AWS re:Invent

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ARC316

Well-Architected reliability: Best practices you can use now

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Agenda

Well-Architected reliability

- Design principles
- Best practices

Key takeaways and helpful resources

Answer **your** questions

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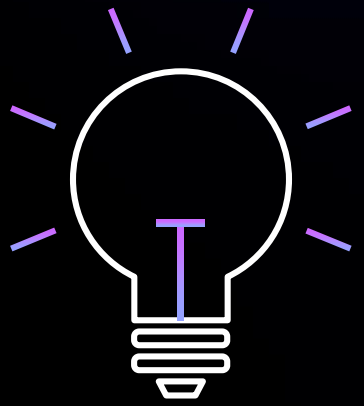
“We needed to build systems that embrace failure as a natural occurrence.”



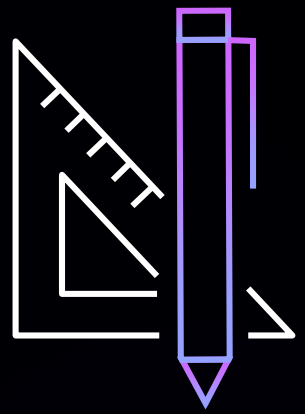
Werner Vogels
CTO, Amazon.com

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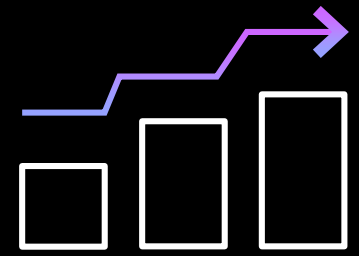
AWS Well-Architected



Learn



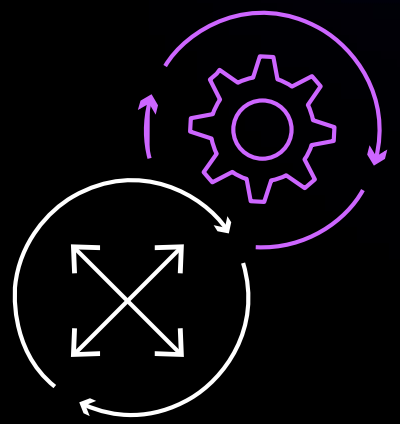
Measure



Improve

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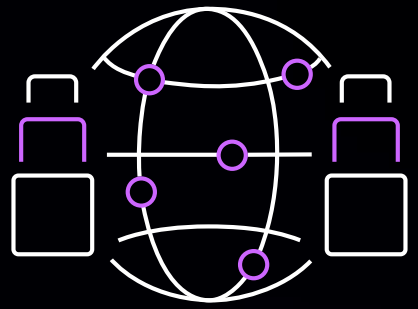
Five pillars of the AWS Well-Architected Framework



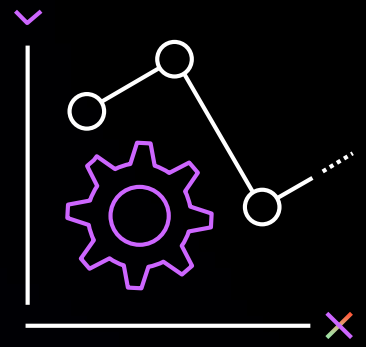
Operational Excellence



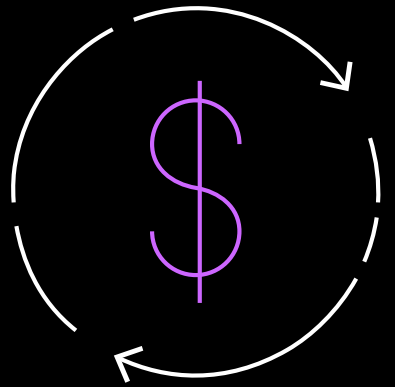
Security



Reliability



Performance Efficiency

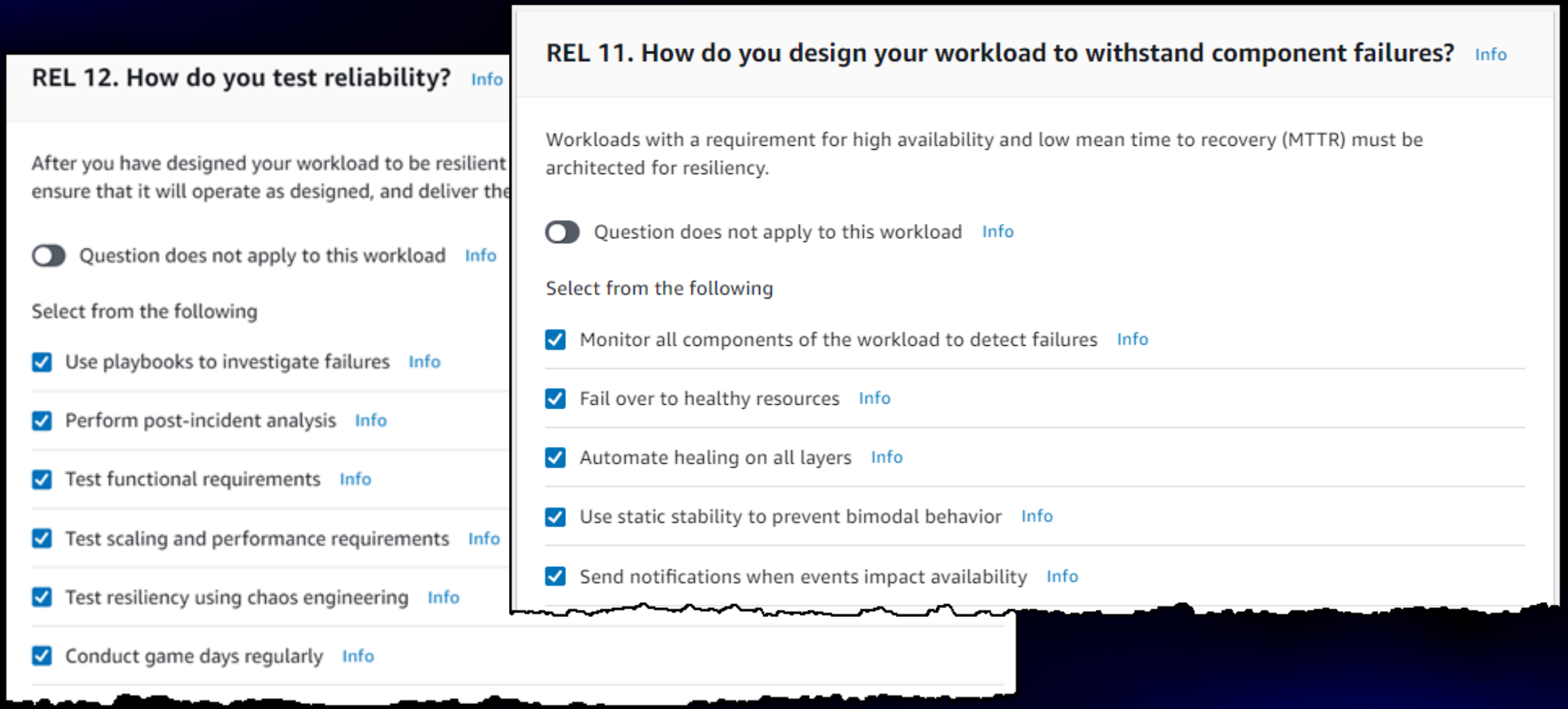


Cost Optimization

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AWS Well-Architected Tool



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Reliability

Ability of a workload to perform its required function correctly and consistently . . .

Resiliency

Ability of a workload to recover from infrastructure or service disruptions . . .

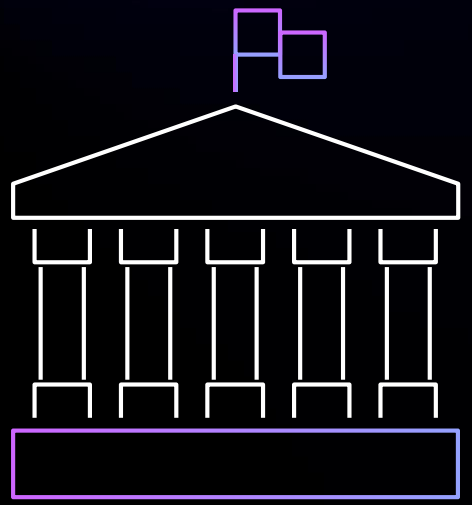
Reliability Pillar: AWS Well-Architected Framework

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Best practices
Well-Architected reliability

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Well-Architected reliability pillar



Foundations

REL 1

Service quotas and limits

- Know your AWS resource quotas
- Raise quotas where necessary
- Work within hard limits

REL 2

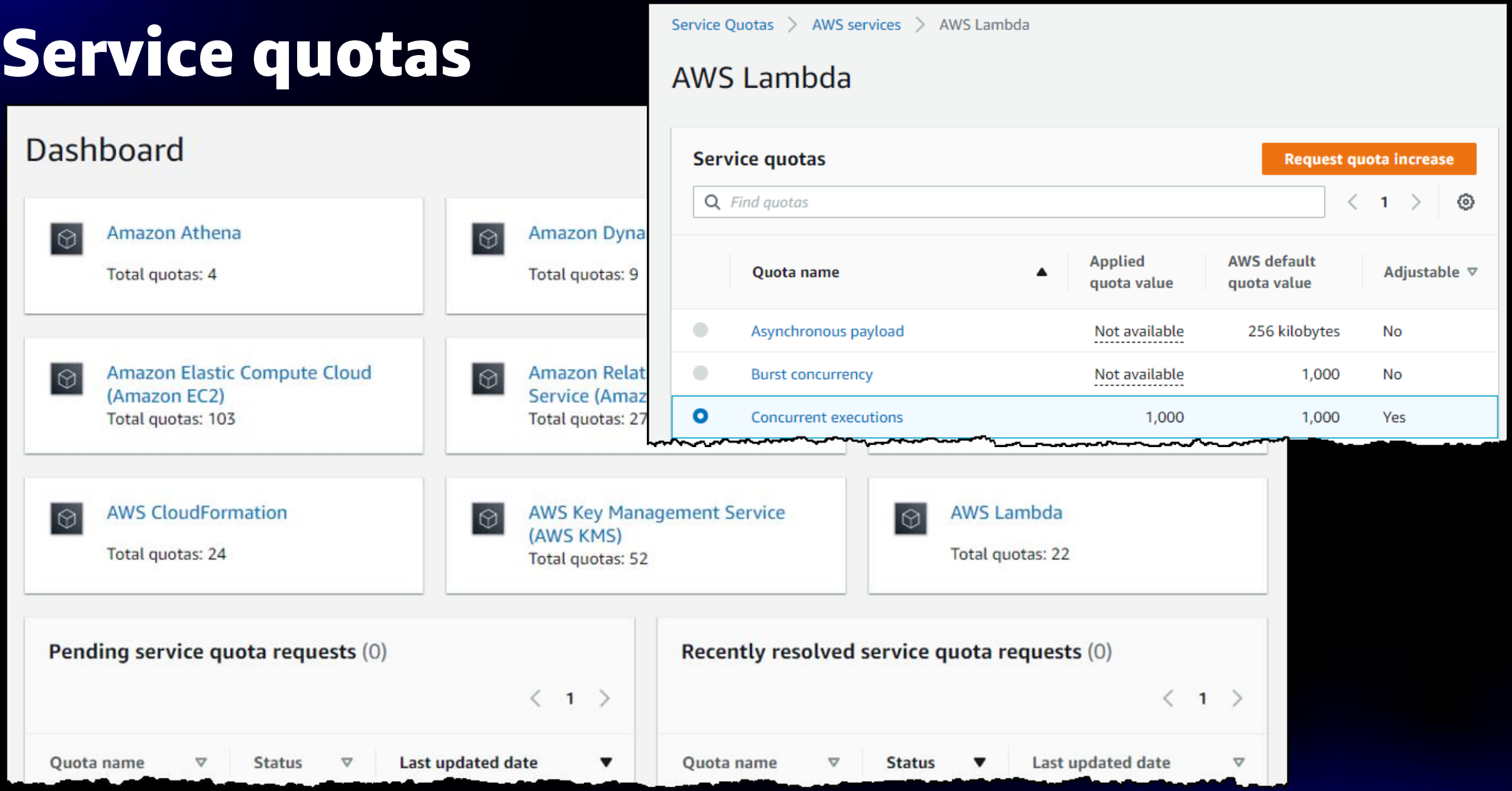
Network topology

- Highly available endpoints
- Redundant connections
- Size and layout of network

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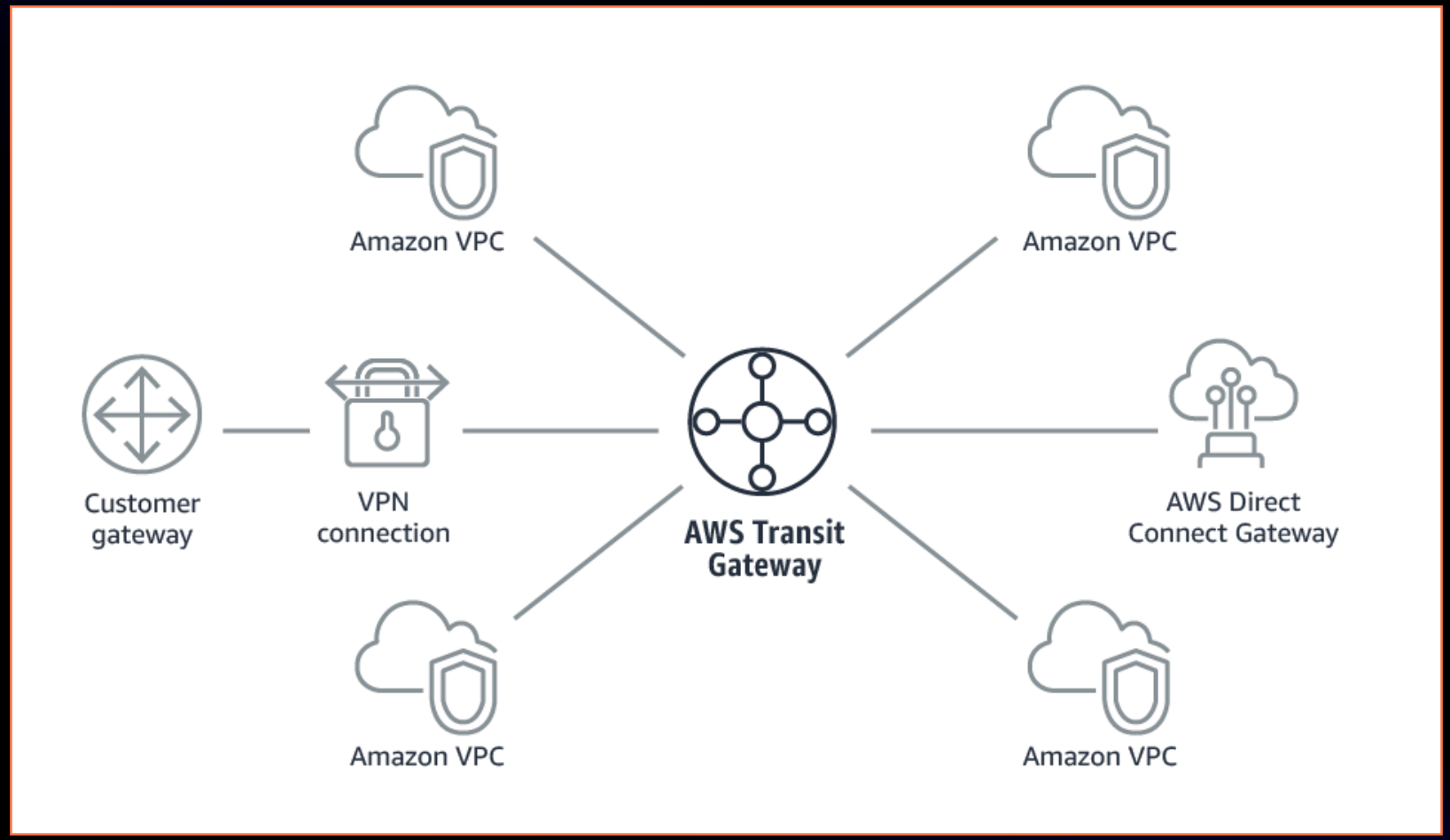
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Service quotas



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Hub and spoke network topology



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Well-Architected reliability pillar



Workload architecture

REL 3 **Service architecture**

- Business domains
- Right-sized, decoupled services

REL 4 **Prevent failures**

- Loosely coupled dependencies
- Idempotent, consistent

REL 5 **Mitigate failures**

- Graceful degradation
- Throttle, fail fast, limit retries

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Architecture evolution



Monolithic application

- Does everything
- Shared release pipeline
- Rigid scaling
- High impact of change
- Hard to adopt new technologies

Service oriented

- Does some things
- Services surfaced via comms protocol
- Some coupled services

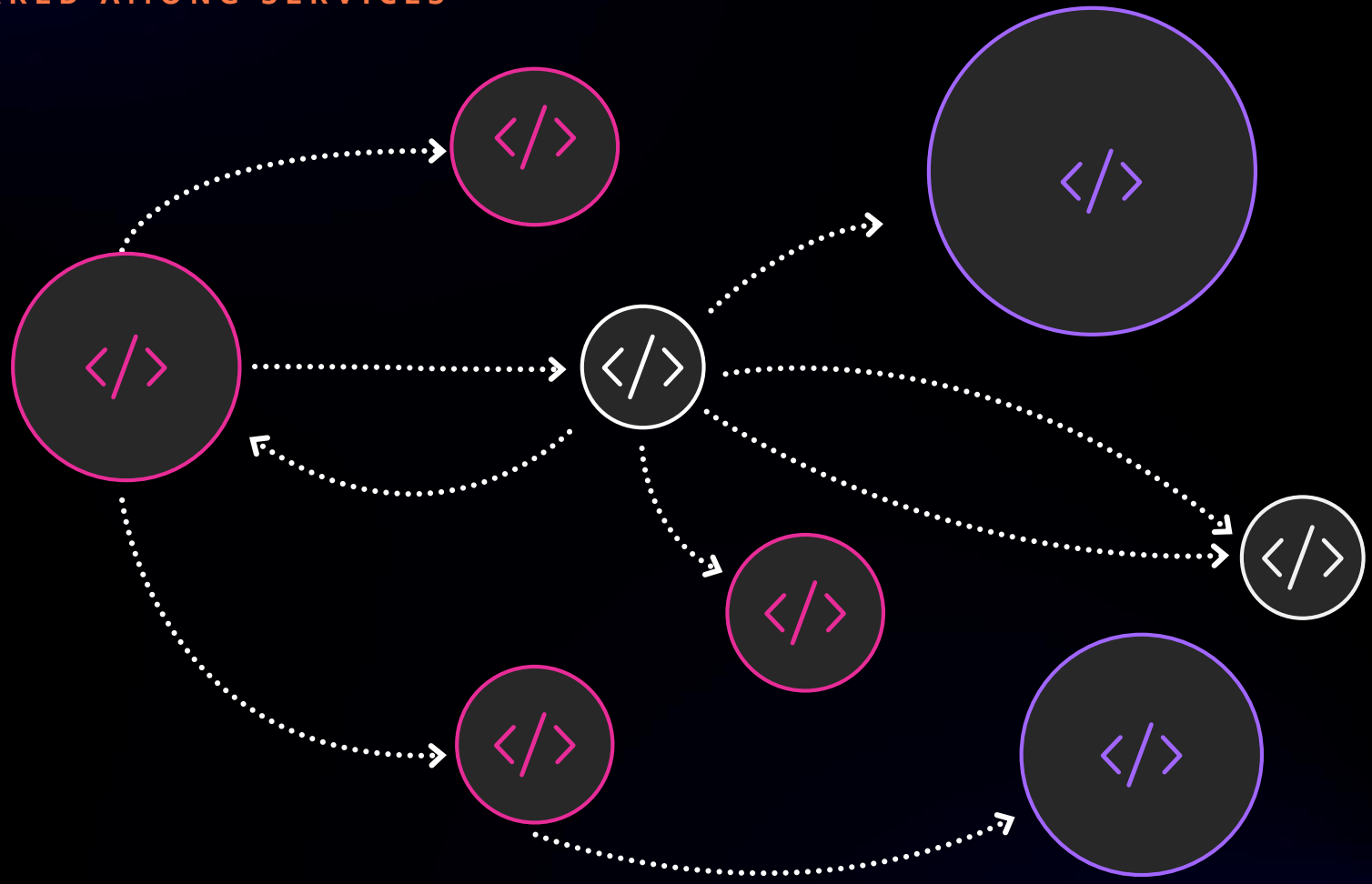
Microservices

- Does one thing
- Independent deployments
- Independent scaling
- Small impact of change
- Choice of technology

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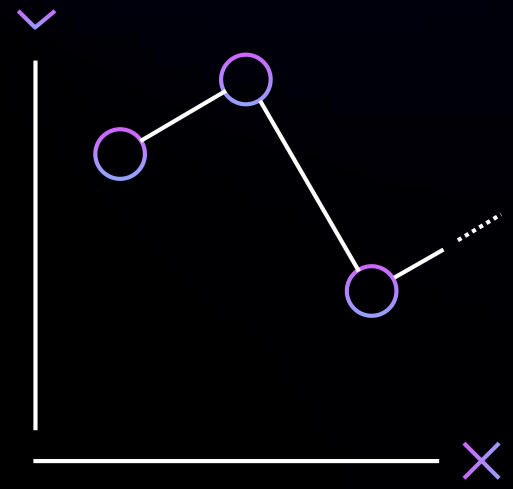
Microservices deploy & scale independently

CAPACITY IS SHARED AMONG SERVICES



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Well-Architected reliability pillar



Change management

REL 6 **Monitor workload resources**

- You can’t manage what you can’t see
- Implement observability

REL 7 **Adapt to changes in demand**

- Scale up and down as needed
- Use automation

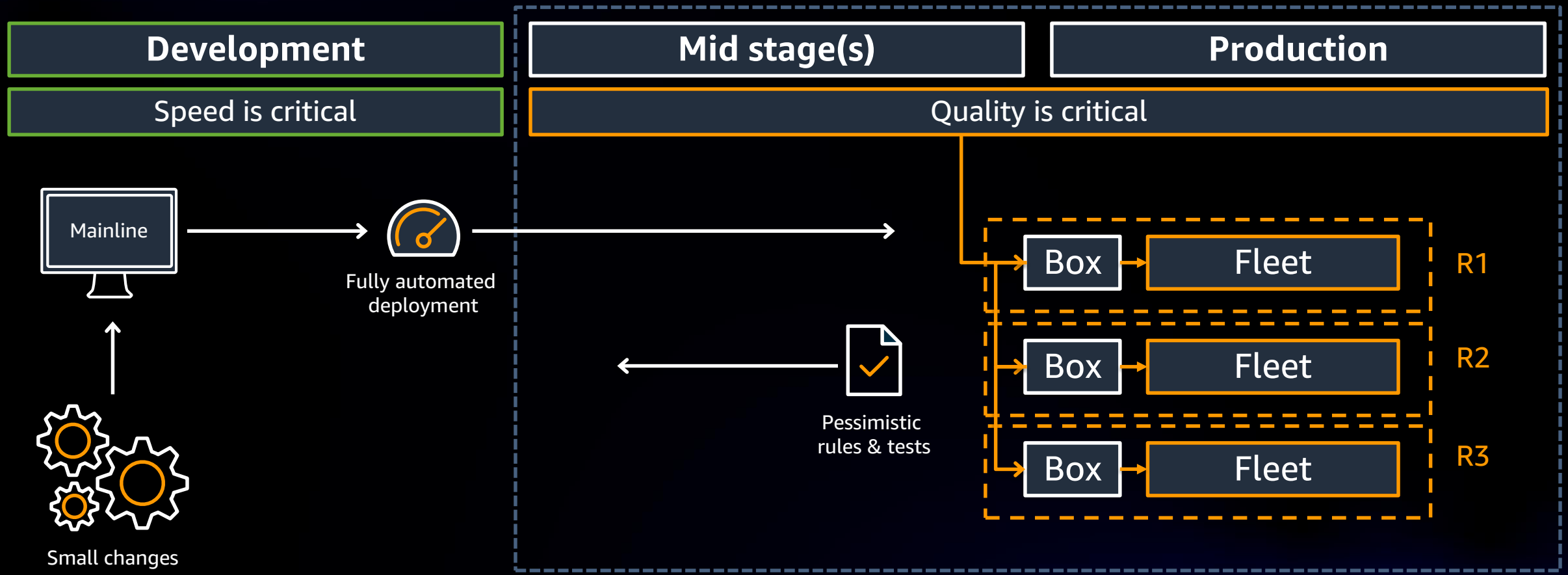
REL 8 **Implement change**

- Deployments can be dangerous
- Manage and reduce negative impacts

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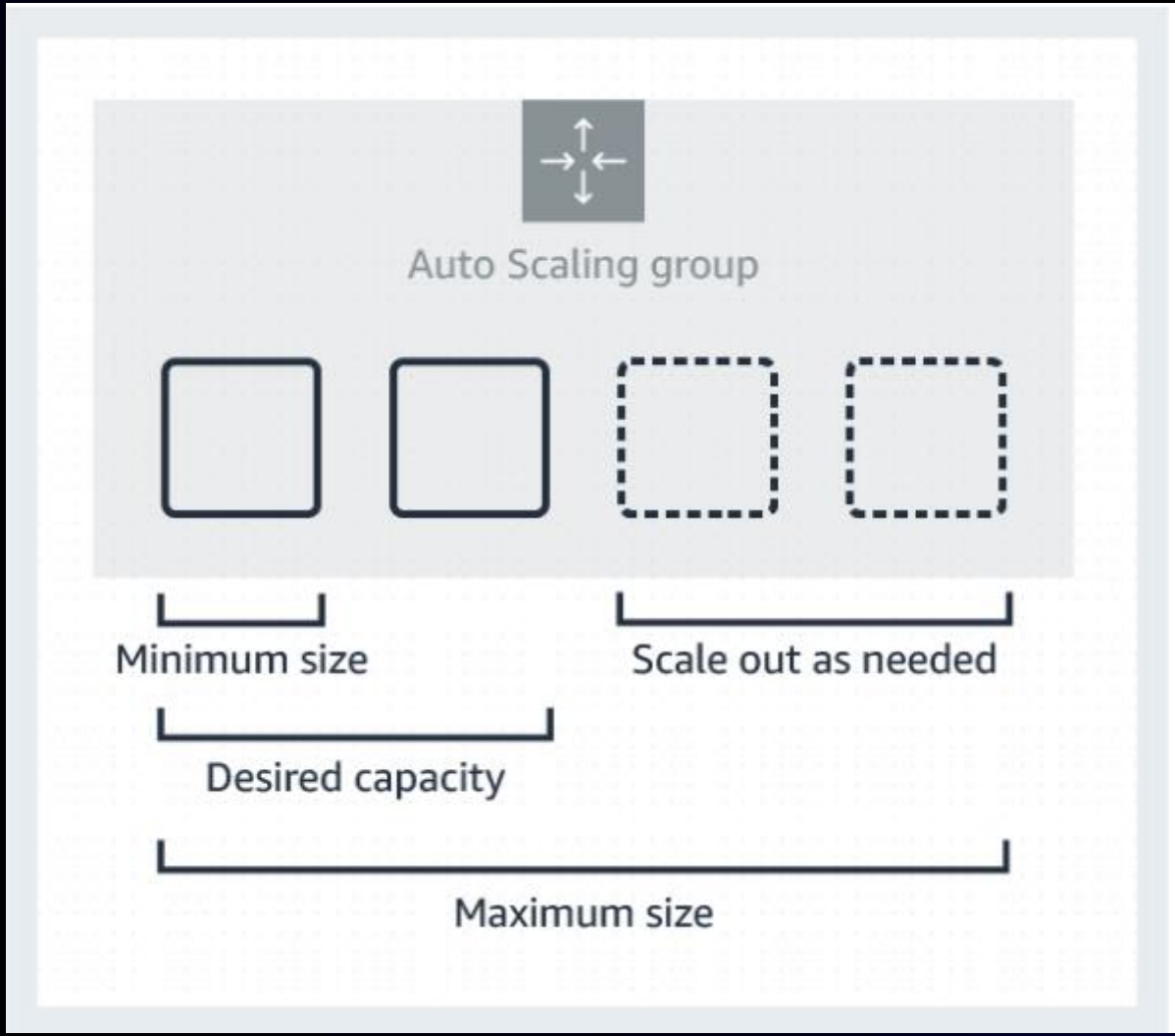
Well-Architected deployment

Automate everything



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Autoscaling of resources



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Well-Architected reliability pillar



Failure management

REL 9 **Back up data**

- Identify data to back up
- Automate and secure back up

REL 10 **Fault isolation**

- Use multiple sites
- AWS Region, Availability Zone, etc.

REL 11 **Withstand component failures**

- Automate recovery
- Notify when failures occur

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AWS Regions and Availability Zones (AZs)

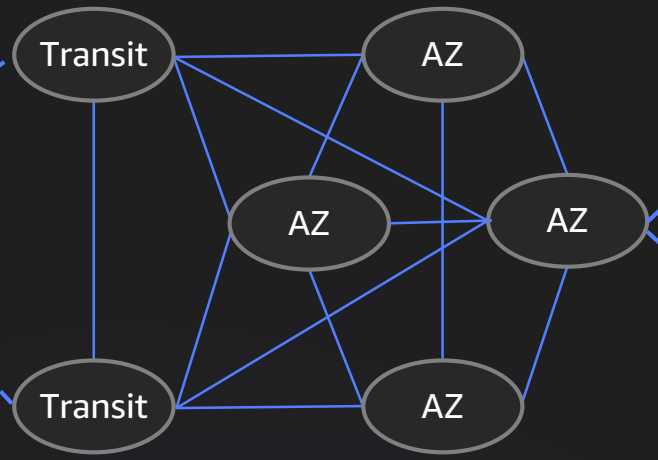
AWS REGIONS ARE PHYSICAL LOCATIONS AROUND THE WORLD WHERE WE CLUSTER DATA CENTERS

25 AWS Regions worldwide



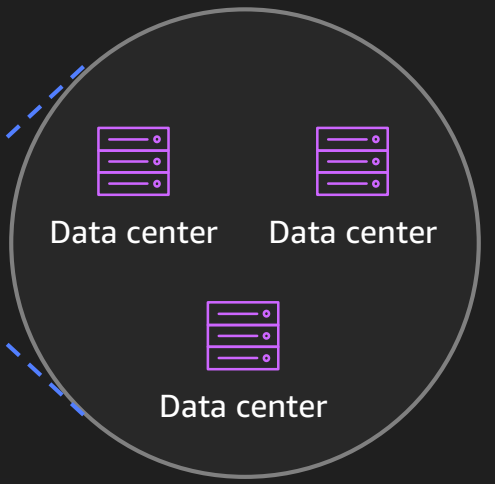
- AWS Regions
- Announced Regions

Each AWS Region has multiple AZs



A Region is a physical location in the world

Each AZ is one or more discrete data centers



Data centers, each with redundant power, networking, and connectivity, housed in separate facilities

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Well-Architected reliability pillar



Failure management

REL 12 **Test reliability**

- Simulate failure modes
- Test scaling, performance, processes

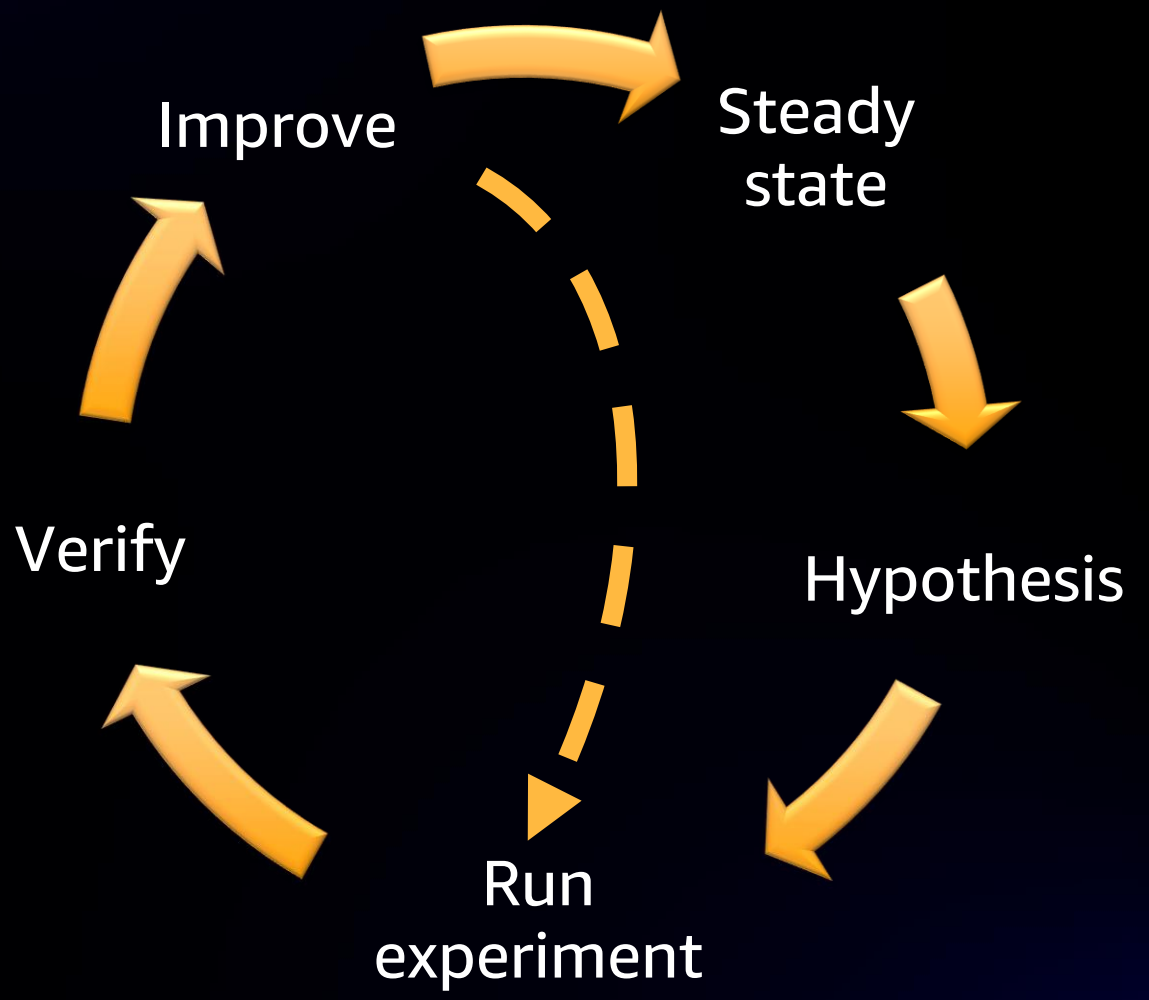
REL 13 **Disaster recovery**

- Set objectives
- Implement and test DR strategy

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Chaos engineering

A SCIENTIFIC METHOD



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Game days

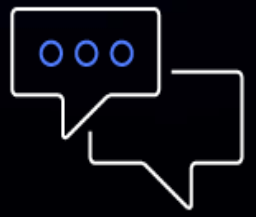
SIMULATE FAILURE OR EVENT TO TEST SYSTEMS RESILIENCY, PROCESSES, AND TEAM RESPONSES



People

Cross-discipline team

Processes



Briefing

Overview

Roles



Planning

Preparation

Hypothesis



Execution

Run experiment



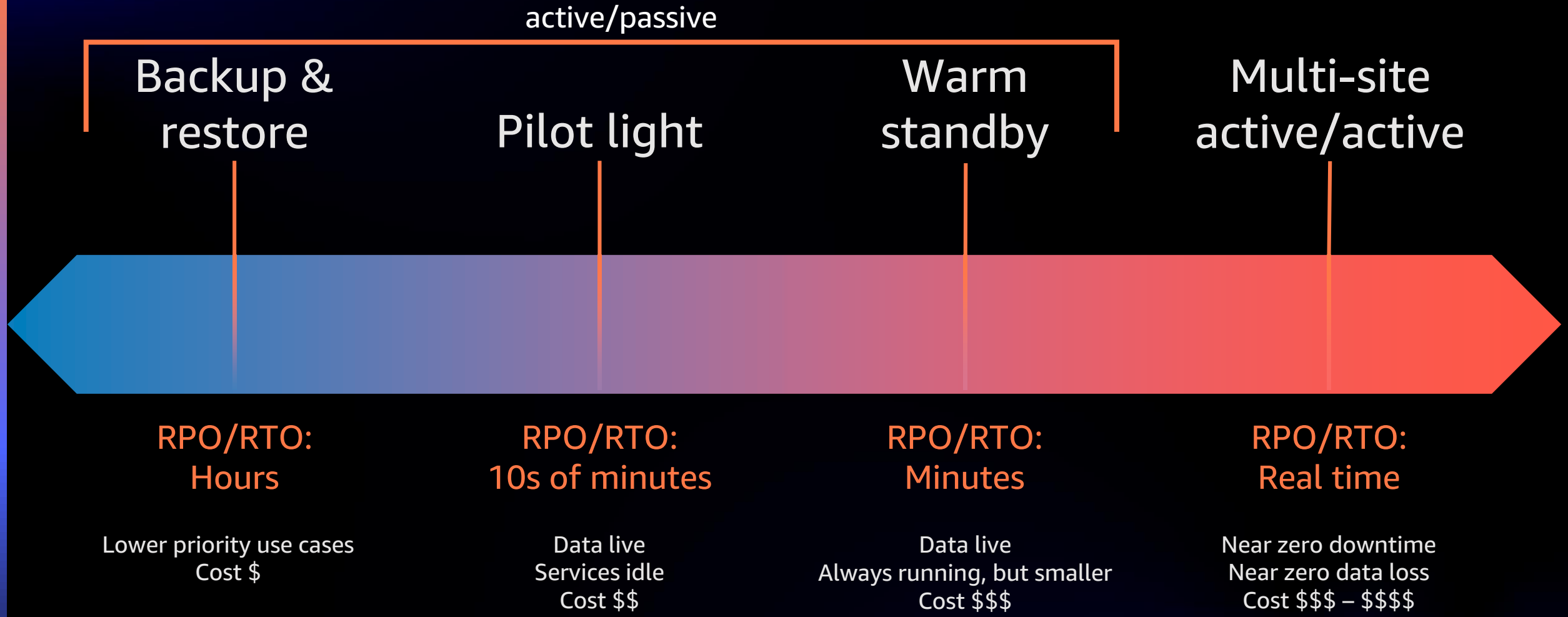
Analysis

Verify

Improve

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Strategies for disaster recovery



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Key takeaways

- Reliability is a continuous improvement process
  - Not just a “check the box” activity
- Your system is not reliable and resilient unless you test that
- Prepare for the worst
  - Build reliability mechanisms that can either prevent failure or recover automatically
- Call to action: Get started with the best practices mentioned!

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Resources



AWS Well-Architected

ARC317 [Chalk Talk]: Best practices for disaster recovery of workloads on AWS

ARC319 [Workshop]: Improving reliability with fault isolation and shuffle sharding

FSI315 [Builders' Session]: Test resiliency in financial services with chaos engineering

Whitepaper: Reliability Pillar: AWS Well-Architected Framework
bit.ly/reliability-pillar

Well-Architected hands-on labs
wellarchitectedlabs.com/reliability

Well-Architected Tool
aws.com/well-architected-tool/

AWS Resilience Hub
aws.amazon.com/resilience-hub/

aws

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Thank you!

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