

The Power of DevOps in the Real World – DevOps at Microsoft



Randy Pagels

Sr. Cloud Solution Architect | Developer Advocate
Microsoft US Healthcare & Life Sciences

Mark your Calendars



Microsoft Ignite

October 12-14, 2022

Register Now!

<https://ignite.microsoft.com/>

Explore the latest tools, training sessions, technical expertise, networking opportunities, and more.

Focus Areas

- Empower everyone for a new world of hybrid work
- Innovate anywhere from multicloud to edge
- Reimagine a new era of business
- Protect everything with end-to-end security

Exciting announcements about Azure DevOps and GitHub!

GitHub Universe 2022

FREE Registration

<https://www.githubuniverse.com/>

November 9-10, 2022 PDT — Streaming Everywhere

The global developer event!!!

On Demand

Wherever you are on your GitHub journey, our stacked catalog of on demand sessions will help you dive deeper. Register for free access to the full library.

Interactive

Get hands on with the people who write the code that helps you build what you want through demos, Q+As, and roundtables. Register for free to save your spot.



.NET Conf 2022

FREE Registration

<https://www.dotnetconf.net/>

November 8-10, 2022 — Streaming Everywhere

The global .NET 7 launch!!!

Day 1

Day one is all about the big news, .NET 7!

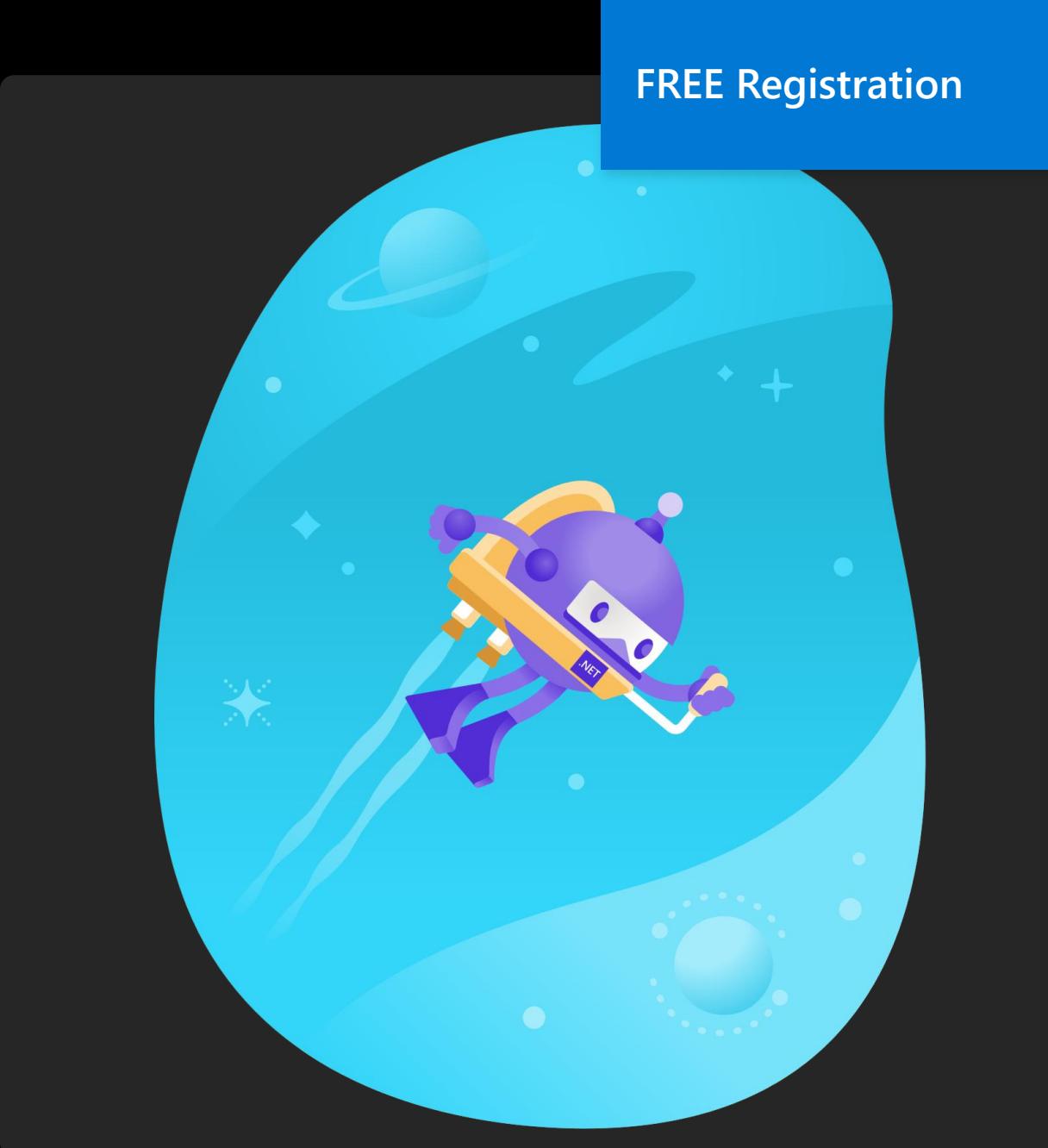
Day 2

Day two is where we dive deeper into all the things you can do with .NET.

Day 3

Day three continues our all day and night broadcast with speakers around the world.

Join the biggest .NET virtual event on the planet!!!



Real-life Disaster Story



Hmmm... can't reach this page

Check if there is a typo in app-hdc-demo-dev.azurewebsites.net.

If spelling is correct, [try running Windows Network Diagnostics.](#)

DNS_PROBE_FINISHED_NXDOMAIN

Refresh



Home >

rg-hdc-demo-dev



Resource group

Directory: Microsoft



Search



Create



Manage view



Delete resource group



Refresh



Export to CSV



Open query



Assign tags



Move



Overview

Activity log

Access control (IAM)

Tags

Resource visualizer

Events

Settings

Deployments

Security

Policies

Properties

Locks

Cost Management

Cost analysis

Cost alerts (preview)

Budgets

Advisor recommendations

Essentials

View Cost | JSON View

Resources Recommendations

Filter for any field...

Type equals all XLocation equals all X

Add filter

Showing 0 to 0 of 0 records. Show hidden types i

No grouping

List view

Name ↑↓

Type ↑↓

Location ↑↓



No resources match your filters

Try changing or clearing your filters.

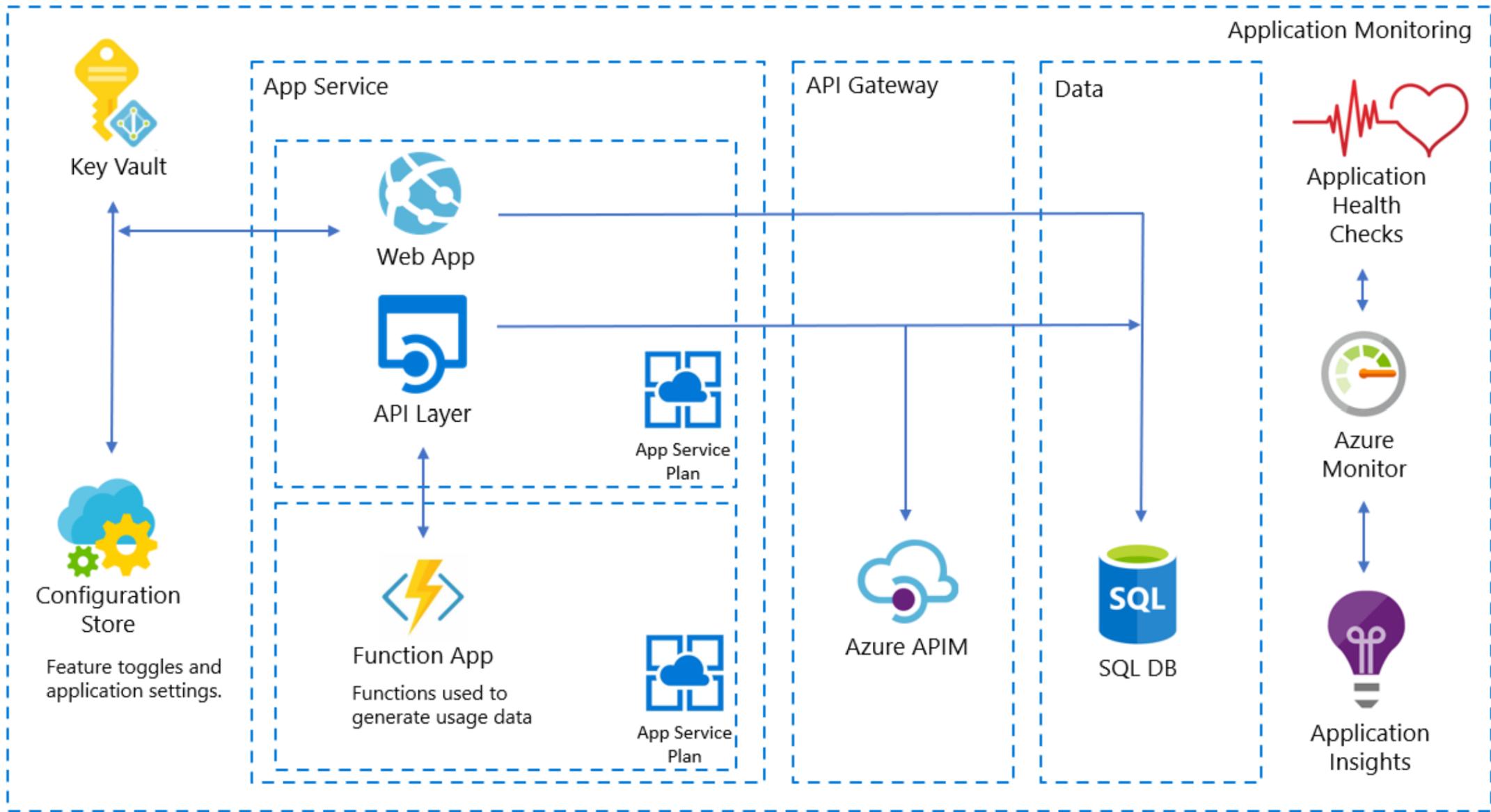
Create resources

Clear filters

Learn more

Give feedback

Application Architecture



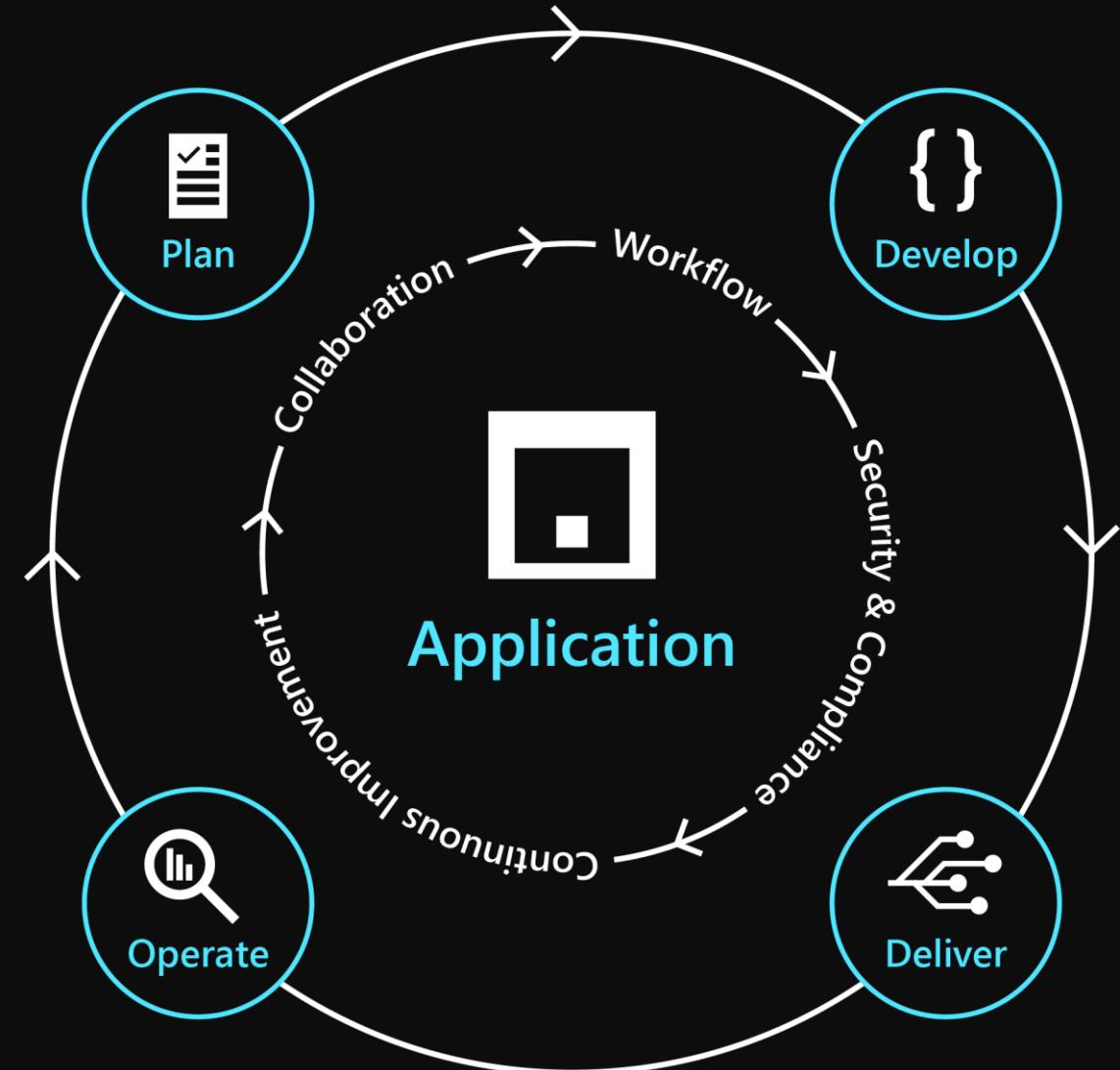
Kick off Deployment Pipeline

What is DevOps?

“

DevOps is the union of **people**,
process, and **products** to
enable continuous delivery of
value to your end users.”

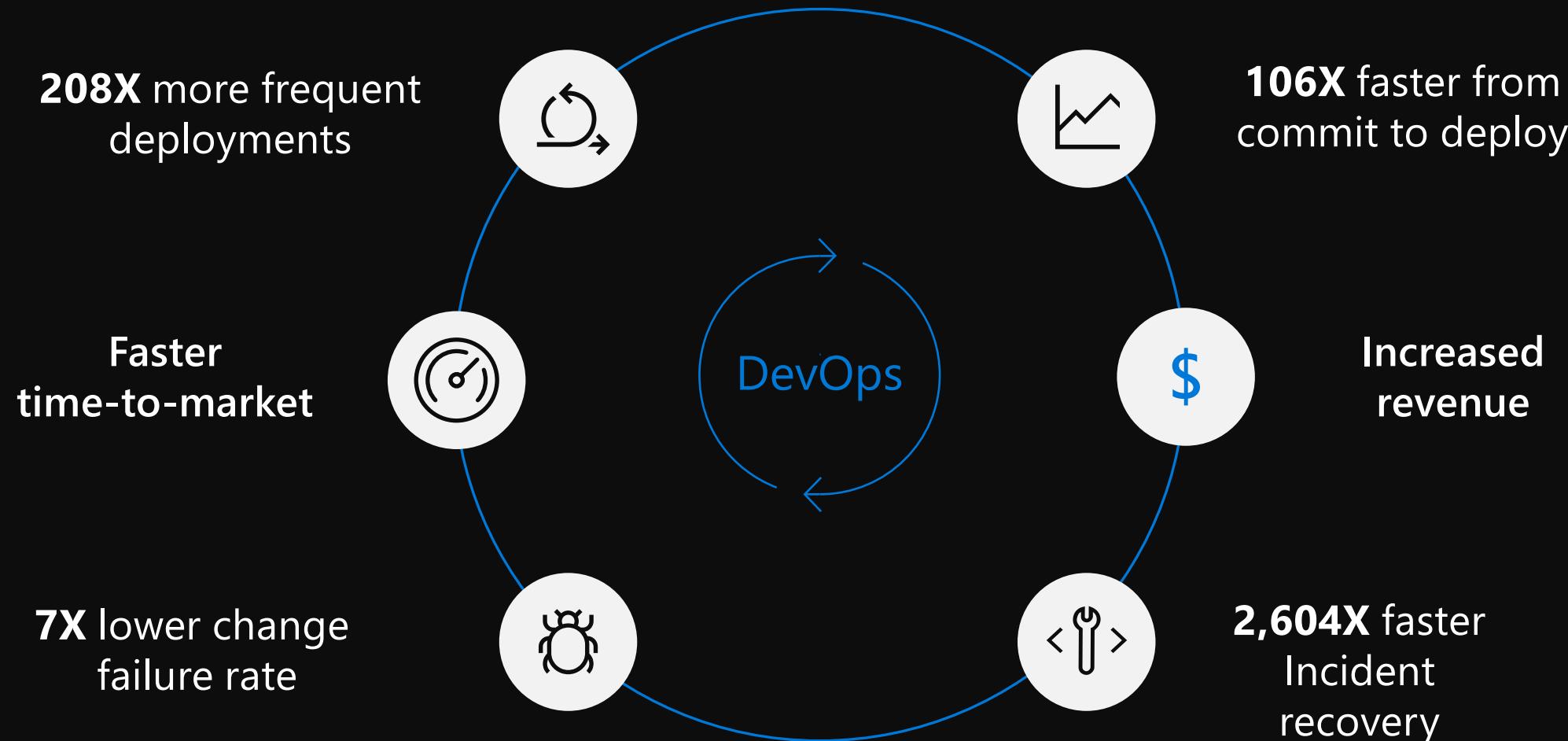
- Donovan Brown



Why is DevOps important?

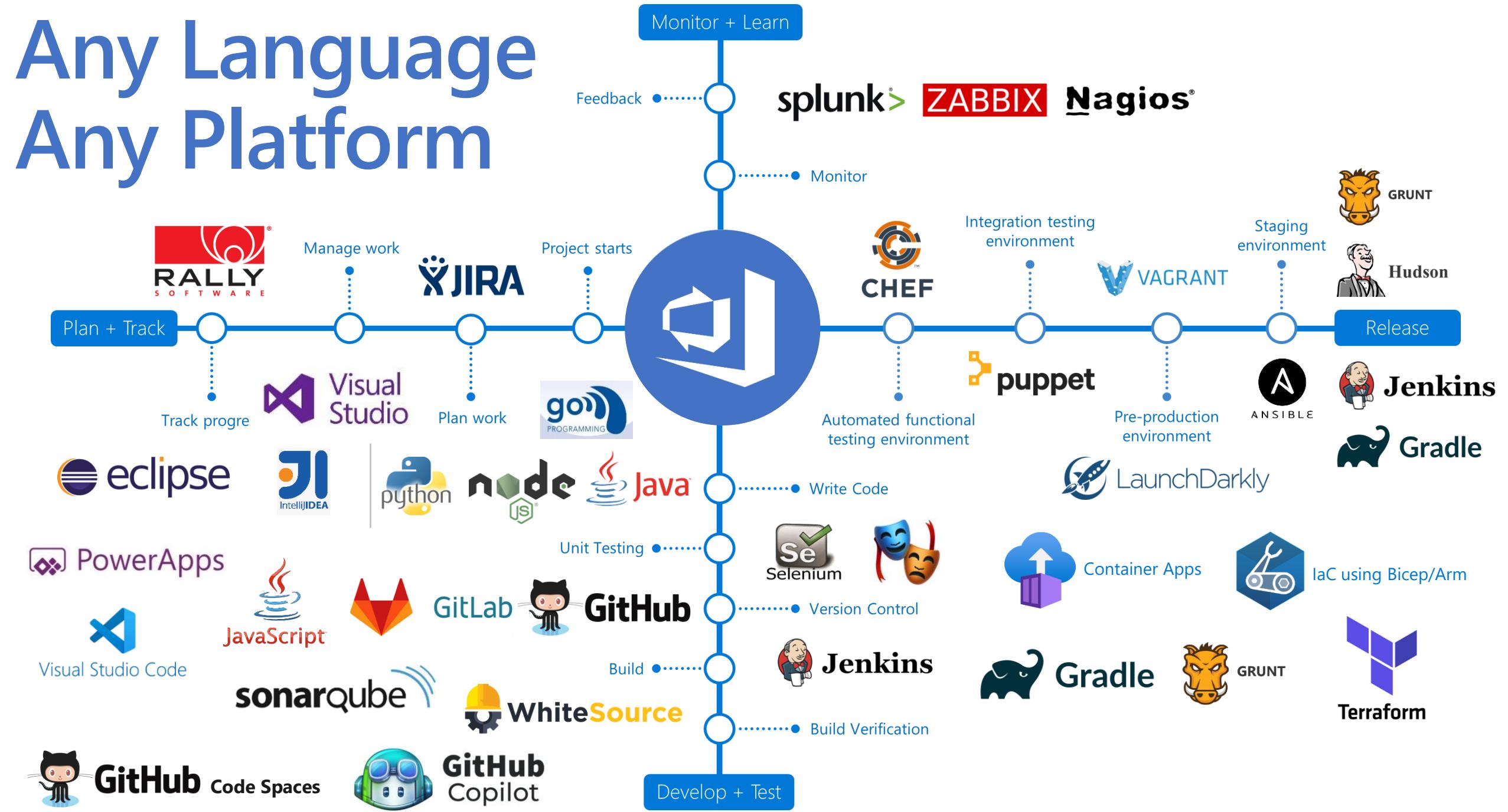
- Your competition is already doing this
- Increase velocity
- Reduce downtime
- Reduce human error

High performance DevOps companies achieve...



Source: 2019 Accelerate State of DevOps Report by DORA and Google Cloud DevOps & SRE

Any Language Any Platform



Azure DevOps



Azure Boards

Deliver value to your users faster using proven agile tools to plan, track, and discuss work across your teams.



Azure Pipelines

Build, test, and deploy with CI/CD that works with any language, platform, and cloud. Connect to GitHub or any other Git provider and deploy continuously.



Azure Repos

Get unlimited, cloud-hosted private Git repos and collaborate to build better code with pull requests and advanced file management.



Azure Test Plans

Test and ship with confidence using manual and exploratory testing tools.



Azure Artifacts

Create, host, and share packages with your team, and add artifacts to your CI/CD pipelines with a single click.



<https://azure.com/devops>

DevOps In The Real World



Real World Apps



- Microservice Based
- ASP.NET / WinForms / IoT
- SQL Server DB / CosmosDB
- API Gateway Management
- Secured Secret Management
- App Configuration Management
- Feature Flag Management
- REST API 's – Containers >>> Kubernetes
- iOS and Android Mobile App

Real World Problems in Apps

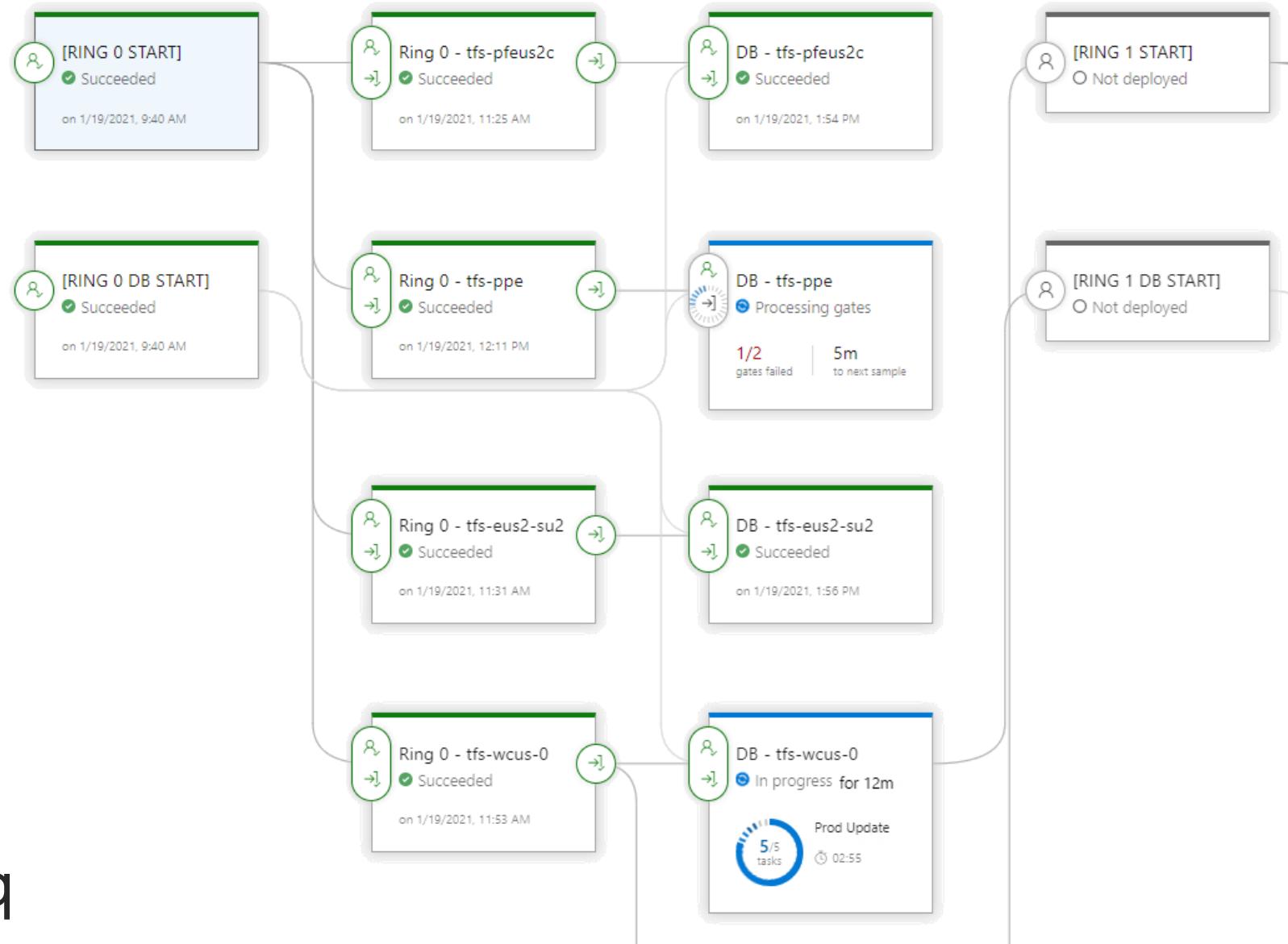


- Not ready for real microservice deployments
- Infrastructure is painful to spin up and configure
- Microservice architecture is difficult to join under single url
- Schema changes - Database DevOps
- Testing on Multiple devices - Mobile DevOps
- Maintaining Quality
- Security In DevOps (DevSecOps)
- Connection String and Keys management Secrets
- Setting up DNS
- Setting up HTTPS and Certificates

DevOps Nirvana



Blog part 1
<https://aka.ms/AAh5enq>



One Engineering System ("1ES")

There cannot be a more important thing for an engineer, for a product team, than to work on the systems that drive our productivity.

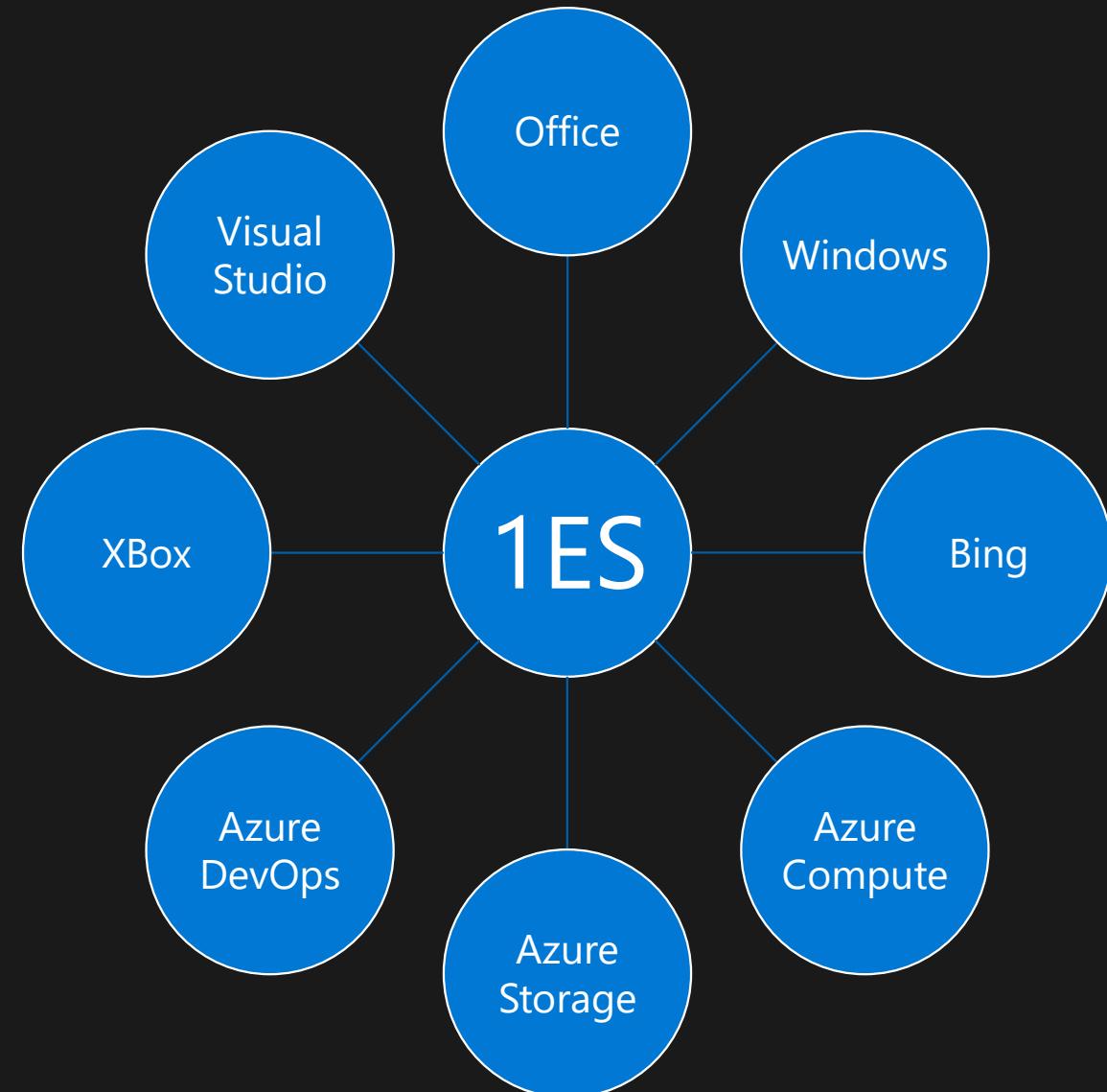
So I would, any day of the week, trade off features for our own productivity.

I want our best engineers to work on our engineering systems, so that we can later on come back and build all of the new concepts we want.

- Satya Nadella



One Engineering System Landscape



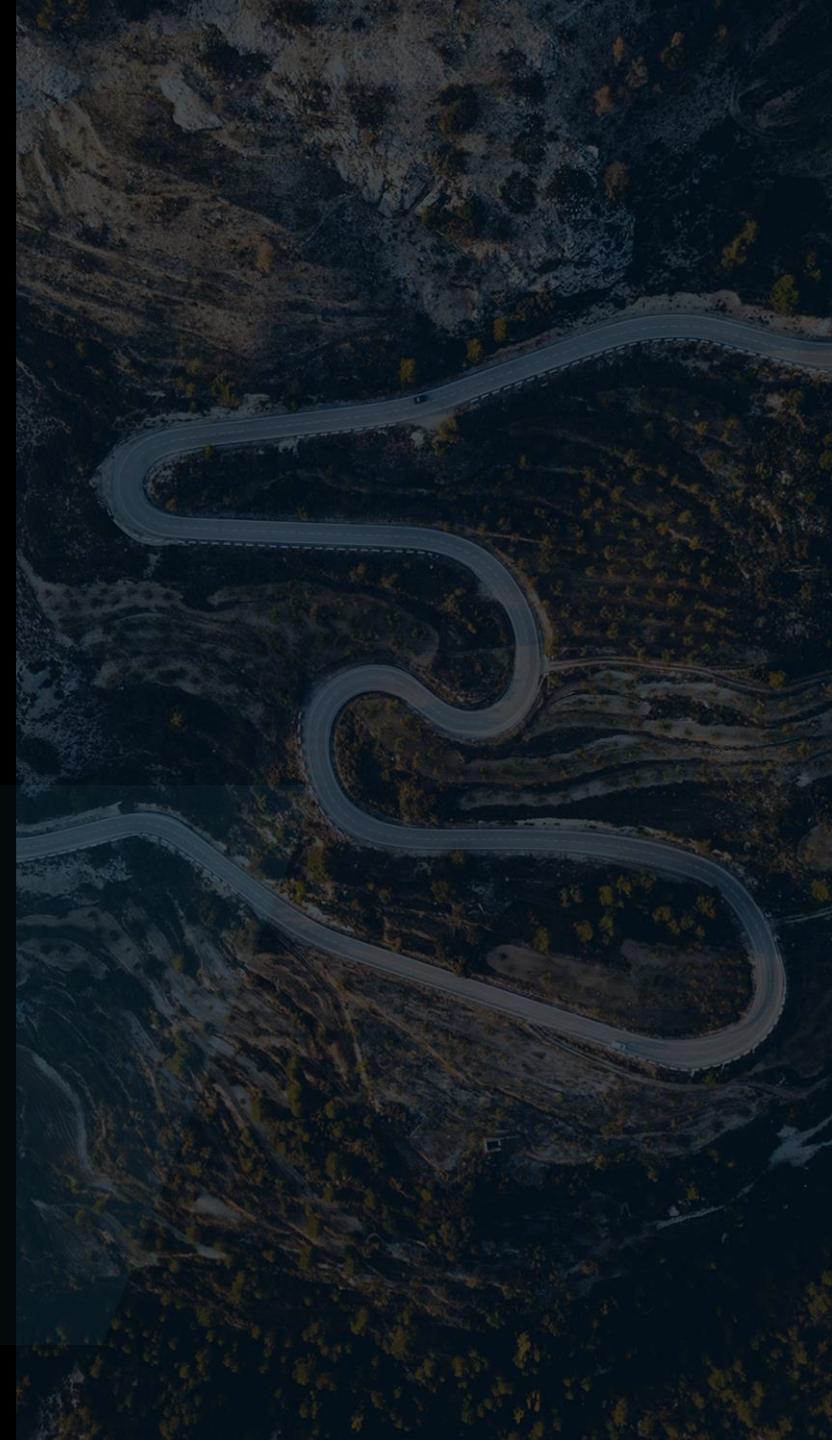
What we've done throughout our DevOps journey

Changed our definition of done

We rely on the Idea to Data (I2D) method, which involves updating our key performance indicators (KPIs) and collecting telemetry to continually measure the value our products bring customers.

Adopted a production-first mindset

Engineering teams own the entire lifecycle of a feature, from inception through operation. As issues or incidents arise, engineering teams are responsible for owning the customer response.



DevOps at Microsoft

Azure DevOps is the toolchain of choice for Microsoft engineering with over 110,000 internal users

→ <https://aka.ms/DevOpsAtMicrosoft>

185K

Monthly Engaged
Users (MEU)

15.4M

Builds per month

2.2M

Work items
created per month

3M

Test runs per day

5.5M

Git commits
per month

457K

Pull Requests
complete per month

5.6M

Work items
revised per month

6.5M

Releases per month

The journey



TFS
2005



TFS
2008



TFS
2010



TFS
2012



TFS
2013

TFS
U1

TFS
U2

TFS
U3

TFS
U4

TFS
U5

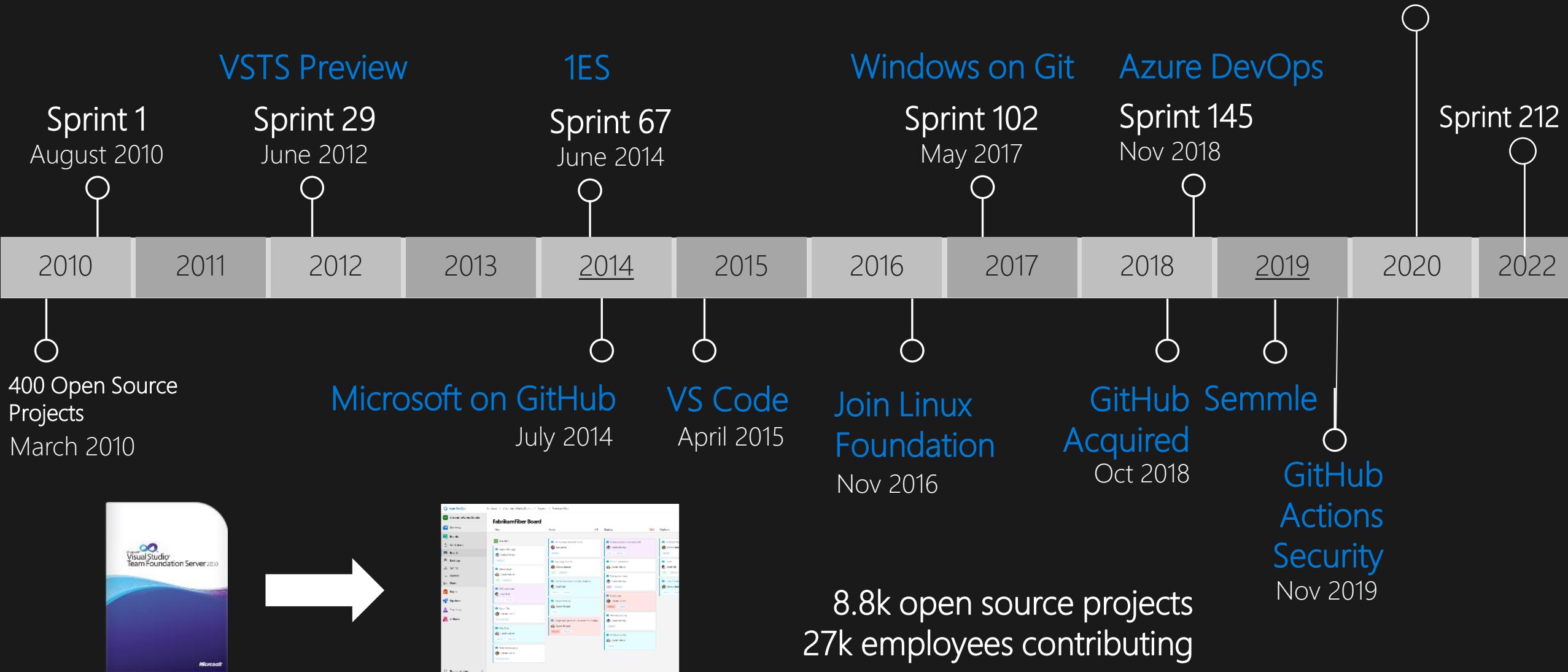


TFS
2015

Visual Studio

The Azure DevOps Journey

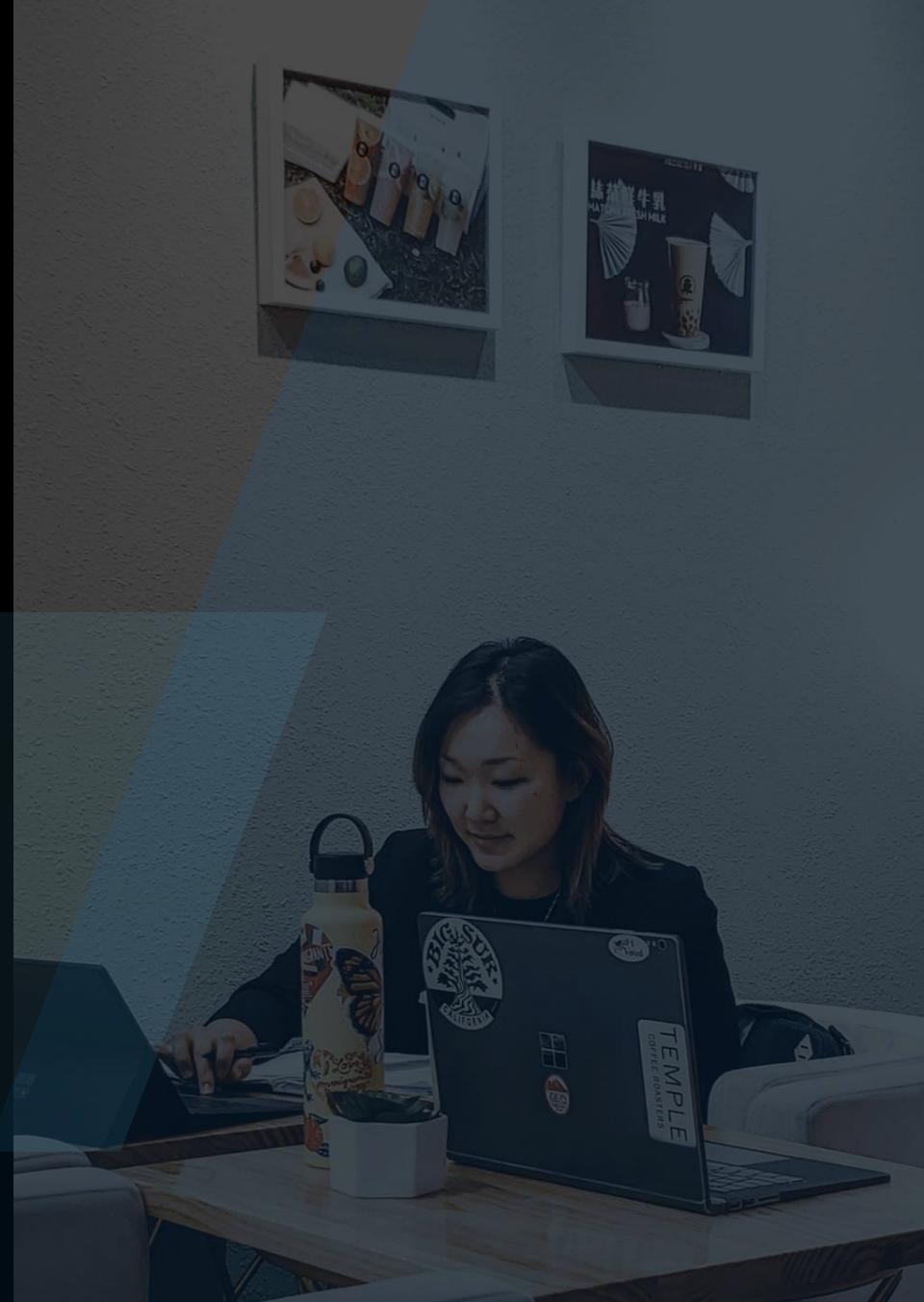
105K employees engaged
85K deployments/day
Sprint 179
December 2020



Change your definition of done

Ensure products are live in production and collecting feedback

- ⌚ Products are collecting telemetry data that examines the hypothesis that motivated the deployment.
- ⚙️ Gather information and making incremental changes is key to improvement.
- 🔍 Treating the goal as a question rather than a statement of fact motivates developers to continue testing their ideas.



Change your definition of done

Take a zero-distance approach by listening to your customers

Forums and social

Automatically feed data into the work item tracking system

Gathering customer feedback early and often is key to building empathy between engineers and customers.

The image shows a tablet screen with two forum interfaces side-by-side. On the left is the Microsoft Azure MSDN Forum, which features the Microsoft logo and navigation links like Overview, Solutions, Products, Documentation, Pricing, Training, Marketplace, Partners, Support, Blog, and More. It also has a 'Free account' button. The forum lists several questions under categories Most Recent, Popular, and Trending. One question is about running a DHCP server in an Azure VM. On the right is the StackOverflow interface, which includes the Stack Overflow logo and similar navigation links. It lists questions such as migrating Application Insights, enforcing TLS 1.2, performing cold backups on Azure VMs, and renaming Azure Data Lake Storage accounts. Both forums include 'View forum >' and 'Ask question >' buttons at the bottom. At the very bottom of the tablet screen, there are logos for Serverfault and Azure Feedback.

Change your definition of done

Eliminate unhelpful KPIs

Here are a **list of things we don't watch:**



Original estimate



Completed hours



Lines of code



Team capacity



Team burndown



Team velocity



of bugs found

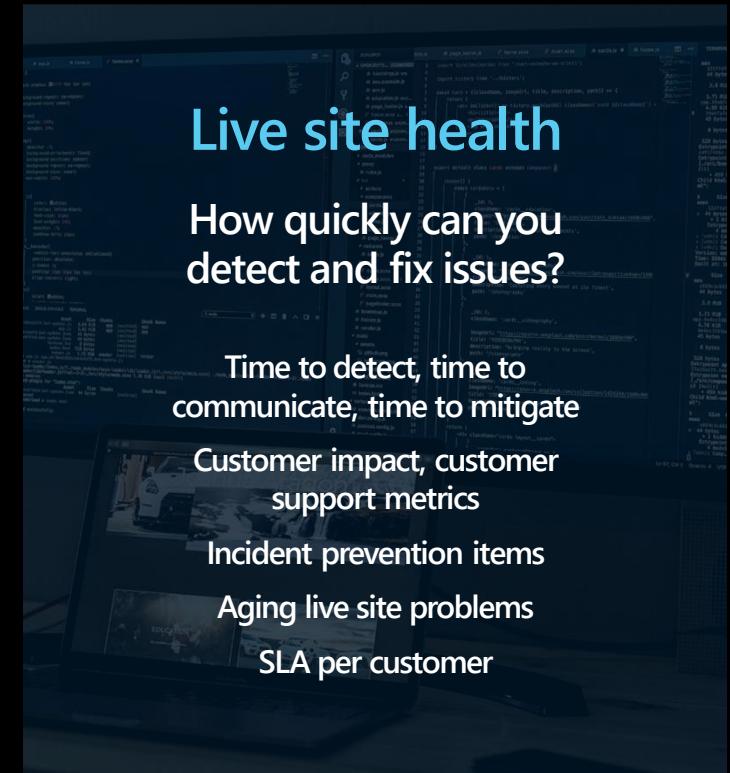
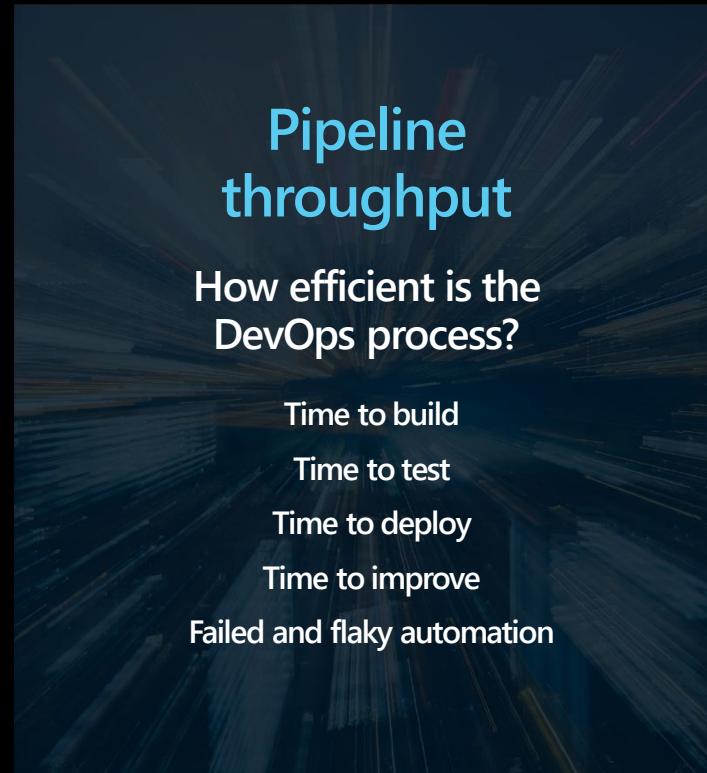
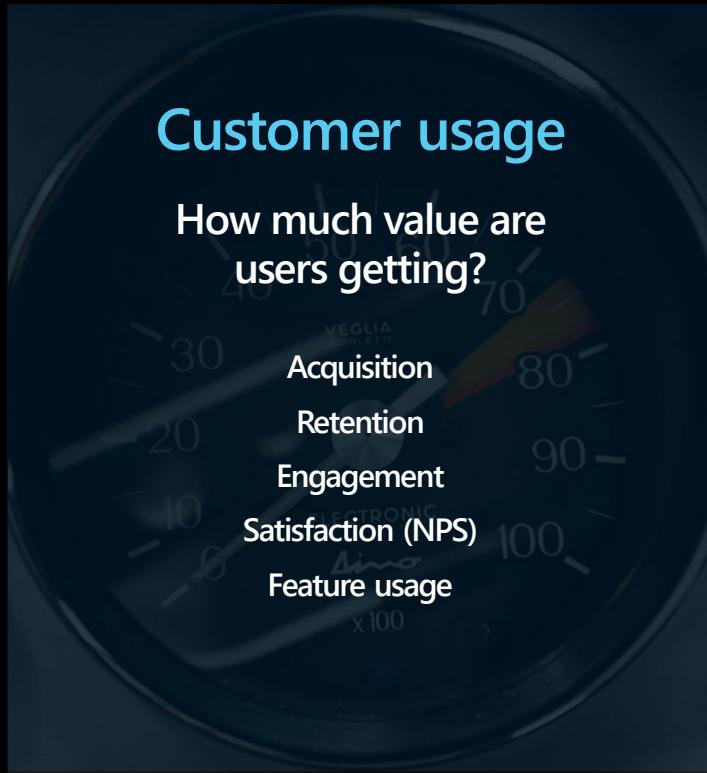


% code coverage

Change your definition of done

Change what you track

Focus on measuring only the most critical and impactful KPIs:

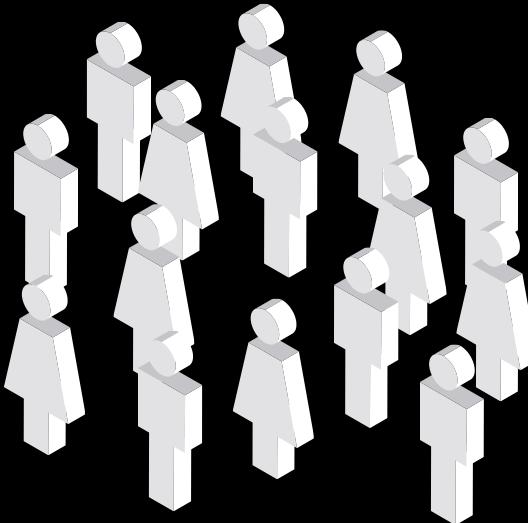


Evolve to full stack teams

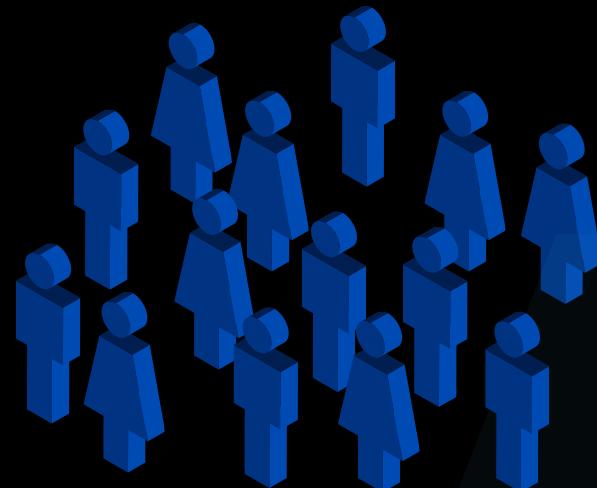


Adopt a product-centric mindset

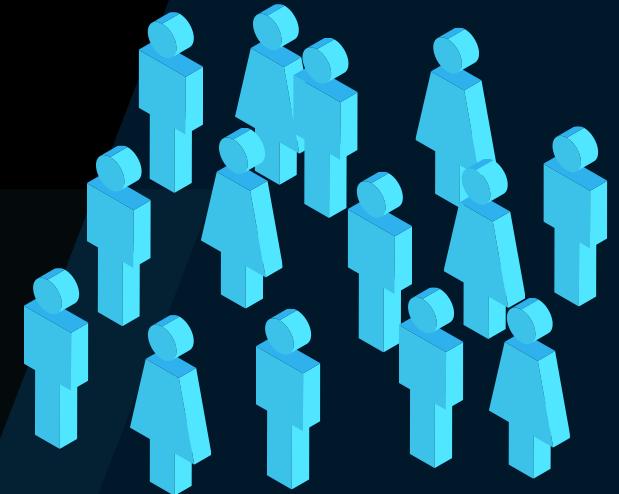
Evolve the organization



Program
management



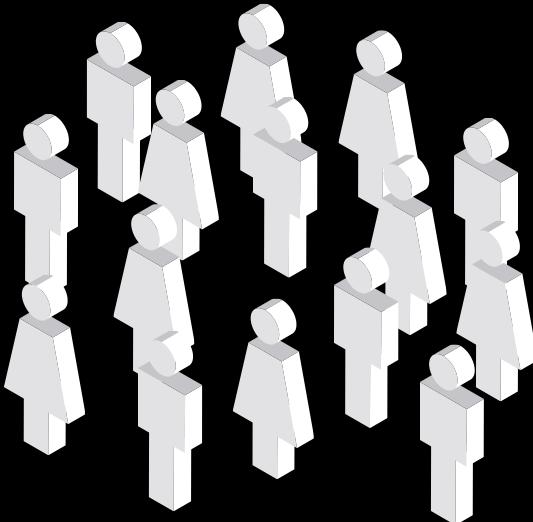
Development



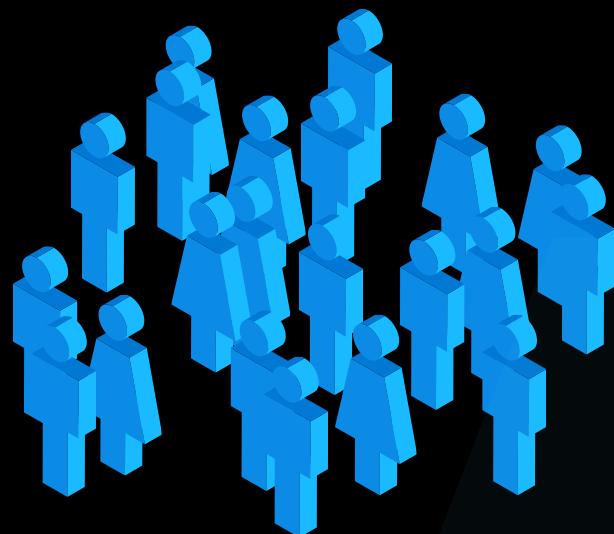
Testing

Adopt a product-centric mindset

Evolve the organization



Program
management



Engineering



Ops/SRE

Adopt a product-centric mindset

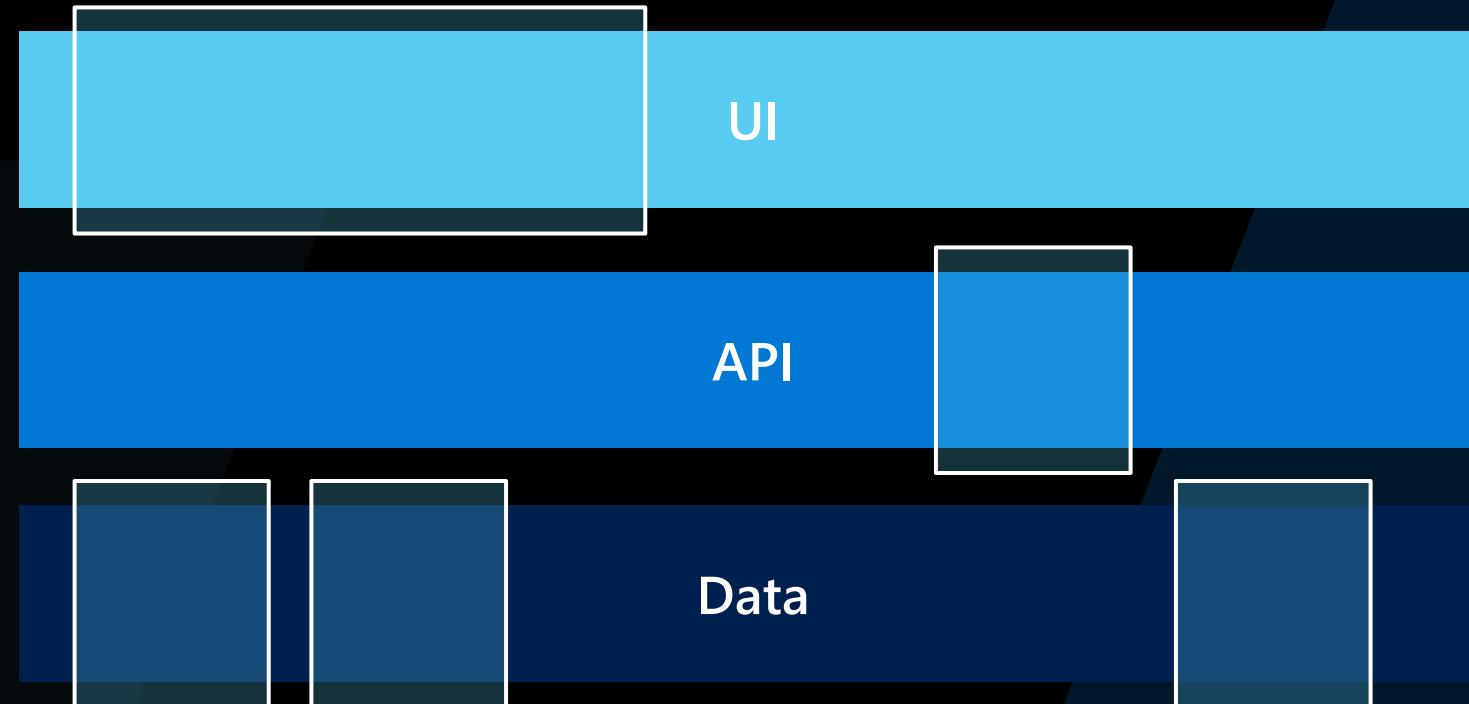
Evolve the organization



Feature team

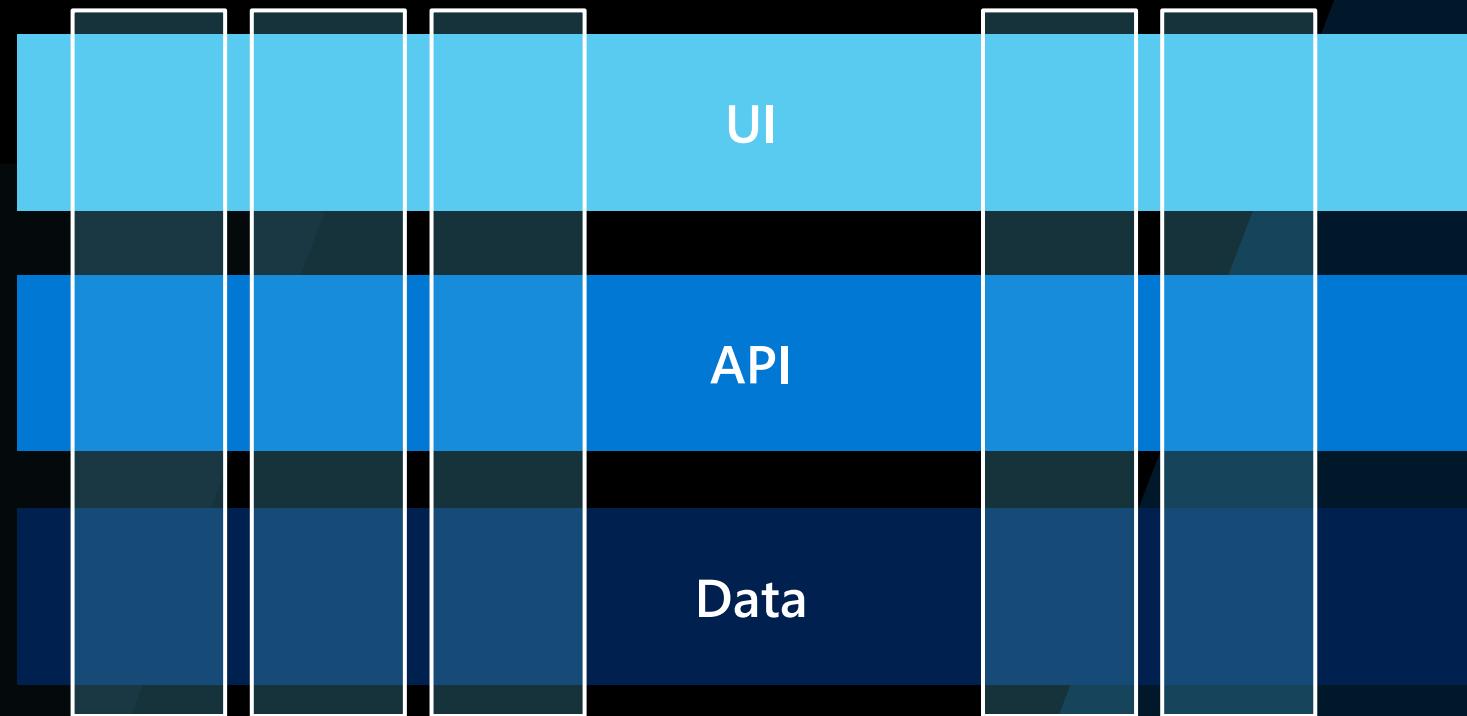
Adopt a product-centric mindset

Instead of horizontal...



Adopt a product-centric mindset

We strive for vertical



Evolve to full stack teams

Evolution of full stack teams

Physical team rooms (augmenting remote workers)

Cross discipline

1 engineering lead + 1 product owner

10–12 engineers

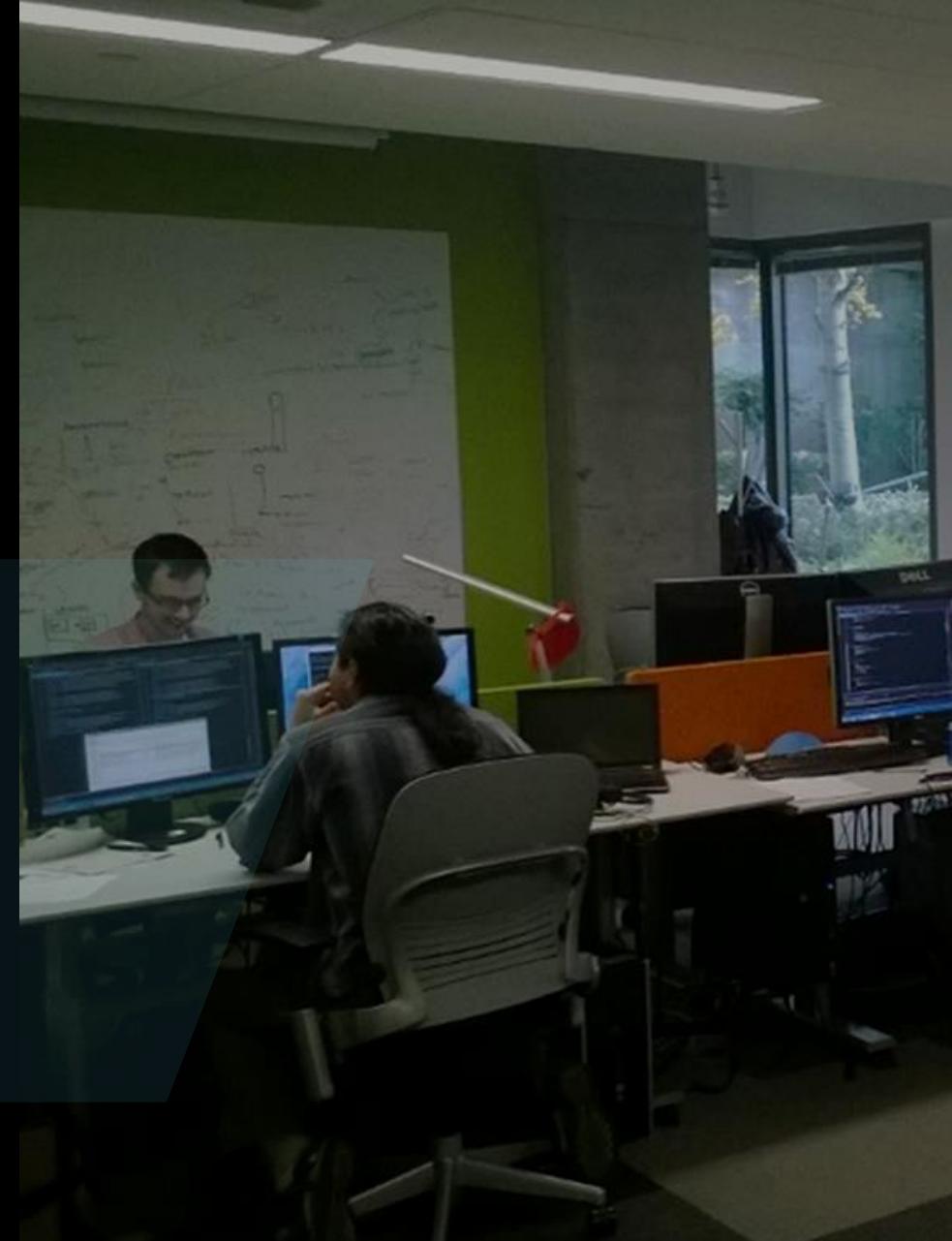
Self managing

Clear charter and goals based on OKRs

Intact for 12–18 months

Own features in production

Own deployment of features



Evolve to full stack teams

Self forming teams

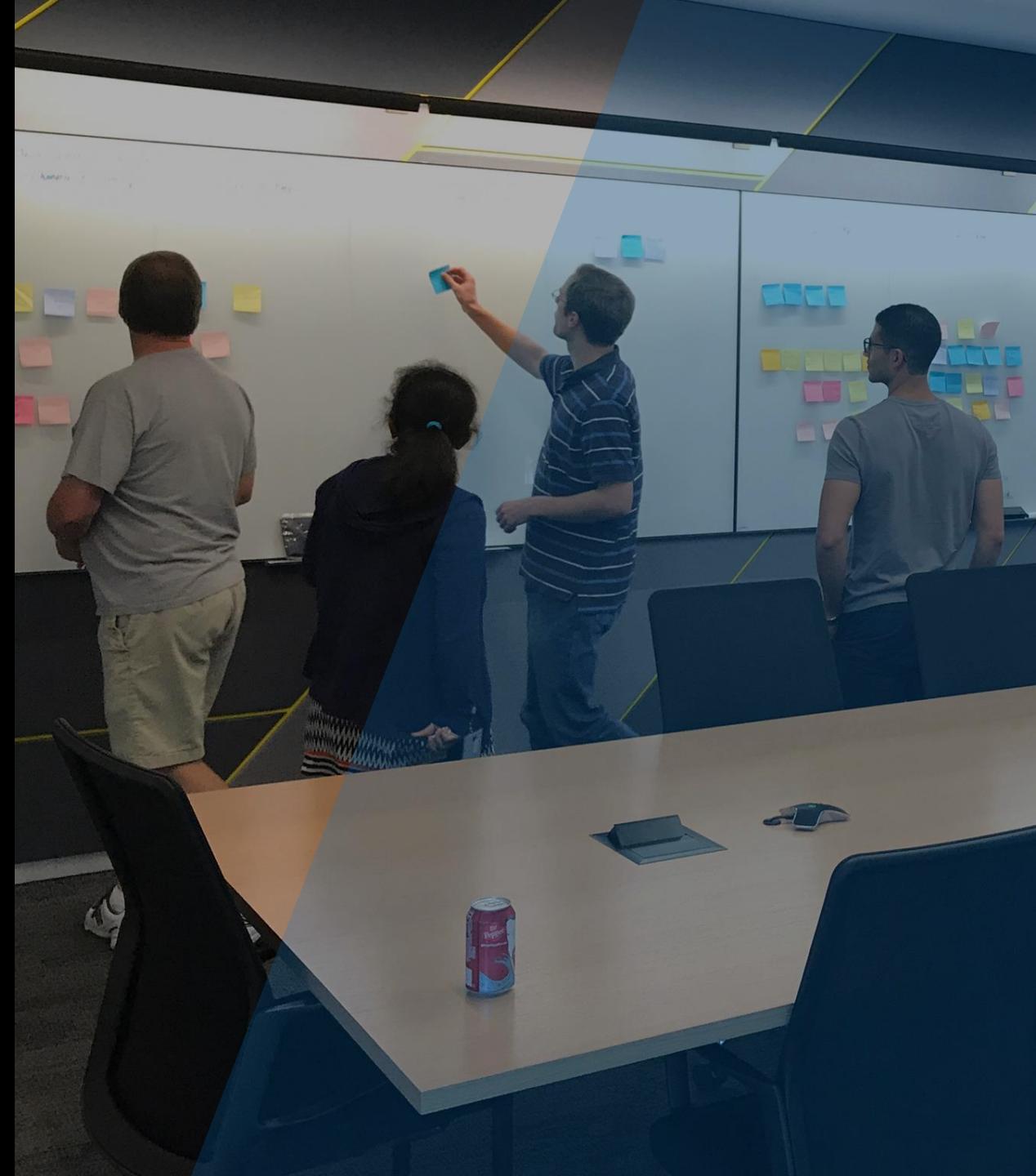
Opportunity to change team without formal interviews or top down re-org

Unique approach within Microsoft

Typically <20% changes, but 100% get a choice

Create opportunities for everyone to learn new things

Cross-pollinate teams and micro-culture



Build for resiliency

Be transparent

Expose live-site incidents to customers and create ways to keep them informed.

Notify customers

Show customers service health and clearly document post-incident review.

The screenshot shows the Microsoft Azure Status page. At the top, it displays "Azure status" and "Last updated 36 seconds ago". Below this, there's a link to "Go to Azure Service Health". On the right side, there are "HELPFUL LINKS" including "Status history & Root Cause Analysis (RCAs)", "Set up automatic service health alerts", and "Service Level Agreements (SLAs)". A "Refresh every" dropdown menu is set to "2 minutes". At the bottom, there's a legend for service health: "Good" (green checkmark), "Information" (blue exclamation mark), "Warning" (orange triangle), and "Critical" (red X). The main content area shows a grid of regions and services. The "Americas" region is highlighted in blue. Other regions include Europe, Asia Pacific, Middle East and Africa, Azure Government, and Azure China. Under the "COMPUTE" category, "Virtual Machines" is listed with a green checkmark in all regions, while "Azure VMware Solution by CloudSimple" has a green checkmark in the West US and South Central US regions.

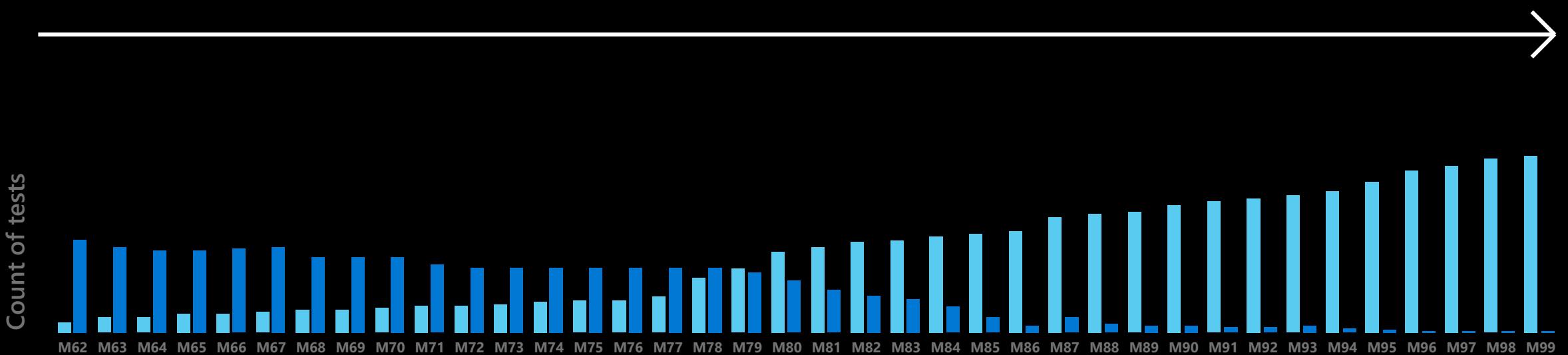
Region	Americas	Europe	Asia Pacific	Middle East and Africa	Azure Government	Azure China
Virtual Machines	✓	✓	✓	✓	✓	✓
Azure VMware Solution by CloudSimple		✓				✓

Change how you collaborate, develop, and deliver

Drive toward automation

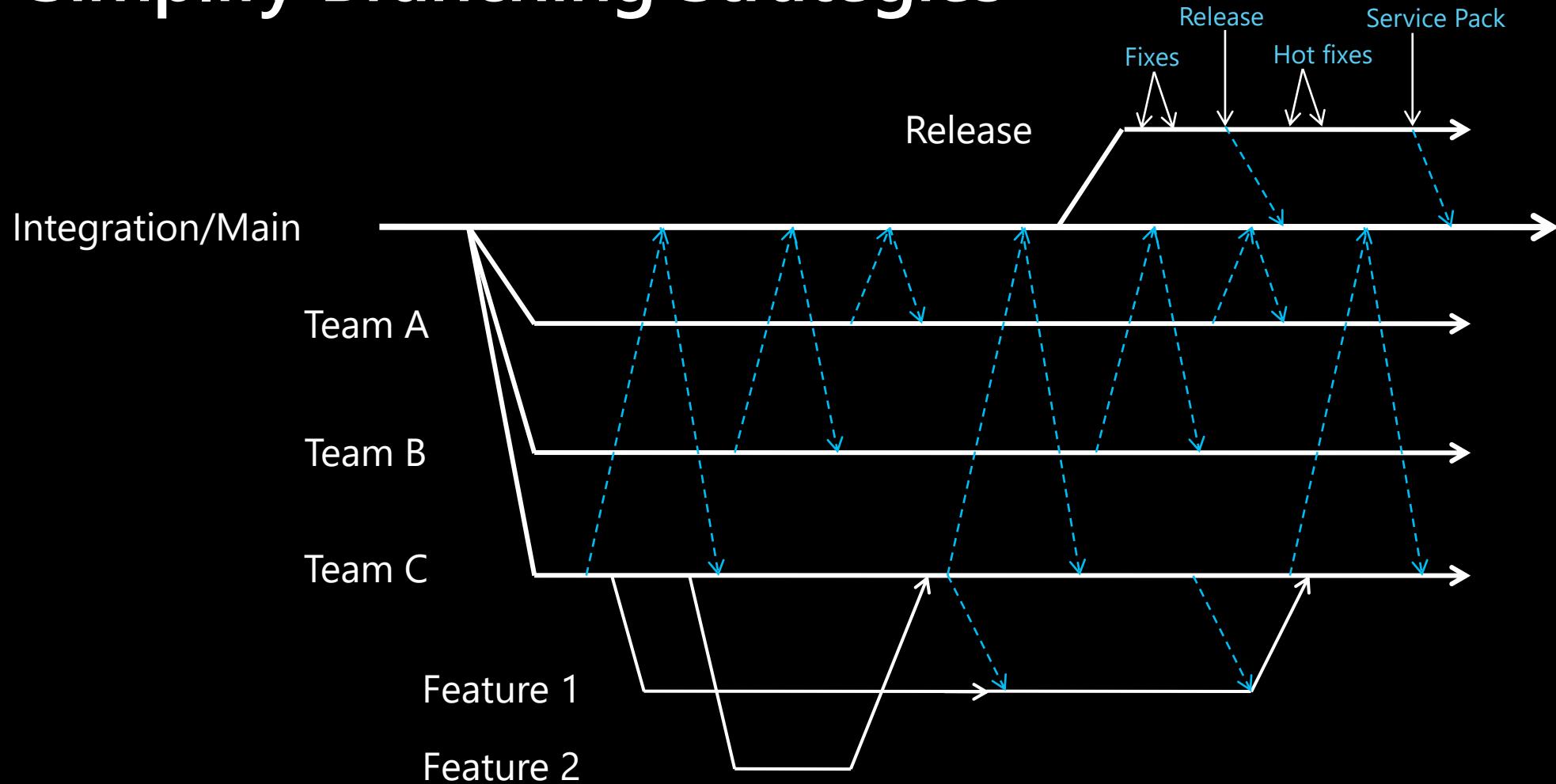
Long running
functional tests

Shifted to unit tests from
automated functional tests



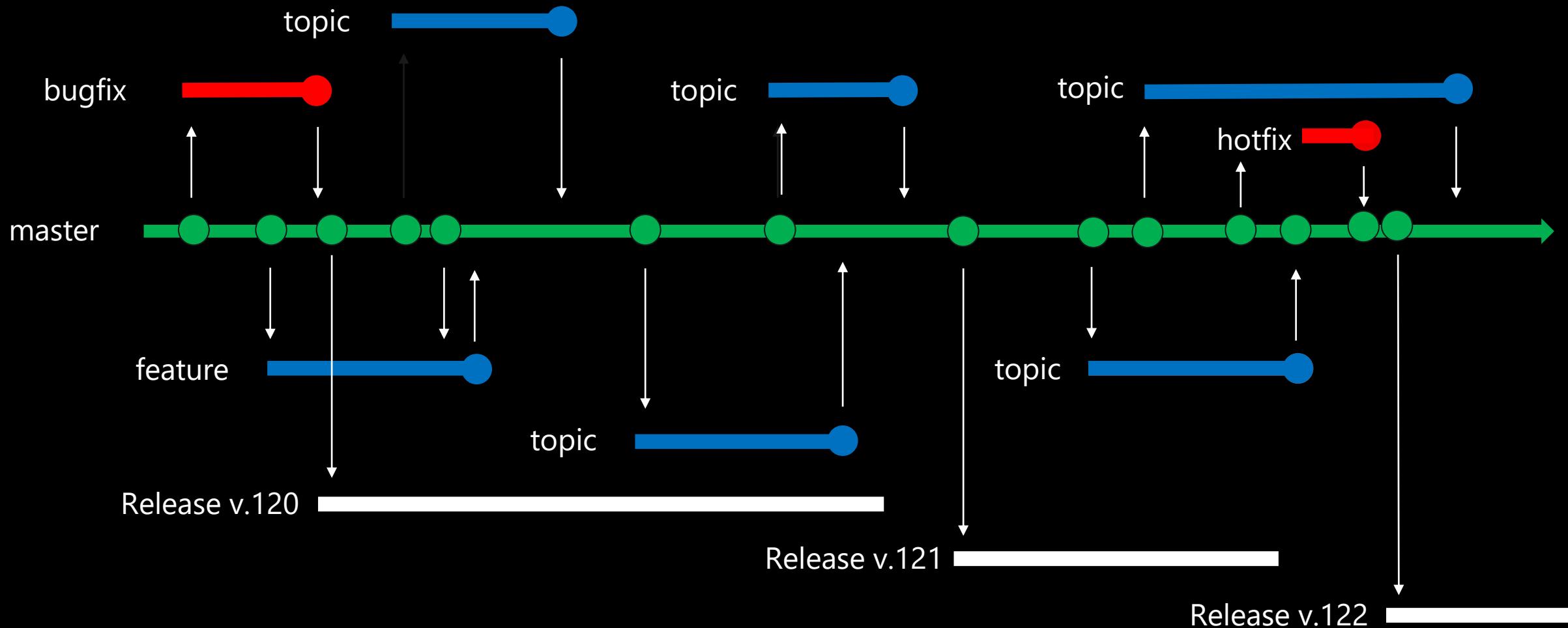
Composing Isolation Mechanisms

Simplify Branching Strategies



Using Trunk Based Development to avoid Merge Debt

Release Flow



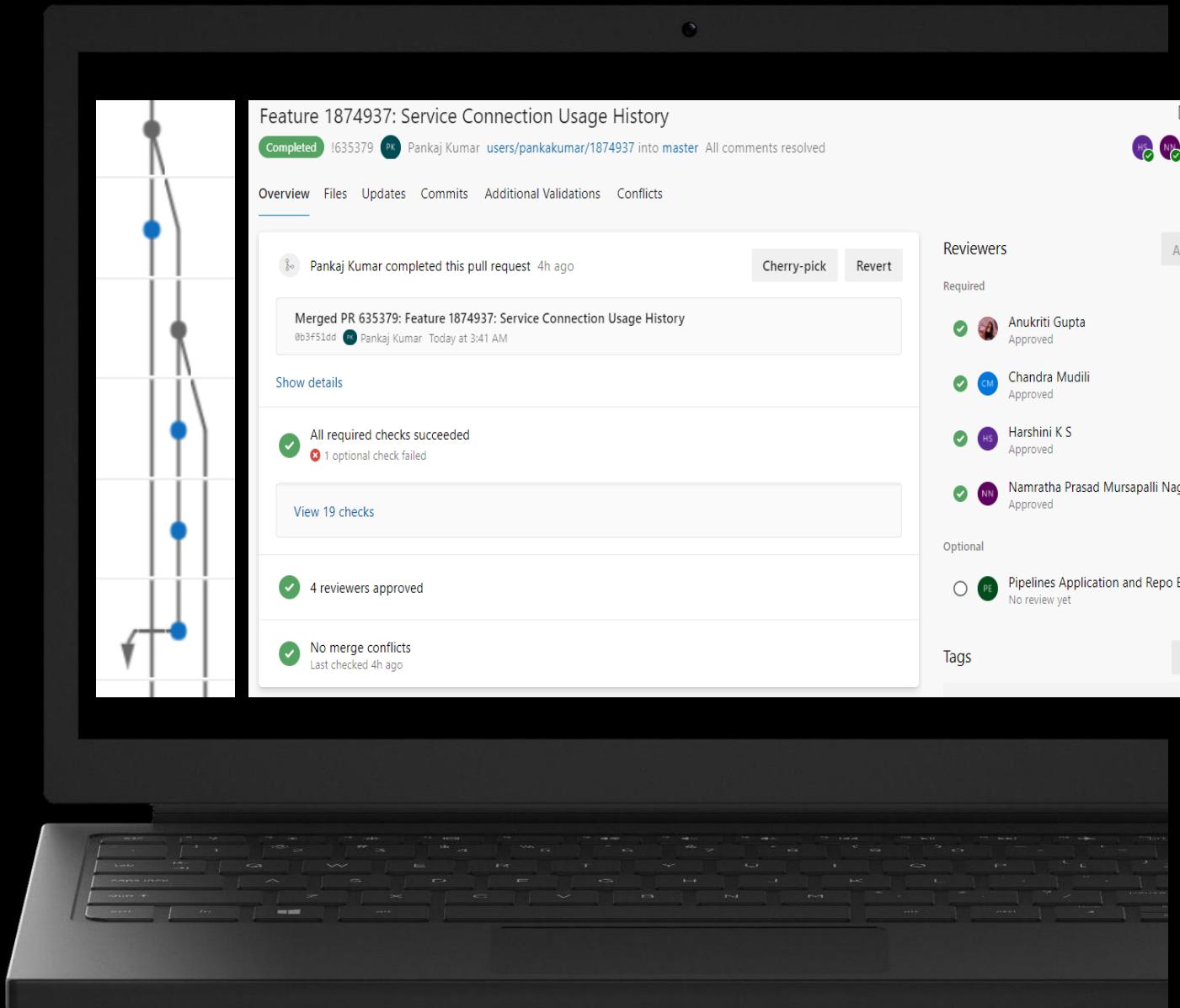
Change how you collaborate, develop, and deliver

Utilize pull requests

Control changes

Pull requests are the first gate to control how changes get merged to the master.

Limit human error and ensure only high-quality code gets merged with detailed permissions, policies, and status checks.



Change how you collaborate, develop, and deliver

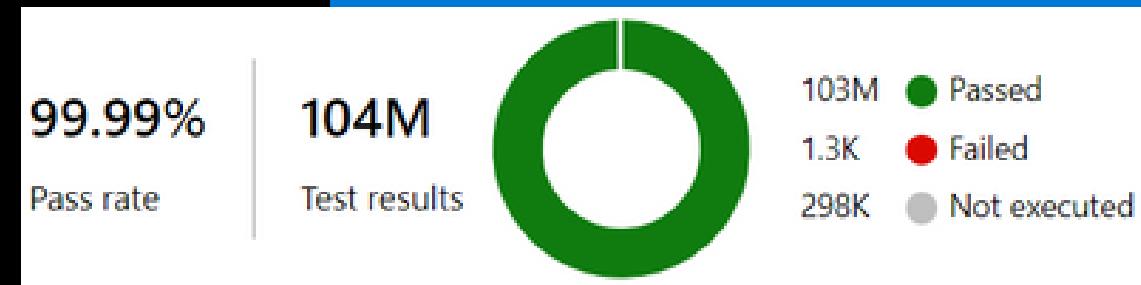
**Green means green,
red means red**

Test control whether PR can merge to the master branch

Core tests run before pull request is merged with a 100% pass required to advance.

Rolling tests continue to run in production.

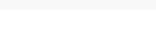
ADO Unit Tests in the pipeline for past 14 days



Summary Tests Releases Extensions 1ES Test Dogfood Scans

Summary

1 Run(s) Completed (1 Passed, 0 Failed) [113 unique failing tests in the last 14 days](#)

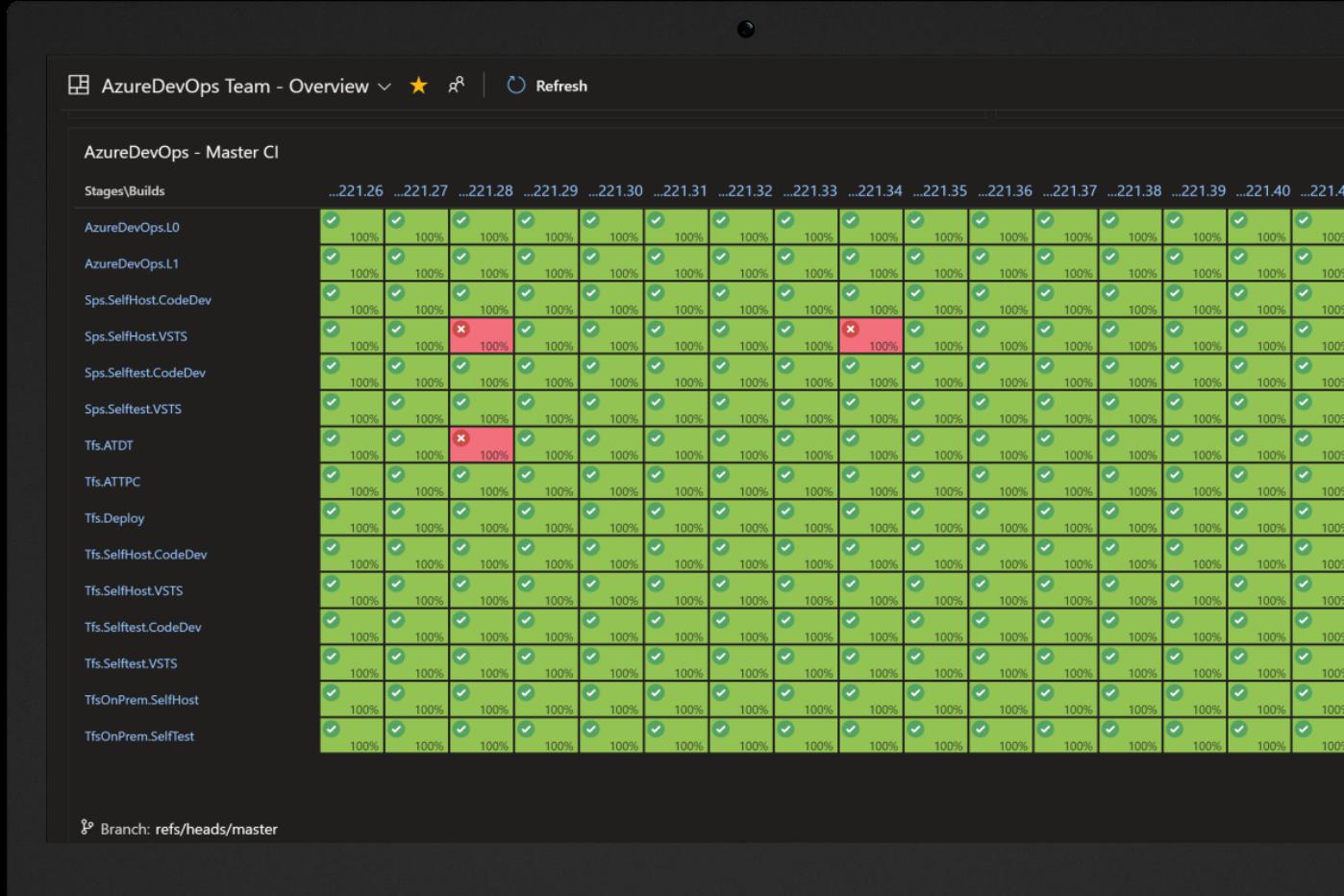
91,146 Total tests -1	 91,146 Passed 0 Failed 0 Others	100% Pass percentage	20m 19s Run duration ⓘ ↓ 20s 293ms	322 Tests not reported
------------------------------------	--	--------------------------------	---	----------------------------------

...0412.1	...0412.2	...0412.3	...0412.4	...0412.5	...0412.6	...0414.3	...0418.1	...0420.2	...0421.1
100%	100%	100%	100%	100%	100%	100%	100%	99.98%	99.98%

Change how you collaborate, develop, and deliver

Only all-green builds get to release

Pre-production tests check
every CI build

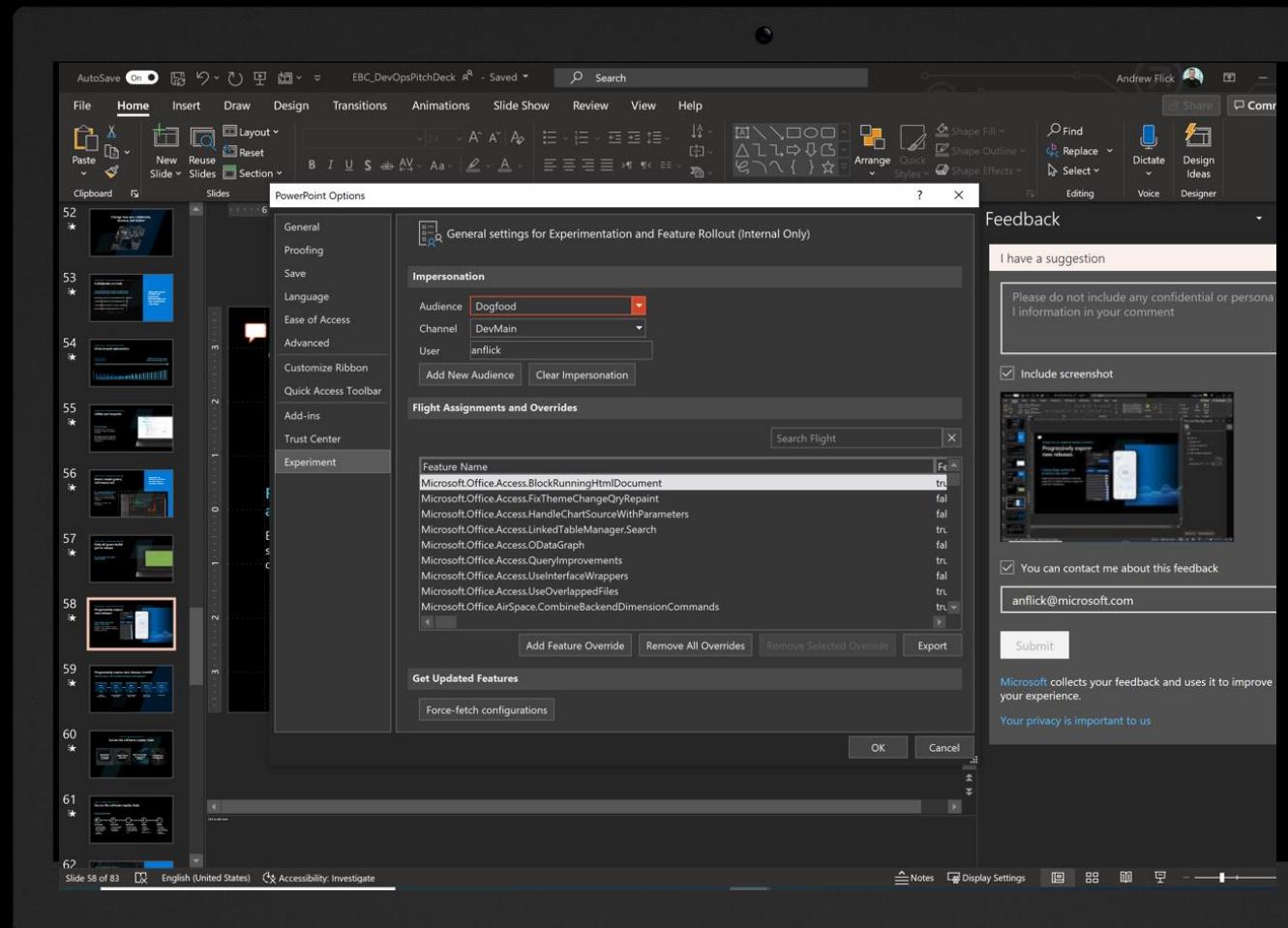


Change how you collaborate, develop, and deliver

Progressively expose new releases

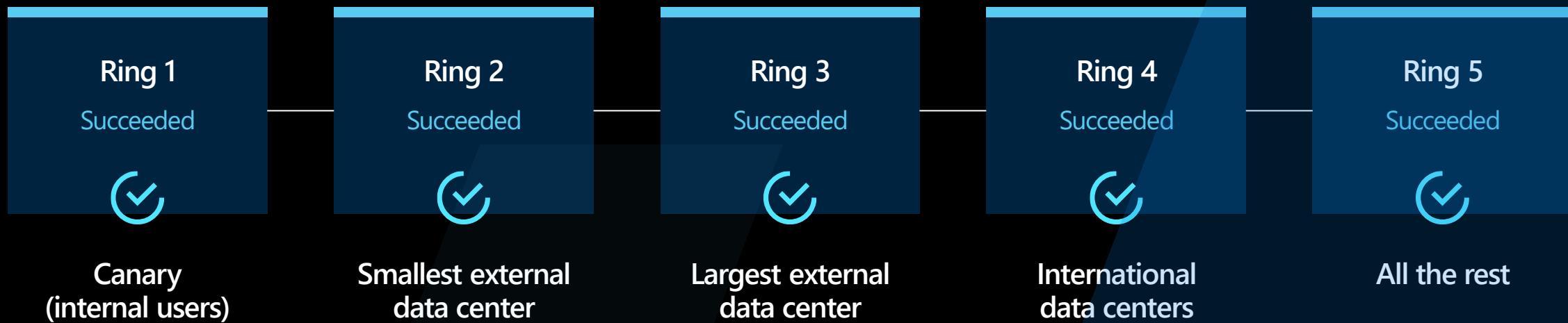
Feature flags control the access to new work

Experiment across different customer segments to identify feature usage and customer satisfaction.



Progressively expose new releases (cont'd)

Deploy one ring at a time to monitor the impact of every deployment.



Change how you collaborate, develop, and deliver

Progressively expose new releases (cont'd)

Deploy one ring at a time to monitor the impact of every deployment.

Example plan

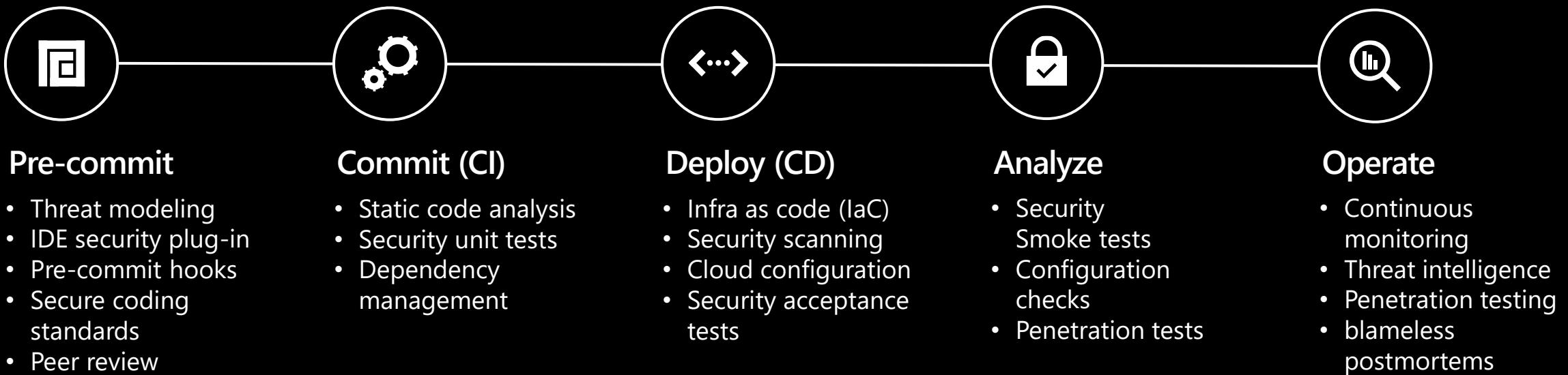
1. Canary
2. Data centers with small user counts
3. Data centers with large user count
4. Highest latency
5. The rest



Enhance security from dev to production

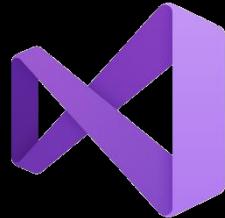
Build security practices into your delivery

Key security practices:



Developer tools

Integrated developer environment



Reimagine developer productivity

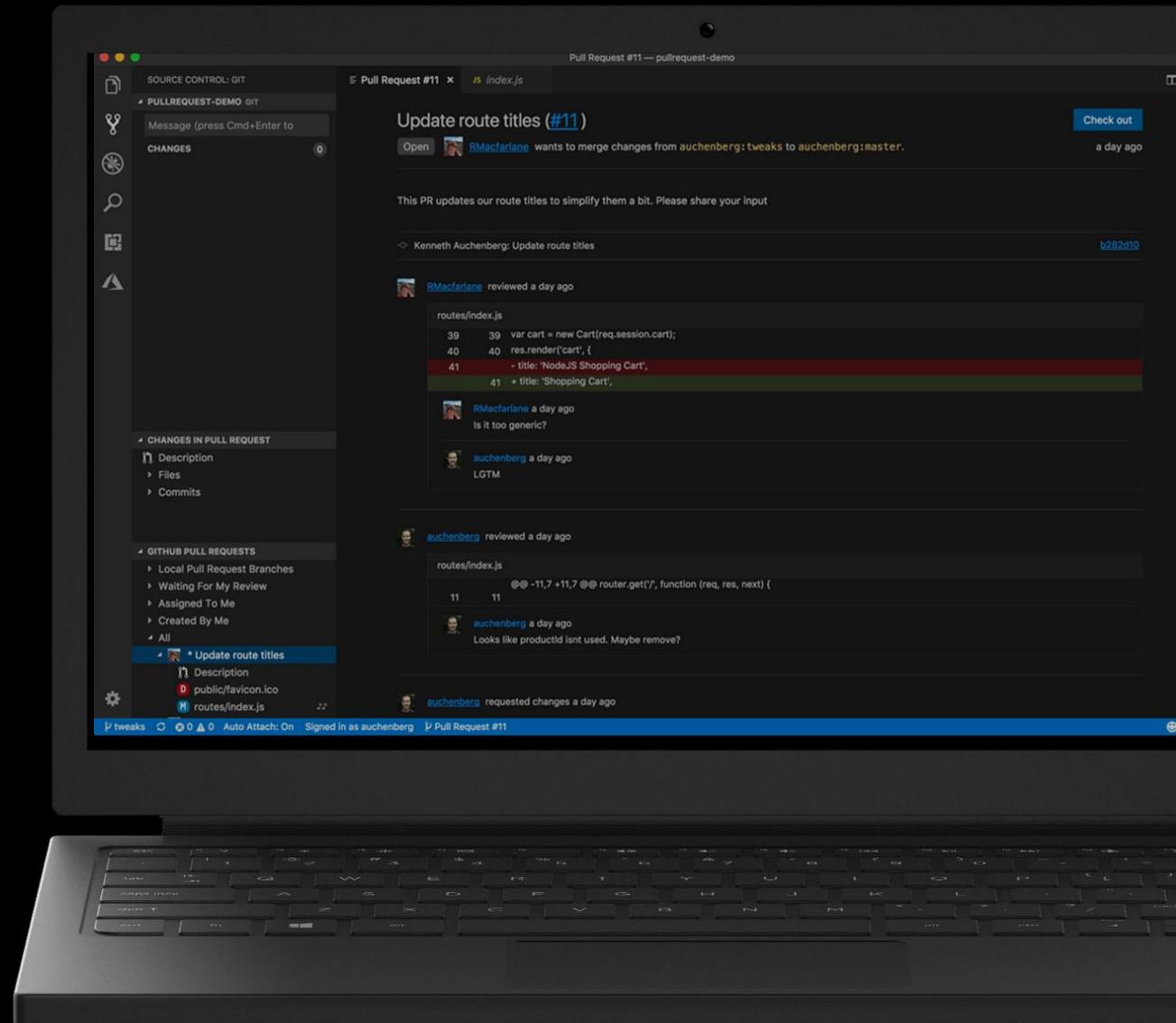
Innovate at scale and enrich your enterprise projects. Create and publish reports, manage pull requests on GitHub, and review source code right inside Visual Studio.

Quickly publish and test on Azure

Deploy your code directly from Visual Studio to Azure, whether you're building a web page or a serverless solution with Azure Functions.

Debug after deployment

Easily find and resolve bugs and performance issues in your cloud apps using snapshot Debugger and IntelliTrace to track and record your code's execution history, whether your application is running locally or in Azure.





Deliver with



Azure Boards



Azure Repos



Azure Pipelines



Azure Artifacts



Azure Test Plans

GitHub

GitHub brings the **premier** social coding workflows to your team, breaking down silos and enabling Inner Source through:

- Expertise sharing
- Cross-team collaboration
- Improved code reuse
- Increased velocity

83M+
developers

The largest developer community on the planet

A wide-angle photograph of a modern control room or operations center. In the foreground, several rows of desks are filled with computer monitors, each showing different types of data and interfaces. In the background, a massive wall of screens displays complex dashboards with graphs, charts, and geographical maps. Two individuals are visible standing near the large screen wall, possibly monitoring or managing the systems.

Demo of Mercury Health
Demo of MSENG

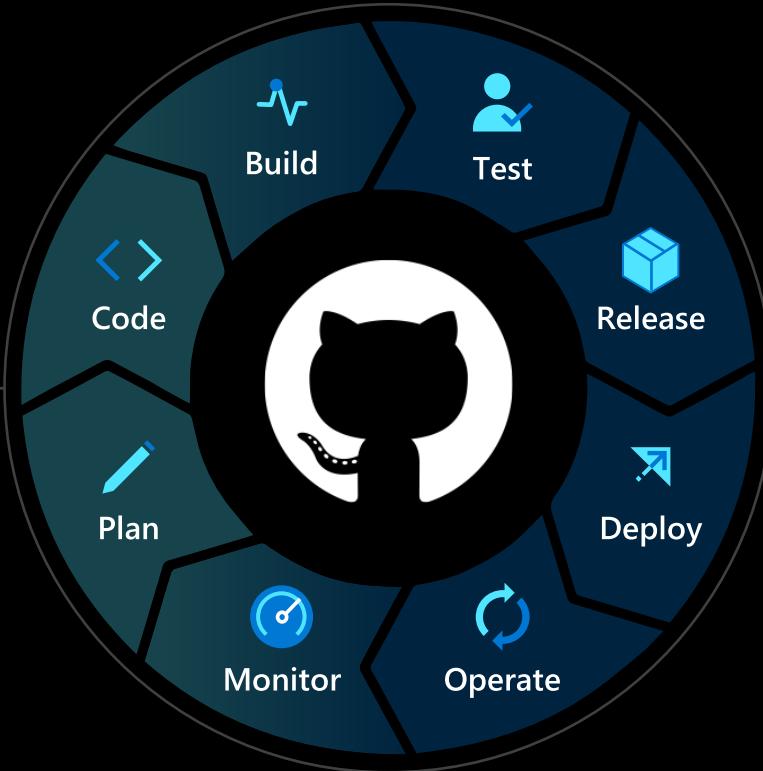
Building Azure DevOps
...with Azure DevOps

Accelerate delivery with code-to-cloud DevOps



Home for all developers Home for the world's code

- Elastic, to any scale
- Fully managed
- Packages always the latest
- Supports all OS for CI/CD
- Largest ecosystem
- Community-led automation



Deploy anywhere, including your own data centers

- On-premises
- Azure
- AWS
- Google Cloud Platform

GitHub Roadmap

Security

- CodeQL
- Dependabot
- Secret Scanning

Actions

- Event/Schedule Driven
- Not just CI/CD

Codespaces

- Secure Development Environment

CoPilot - In Preview

Resources

Developer Velocity – <https://aka.ms/DevOps/DeveloperVelocity>

The DevOps Lab – <https://aka.ms/DevOpsLab>

Microsoft Learn – <https://aka.ms/MSLearn>

DevOps Blog – <https://aka.ms/devopsblog>

Thank you!