



# SRE@MSFT

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## Site Reliability Engineering

Greg Veith  
Director – Microsoft Azure SRE

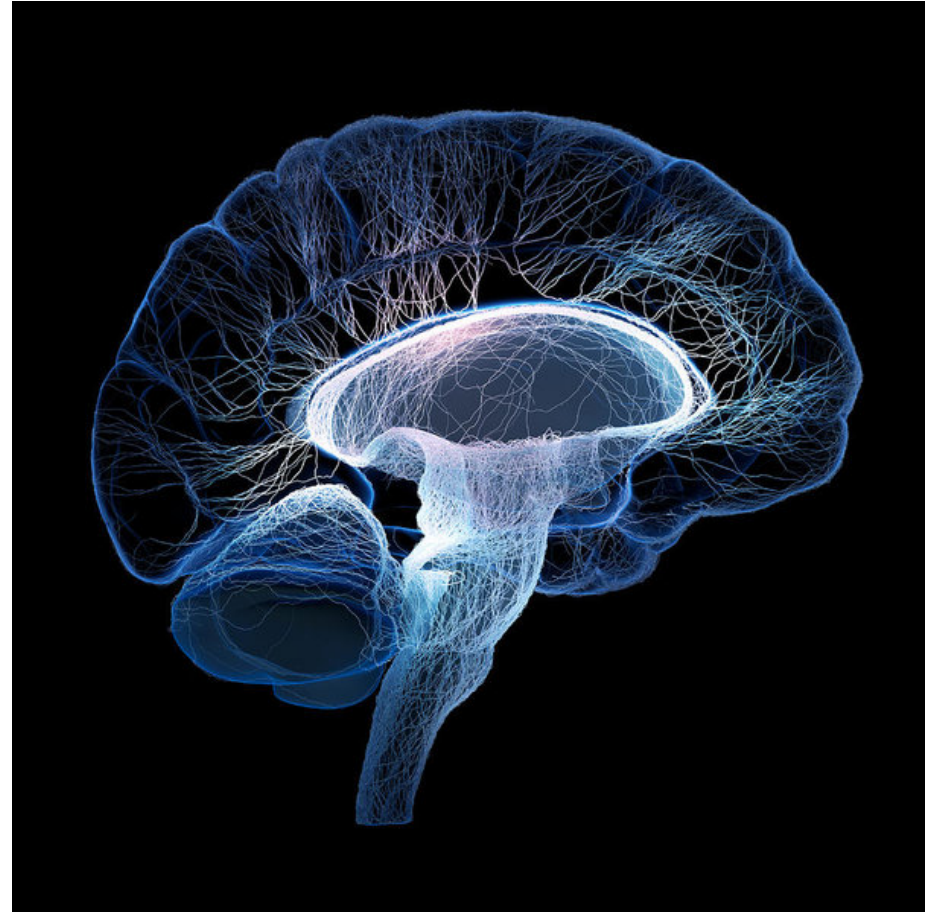
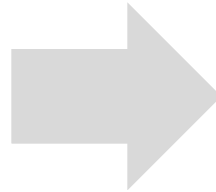
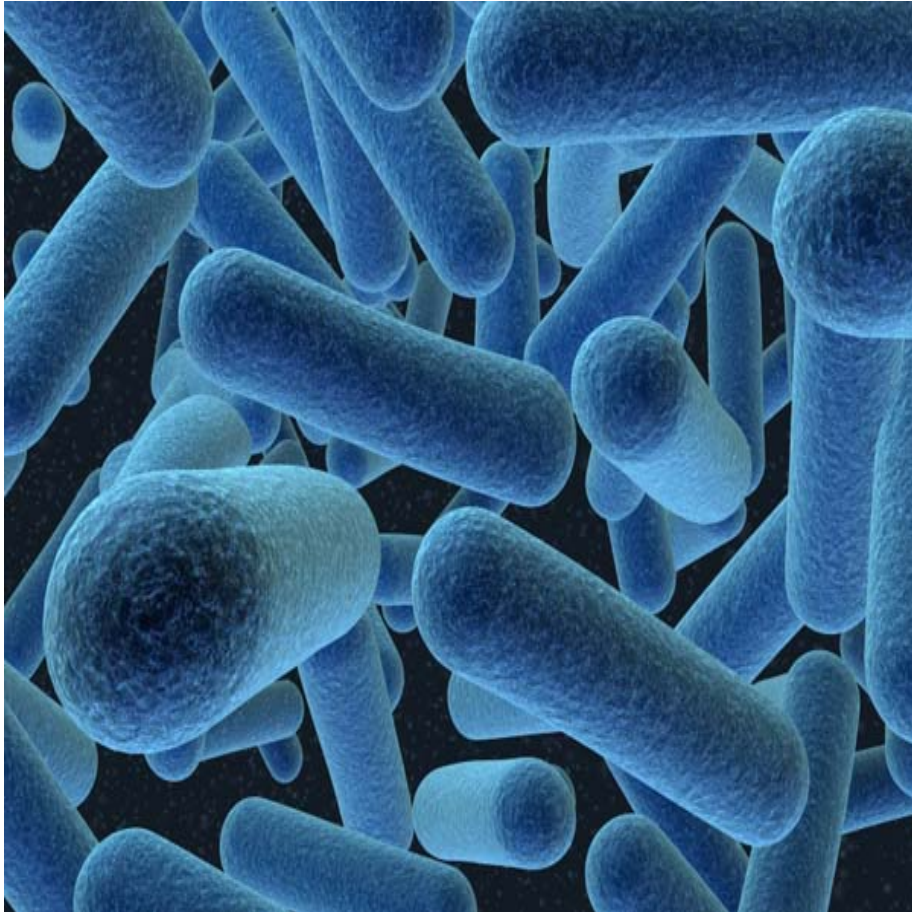
# They're Alive!

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## Organizations Are Living Organisms

# Evolution and Complexity

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# Azure Service Offerings

<p>Virtual Machines</p>  <p>Provision Windows and Linux virtual machines in minutes</p>	<p>App Service</p>  <p>Create web and mobile apps for any platform and any device</p>	<p>SQL Database</p>  <p>Managed relational SQL Database-as-a-service</p>	<p>Storage</p>  <p>Durable, highly available, and massively scalable cloud storage</p>	<p>Virtual Network</p>  <p>Provision private networks, optionally connect to on-premises datacenters</p>	<p>Media Services</p>  <p>Encode, store, and stream video and audio at scale</p>	<p>Stream Analytics</p>  <p>Real-time stream processing</p>	<p>Azure AD Domain Services</p>  <p>Your domain controller as a service</p>	<p>Managed Cache</p>  <p>Distributed, in-memory, scalable solution providing super-fast data access</p>	<p>Azure Active Directory B2C</p>  <p>Consumer identity and access management in the cloud</p>	<p>Scheduler</p>  <p>Run your jobs on simple or complex recurring schedules</p>	<p>Azure DevTest Labs</p>  <p>Quickly create environments to deploy and test applications</p>				
<p>Cloud Services</p>  <p>Create highly available, infinitely scalable cloud applications and APIs</p>	<p>Document DB</p>  <p>Managed NoSQL document database-as-a-service</p>	<p>Active Directory</p>  <p>Synchronize on-premises directories and enable single sign-on</p>	<p>Backup</p>  <p>Simple and reliable server backup to the cloud</p>	<p>Event Hubs</p>  <p>Ingest, persist, and process millions of events per second</p>	<p>Data Factory</p>  <p>Orchestrate and manage data transformation and movement</p>	<p>Key Vault</p>  <p>Safeguard and maintain control of keys and other secrets</p>	<p>Service Bus</p>  <p>Connect across private and public cloud environments</p>	<p>Notification Hubs</p>  <p>Scalable, cross-platform push notification infrastructure</p>	<p>Automation</p>  <p>Simplify cloud management with process automation</p>	<p>Log Analytics</p>  <p>Collect, search and visualize machine data from on-premise and cloud</p>	<p>Azure Security Center</p>  <p>Prevent, detect, and respond to threats with increased visibility</p>				
<p>ExpressRoute</p>  <p>Dedicated private network fiber connections to Azure</p>	<p>Site Recovery</p>  <p>Orchestrate protection and recovery of private clouds</p>	<p>DNS</p>  <p>Host your DNS domain in Azure</p>	<p>Machine Learning</p>  <p>Powerful cloud-based predictive analytics</p>	<p>HDInsight</p>  <p>Provision cloud Hadoop, Spark, R Server, HBase, and Storm clusters</p>	<p>RemoteApp</p>  <p>Deploy Windows client apps in the cloud, run on any device</p>	<p>Batch</p>  <p>Run large-scale parallel and batch compute jobs</p>	<p>StorSimple</p>  <p>Hybrid cloud storage for enterprises, reduces costs and improves data security</p>	<p>Virtual Machine Scale Sets</p>  <p>Create highly available, auto scalable Linux or Windows virtual machines</p>	<p>Microsoft Power BI Embedded</p>  <p>Embed fully interactive, stunning data visualizations in your applications</p>	<p>Mobile Engagement</p>  <p>Increase app usage and user retention</p>	<p>Data Lake Store</p>  <p>Hyperscale repository for big data analytics workloads</p>				
<p>Service Fabric</p>  <p>Build and operate always-on, scalable, distributed applications</p>	<p>Multi-Factor Authentication</p>  <p>Safeguard access to your data and apps with an extra level of authentication</p>	<p>Visual Studio Application Insights</p>  <p>Detect, triage, and diagnose issues in your web apps and services</p>	<p>SQL Data Warehouse</p>  <p>Elastic data warehouse-as-a-service with enterprise-class features</p>	<p>Visual Studio Team Services</p>  <p>Services for teams to share code, track work, and ship software</p>	<p>API Management</p>  <p>Publish APIs to developers, partners and employees securely and at scale</p>	<p>Azure IoT Hub</p>  <p>Connect, monitor, and control millions of IoT assets</p>	<p>CDN</p>  <p>Deliver content to end-users through a robust network of global data centers</p>	<p>Data Lake Analytics</p>  <p>Distributed analytics service that makes big data easy</p>	<p>Cognitive Services</p>  <p>Add smart API capabilities and give your apps a human side</p>	<p>Azure Container Service</p>  <p>Use open source tools to deploy and manage containers</p>	<p>SQL Server Stretch Database</p>  <p>Dynamically stretch SQL Server databases to Azure</p>				
												<p>BizTalk Services</p>  <p>Seamlessly integrate the enterprise and the cloud</p>	<p>Traffic Manager</p>  <p>Route incoming traffic for high performance and availability</p>	<p>Azure Redis Cache</p>  <p>Access to a secure, dedicated cache for your Azure applications</p>	<p>Search</p>  <p>Fully-managed search-as-a-service</p>
												<p>Load Balancer</p>  <p>Deliver high availability and network performance to your applications</p>	<p>VPN Gateway</p>  <p>Establish secure, cross-premises connectivity</p>	<p>Application Gateway</p>  <p>Highly scalable websites with HTTP load balancing and delivery control</p>	<p>Data Catalog</p>  <p>Data source discovery to get more value from existing enterprise data assets</p>

# Scale

24

Datacenter Regions

>100

Datacenters

3.3M

Messages per second  
processed by Azure IoT

>120k

New Azure customer  
subscriptions/month

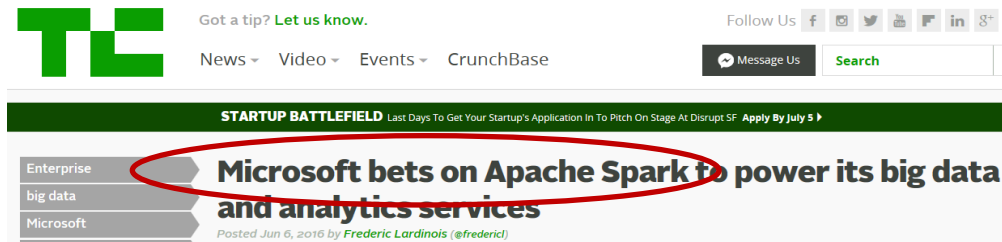
~60

Distinct Azure Service Offerings

>40%

Revenue from Startups  
and ISVs

# Transformation

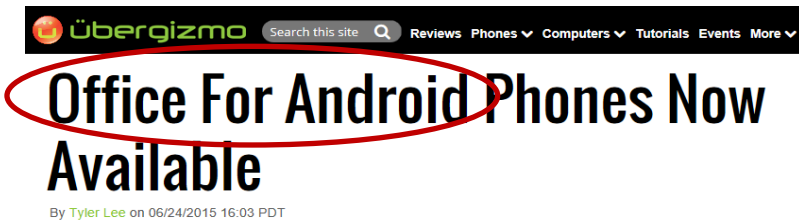


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Enterprise **Microsoft bets on Apache Spark to power its big data and analytics services**  
big data  
Microsoft  
Posted Jun 6, 2016 by [Frederic Lardinois \(@frederic\)](#)



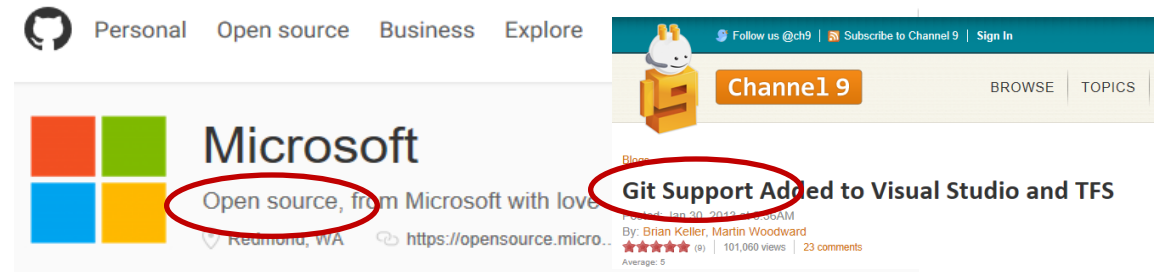
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**Office For Android Phones Now Available**  
By [Tyler Lee](#) on 06/24/2015 16:03 PDT

## Linux in the Cloud

Easily lift and shift Linux workloads to the cloud

Did you know that nearly one in three Azure virtual machines are Linux?

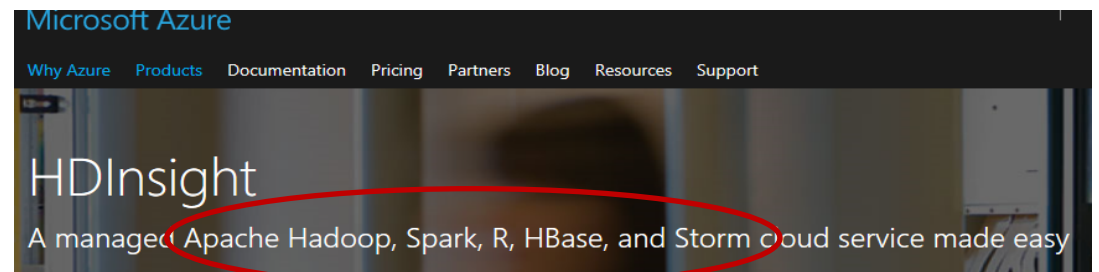


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**Microsoft**  
Open source, from Microsoft with love  
Redmond, WA <https://opensource.micro...>

**Git Support Added to Visual Studio and TFS**  
Posted: Jan 30, 2012 12:05AM  
By: [Brian Keller](#), [Martin Woodward](#)  
★★★★★ (9) | 101,060 views | 23 comments  
Average: 5



**Microsoft Azure**  
[Why Azure](#) [Products](#) [Documentation](#) [Pricing](#) [Partners](#) [Blog](#) [Resources](#) [Support](#)

**HDInsight**  
A managed Apache Hadoop, Spark, R, HBase, and Storm cloud service made easy



**The Register**  
Biting the hand that feeds IT

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Software ▶ [Operating Systems](#)

**Redmond top man Satya Nadella: 'Microsoft LOVES Linux'**

# Learning Culture, Growth Mindset

The screenshot shows two news articles side-by-side. The left article is from CNET, titled "Behind last night's Bing outage". The right article is from InformationWeek, titled "Microsoft Azure Storage Service Outage: Postmortem".

**Behind last night's Bing outage**  
Microsoft says that a change that was being tested was mistakenly moved onto the live site, causing Thursday night's sitewide outage.

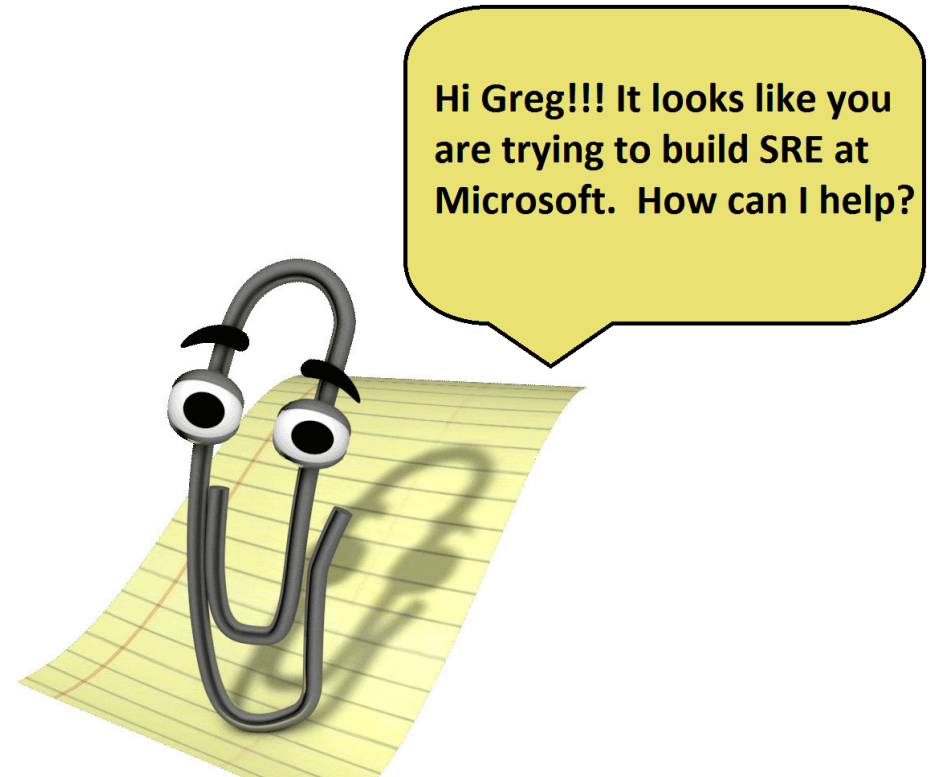
Bing.com was down between about 6:30 and 7:00 PM Pacific Time on Dec 3, 2009. During this time, users were either unable to get to the site, or their queries were returning incomplete results page. **The cause of the outage was a configuration change during some internal testing that had unfortunate and unintended consequences.** As soon as the issue was detected, the change was rolled back, which caused the site to return to normal behavior. Unfortunately the detection and rollback took about half an hour, and during that time users were unable to use bing.com.

**Microsoft Azure Storage Service Outage: Postmortem**  
11/20/2014 10:40 AM

This interruption was due to a bug that got triggered when a configuration change in the Azure Storage Front End component was made, resulting in the inability of the Blob Front-Ends to take traffic. **The configuration change had** been introduced as part of an Azure Storage update to improve performance as well as reducing the CPU footprint for the Azure Table Front-Ends.

# Scaling Up Operational Models

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# Welcome To The Team!

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# North is...



# Symptoms of Success

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Availability and reliability meet SLOs

- defend customer trust

Eliminate human touches to prod

- Toil elimination

Speed up deployments

- Reduce inventory, ship fast, safely

All the above areas reinforce measurement. Reliability's foundation.

# 3 Strategic Pillars

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Start SRE at Microsoft – Establish Principles

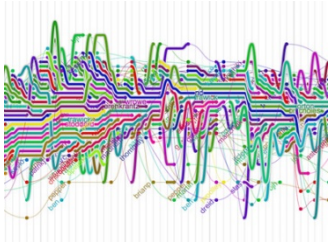


Prove the model – Apply Principles

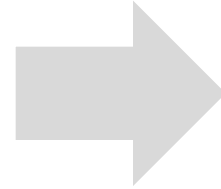


Accelerate and improve – Scale the Principles

# SRE Engagement Types



Services at Planetary Scale

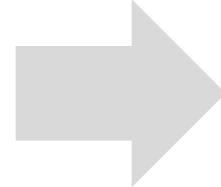


## **Ops Transformation at Scale**

SRE develops solutions to close operational gaps, fire suppressant, iterate toward transformation



Newer Service Facing Rapid Growth



## **Growth and Maturation**

SRE attaches to team, develops targeted improvements to prepare for growth, get on call



Greenfield Services or Redesign



## **Design and Architecture**

Operability and continuous innovation, design for scale from the beginning

# Production Readiness

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# 3 Strategic Pillars

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Start SRE at Microsoft - Establish Principles



Prove the model – Pilots – Apply Principles




Accelerate and improve – Scale the Principles

# Service Facing Rapid Growth Azure IoT

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Azure IoT Hub



Connect, monitor, and control millions of IoT assets




# Established Service at Planetary Scale

## Azure Storage

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Storage



Durable, highly available, and massively scalable cloud storage

# 3 Prong Strategy

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Start SRE at Microsoft - Establish Principles



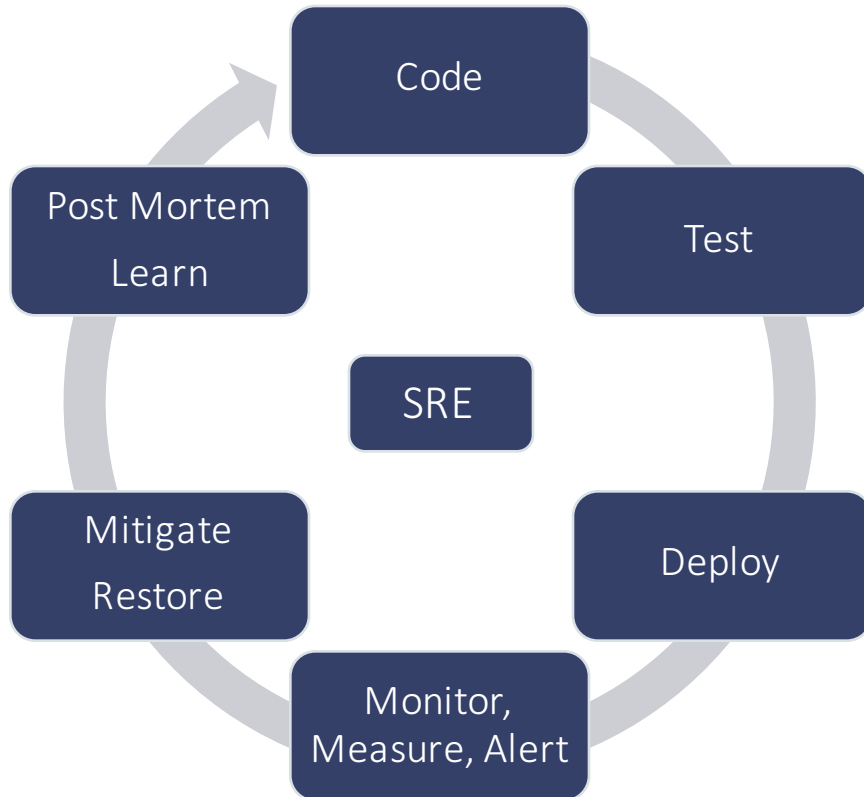
Prove the model – Pilots – Apply Principles



Accelerate and improve – Scale the Principles

# Production Virtuous Cycle

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**Goal:** Enable this loop to run as fast and often as possible while maintaining SLOs

# SRE Areas of Focus

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## Metrics and Monitoring

- Instrumentation, SLOs, Alarms, insights → actions

## Infrastructure Engineering

- Tooling, infra for global optima

## Release Engineering

- Change Management, Deployment

## Incident Response

- Enough Said

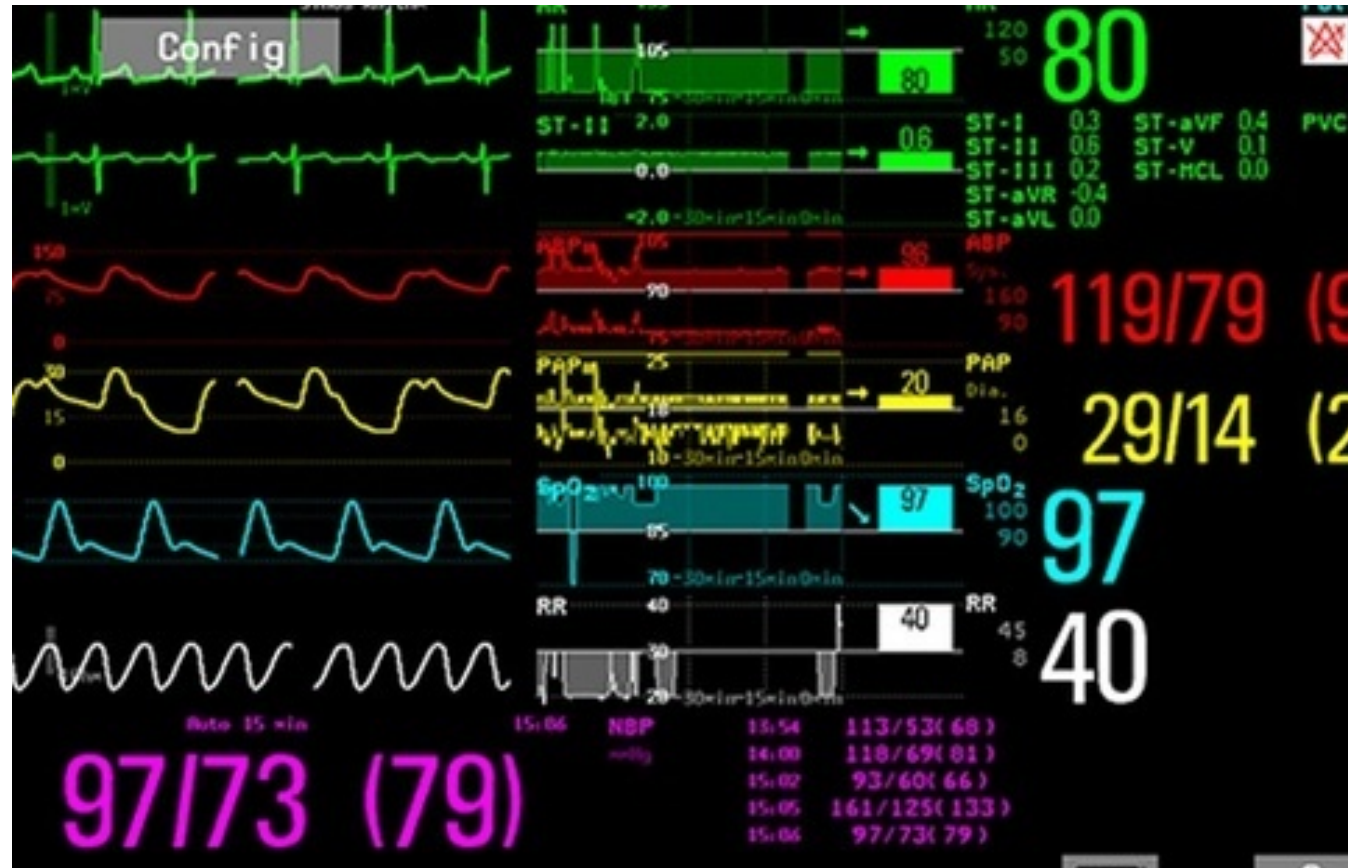
## Common Infrastructure

- Integrating existing best in class infra

## Capacity & Fleet Management

- Build out, decomm, fleet understanding and mgmt

# Metrics and Monitoring



# Incident Response

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# Critical Moves, Learnings

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- Build and protect the SRE brand
- Manage the change
- Meet teams where they are
- Grab a Shovel (and build a backhoe)
- Find the bright spots

# In Conclusion

[gveith@microsoft.com](mailto:gveith@microsoft.com)