PowerShell Conference Europe 2019

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# Lessons learned from a large-scale infrastructure as code project

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# After this Session

- I am able to **develop a mature “Infrastructure As Code”** project from scratch using a Test-Driven development approach, avoiding common pitfalls and getting a heads up in necessary considerations,  tools and best practices

- I can **build sophisticated Azure Release Pipelines** that leverage advanced testing scenarios using Azure Resource Manager Templates, PowerShell tooling to support an advanced “Infrastructure As Code” project

# Agenda

Introduction

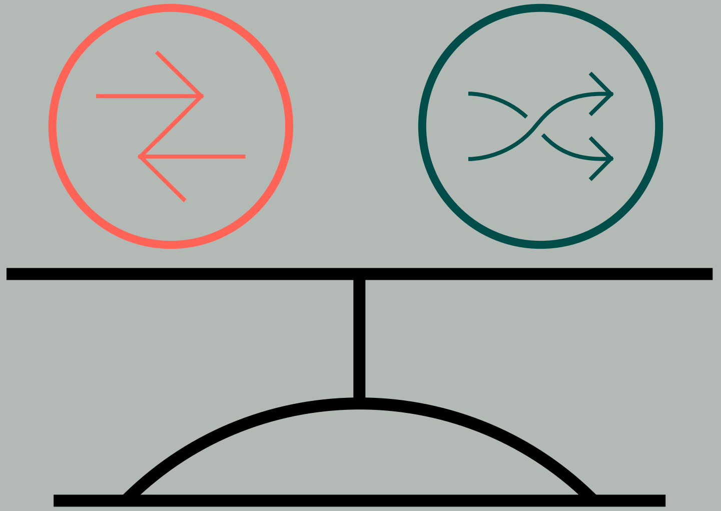
Architecture

Demo

> By viewing cloud computing as a starting point for IT automation, companies may be able to have it all: scalability, agility, flexibility, efficiency, and cost savings.
> But that’s only possible by building up both **automation and cloud** capabilities.

– McKinsey

# What is the challange?

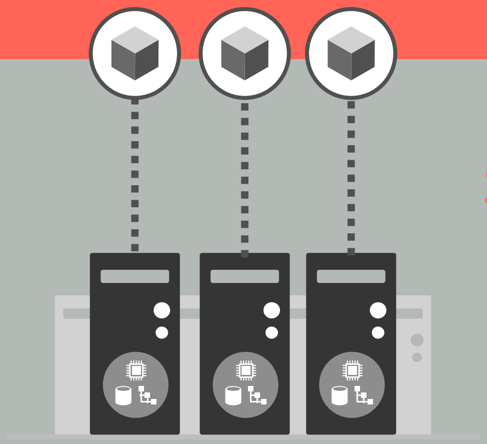


Control

Speed

Agility

# Why change?



Servers

→

Services

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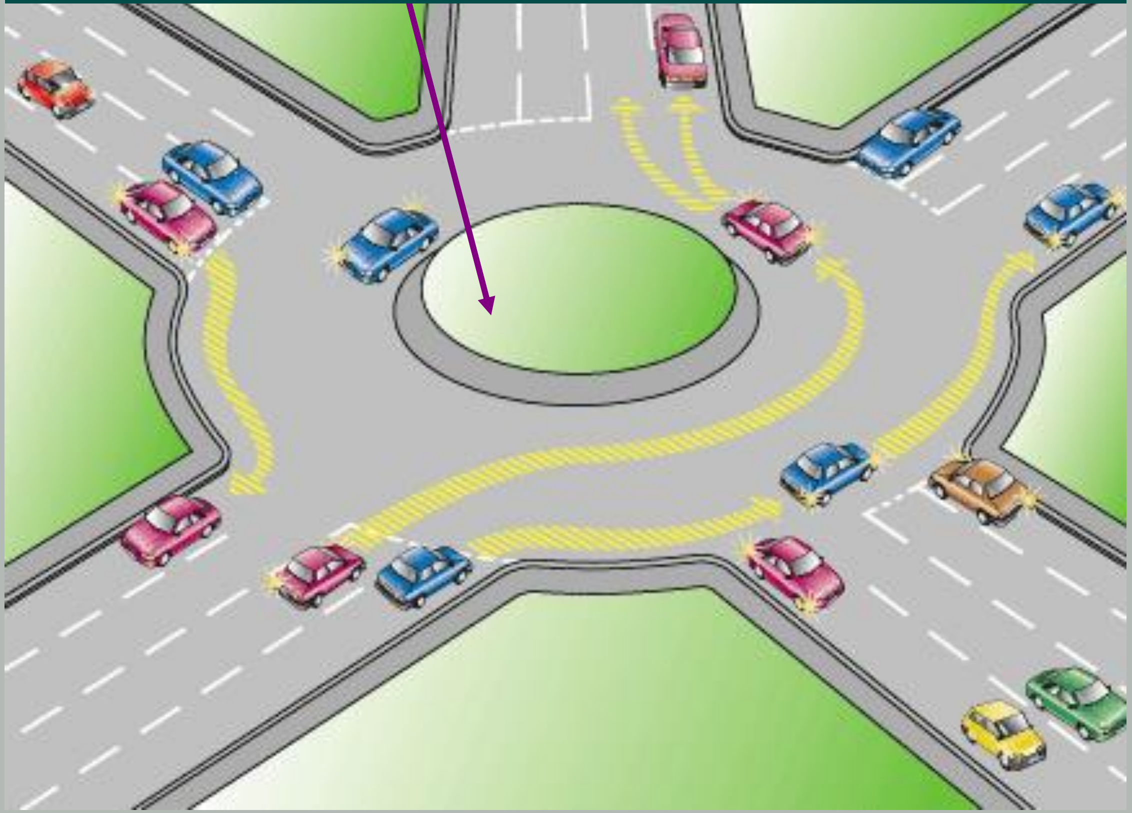
# Paradigm shift

**Enforce/Control**

Controlled & *central* responsibility

**Enable/Support**



Freedom & *delegated* responsibility

# What organization want

**Control** → Secure, predictable, and flexible service delivery and operations capability (end to end traceability).

**Innovation** → Faster business innovation through adoption of cloud services.

**Speed/Agility** → Business agility and reduced time-to-market through efficient DevOps teams.

**Costs** → Efficient use of public cloud scale.

# DevOps benefits based on research

Comparing elite DevOps performers against low performers,
we find that elite performers have...

46 times more

Frequent code deployments

2,555 times faster

Lead time from commit to deploy

7 times lower

Change failure rate
(changes are 1/7 as likely to fail)

2,604 times faster

Time to recover from incidents

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Source: 2018 State of DevOps Report DORA

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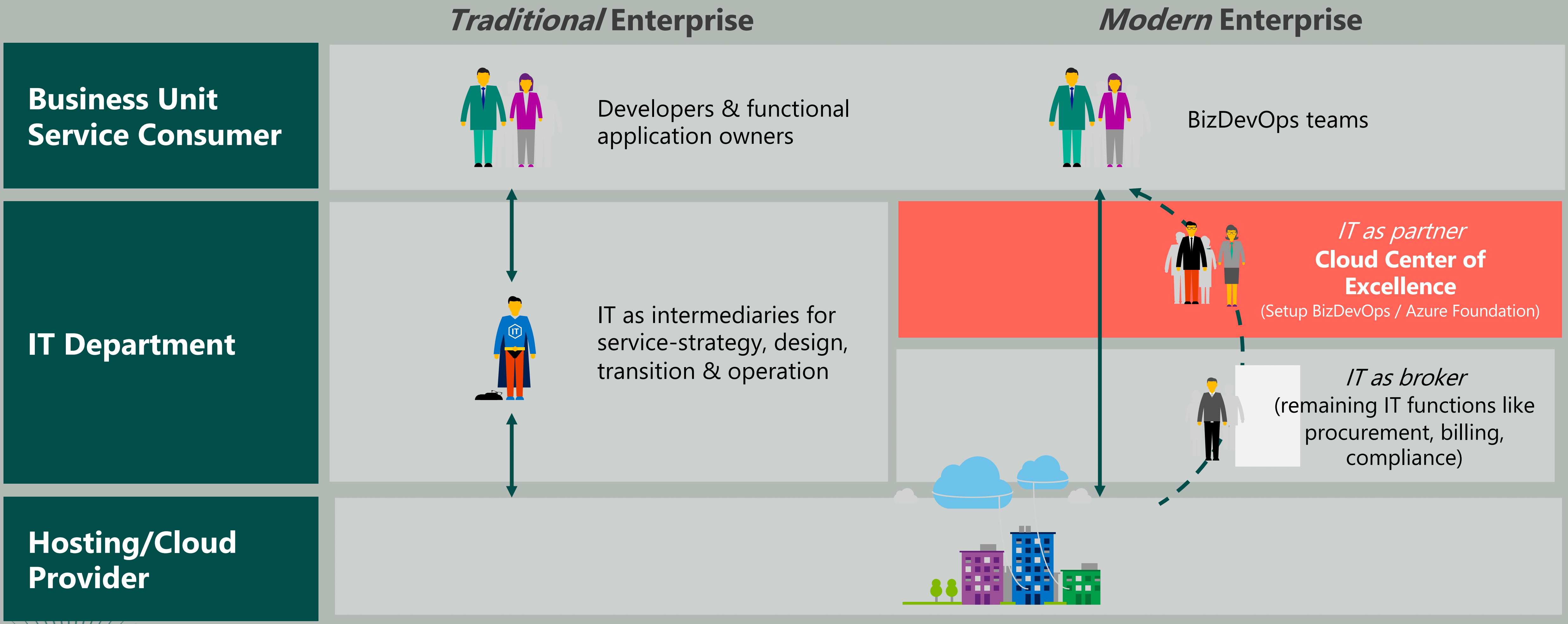
A Cloud Center of Excellence (CCoE) is a **cross-functional** team of people responsible for **developing** and **managing the cloud** strategy, governance, and best practices that the rest of the organization can **leverage to transform the business** using the cloud.

– Cloud Management Report

https://cloudcheckr.com/document/cloud-management-report/

# What is CCoE about?



*Traditional* Enterprise

*Modern* Enterprise

**Business Unit Service Consumer**

Developers & functional application owners

BizDevOps teams

**IT Department**

IT as intermediaries for service-strategy, design, transition & operation

*IT as partner*
**Cloud Center of Excellence**
(Setup BizDevOps / Azure Foundation)

*IT as broker*
(remaining IT functions like procurement, billing, compliance)

**Hosting/Cloud Provider**

*"shift the value of the IT department from build, own and run, to enable others to do autonomously"*

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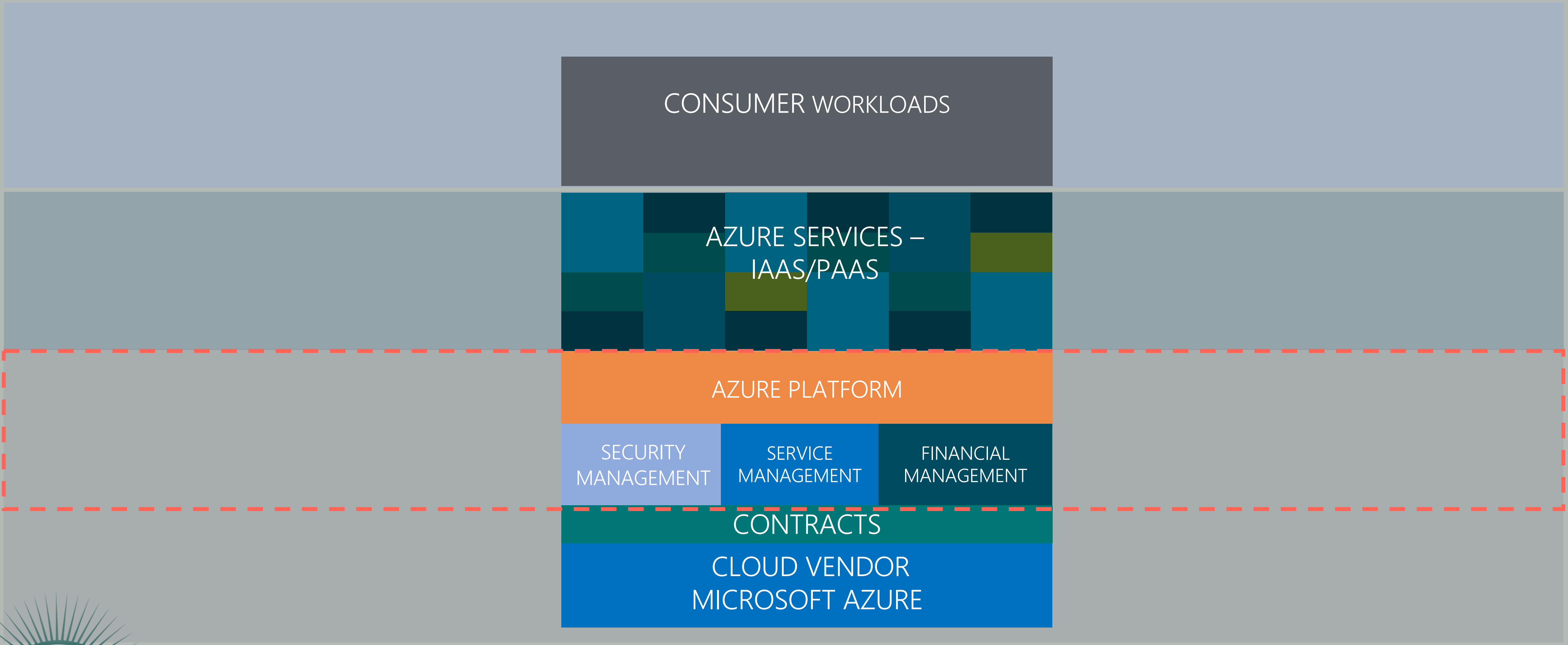
# Scope of CCoE



CONSUMER WORKLOADS

AZURE SERVICES – IAAS/PAAS

AZURE PLATFORM

SECURITY MANAGEMENT

SERVICE MANAGEMENT

FINANCIAL MANAGEMENT

CONTRACTS

CLOUD VENDOR
MICROSOFT AZURE

# CCoE needs to: find a tremendous amount of support from the executive team

Stephen Orban

https://medium.com/aws-enterprise-collection/how-to-create-a-cloud-center-of-excellence-in-your-enterprise-8ed3a97adcc6

# Speed and stability – no compromise

## Enable agility with DevOps

Incentivize desired behavior

Insights vs control

Balance standardization / flexibility (mature over time)

## Stay in control

End-to-end traceability

Smart governance

Identity & data centric controls

# Technologies & Tools

- ARM - Terraform
- PowerShell - Python
- Ansible – Chef – PS DSC
- Azure DevOps – Jenkins
- Git – TFVC - Subversion
- Pester - RSpec - xUnit

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# PowerShell: Framework

## Pester

Test & Validation @nohwnd

ARM-Templates

psake
@devblackops

azure-pipelines.yml

platyPS
@xvorsx

PSDepend
@psCookieMonster

## PowerShell Module

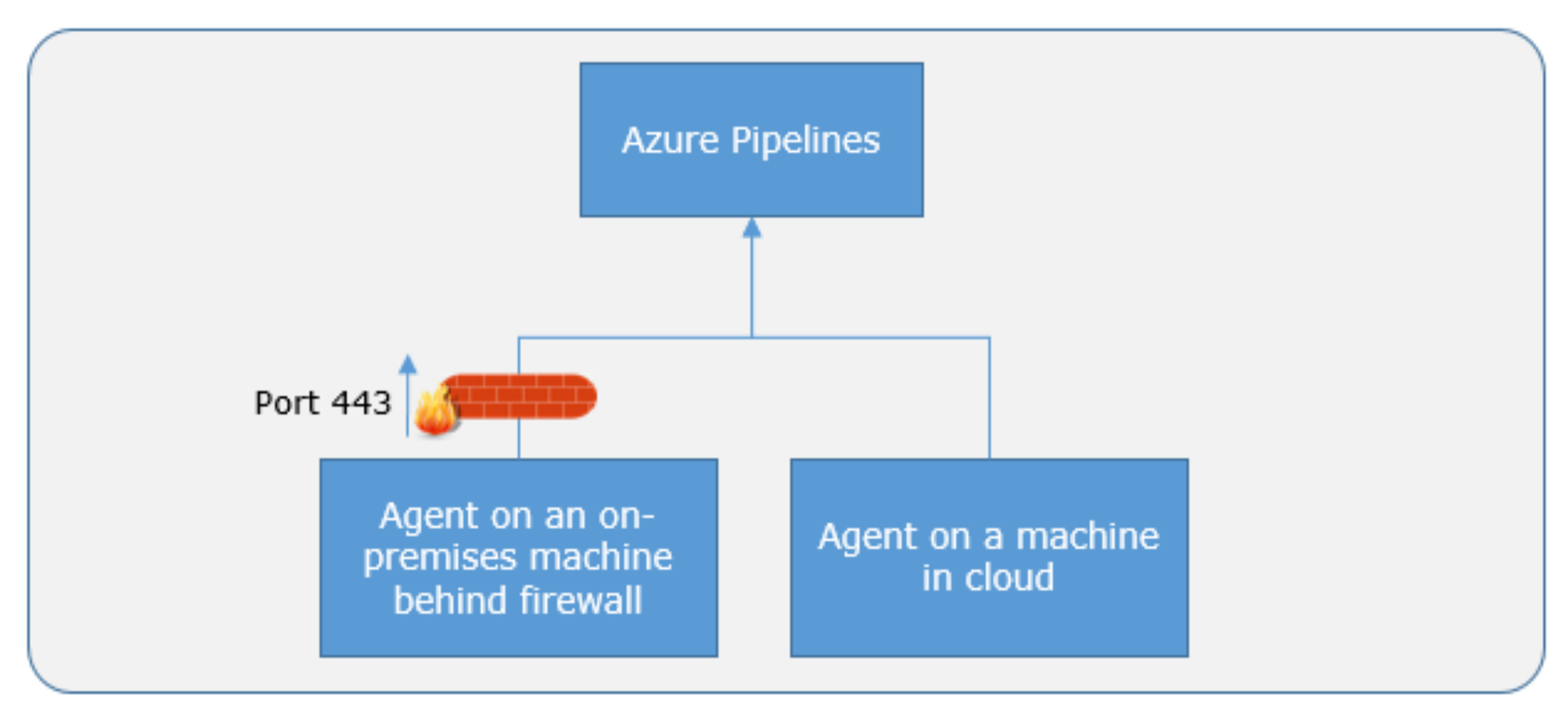
Generated by Plaster → requires Az Module
@r_keith_hill -@daviwil - @neongreenie

Azure DevOps
CI/CD

Azure
Automation
Functions

VSCode
Extensions

# Azure Pipelines agents


Azure Pipelines
Port 443
Agent on an on-premises machine behind firewall
Agent on a machine in cloud

## Environment

„Baseline Infrastructure “

Reliable

Stable

## Application

„Cloud Native App“

Fast Deployment

Focus on Requirements

## User

„Self-Service“

Accessibility

Self-Service

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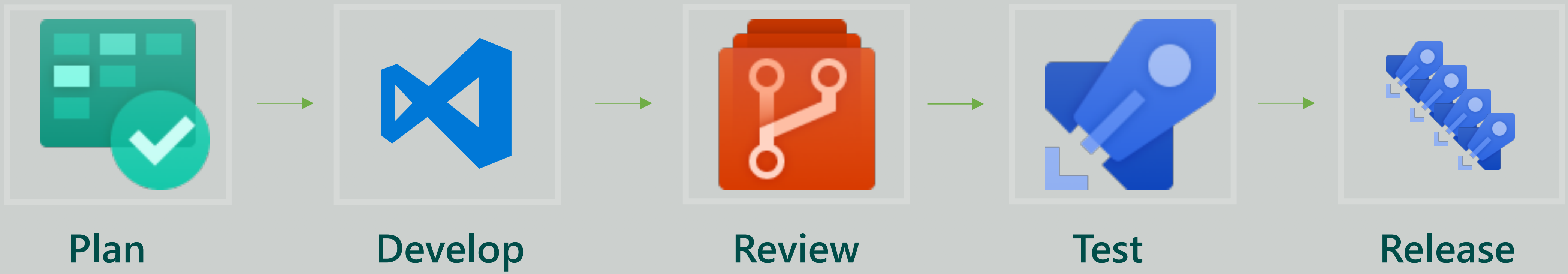
# Release: Hub Deployment



Plan → Develop → Review → Test → Release

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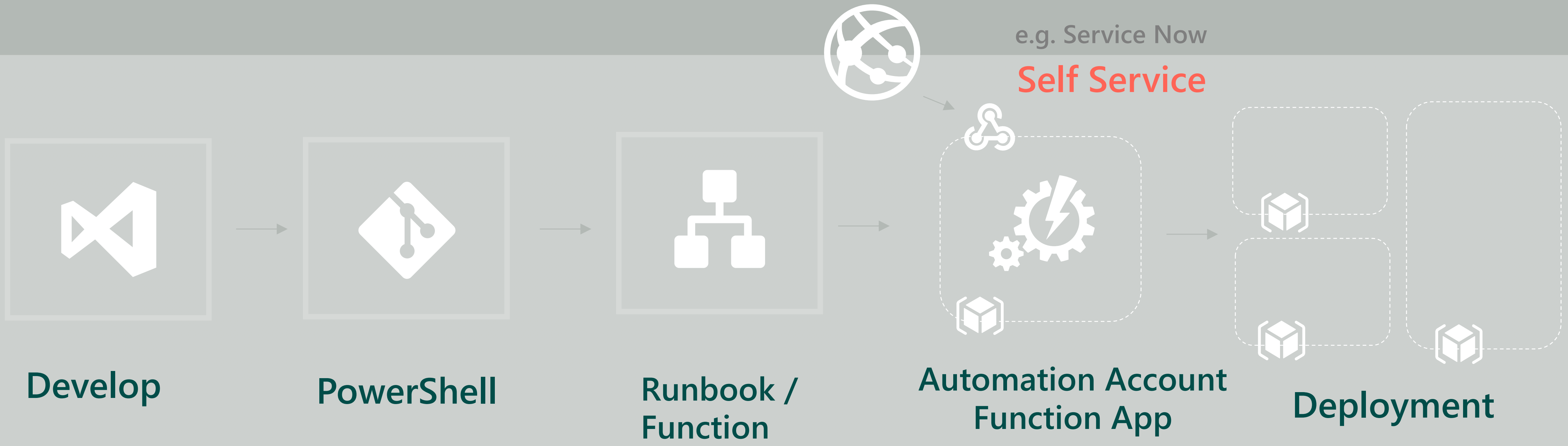
# Release: Self Service



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# DEMO

aka.ms/az.new

aka.ms/az.new/resources

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# Summary

- Visit aka.ms/az.new to review content presented
- Review aka.ms/az.new/resources to look into the sources
- Look into building a CCoE to increase quality and maturity

# Questions?

Use the conference app to vote for this session:
https://my.eventraft.com/psconfeu

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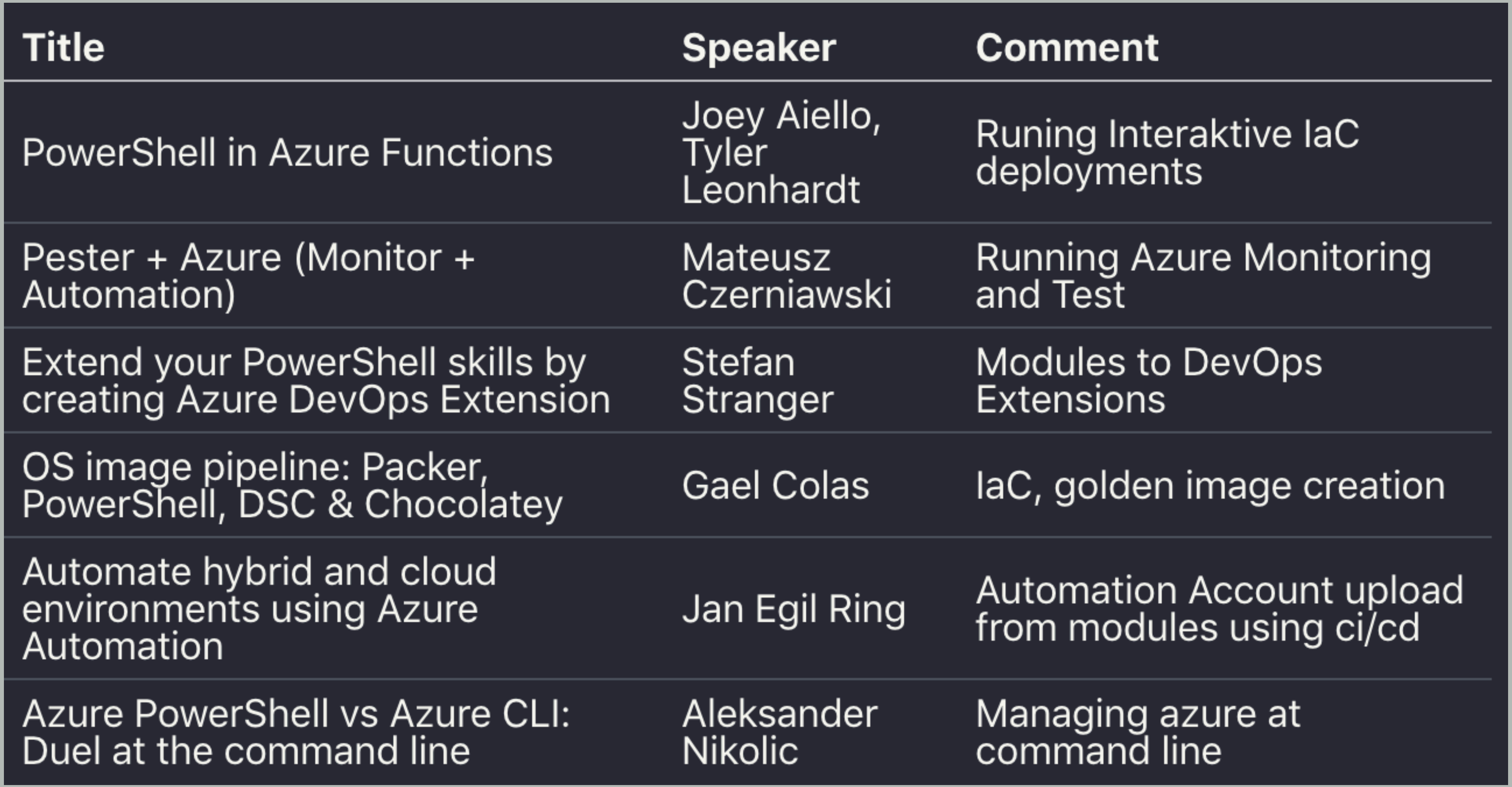
# Sessions at PSConfEU 2019



| Title | Speaker | Comment |
|---|---|---|
| PowerShell in Azure Functions | Joey Aiello, Tyler Leonhardt | Runing Interaktive IaC deployments |
| Pester + Azure (Monitor + Automation) | Mateusz Czerniawski | Running Azure Monitoring and Test |
| Extend your PowerShell skills by creating Azure DevOps Extension | Stefan Stranger | Modules to DevOps Extensions |
| OS image pipeline: Packer, PowerShell, DSC & Chocolatey | Gael Colas | IaC, golden image creation |
| Automate hybrid and cloud environments using Azure Automation | Jan Egil Ring | Automation Account upload from modules using ci/cd |
| Azure PowerShell vs Azure CLI: Duel at the command line | Aleksander Nikolic | Managing azure at command line |

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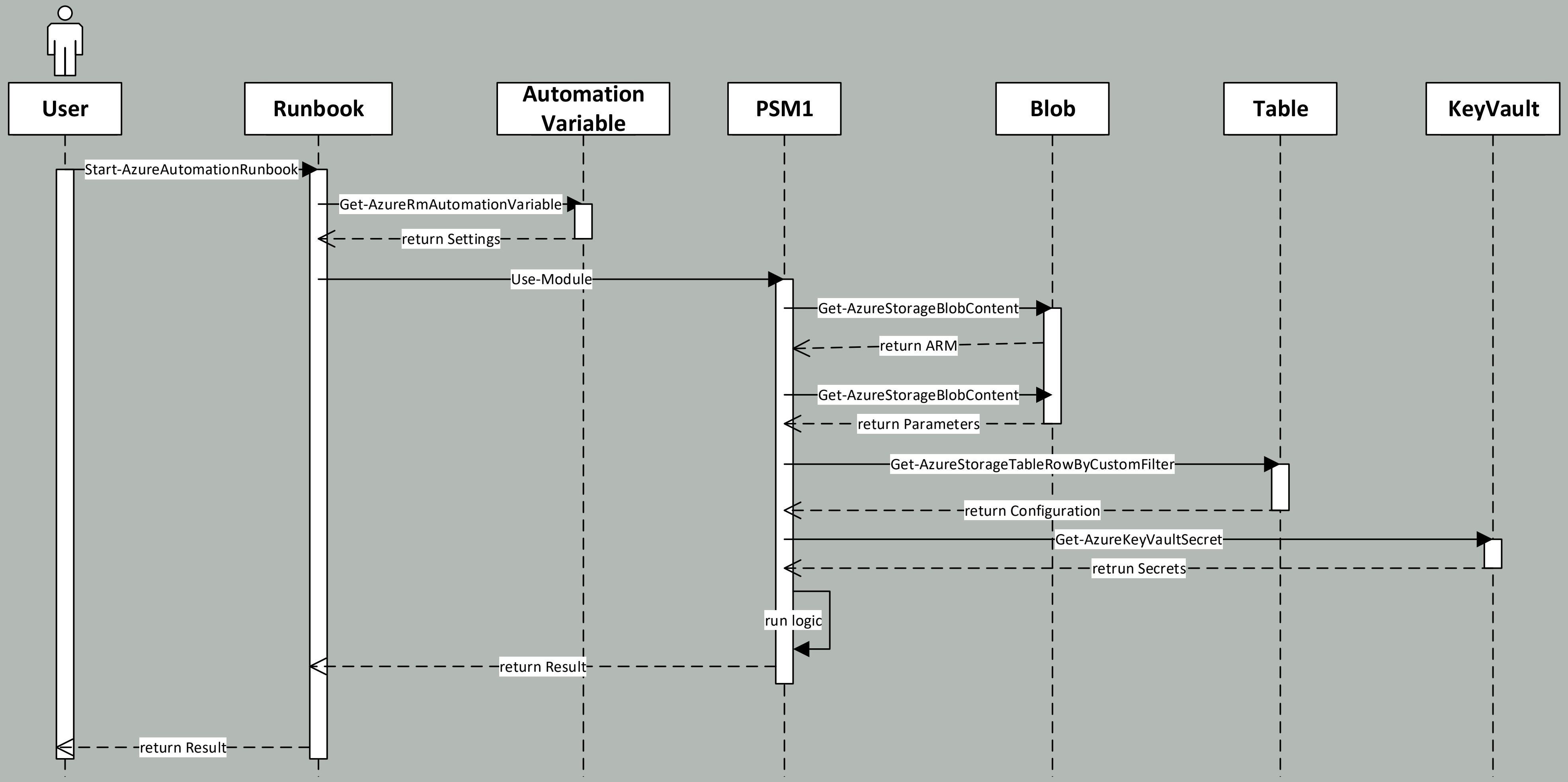
# Cloud Governance

Cloud Native

Organize Resources

Policy & Blueprints

Security Center



User

Runbook

Automation Variable

PSM1

Blob

Table

KeyVault

Start-AzureAutomationRunbook

Get-AzureRmAutomationVariable

return Settings

Use-Module

Get-AzureStorageBlobContent

return ARM

Get-AzureStorageBlobContent

return Parameters

Get-AzureStorageTableRowByCustomFilter

return Configuration

Get-AzureKeyVaultSecret

retrun Secrets

run logic

return Result

return Result

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<ComponentName>

- .vscode -- *VSCode configuration*
  - launch.json
  - settings.json -- *VSCode Code Formating*
  - tasks.json -- *VSCode Code automation tasks*
- Static -- *Static files per component like ARM templates*
  - [Configuration] -- *if more then one arm template can be used, distinguish with folders*
    - Azuredeploy.json * -- see [ARM Template Nameconvention]*
- [Classes]
- docs
  - en-US
    - about_<ComponentName>.help.txt -- *files should be generated using [PowerShell Help]*
- Public -- *Public functions of module : gets exported to user*
  - Get-<Functionname>.ps1
  - Set-<Functionname>.ps1
  - New-<Functionname>.ps1
- Private -- *Private functions of module : are for module internal use*
  - <Functionname>.ps1
- Tests -- *Pester tests : should at least contain a test per public function and tests for module*
  - <ComponentName>.Tests.ps1 -- *tests for module import*
  - Get-<Functionname>.Tests.ps1 -- *tests per public function*
  - Set-<Functionname>.Tests.ps1
  - New-<Functionname>.Tests.ps1
  - Help.Exceptions.txt *-- Exceptions of script analyzer, should be as few as possible *
  - Help.Tests.ps1 -- *tests PowerShell help existing*
  - Project.Tests.ps1 -- *tests whole PowerShell project*
  - Shared.Tests.ps1 *-- tests shared components **
- <ComponentName>.psm1 -- *dot sources all functions and exports public folder functions to user*
- <ComponentName>.psd1

# VSCode Extensions

- Formatting / Code Style
- Extension
  - PowerShell
  - Arm
  - Markdown
  - Brackets
  - LiveShare
  - Azure DevOps Integration

# Storage Account Layout

```
$StorageAccount = „centralStorage"

$Container = "template"

$ModulePath = „<My>Component"

$TemplatePath = " $ModulePath/static/azuredeploy.json„
```

```
https://<StorageAccount>.blob.core.windows.net/<Container>/<Release./<Module>/<Tem
plate>

-> https://
centralStorage.blob.core.windows.net/template/MyComponent/1.0.0/azuredeploy.json
```

```
-> https:// centralStorage.blob.core.windows.net/template/MyComponent/1.0.0/azuredeploy.json
-> https://
centralStorage.blob.core.windows.net/template/MyComponent/1.0.0/nestedtemplates/Provider.ResourceType.js
on
-> https:// centralStorage.blob.core.windows.net/template/MyComponent/1.0.0/scripts/customscript.ps1
```

# about_Speaker

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Microsoft

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