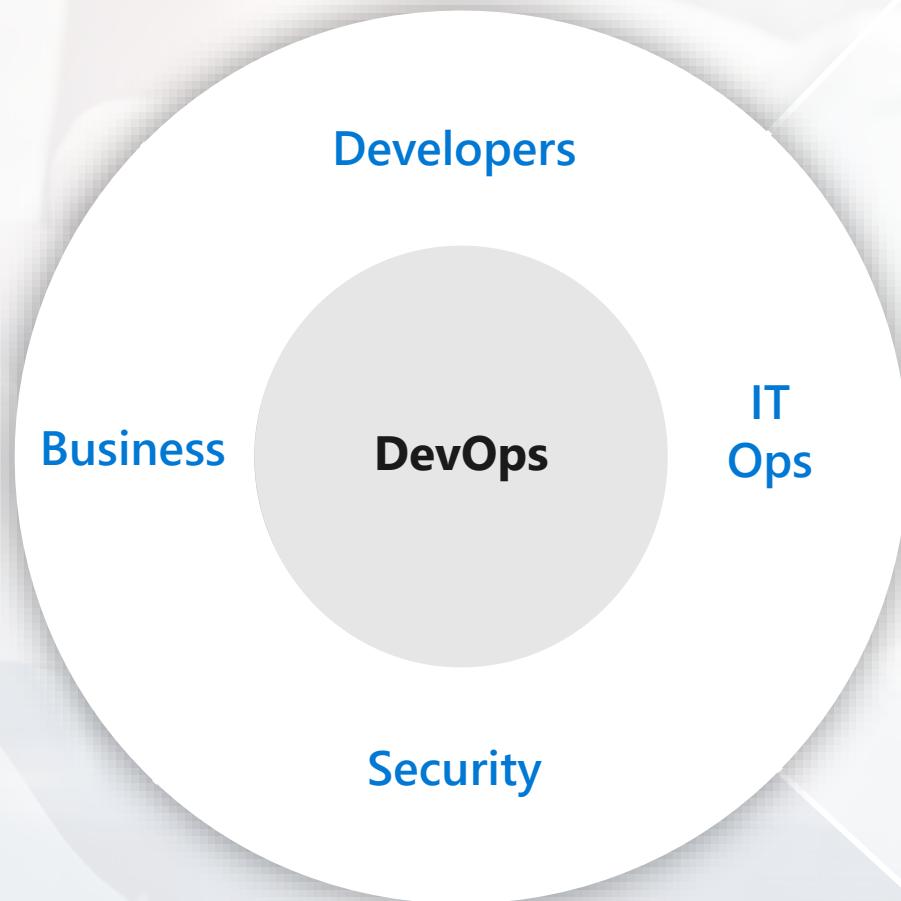
## Traditional IT Organization



## Modern IT Organization



## IT skills need an update



### Adopting new cloud technologies



ARM



Templates



Scripting



Functions



Event Grid

### Changing operating model



Developer  
Collaboration



Business  
value



Time to  
market

## Traditional approach needs rethinking

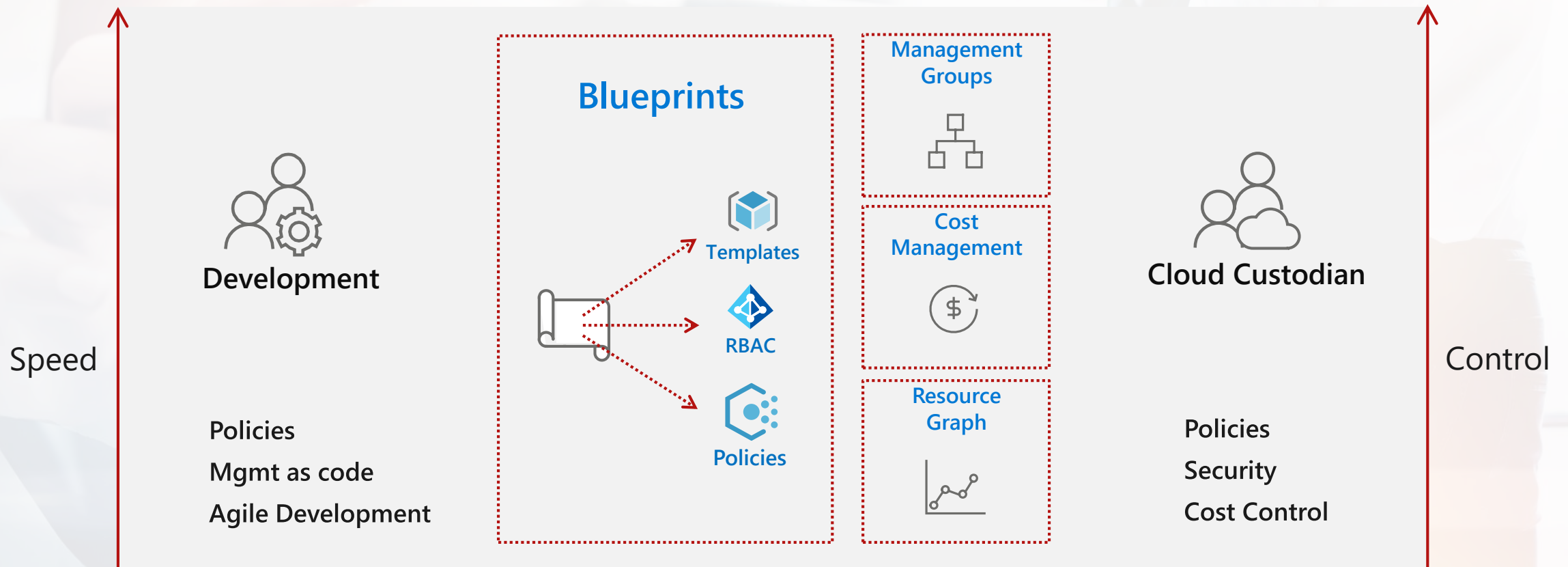
- **Speed** versus **Control**



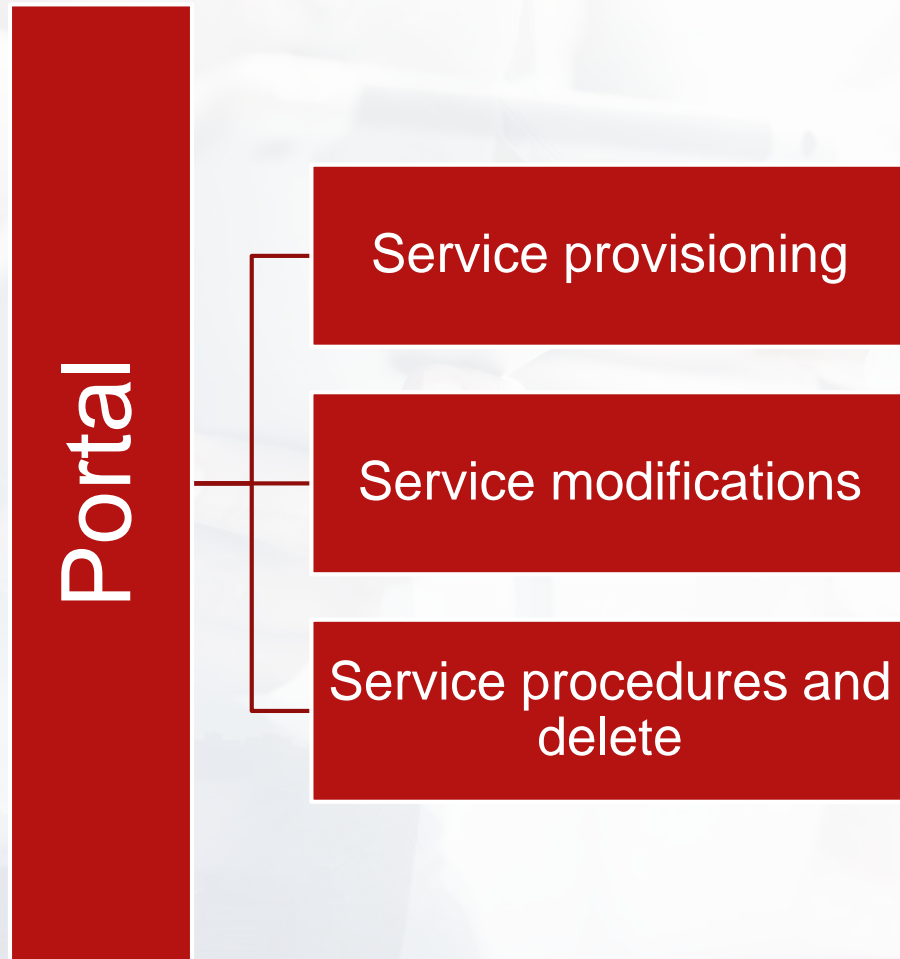


## Built-in modern governance

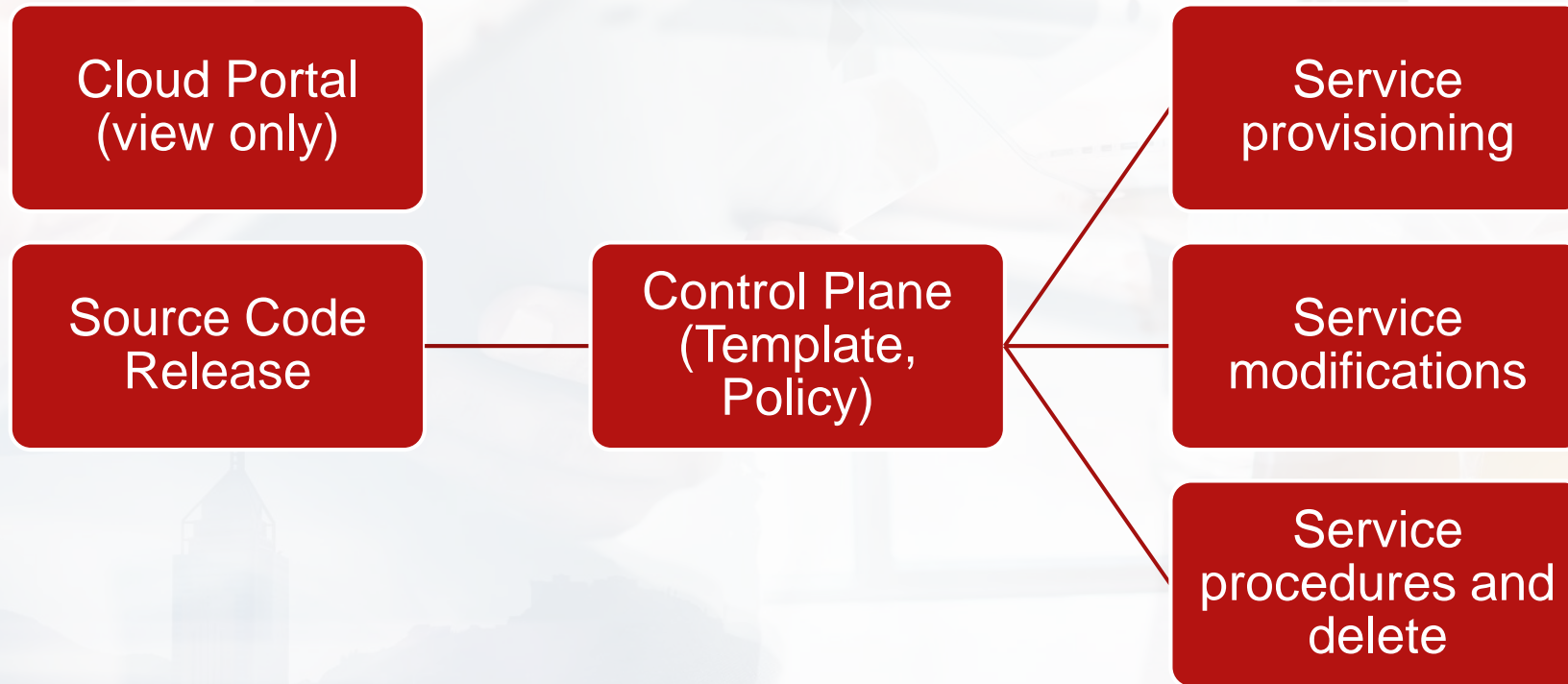
- **Speed** and **Control**



## Bad Assumption

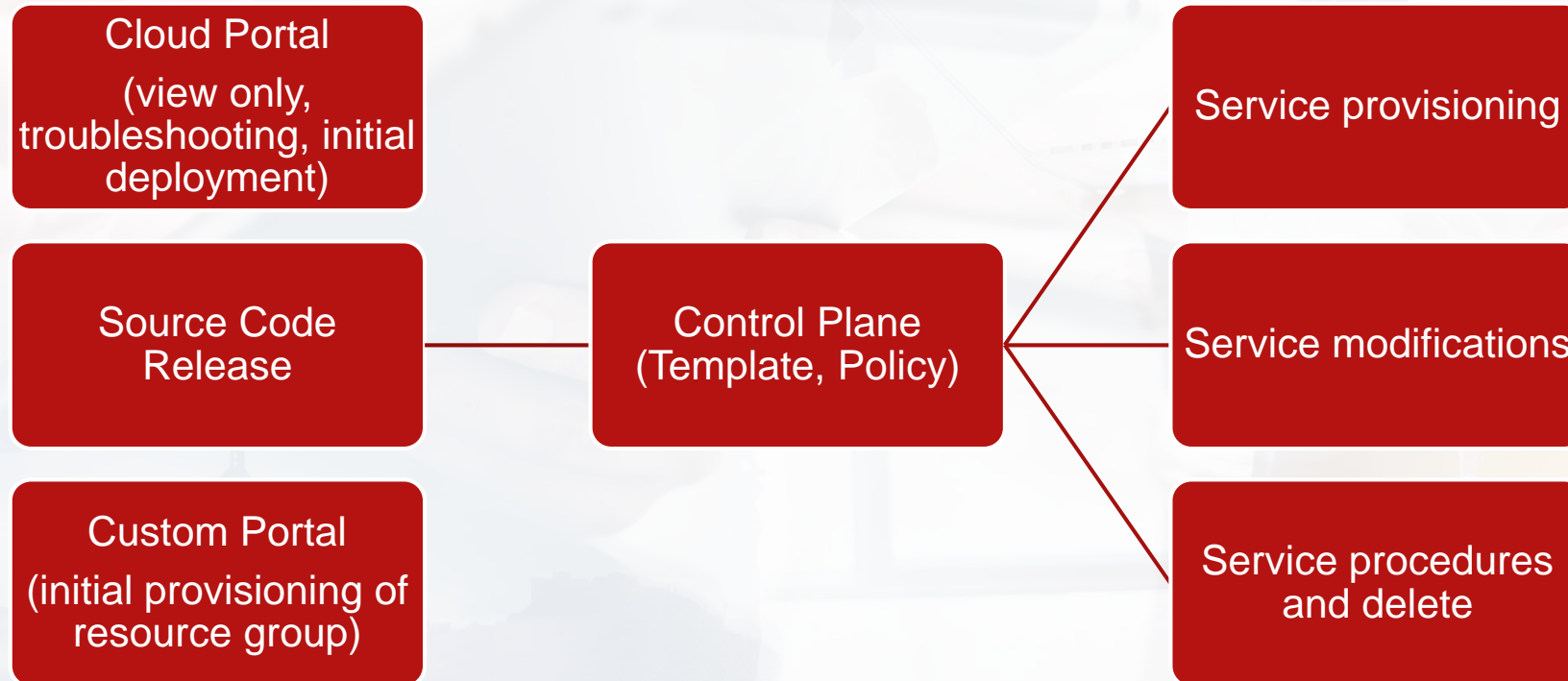


## Goal Destination



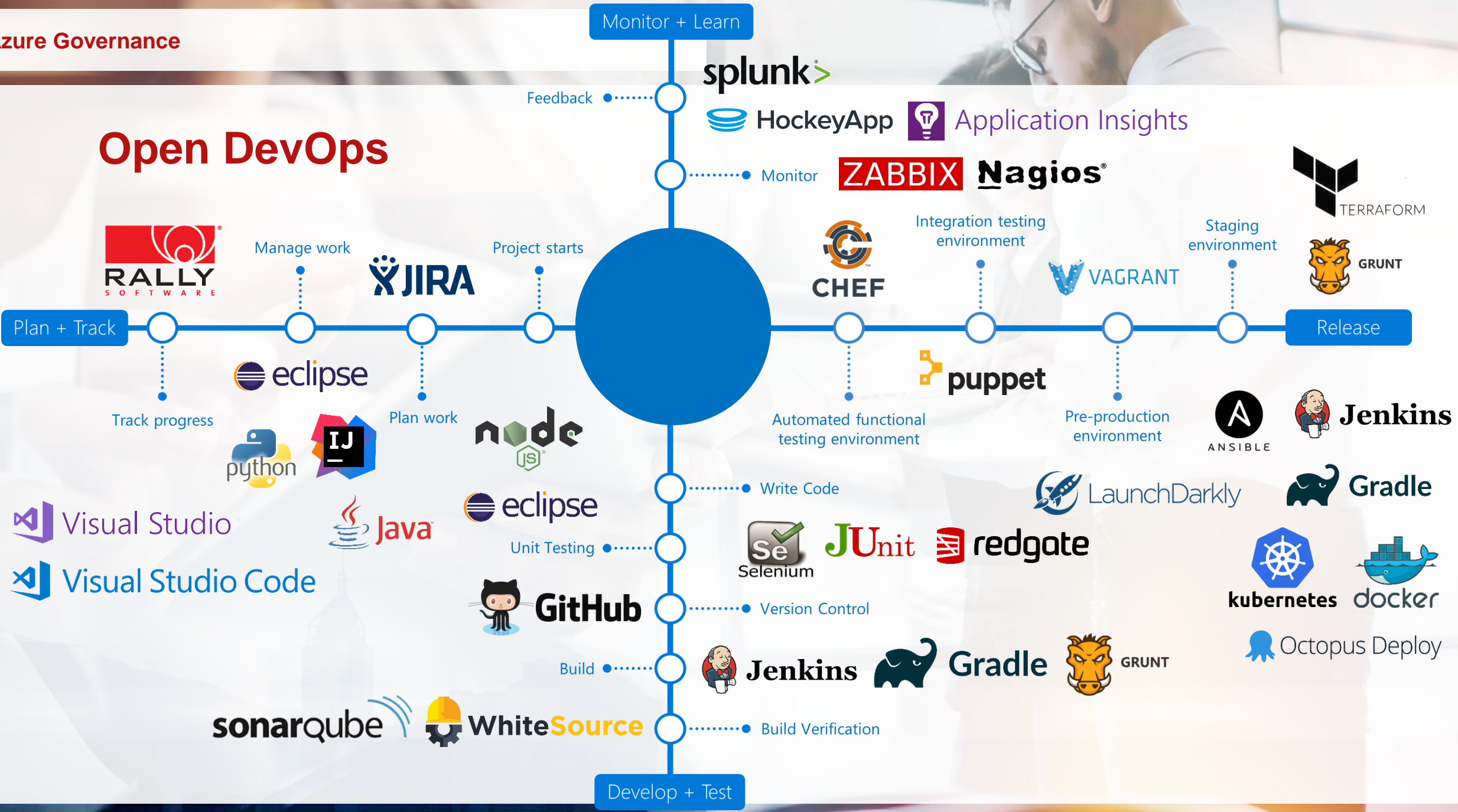


## Stepping Stone



# Corp Infrastructure as Code

- **Assume Re-Deployability, DevOps at every level**
  - The Corp IT infrastructure is code too, store it in a code repository
  - Build based on release management pipeline
- **Build a Corp-Infrastructure release management pipeline**
  - **Azure DevOps**, Ansible, Chef, Puppet
  - Technology doesn't matter, approach does
- **Use Native Providers**
  - Terraform for Multi-Cloud Management (as far as integrated) (Corp)
  - JSON for Cloud specifics (App)





## Optimized Model

DevOps CI / CD

Monitor: AppInsights / Azure Monitor

Release: JSON / Terraform / DSC / Chef

Develop: Git / TFS / BitBucket

Plan: JIRA / Azure DevOps