SKILUP SM DAYS

by: DevOps INSTITUTE

Testability in the Paradigm of Kubernetes

Essential aspects of Testing in the age of Containers & Kubernetes

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Aventiv Technologies
NavikHub
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Agenda

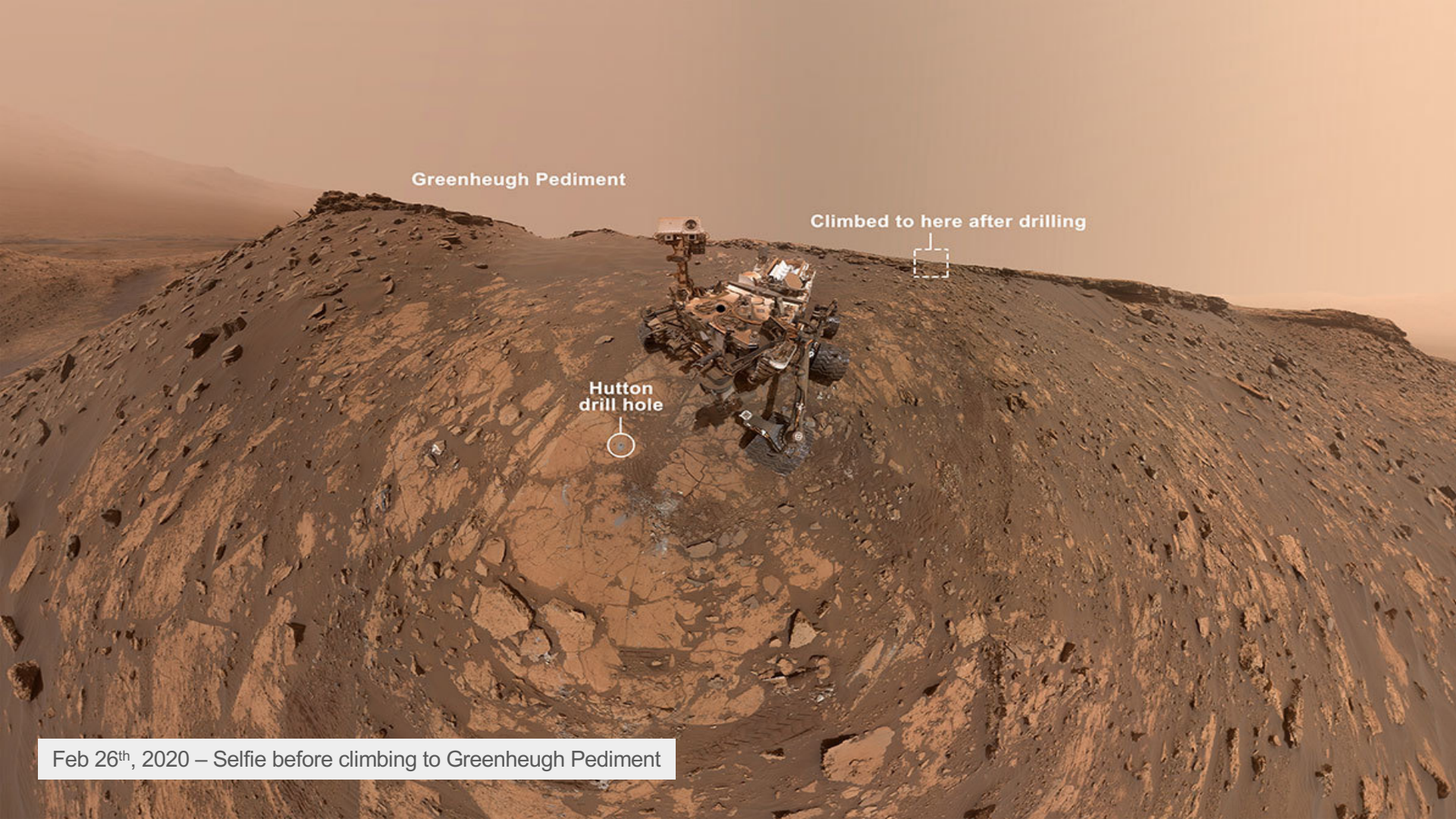
- Context from a Different Angle
- Traditional Lean, Agile, DevOps Values
- Kubernetes Paradigm
- Testability in Kubernetes
- Disposable Environments
- Non-Functional Testing
- Chaos Engineering
- Wrap up!

Himanshu Patel

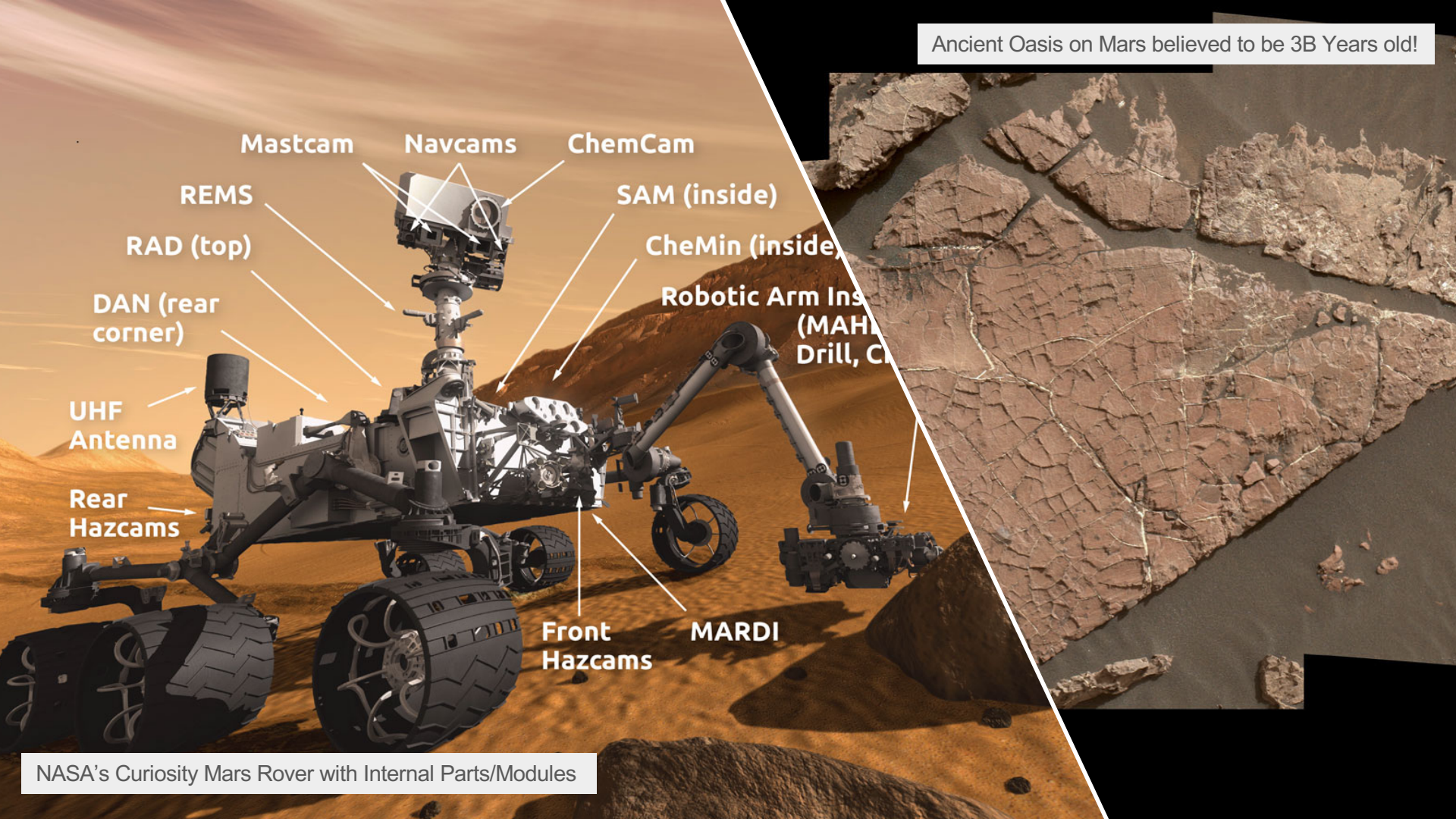
Digital Transformation Leader, DevOps Human & DOI Ambassador

NavikHub

Digital Transformation Leader, Evangelist, Speaker, and Passionate Technologist with a solid breadth and depth, a firm believer in simplistic & sustainable design. Leading Middleware Engineering and DevOps Practices at Aventiv Technologies in Dallas, TX.



Feb 26th, 2020 – Selfie before climbing to Greenheugh Pediment

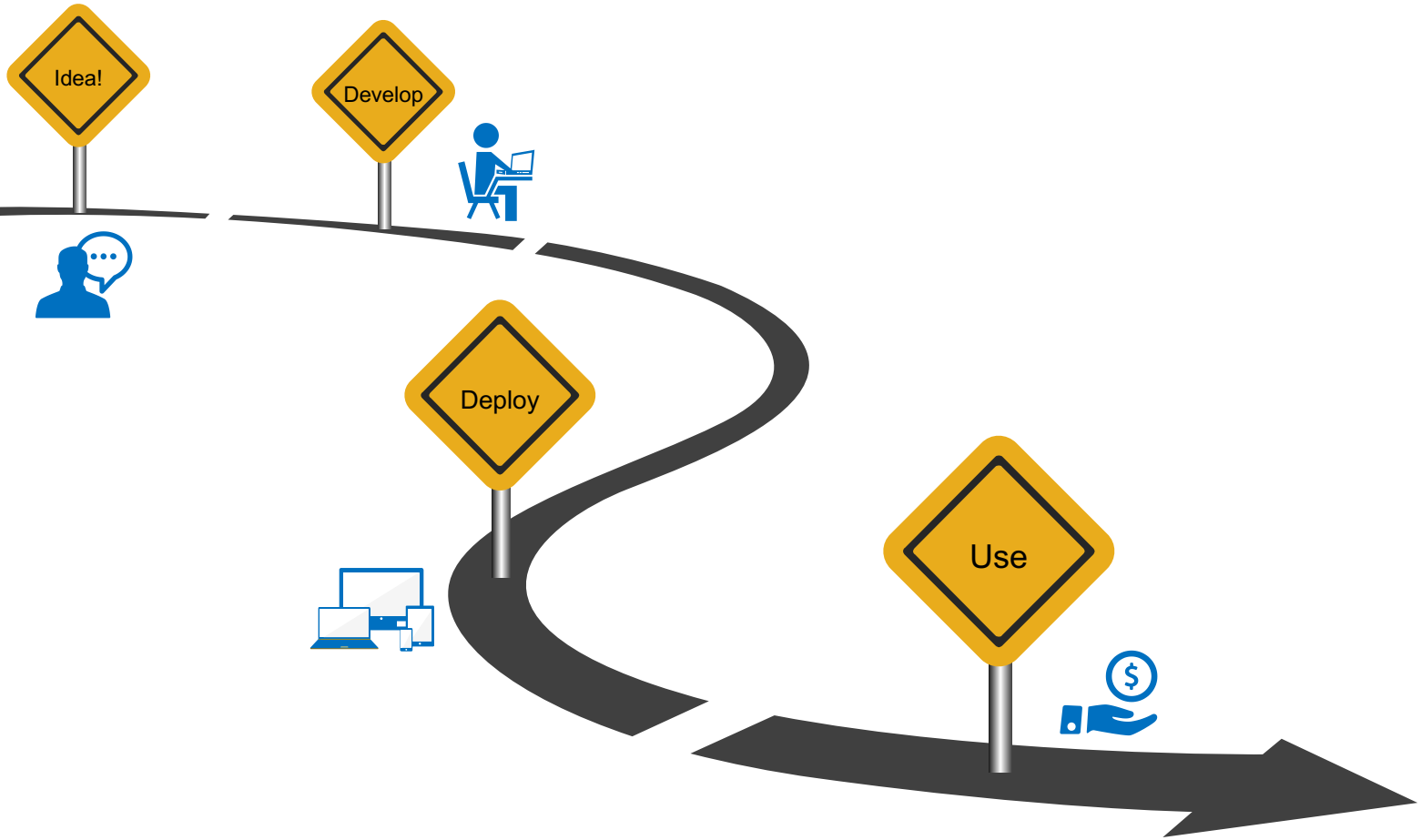


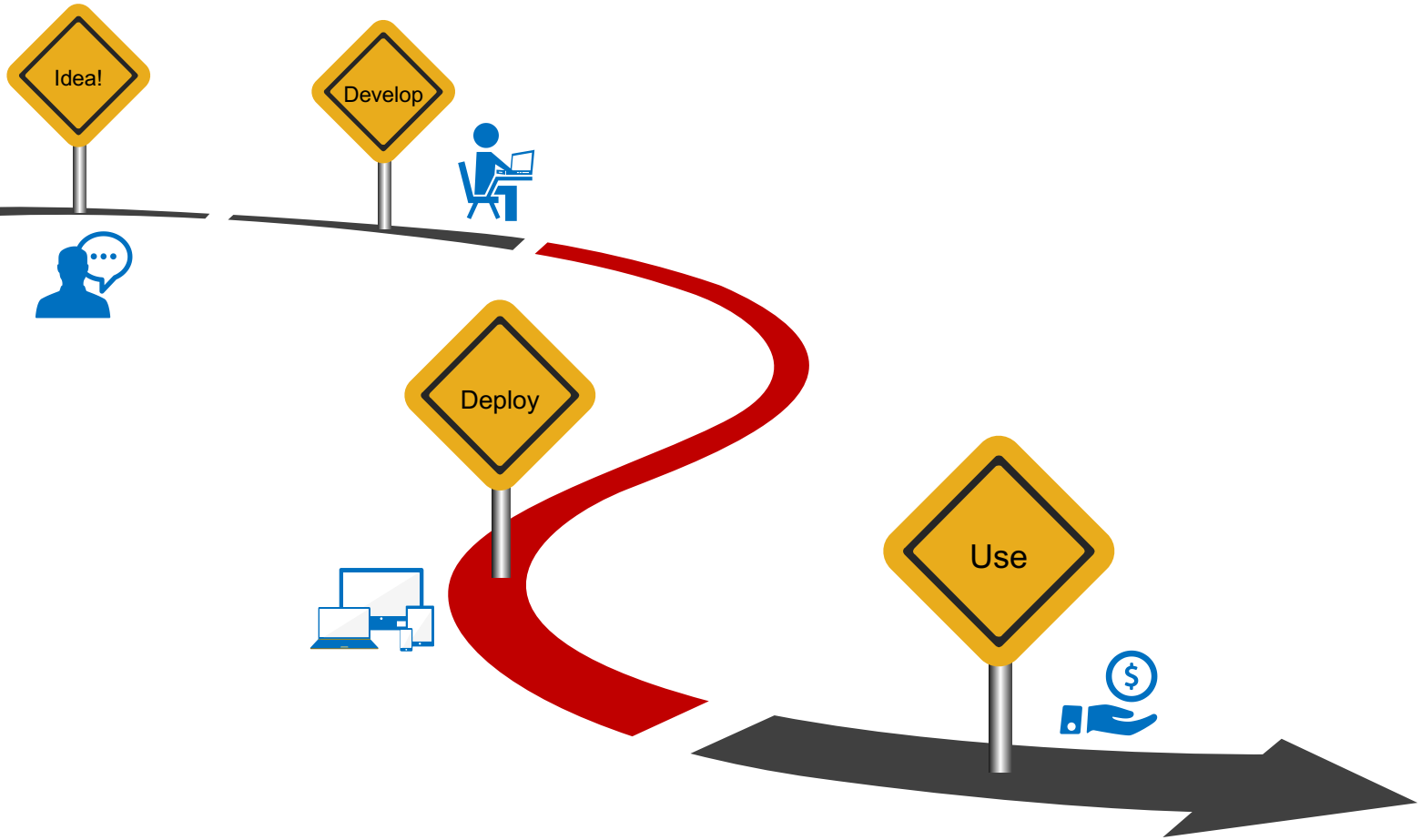
NASA's Curiosity Mars Rover with Internal Parts/Modules

Ancient Oasis on Mars believed to be 3B Years old!

TESTABILITY
IN THE PARADIGM OF CONTAINERS AND KUBERNETES


20K


Idea!
Develop
Deploy
Use


Idea!
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Develop
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Use
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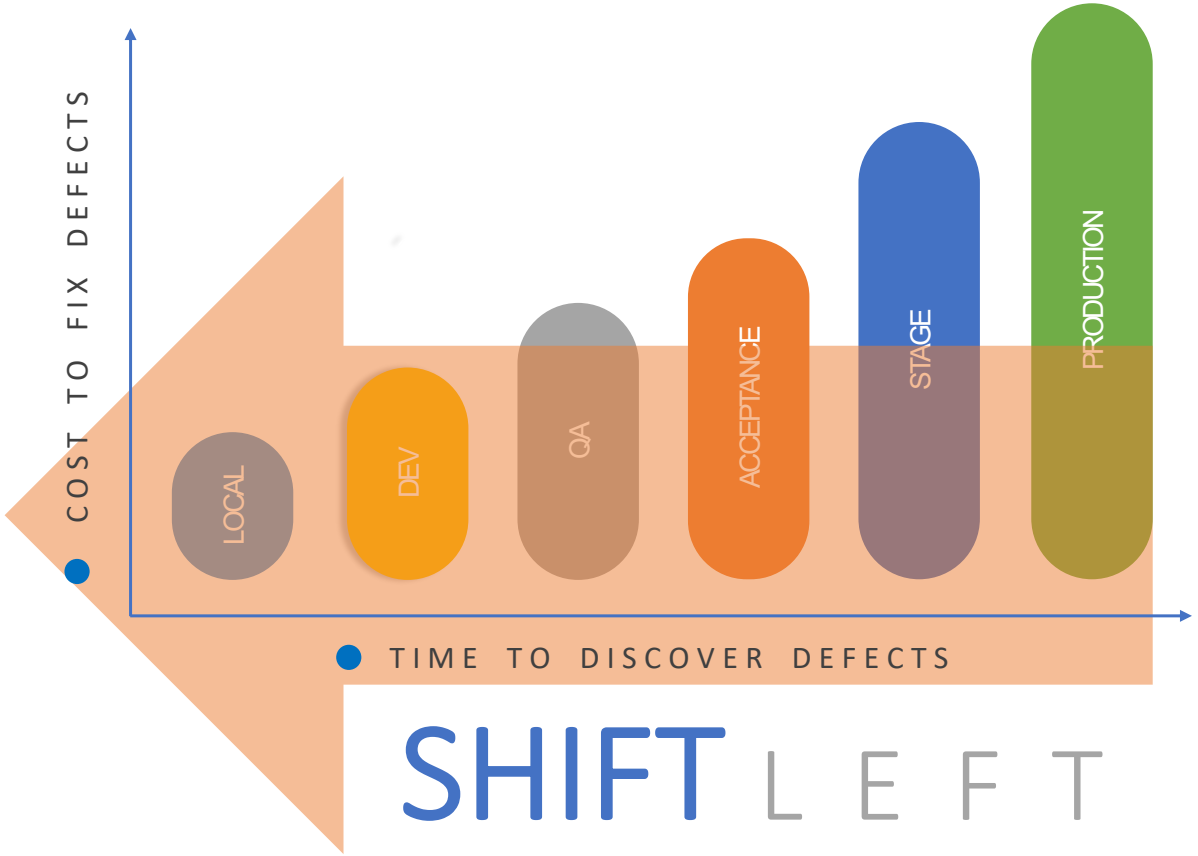
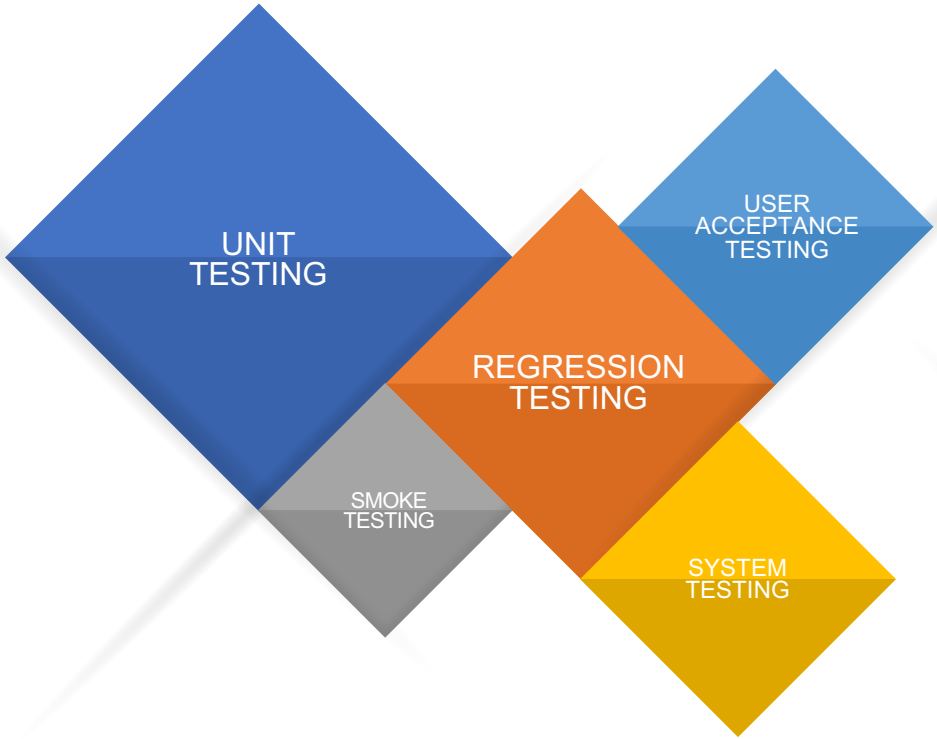


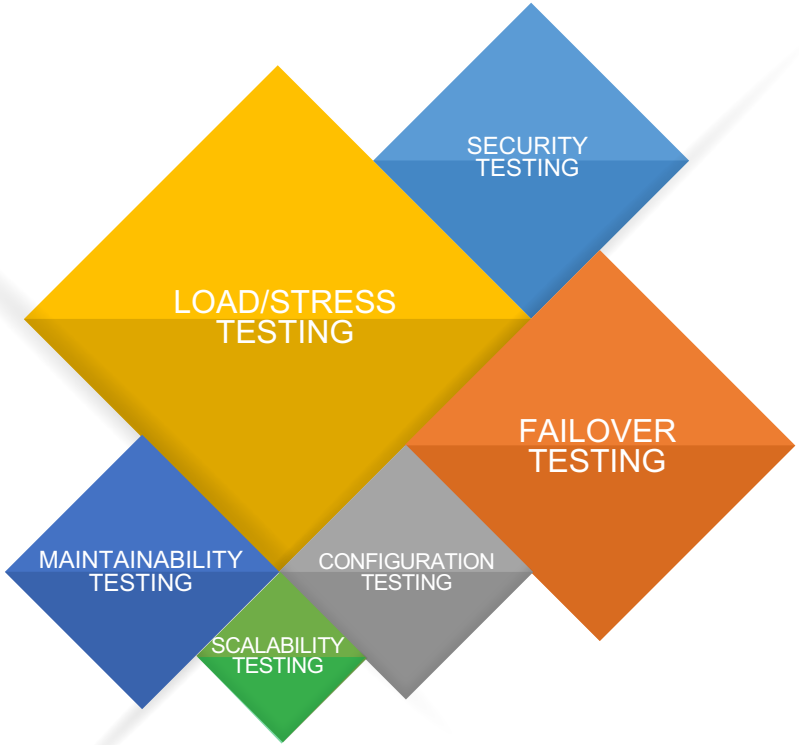
SHIFT LEFT

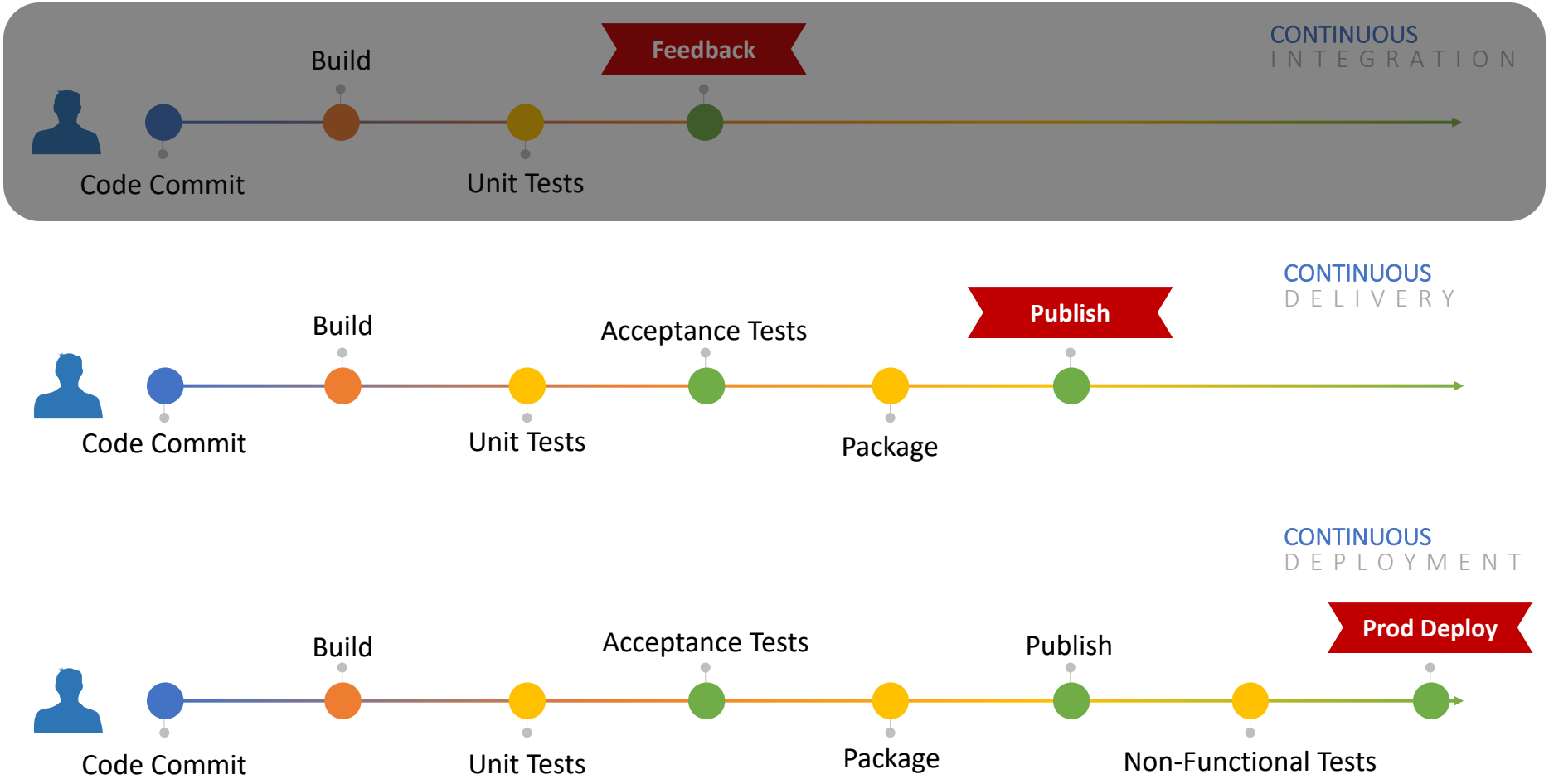
- **EARLY** DETECTION
- **TIME** SAVING
- **COST** SAVING
- **SMOOTH** RELEASES



FUNCTIONAL TESTING

NON-FUNCTIONAL TESTING




CONTINUOUS
INTEGRATION
Feedback
Build
Code Commit
Unit Tests
CONTINUOUS
DELIVERY
Publish
Build
Acceptance Tests
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Package
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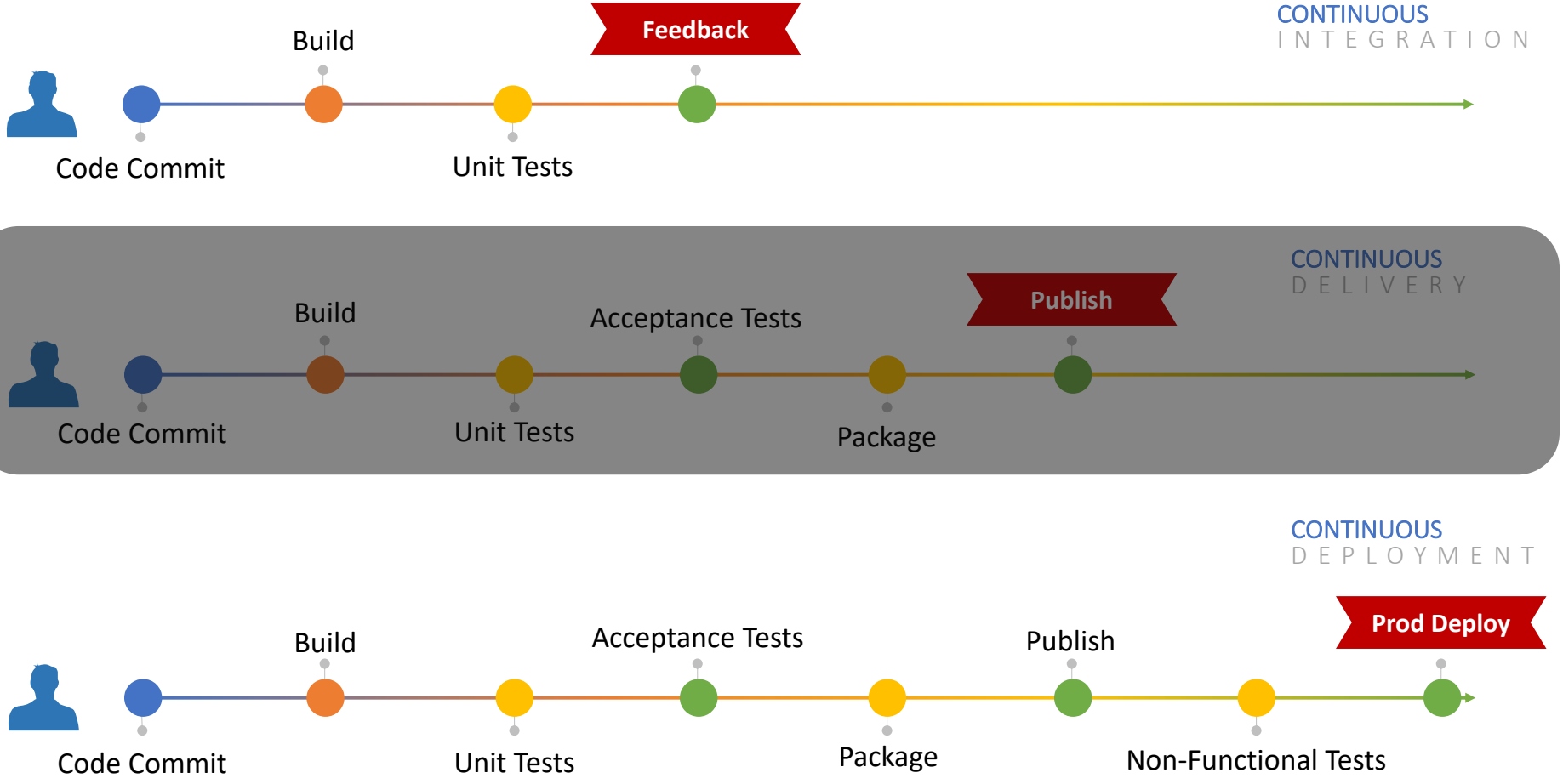
Non-Functional Tests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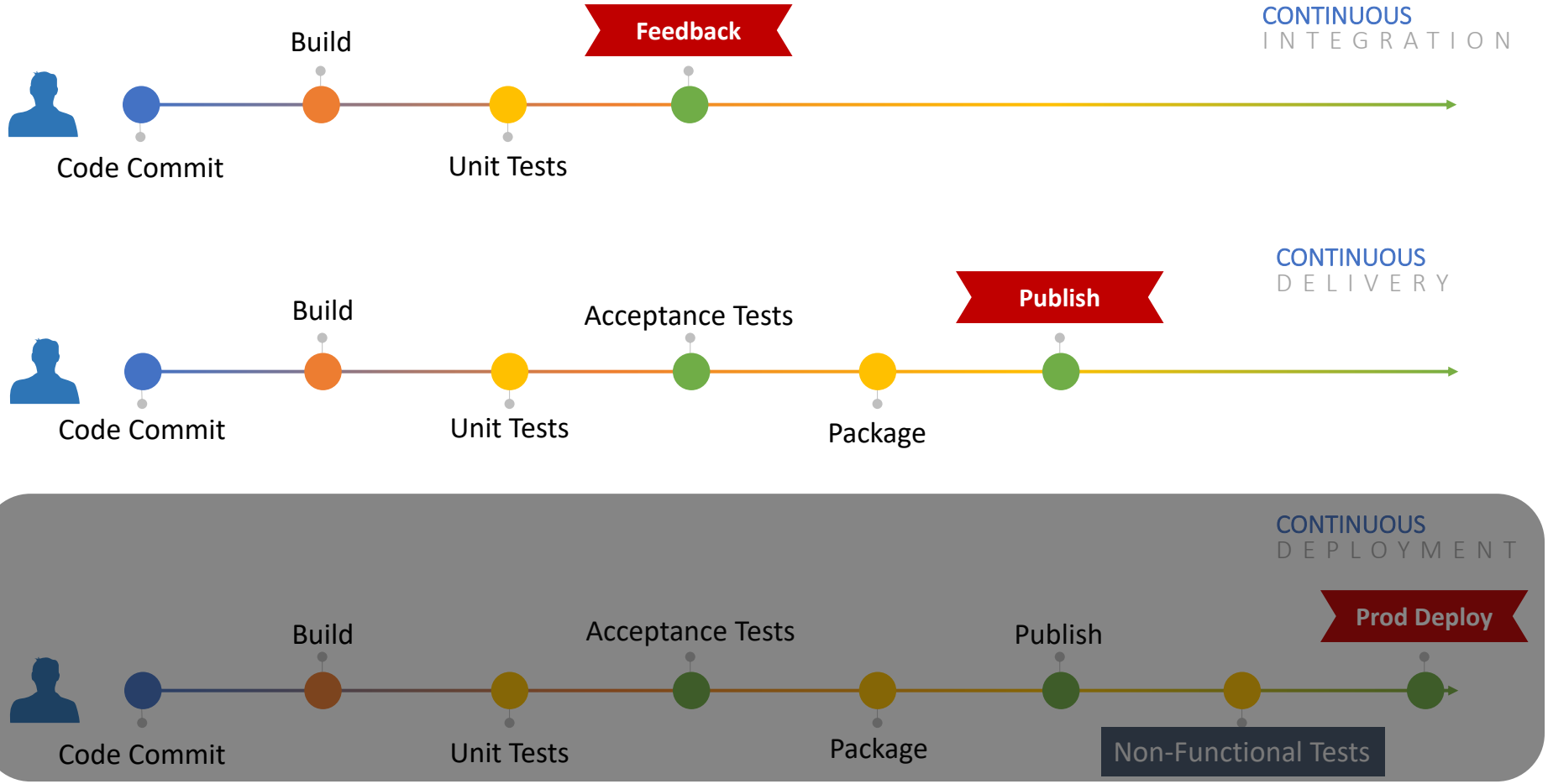
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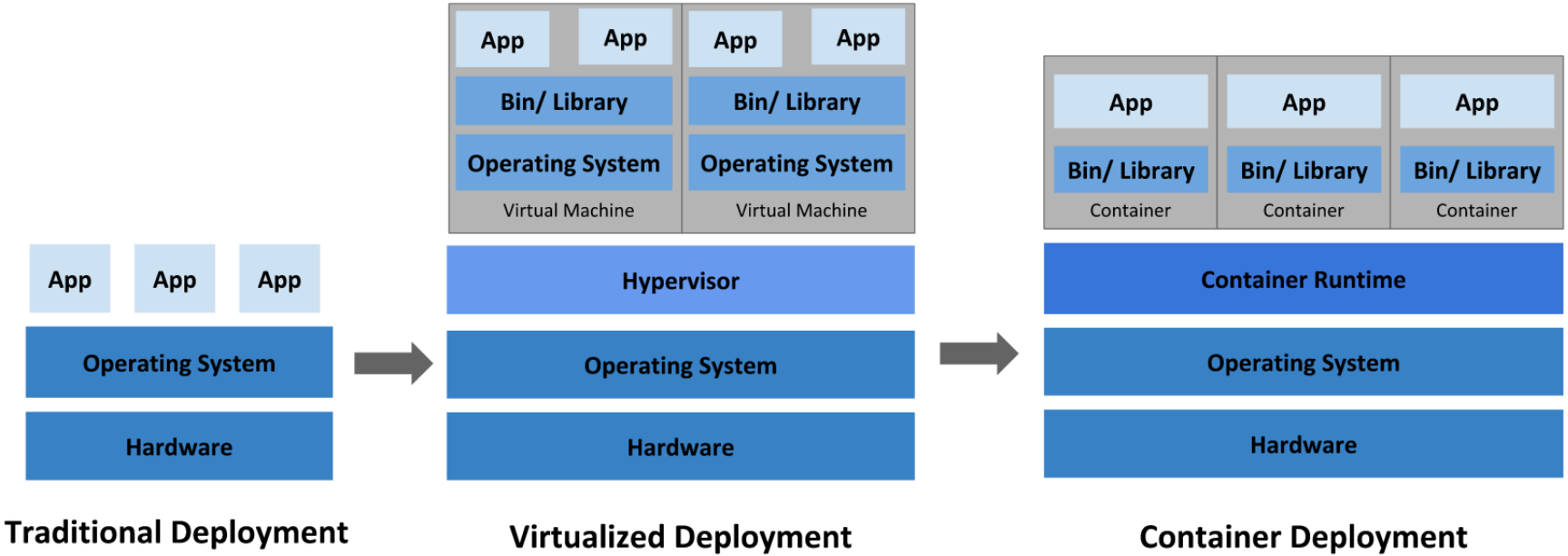
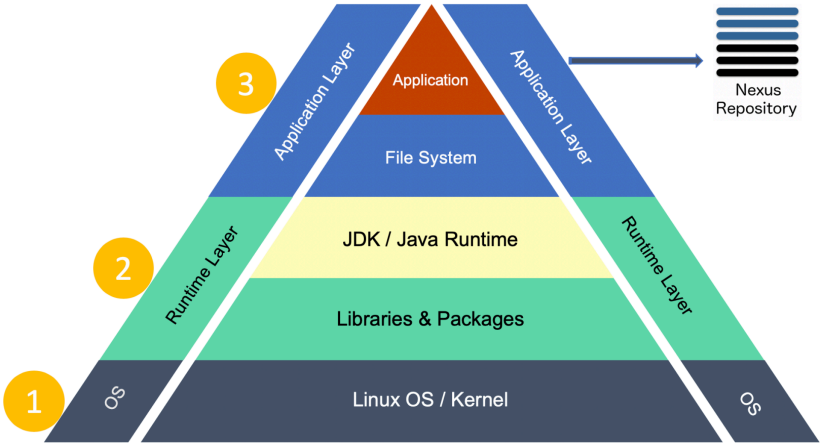
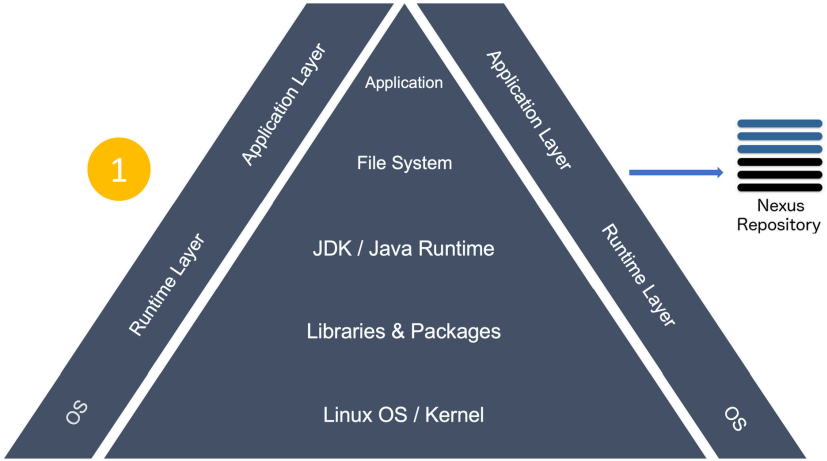
EVOLVING DEPLOYMENTS





TRADITIONAL DEPLOYMENT

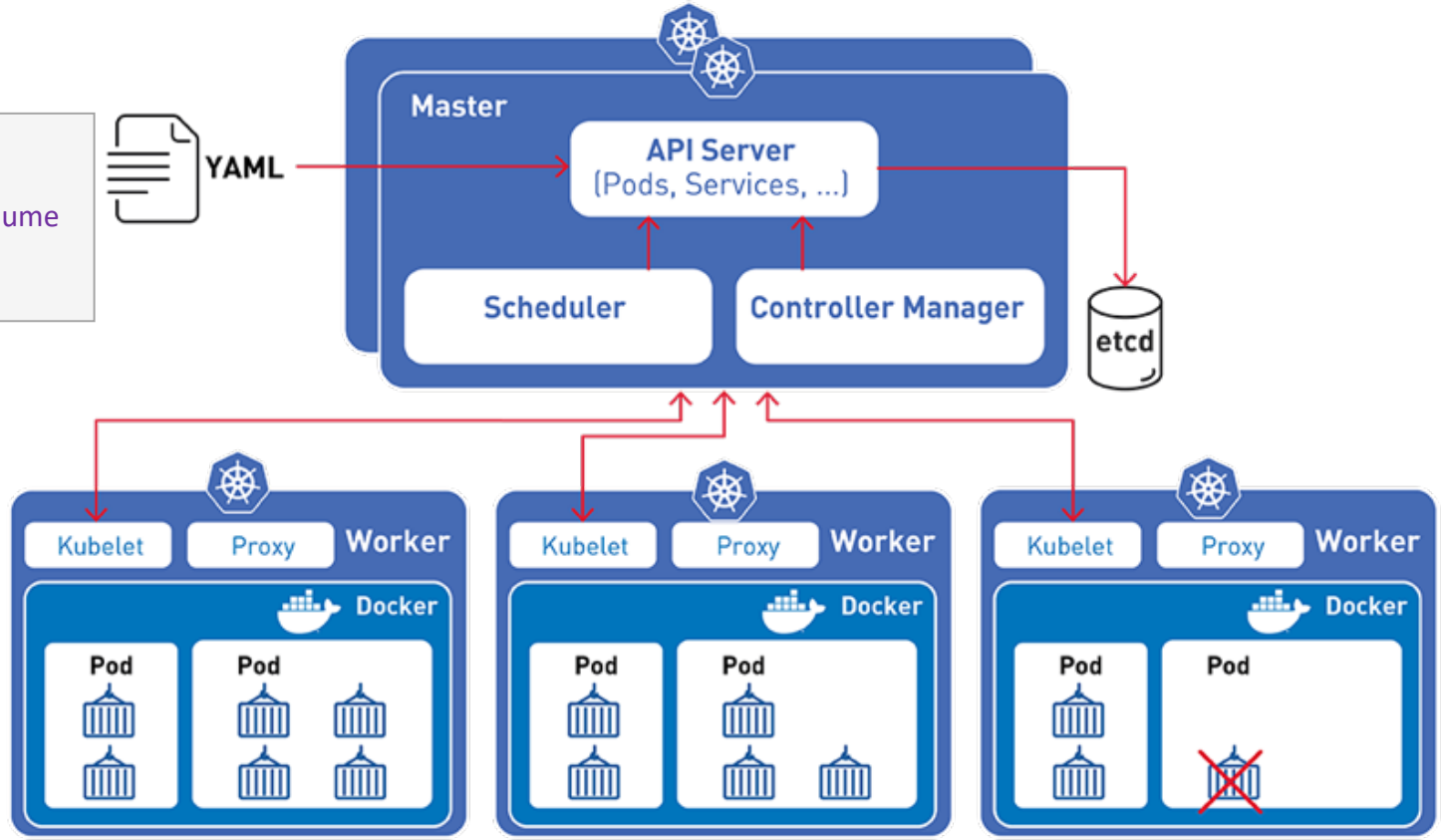


CONTAINERIZED DEPLOYMENT

SKILup DAYS

KUBERNETES ARCHITECTURE

Namespace
Service
Persistent Volume
Deployment
Pod



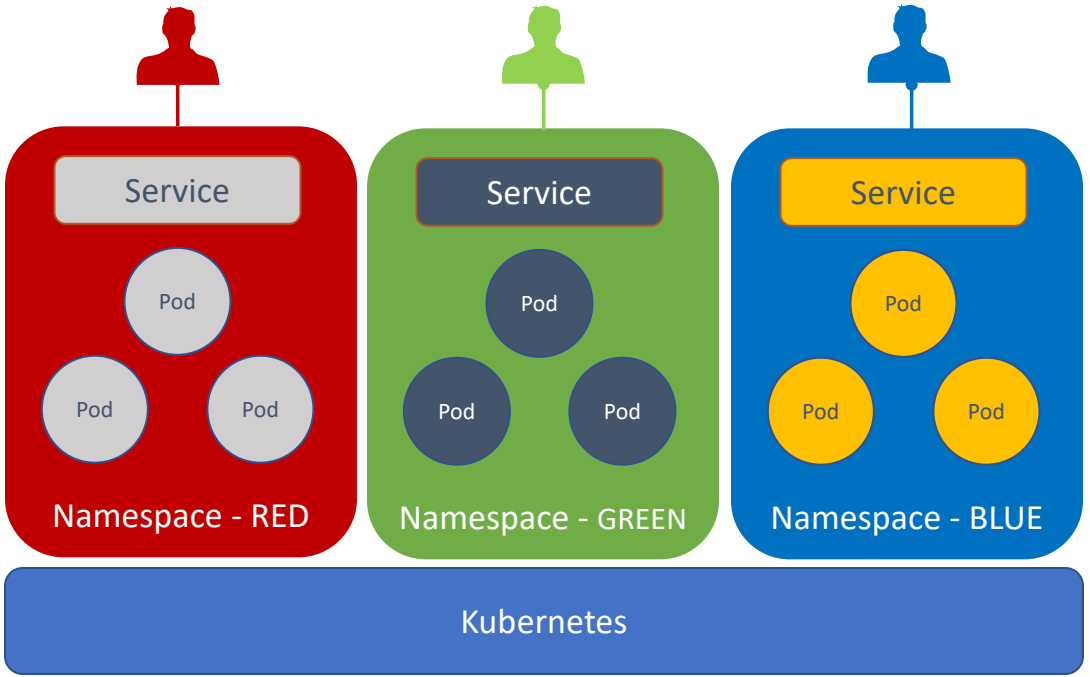
TESTING RESOURCES

TEST CASES / SCENARIOS

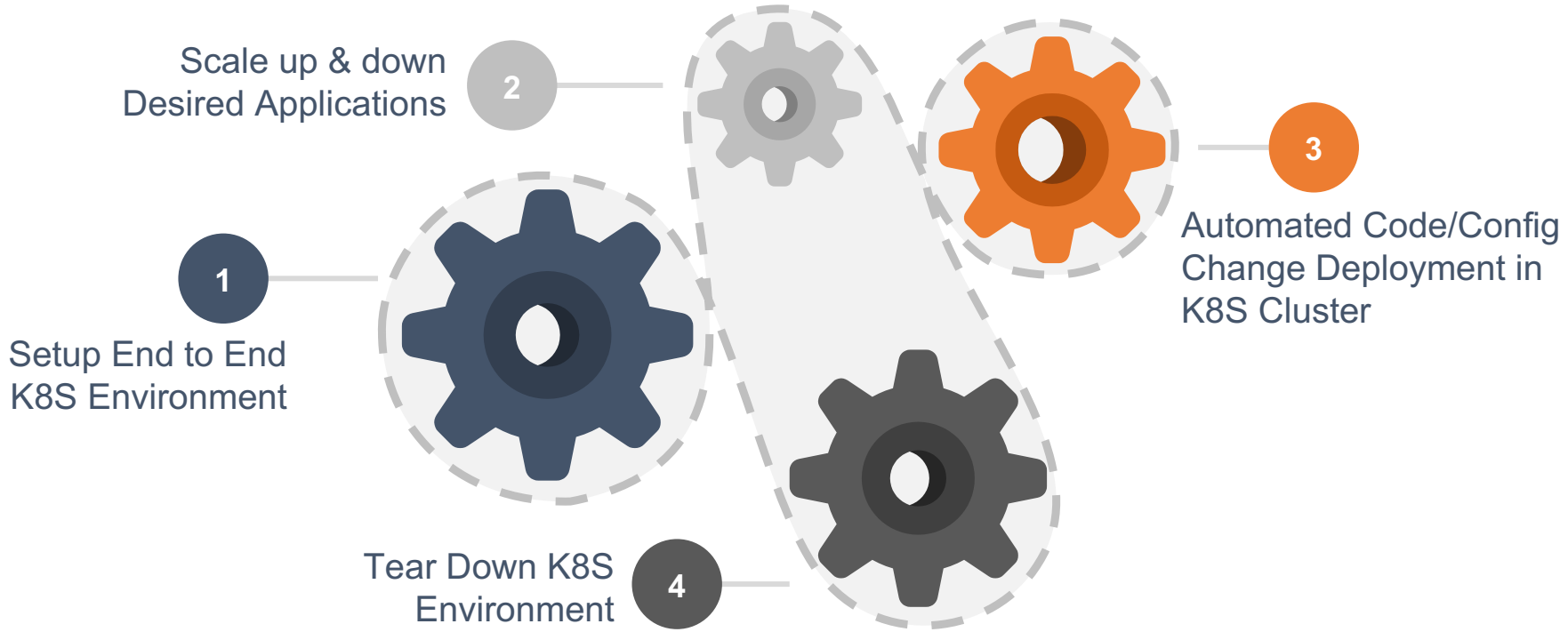
APPLICATION

CONFIGURATION

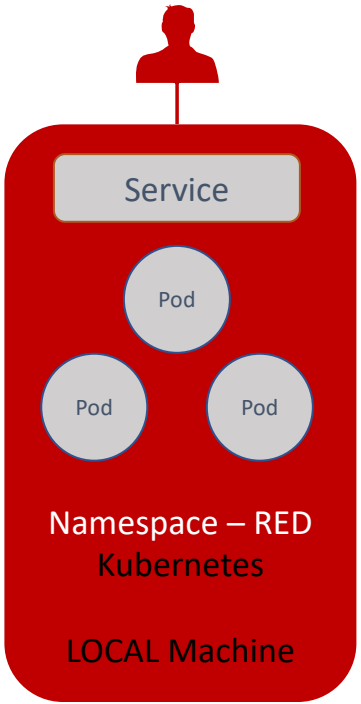
ENVIRONMENT



DEVOPS CI/CD AUTOMATION



SHIFT L E F T



K3S

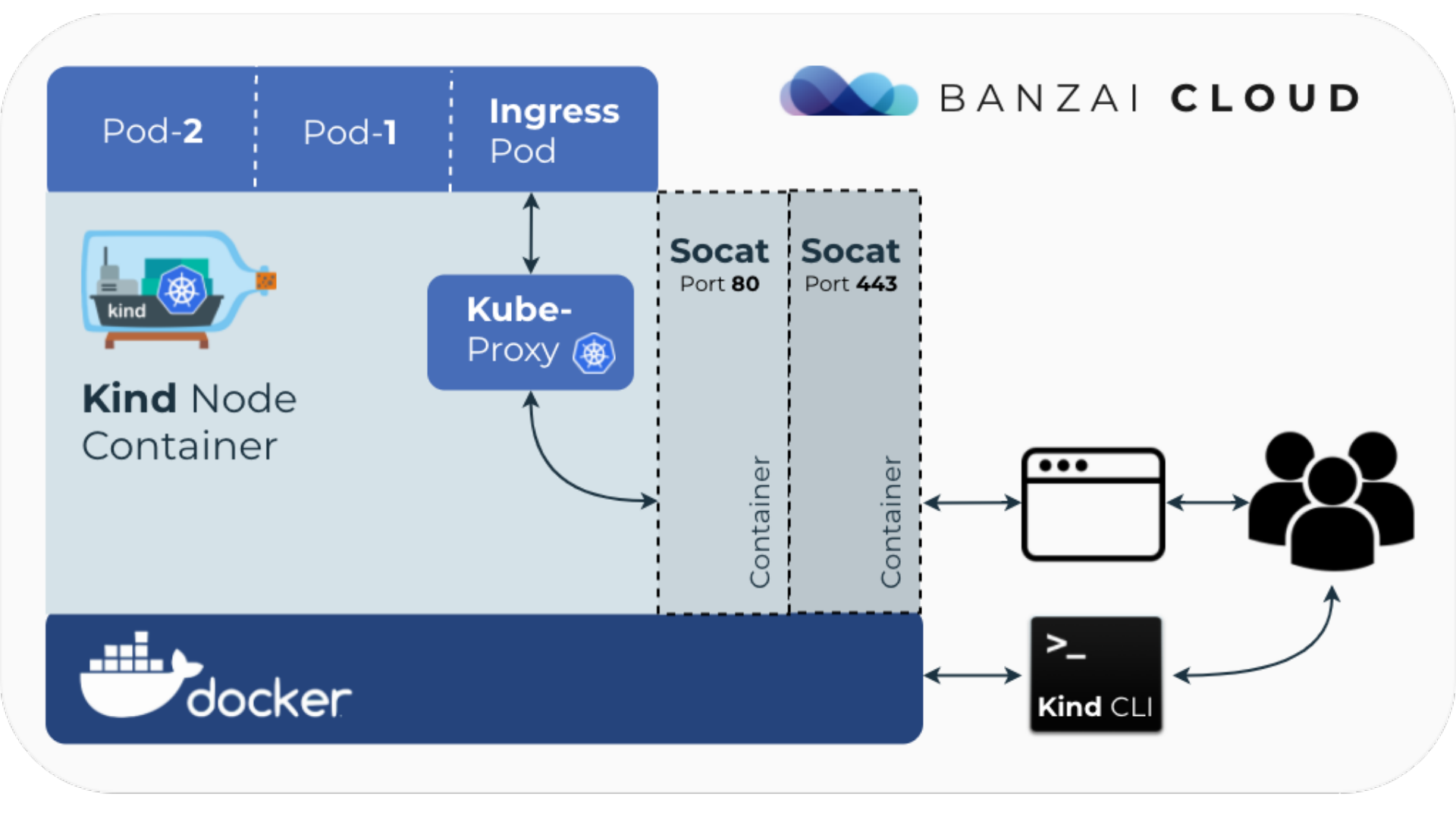
docker

kind

kubernetes

MicroK8s

minikube


Pod-2
Pod-1
Ingress Pod
BANZAI CLOUD
kind
Kube-Proxy
Socat Port 80
Socat Port 443
Container
Container
Kind Node Container
docker
>_
Kind CLI

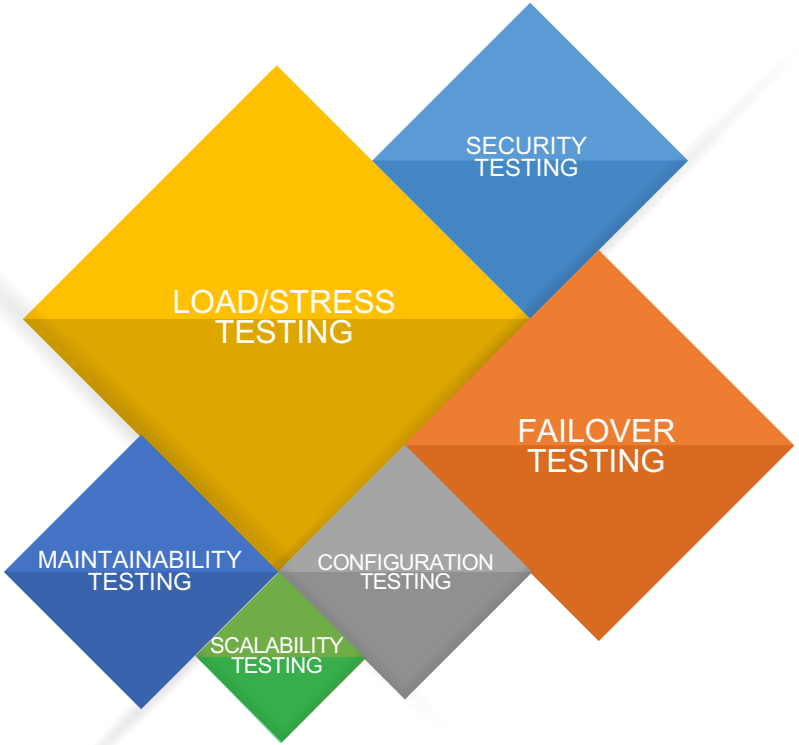
LOCAL SETUP

- What is it?
  - Docker
  - Kind (Kubectl CLI)
  - Docker Registry
  - K8Dash Control Plane
  - CI Server (Jenkins)

- Why K8S Cluster on LOCAL?
  - Multi Cluster Management
  - All K8S Resources Supported
  - Local Docker Registry
  - CLI and Dashboard Access
  - Quick Setup & Teardown
  - SHIFT LEFT

TRY OUT https://github.com/navikco/

NON-FUNCTIONAL TESTING

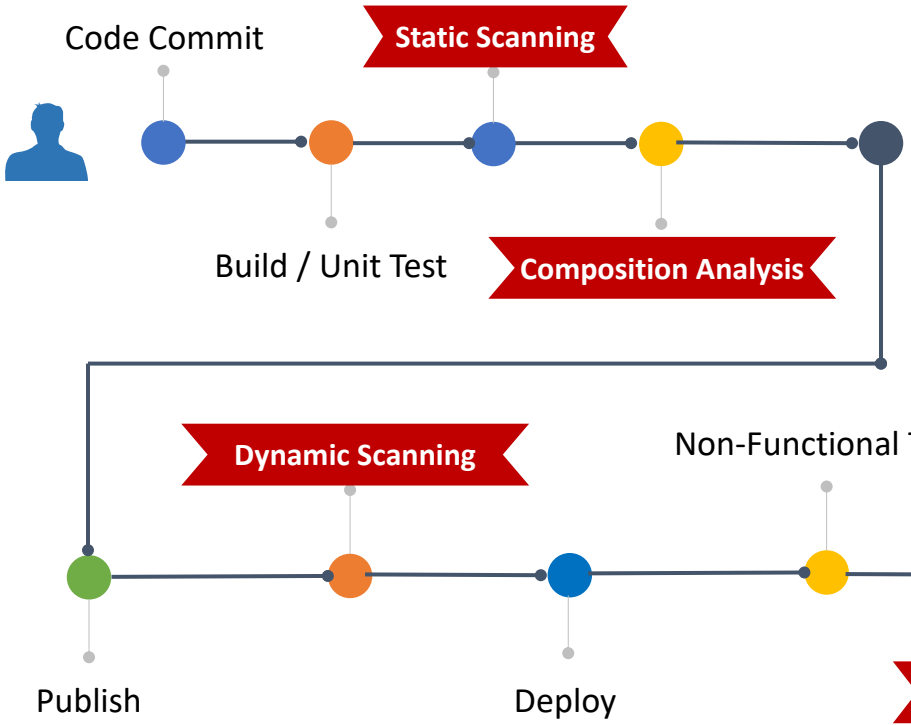


Improved Security & Reduced Risk

High Stability & Site Reliability

Cost & Time Savings

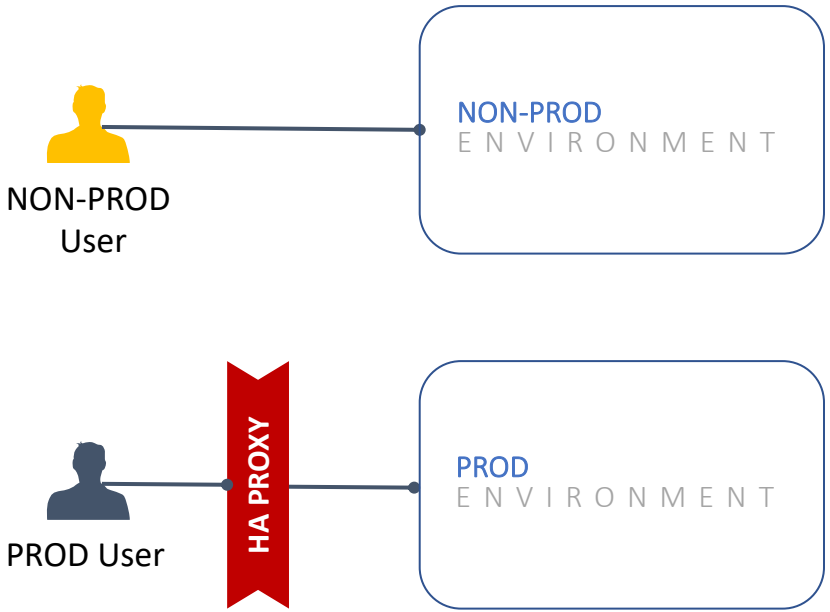
SECURITY TESTING



- Security Testing
  - Rootless Containers
  - Static Scanning
  - Composition Analysis
  - Dynamic Scanning
  - Pen Testing

SECURITY AS PART OF CI/CD DELIVERY PIPELINE

DEALING WITH FAILURES



- Failover Testing
  - Identification, Experimentation, Measurement & Remediation of Failures
  - Identical Non-PROD & PROD Environments

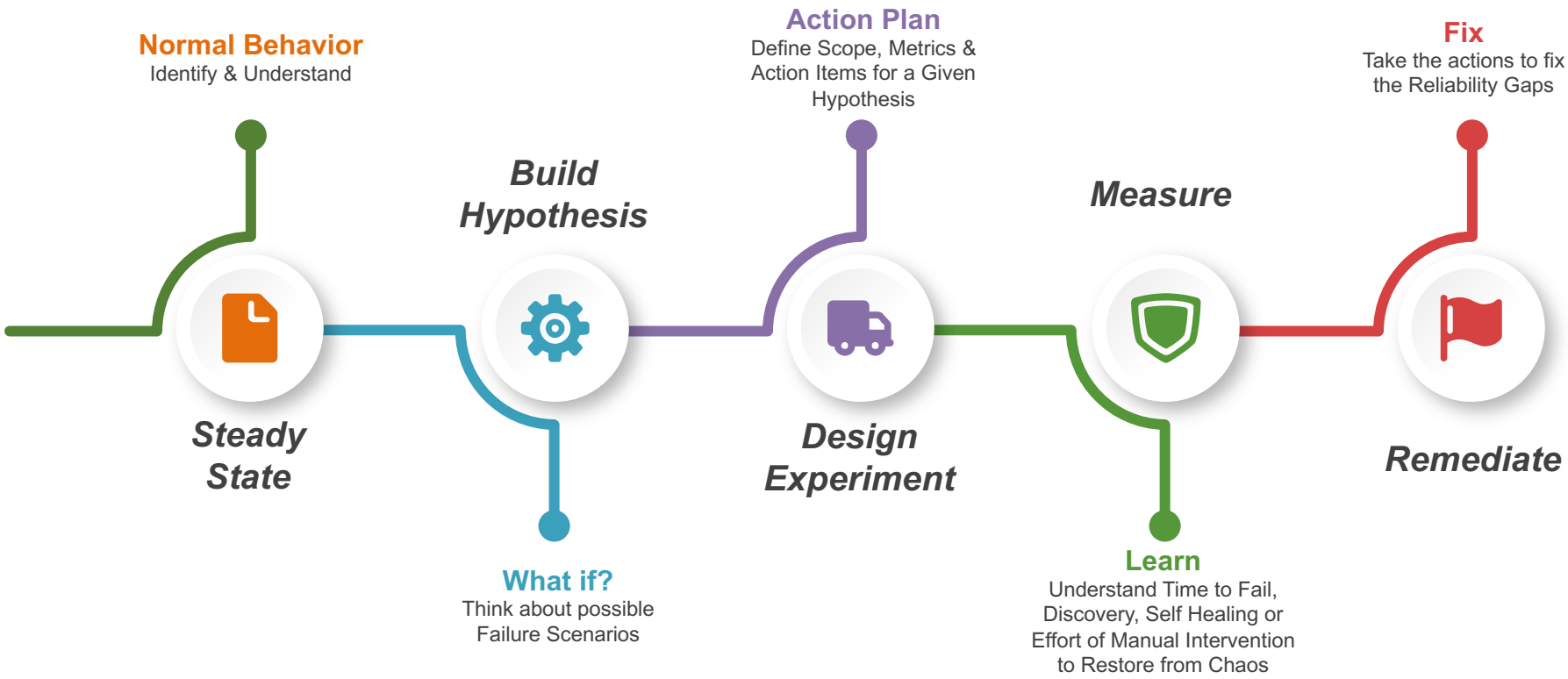
EPHEMERAL ENVIRONMENTS BUILT WITH SAME PRODUCTION MANIFEST

CHAOS ENGINEERING

- Failures are given and everything will eventually fail over time
  - CTO Amazon.com
- Chaos Engineering is the discipline of experimenting on a distributed system in order to build confidence in the system's capability to withstand turbulent conditions in production
- Bad things will happen to your system, no matter how well designed It is. You cannot become ignorant to it
- Chaos doesn't cause problems. It reveals them.
  - Netflix

CHAOS ENGINEERING IS A PRACTICE TO IMPROVE SYSTEM RESILIENCY & CONFIDENCE

CHAOS ENGINEERING CYCLE



FAILURE INJECTION

Common Failures

- **Host Failure**
- **Block DNS**
- **Resource Attack**
- **Traffic Spikes**
- **Dependency Failure**

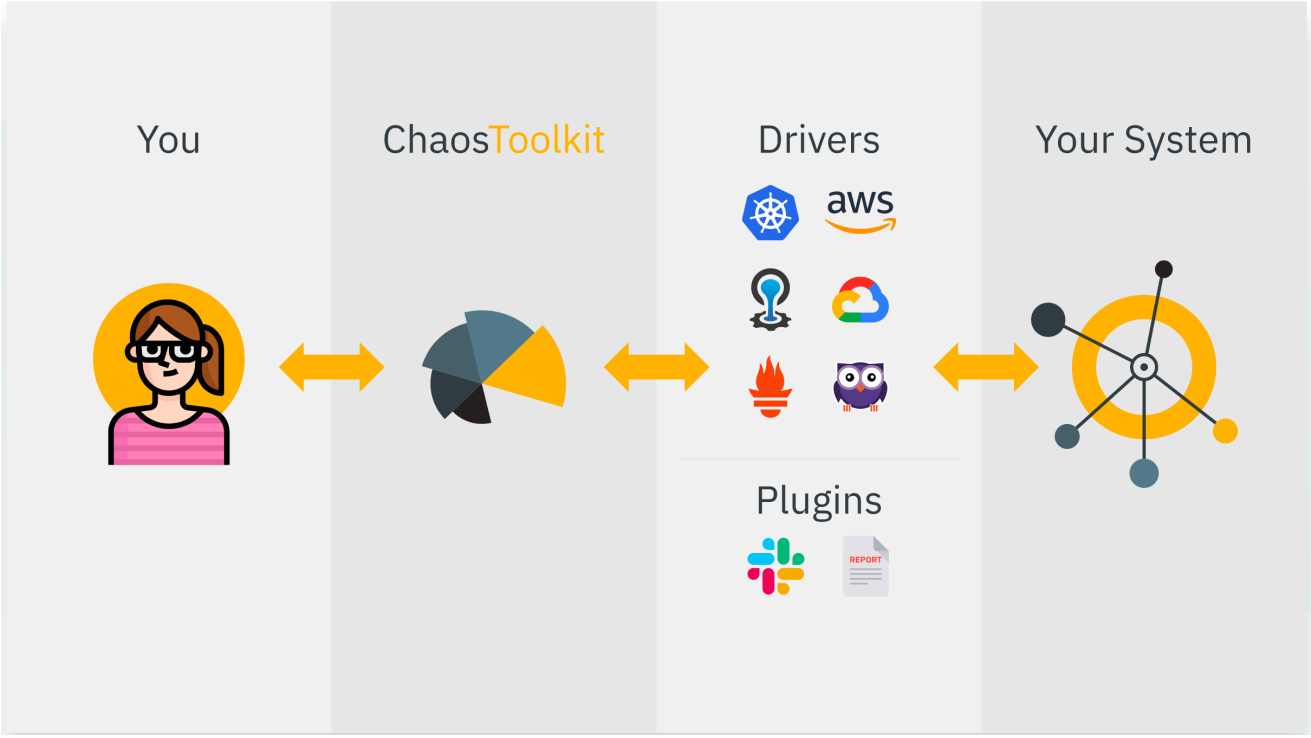
What if?

- Service returns 404, 503?
- Latency Triples?
- Port Inaccessible?
- DB or External System Unavailable?
- Volume Increases Four-Fold?
- IP Tables Wiped out?

Measure

- Time to Detect
- Time to Notification
- Time to Graceful Shutdown
- Time to Partial, Full Auto-Heal or Recovery

CHAOS ENGINEERING TOOLS



- Several Commercial & OSS Options
- Should be Declarative, Extensible & Automated
- Start Small & Build Confidence
- Experiment across Levels,
  - Application
  - Caching
  - Database
  - Network

CHAOS ENGINEERING AS PART OF CI/CD DELIVERY PIPELINE

KUBERNETES TESTABILITY

- Pod Validation
- Rootless Container Validation
- Liveness & Readiness Probs
- Disposable Environments
- Identical Environments for PROD & QA
- Security Testing
- CHAOS ENGINEERING

AUTOMATE N/F TESTS UNDER CI/CD DELIVERY PIPELINE

Oct 11th, 2019 – Another Selfie

THANK YOU!

Meet me in the Network Chat Lounge for questions

SKILUP DAYS