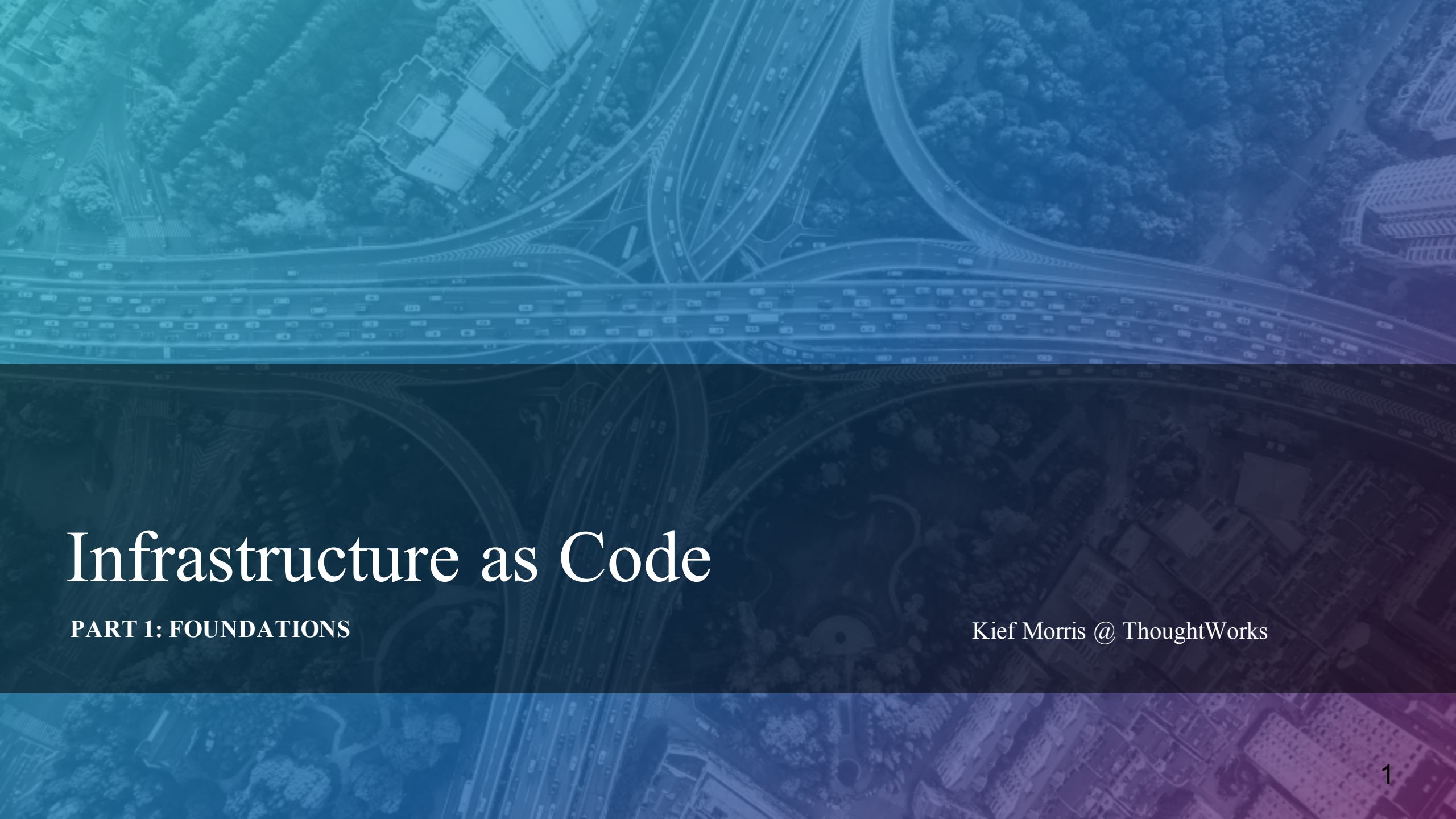


Infrastructure as Code

PART 1: FOUNDATIONS

Kief Morris @ ThoughtWorks

PART 1: FOUNDATIONS

Infrastructure as Code

Kief Morris @ ThoughtWorks

WHO IS THIS WORKSHOP FOR?

PRACTITIONERS AND LEADERS

You are, or will be, building infrastructure

- Developers
- Systems Administrators
- "DevOps" specialists
- Architects
- Technical Leaders

WHO ALREADY KNOW THE FUNDAMENTALS

You work with cloud (IaaS) infrastructure

You have exposure to Infrastructure as Code tools (such as Ansible, Terraform, CloudFormation)

AND WANT IDEAS TO BUILD BETTER SYSTEMS

Design more complex infrastructure

Implement maintainable infrastructure

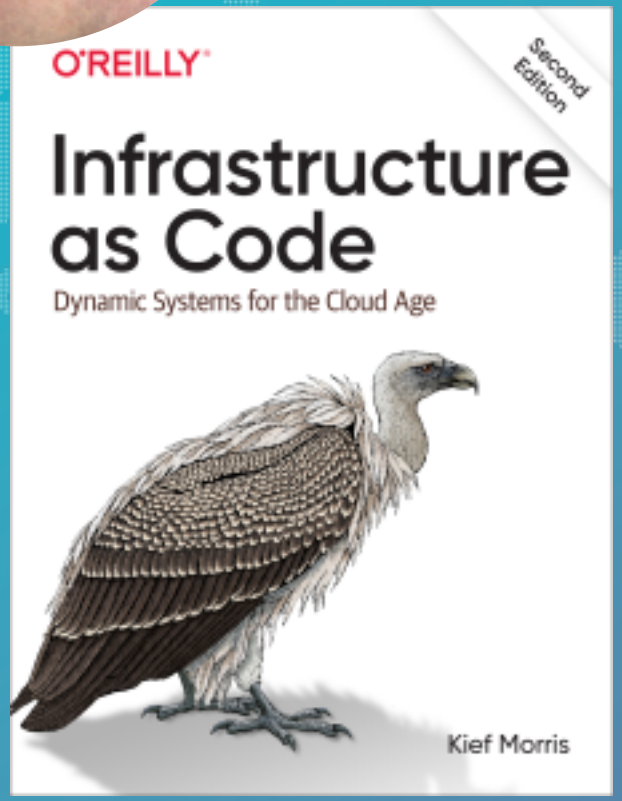
Grow and evolve your systems over time

NOT IN THIS WORKSHOP

- Hands-on coding
- How to use tool X, Y, or Z
- How to work with cloud A, B, or C

IN THIS WORKSHOP

- Patterns and practices
- Applicable to most tools and clouds
- Design guidelines for coping with large and complex projects
- Thoughts on organizing and managing infra codebases
- Practices for testing and delivering code where change is constant, and reliability and safety are essential



KIEF MORRIS

Global Director of Cloud Engineering

ThoughtWorks®

@kief

infrastructure-as-code.com

WORKSHOP CONTENTS

FOUNDATIONS

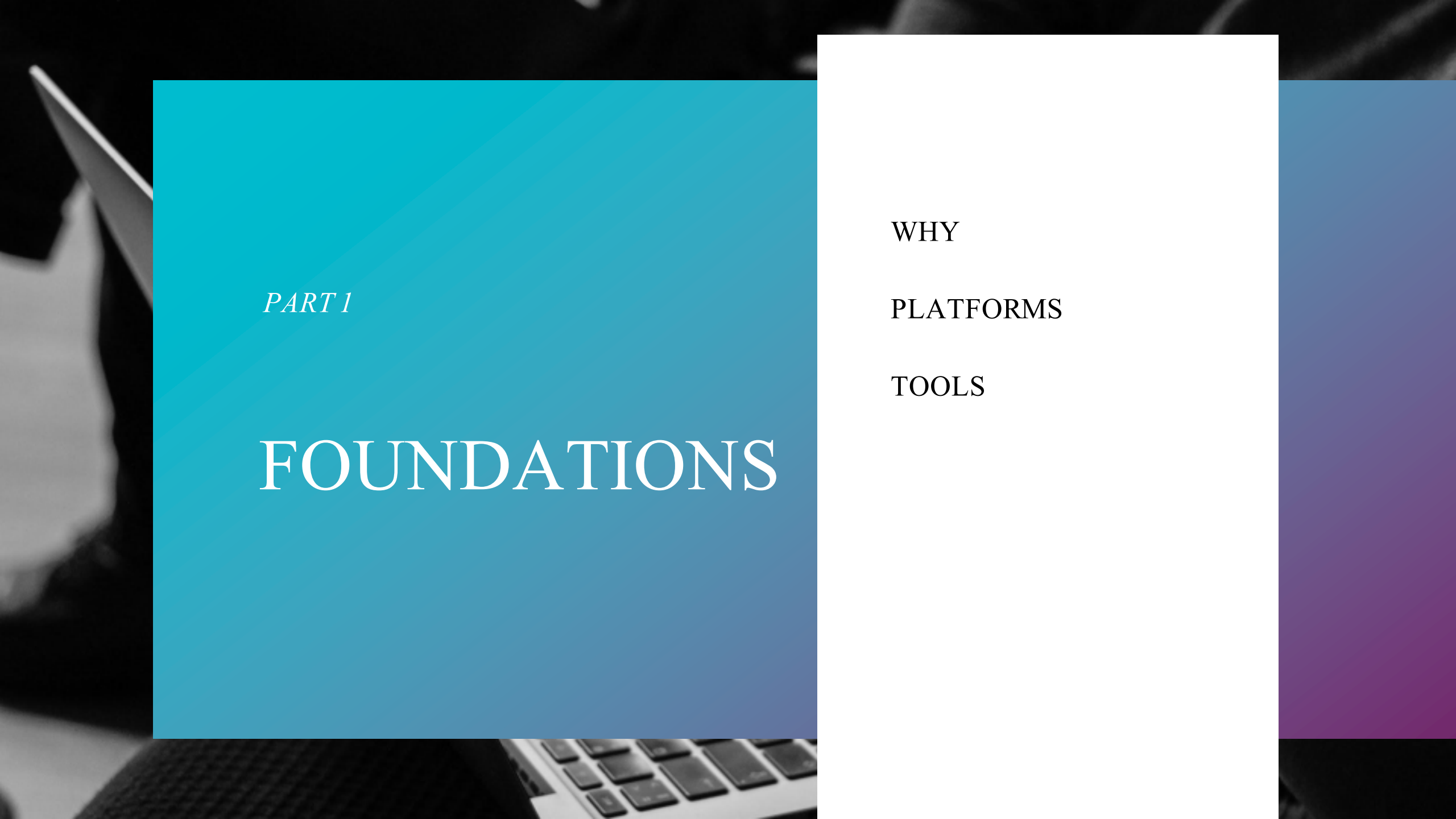
STACKS

TESTING

RUNTIMES

DESIGN

WORKFLOW



PART 1

FOUNDATIONS

WHY

PLATFORMS

TOOLS


WHY?

Automate your system so you can change it

EASILY

SAFELY

REA

"We should build it first, and worry about automating it later"

"We don't make changes often enough to justify automating them"

"We have to choose between speed and quality"

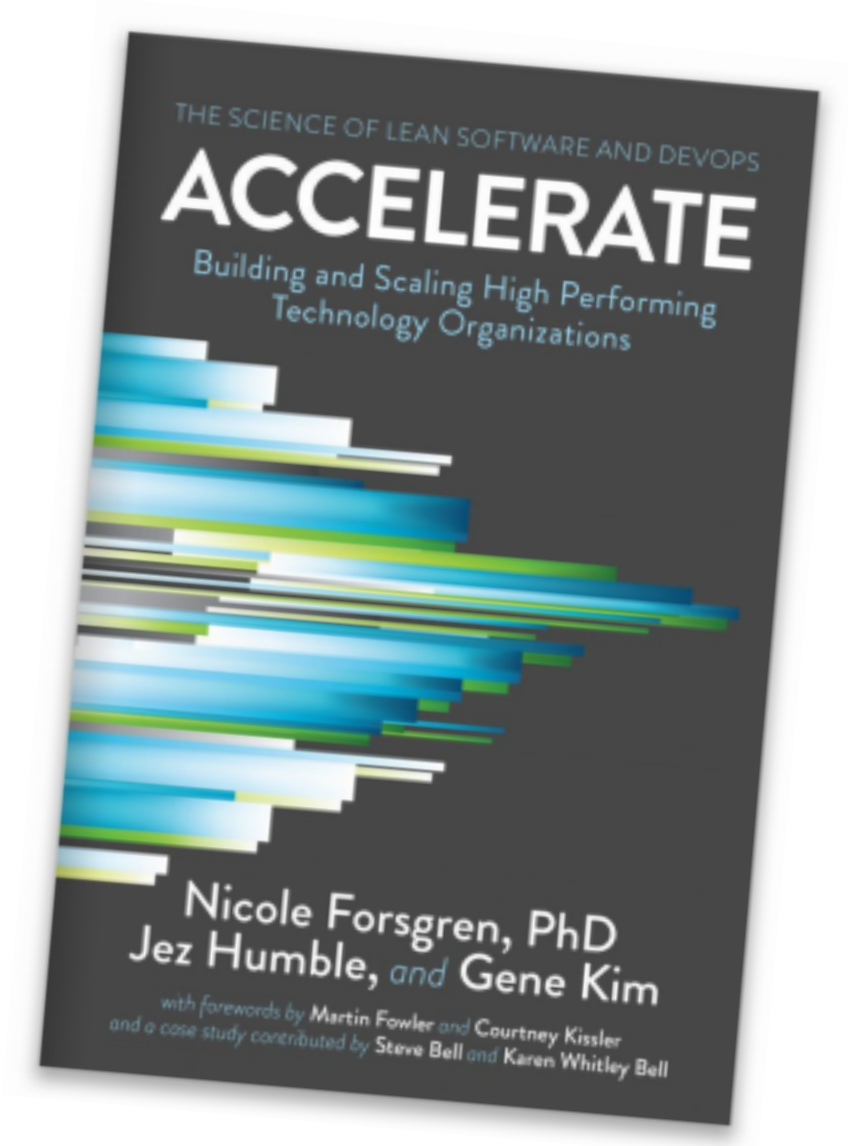

QUALITY
FAST
SLOW
LOW QUALITY

State of the DevOps Report

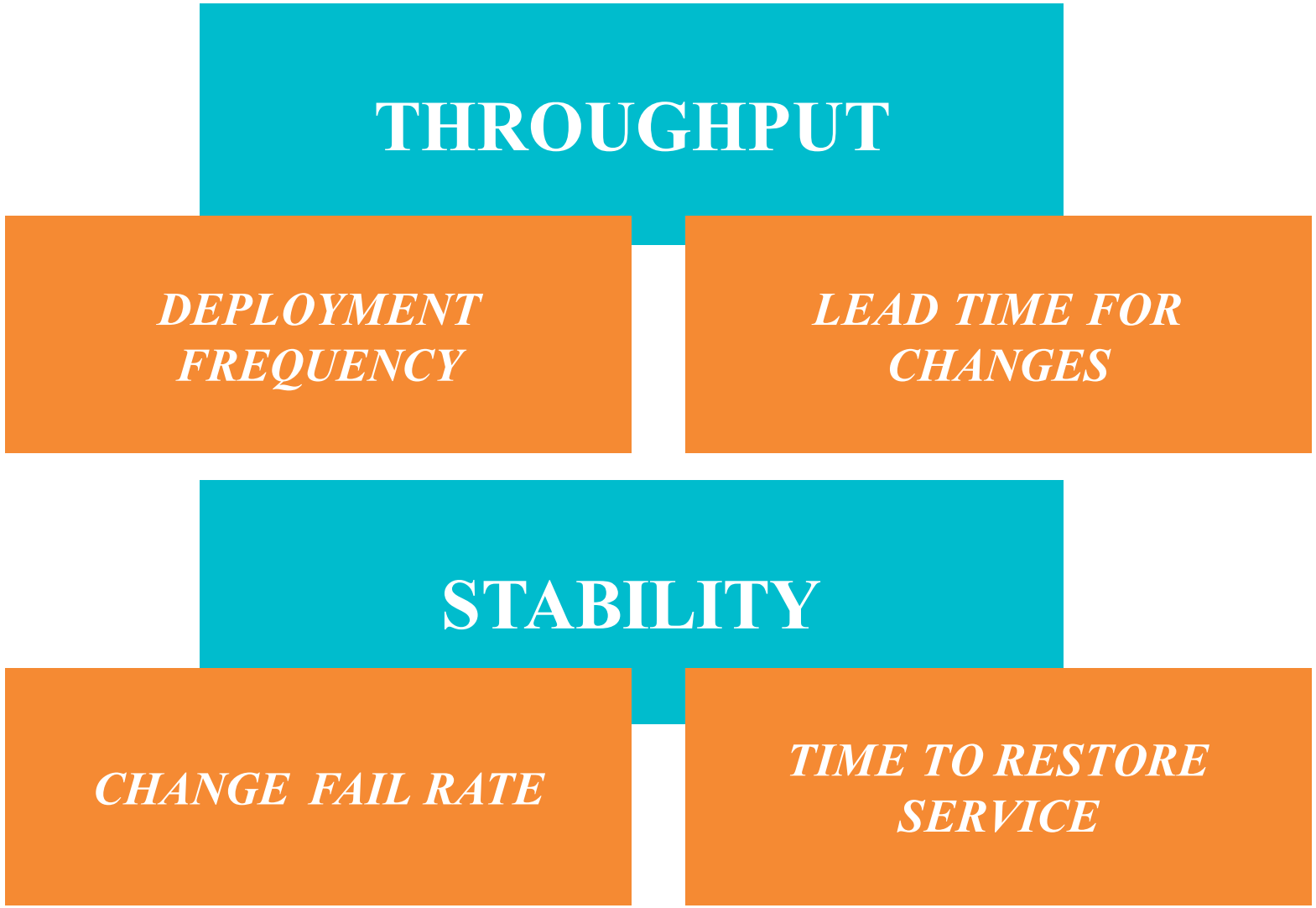
https://devops-research.com/

Accelerate,

Nicole Forsgren, PhD,
Jez Humble,
Gene Kim

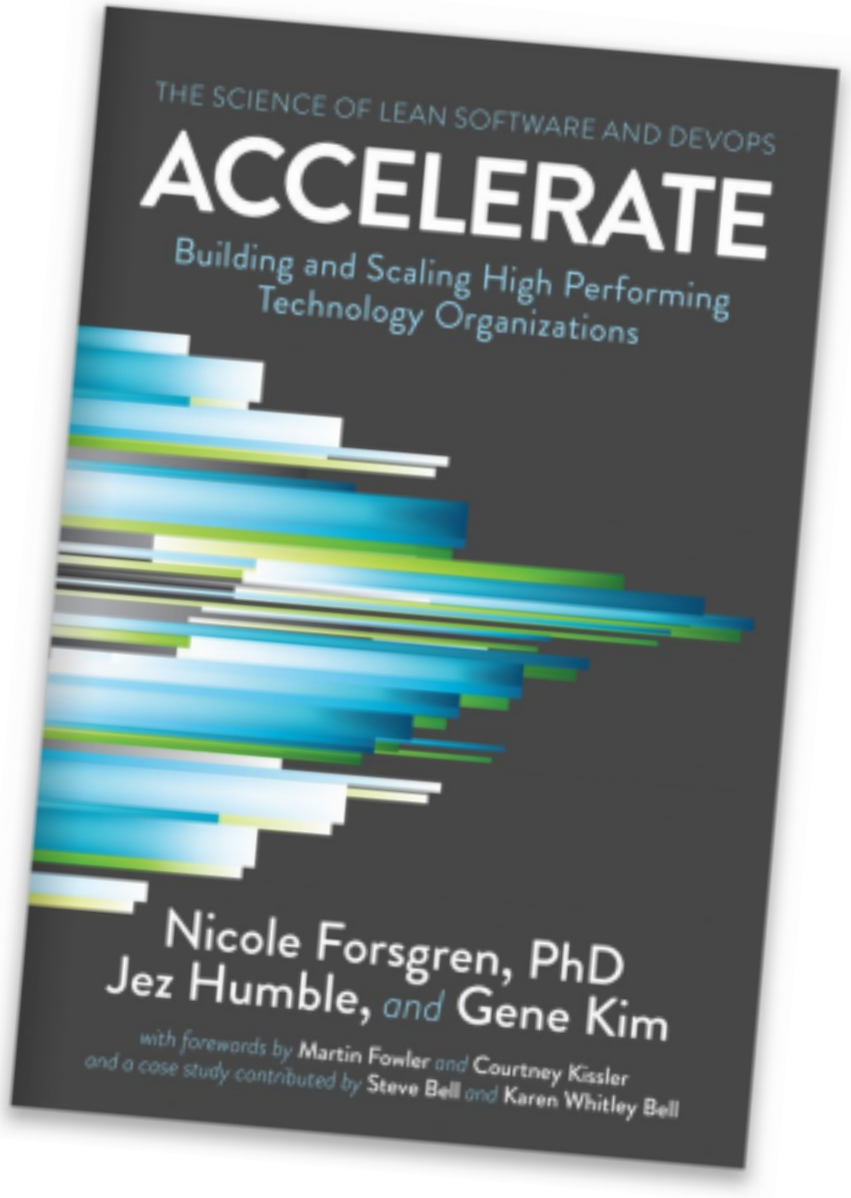


The Four Metrics



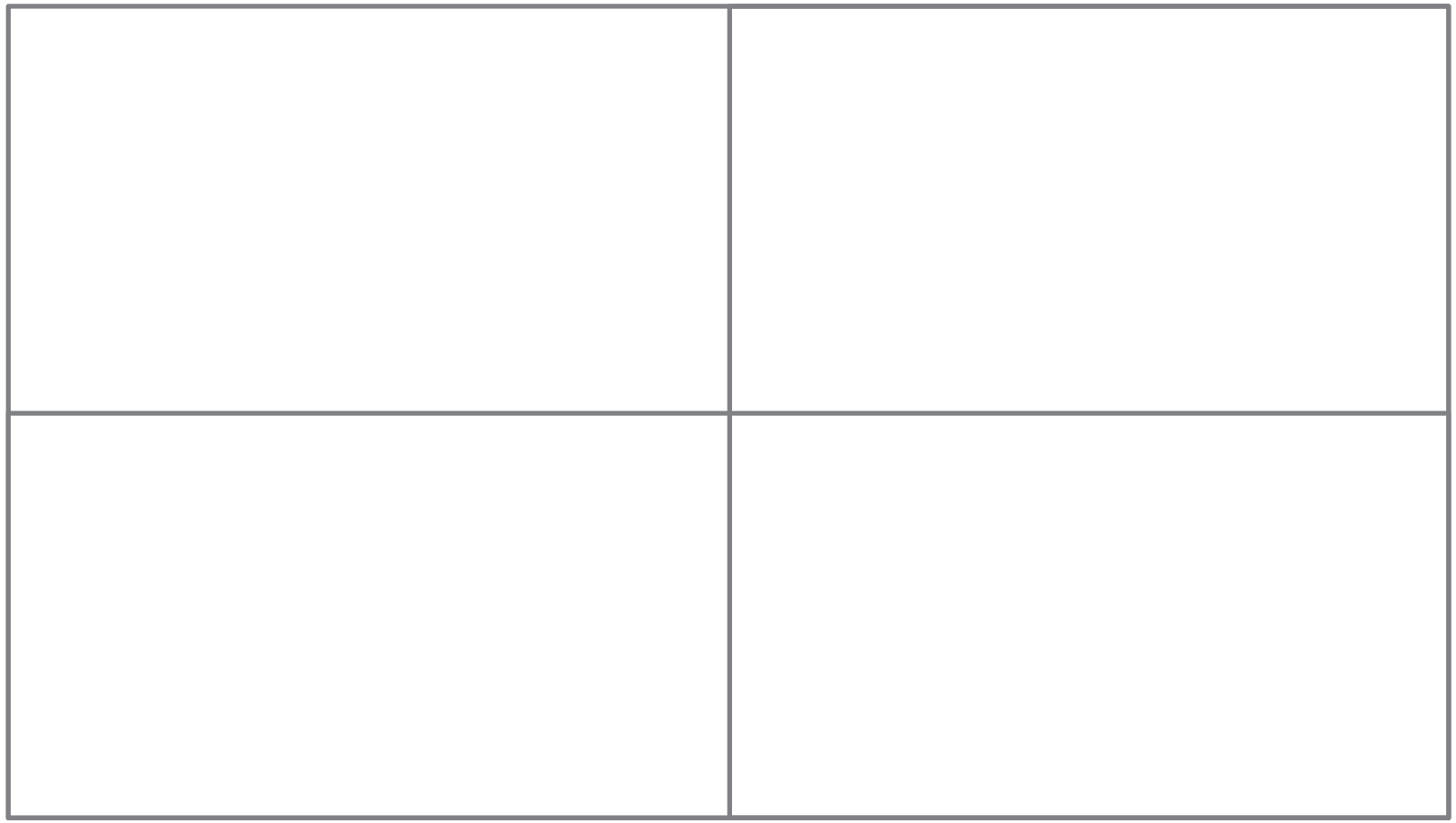
"The highest performers excel at throughput *and* stability"

State of the DevOps Report 2018
Nicole Forsgren, PhD, Jez Humble, Gene Kim
https://devops-research.com/

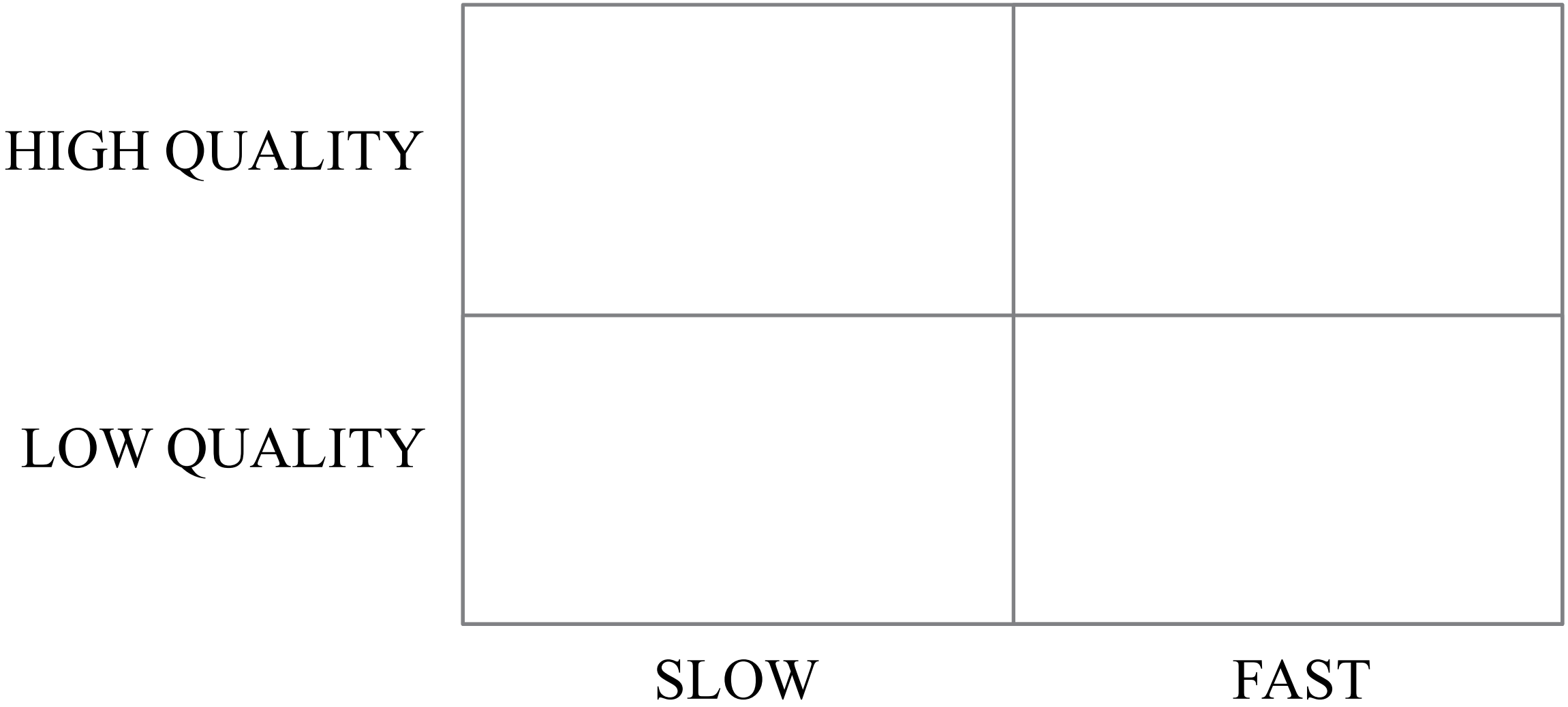


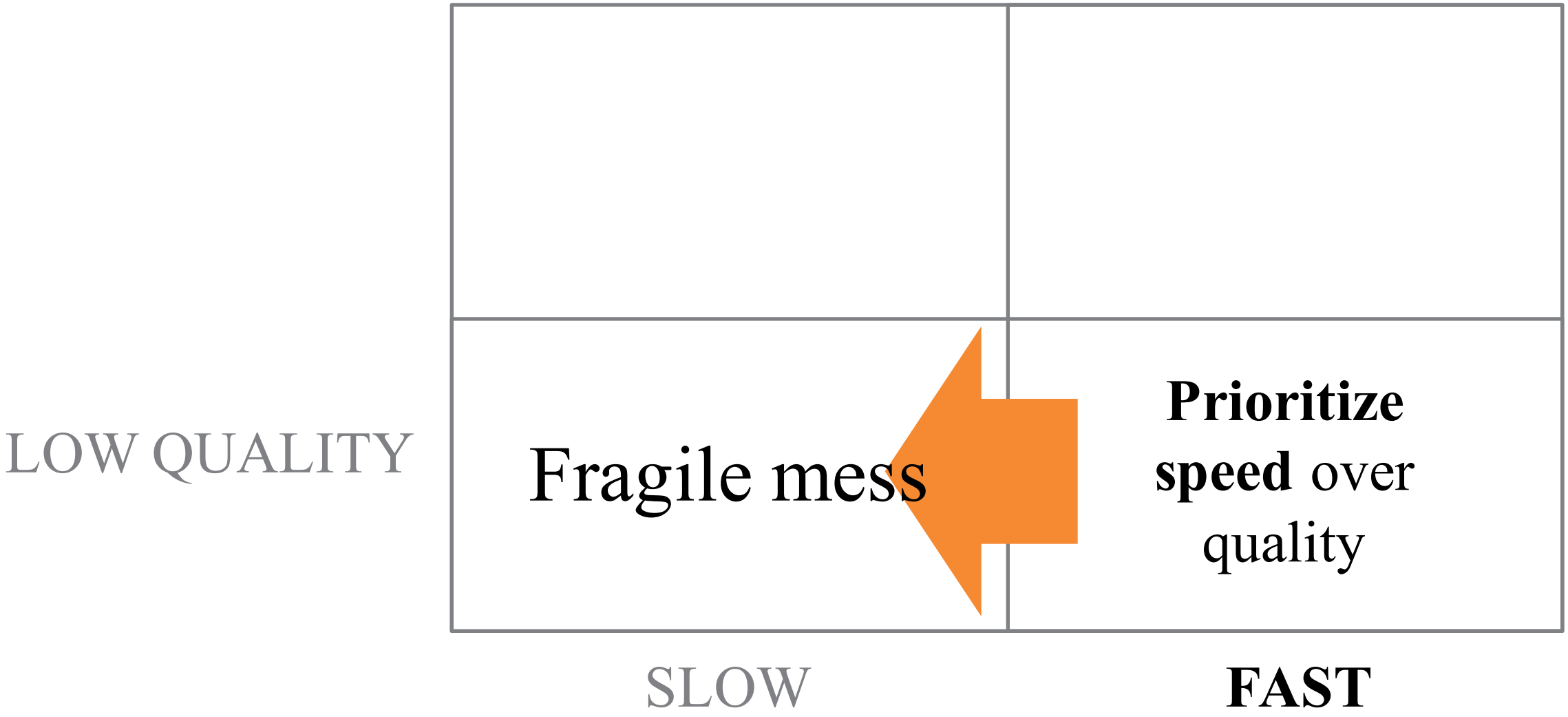
QUALITY SPEED

QUALITY



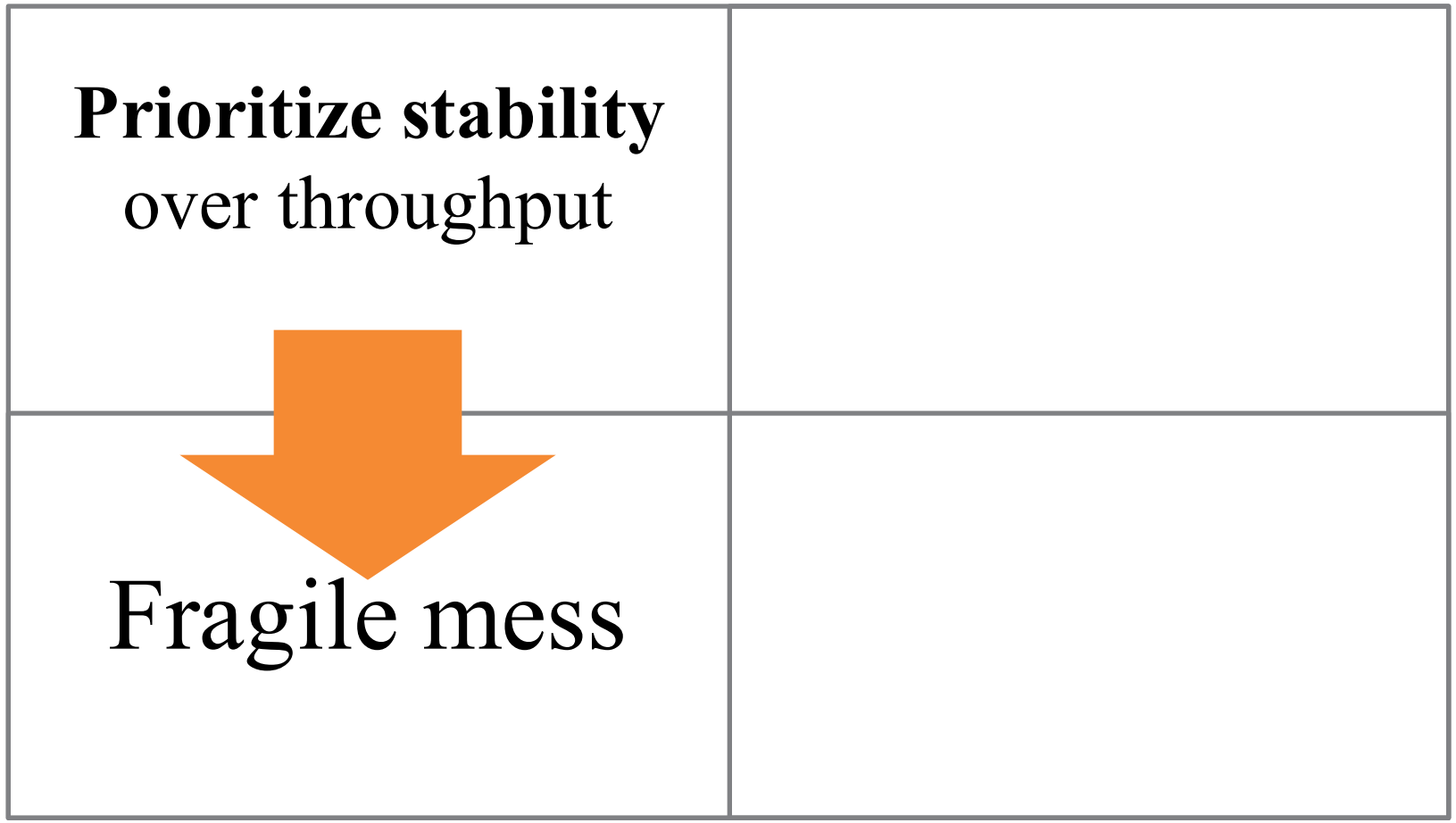
SPEED



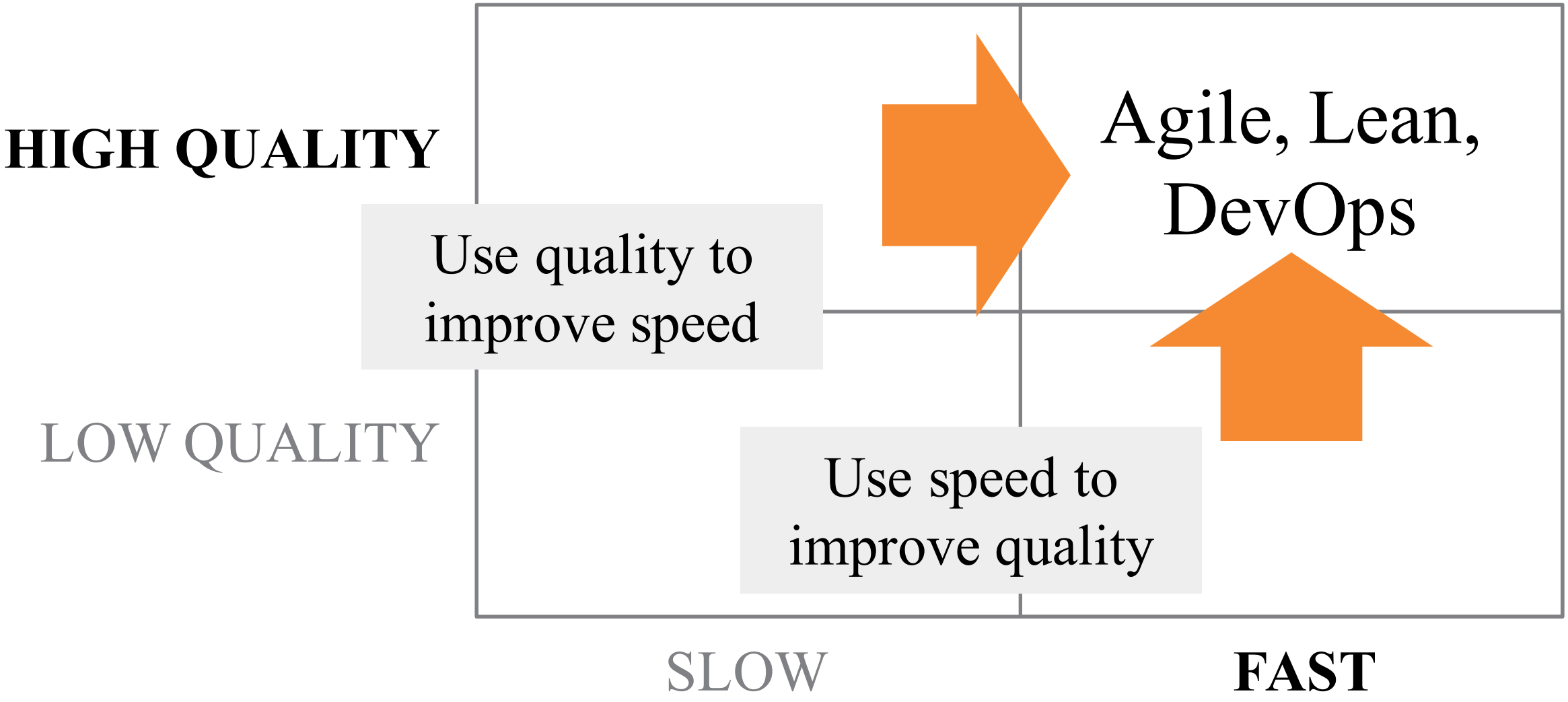


HIGH QUALITY

LOW QUALITY

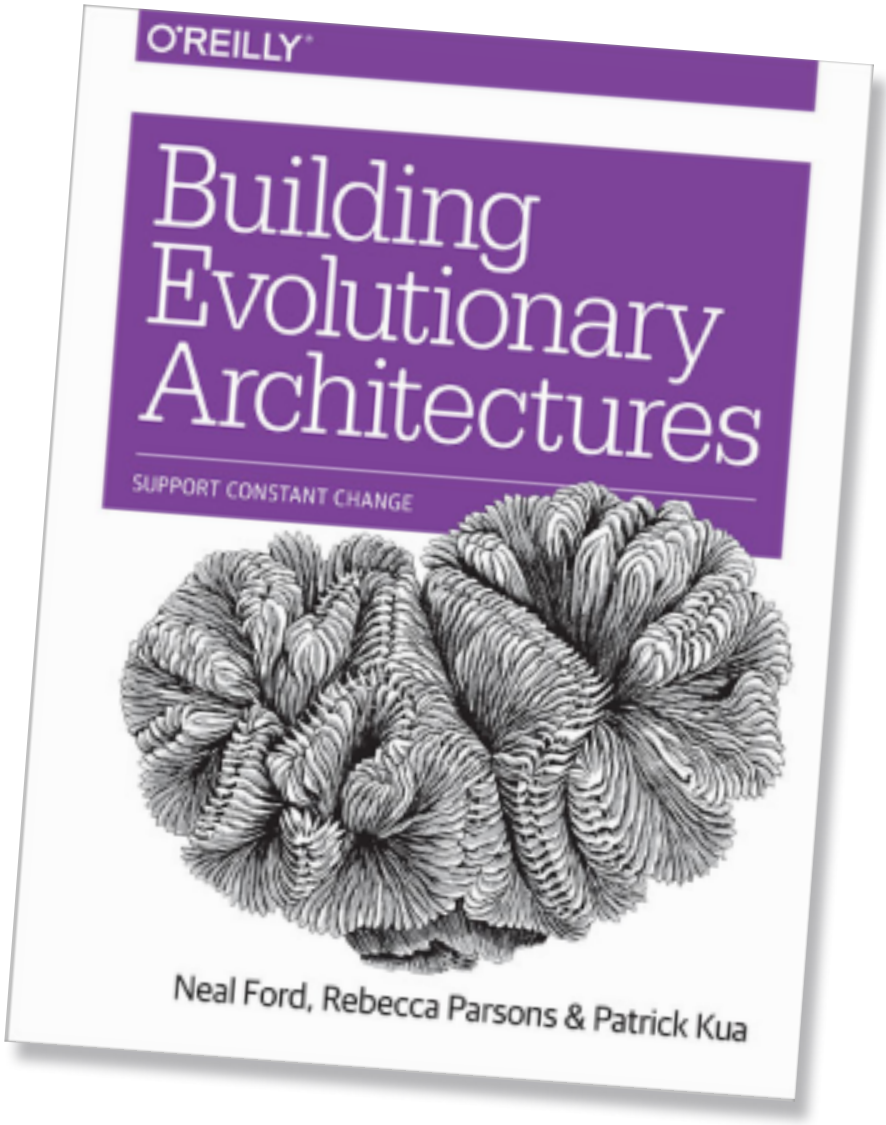


SLOW



"Since we can't avoid change, we need to exploit it"

Building Evolutionary Architectures
Neal Ford, Rebecca Parsons, Pat Kua



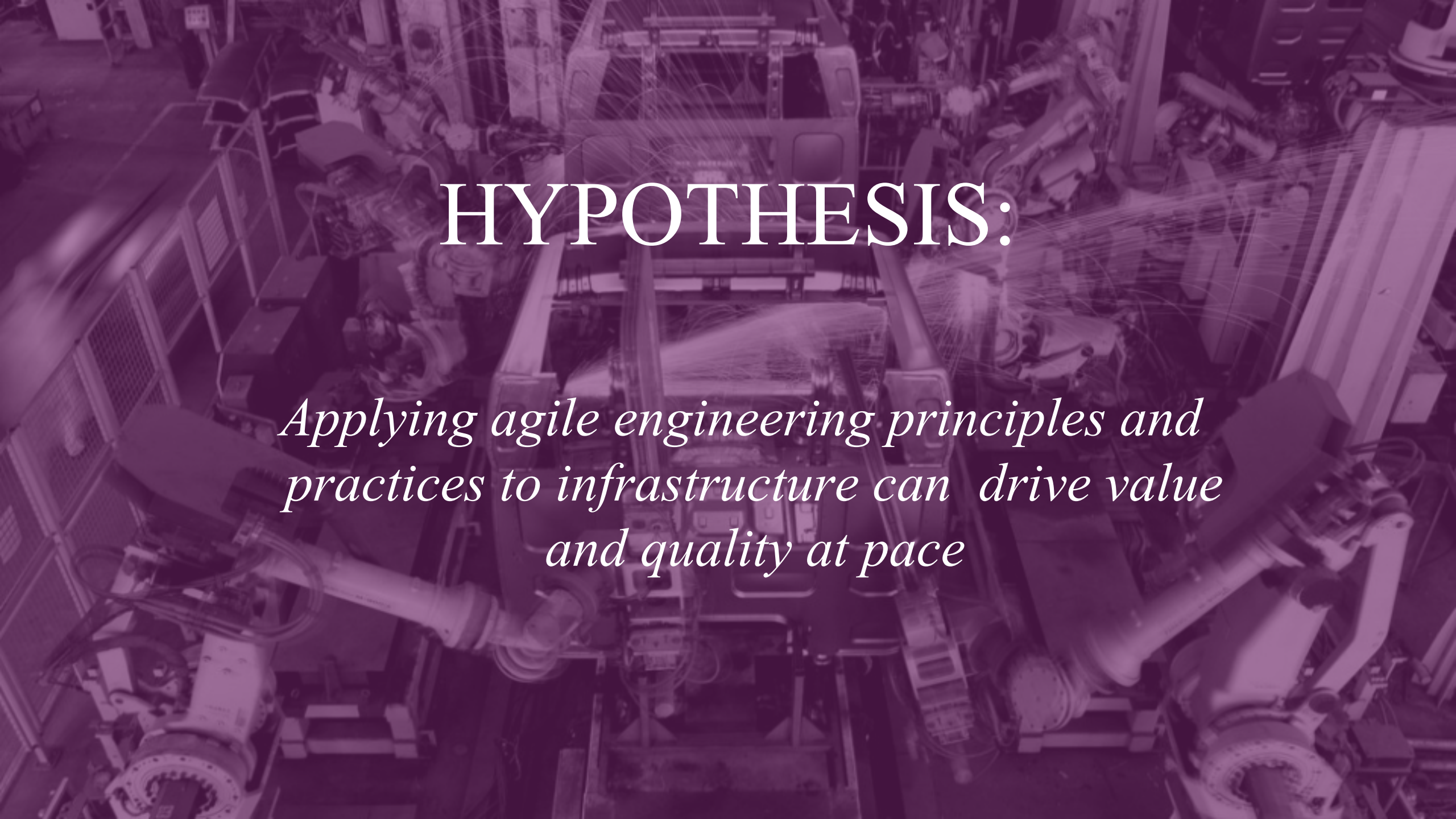
THREE CORE PRACTICES

For Infrastructure as Code

DEFINE EVERYTHING AS CODE

CONTINUOUSLY VALIDATE AS YOU WORK

BUILD SMALL, SIMPLE PIECES



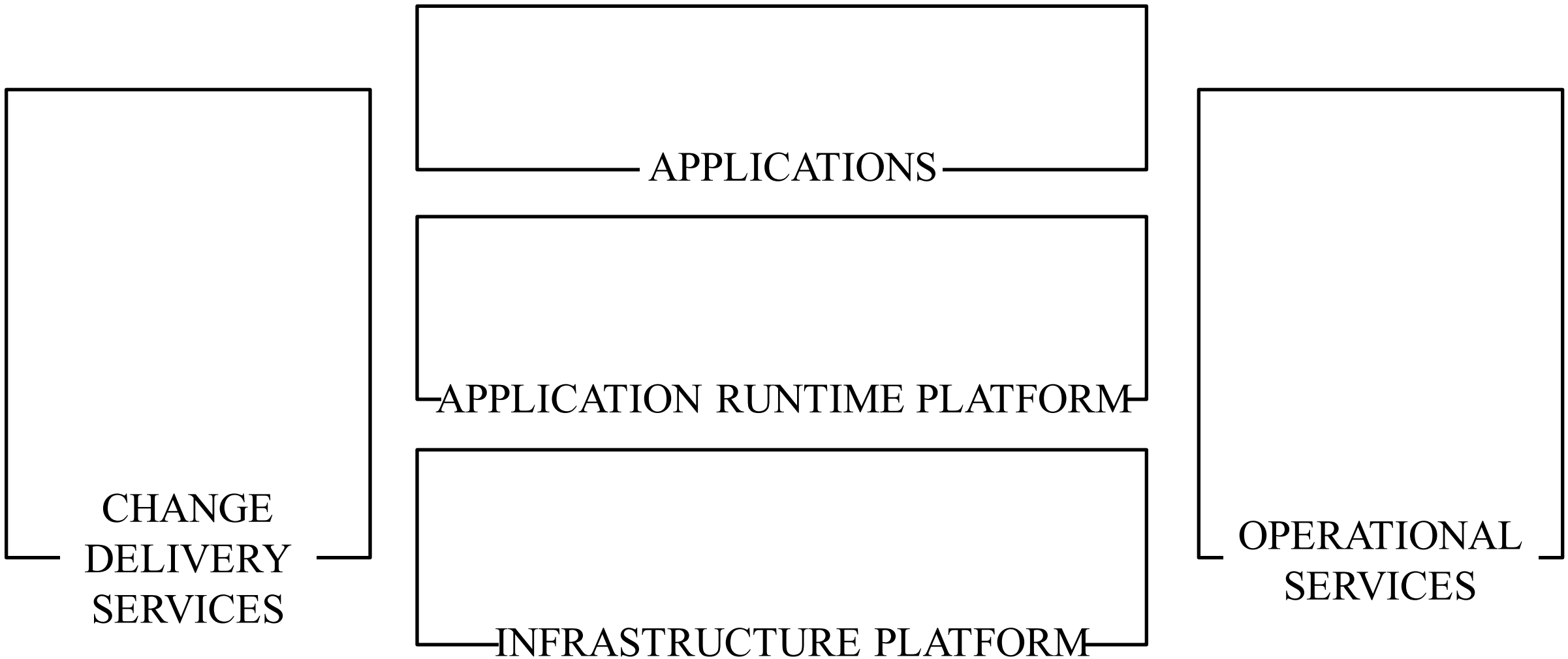
HYPOTHESIS:

Applying agile engineering principles and practices to infrastructure can drive value and quality at pace

Principles of Cloud Age infrastructure

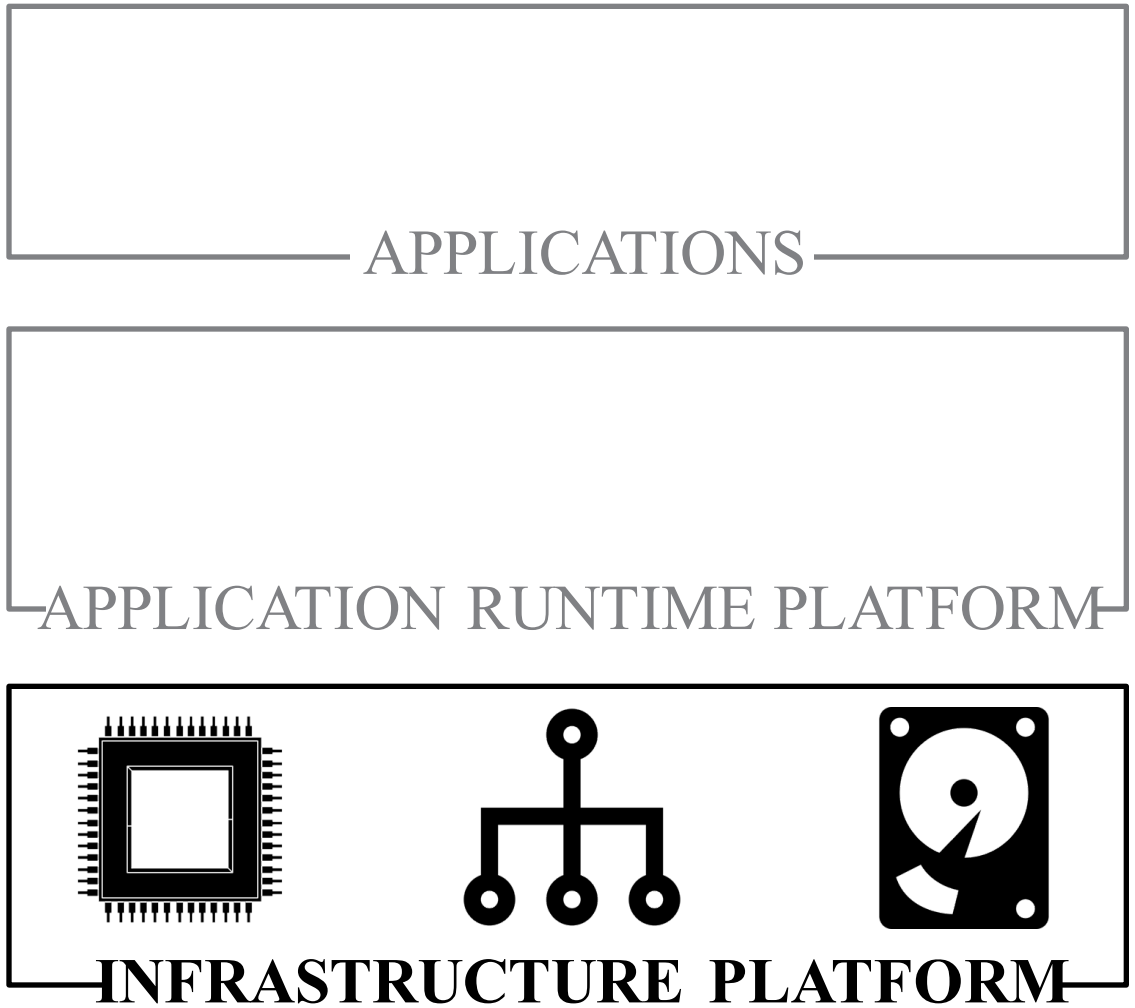
- Assume unreliability
- Make things disposable
- Make things reproducible
- Minimize variations
- Avoid snowflakes

PLATFORMS


APPLICATIONS
APPLICATION RUNTIME PLATFORM
INFRASTRUCTURE PLATFORM
CHANGE DELIVERY SERVICES
OPERATIONAL SERVICES

WHAT:

- Compute
- Networking
- Storage

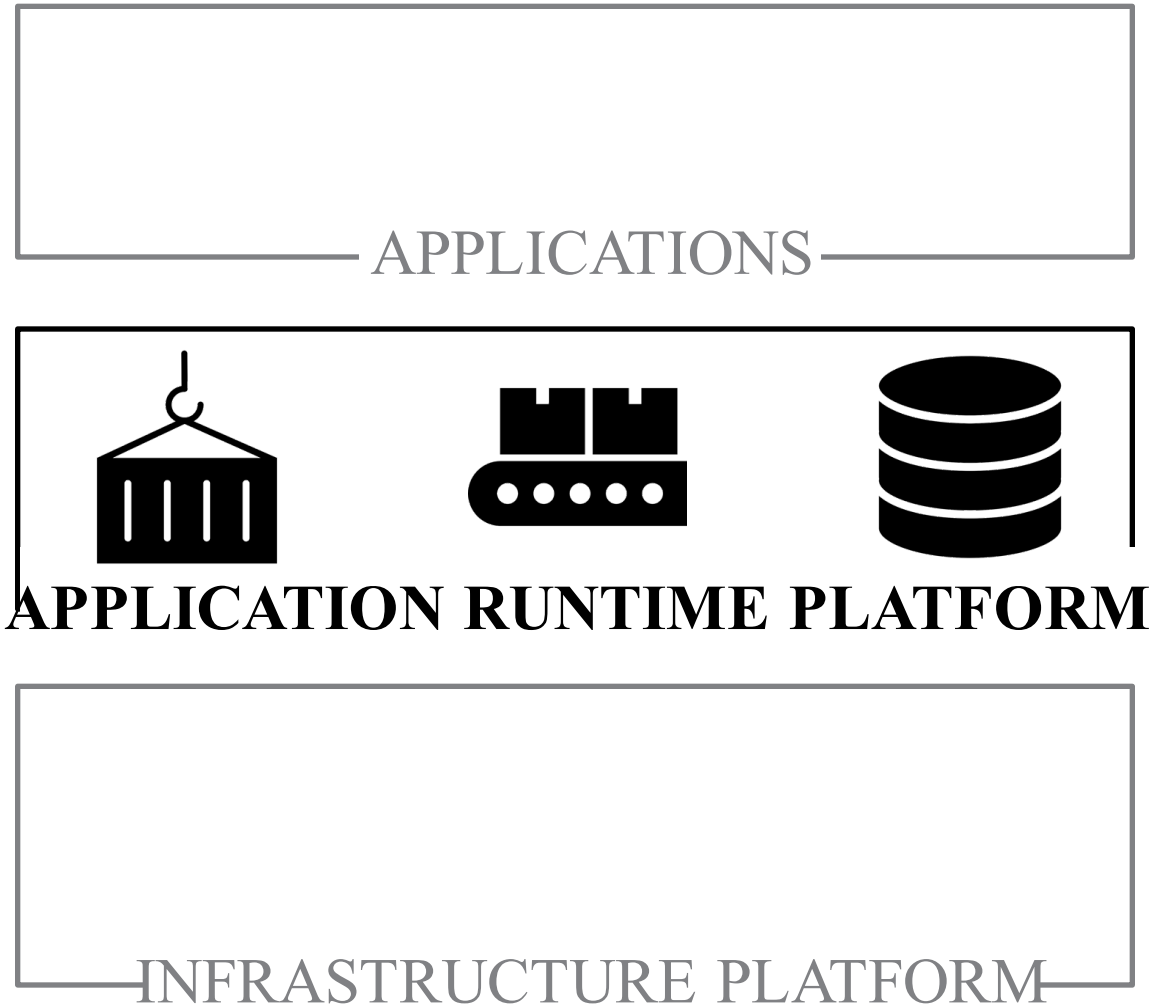


EXAMPLES:

- Public IaaS cloud
- Private IaaS cloud
- Virtualization platform
- Bare metal cloud

WHAT:

- Process management
- Application orchestration
- Application-level connectivity
- Database services

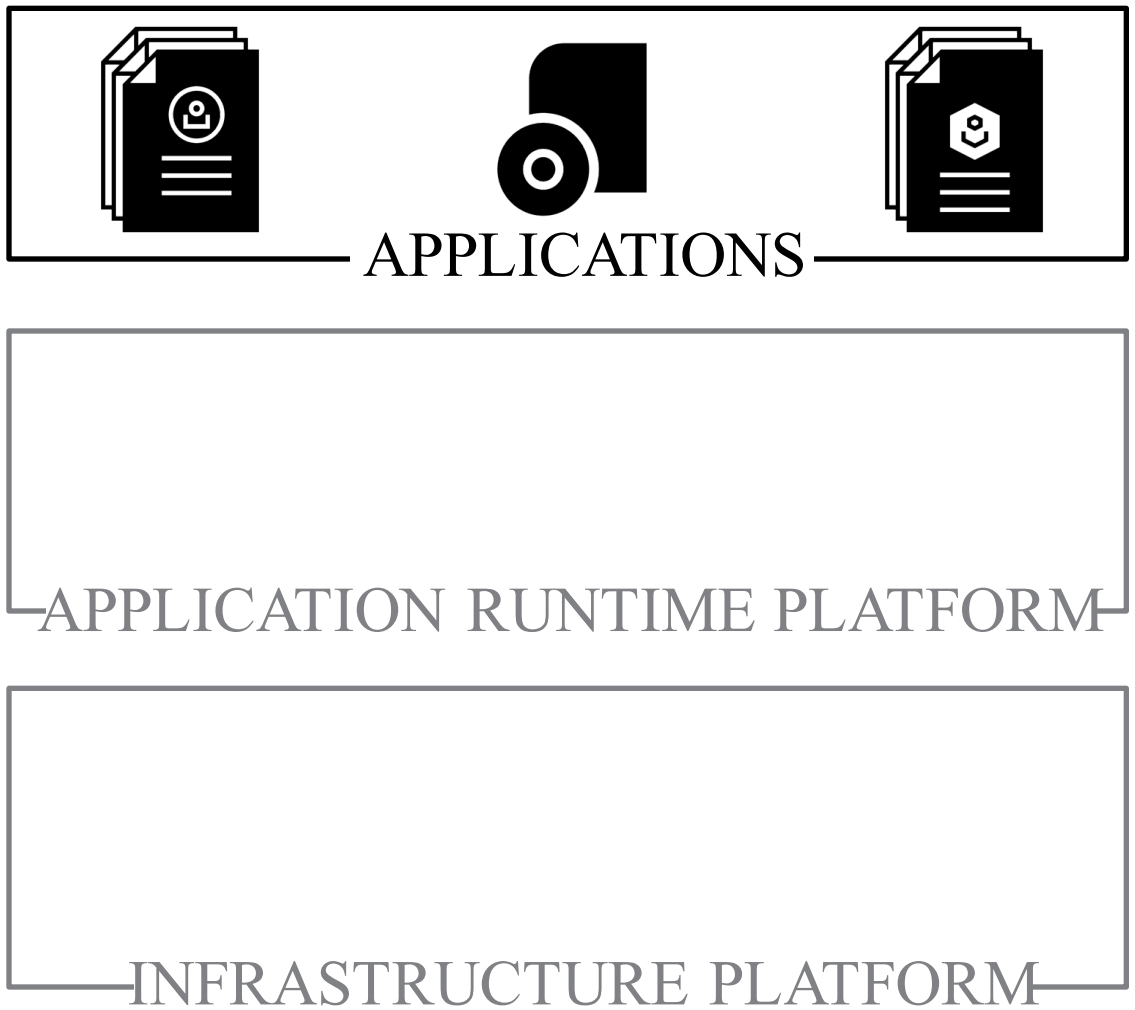


EXAMPLES:

- Operating system
- Application server
- Messaging
- Container cluster
- PaaS
- FaaS runtime
- Service mesh
- Database server

WHAT:

- Application packaging formats
- Application deployment



EXAMPLES:

- OS package (RPM, MSI)
- Language package (.war, .gem)
- Container image

CLOUD

A model for provisioning resources

ON DEMAND

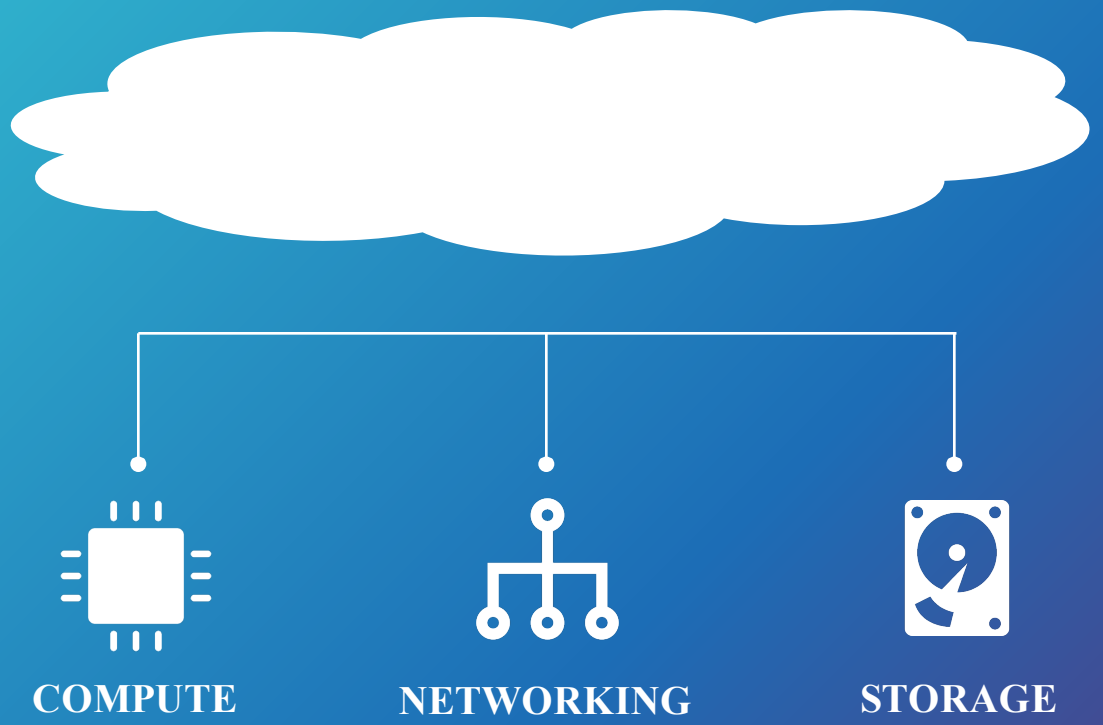
FROM A POOL OF RESOURCES

PROGRAMMATICALLY

INFRASTRUCTURE PLATFORM

Infrastructure as a Service (IaaS)

Provides a pool of resources

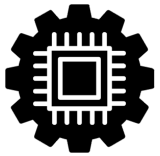


INFRASTRUCTURE PLATFORM

Infrastructure as a Service (IaaS)

Provides a pool of resources

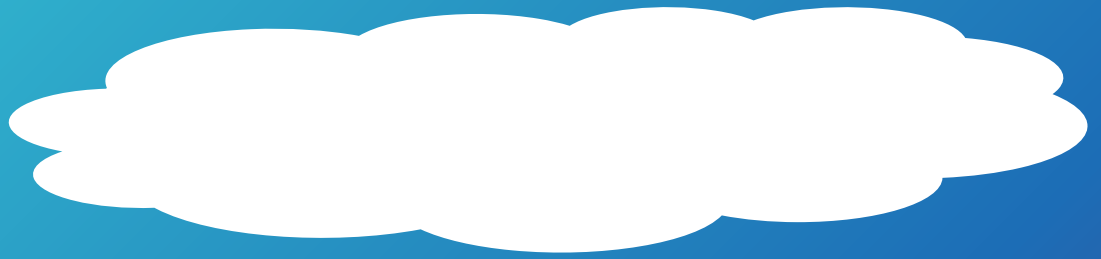
Virtual Machines



Serverless

Containers

Physical Servers



COMPUTE

NETWORKING

STORAGE

INFRASTRUCTURE PLATFORM

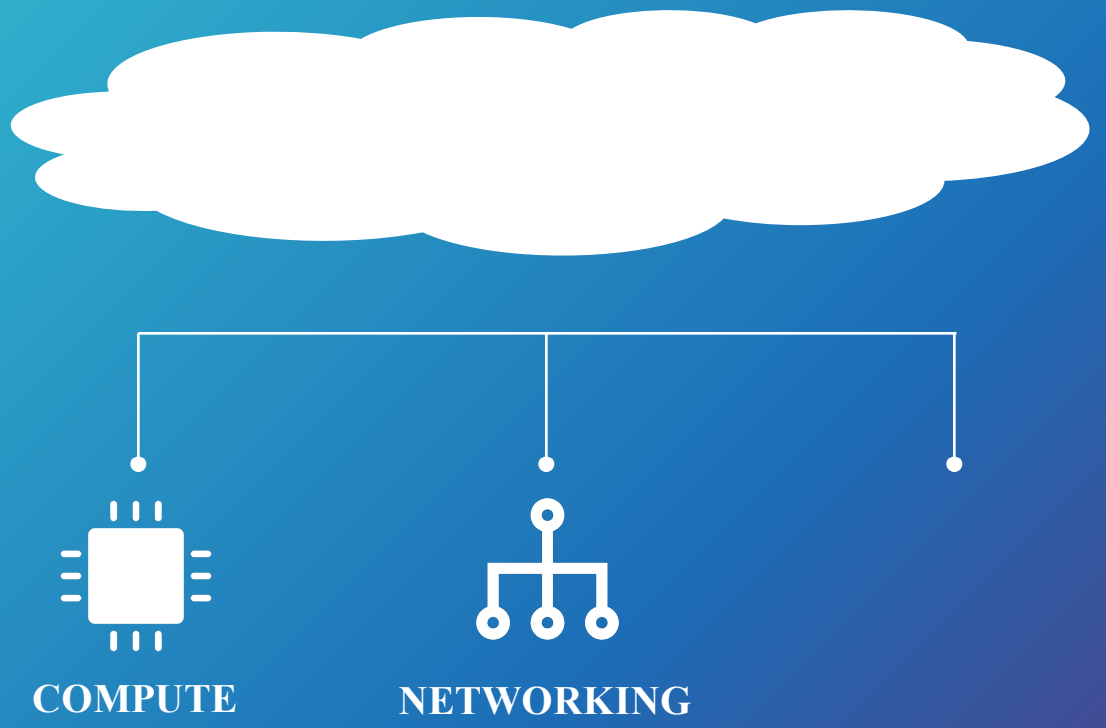
Infrastructure as a Service (IaaS)

Provides a pool of resources

Address Blocks

Routing

Access Rules



INFRASTRUCTURE PLATFORM

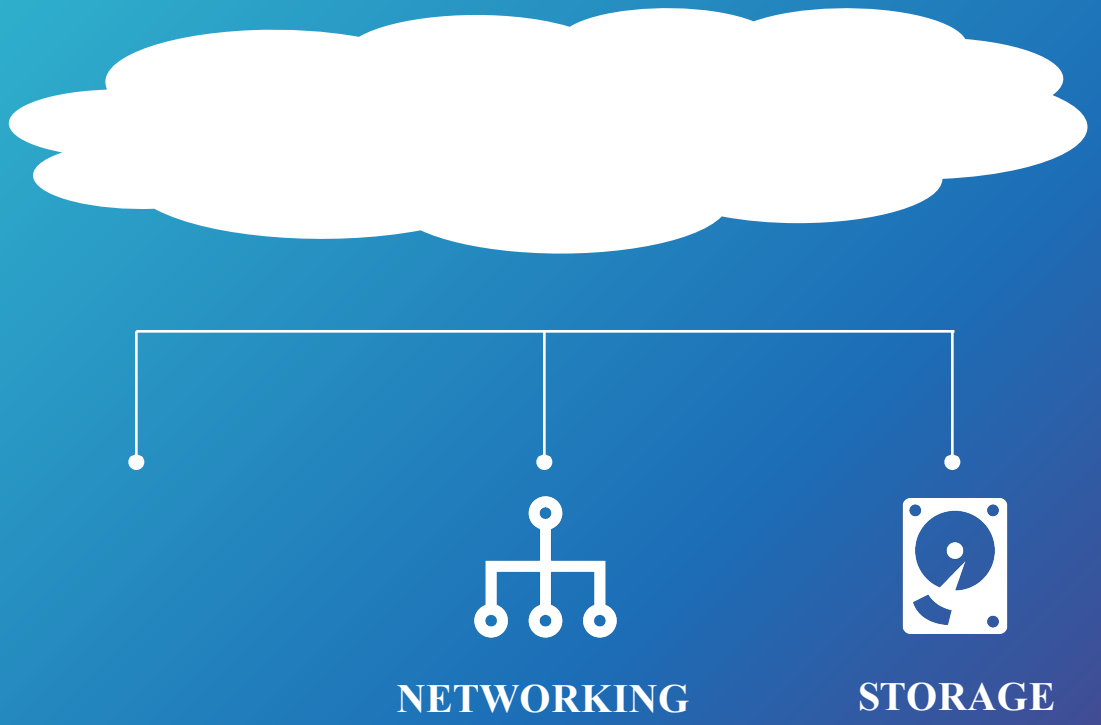
Infrastructure as a Service (IaaS)

Provides a pool of resources

Block Storage Drives

Object Storage Buckets

Network Drives



INFRASTRUCTURE PLATFORMS

Public and Private

PUBLIC IAAS

Alibaba Cloud
AWS
Azure
GCP
Digital Ocean
Linode
Oracle Cloud

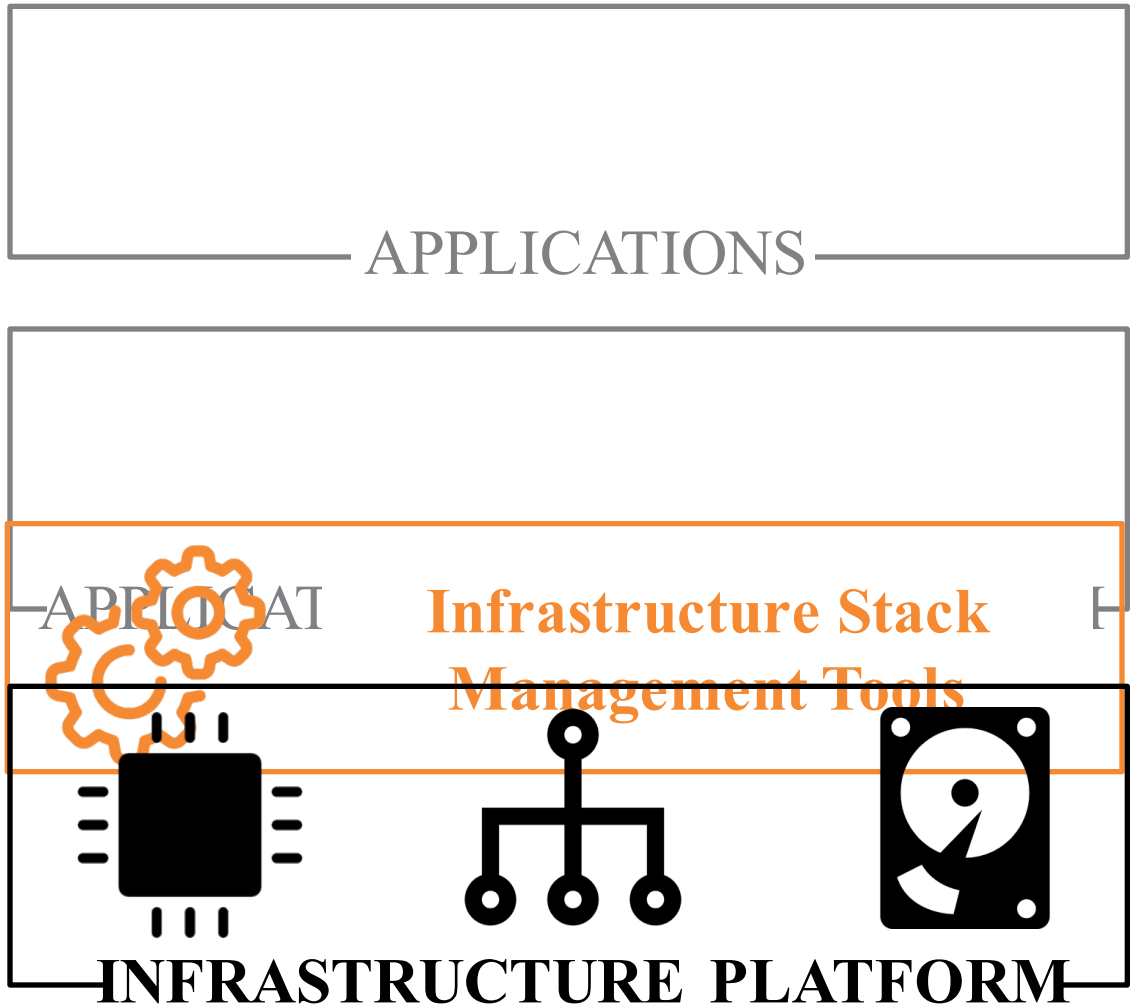
PRIVATE IAAS

OpenStack
VMWare vCloud
VMWare with scripts

BARE METAL CLOUD

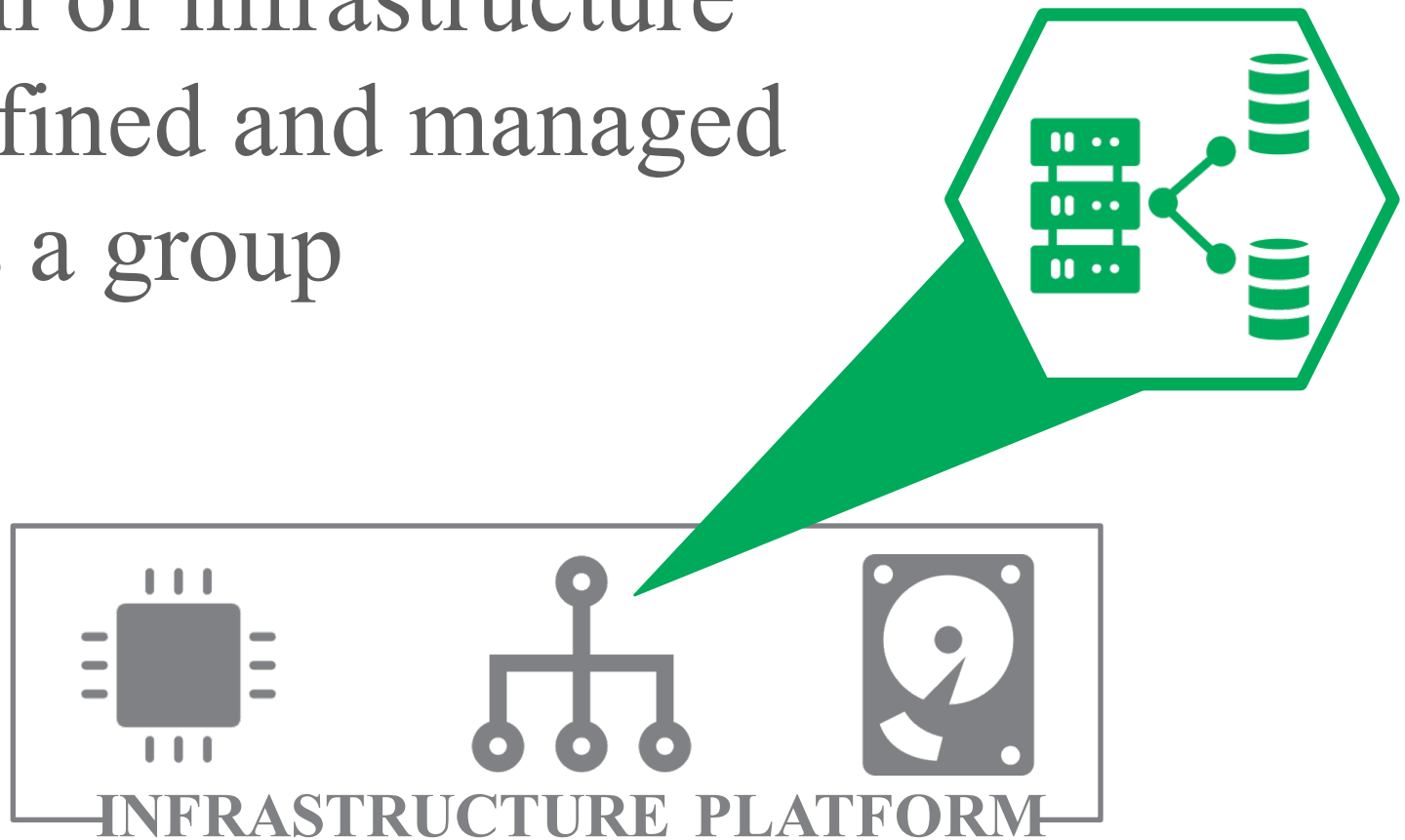
ILO, PXE
Foreman
MAAS
Razor
Rebar
Tinkerbell


TOOLS

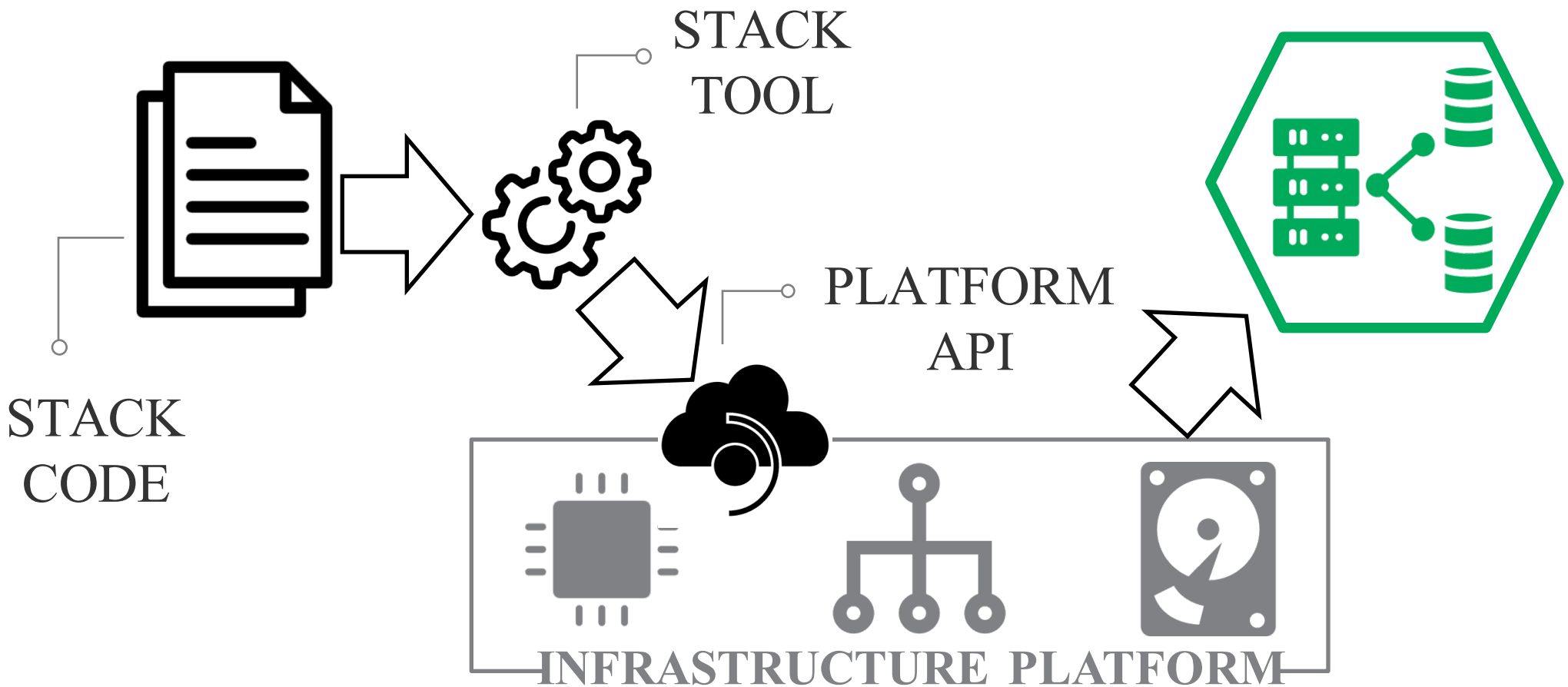

APPLICATIONS
APPLICAT
Infrastructure Stack
Management Tools
INFRASTRUCTURE PLATFORM

INFRASTRUCTURE STACK

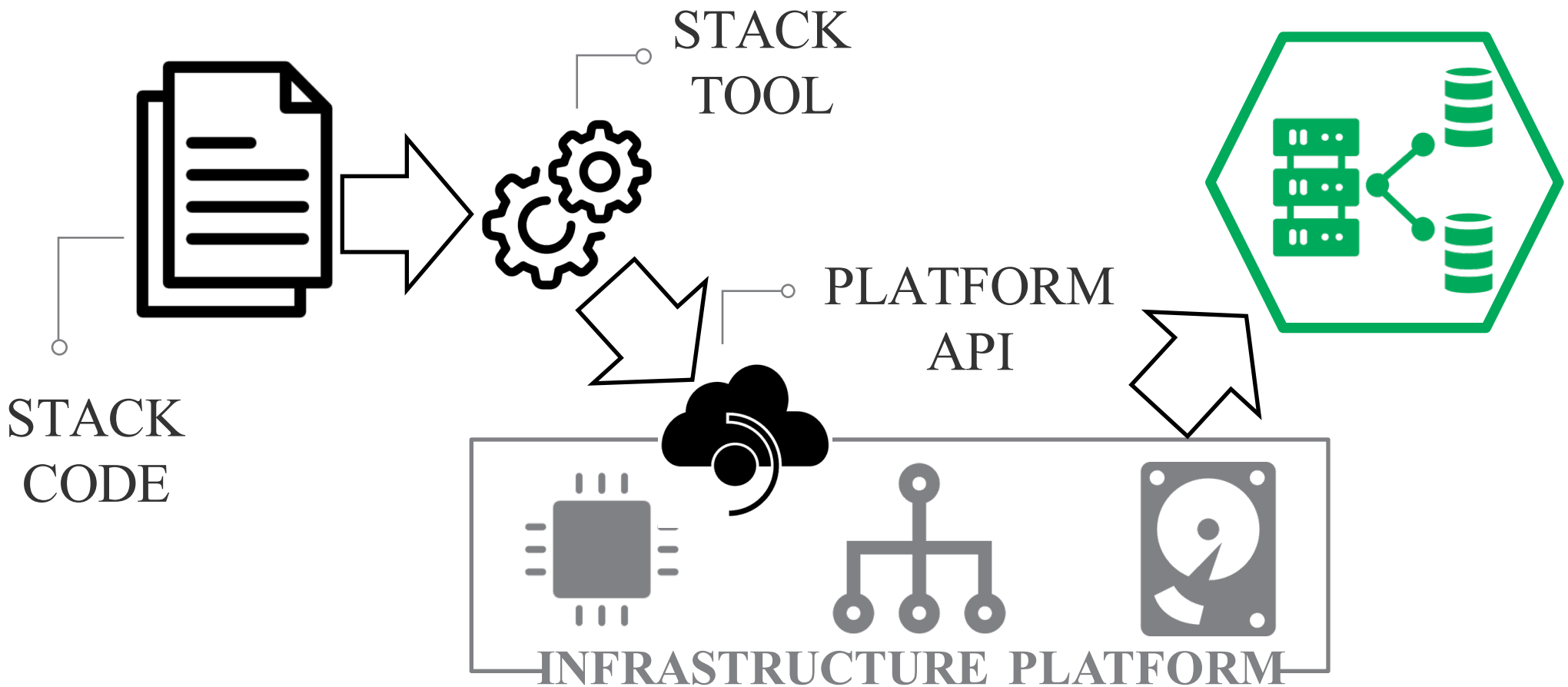
A collection of infrastructure resources defined and managed as a group



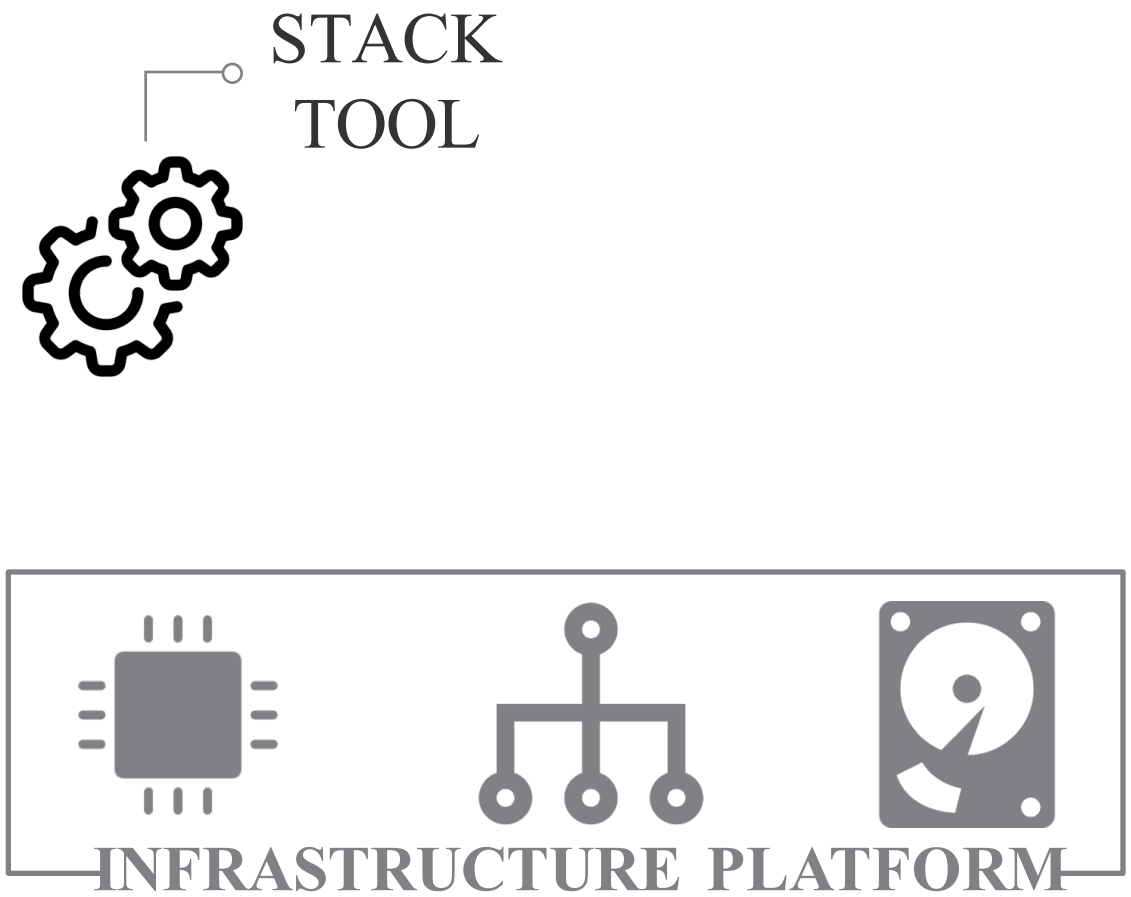
INFRASTRUCTURE STACK



INFRASTRUCTURE STACK

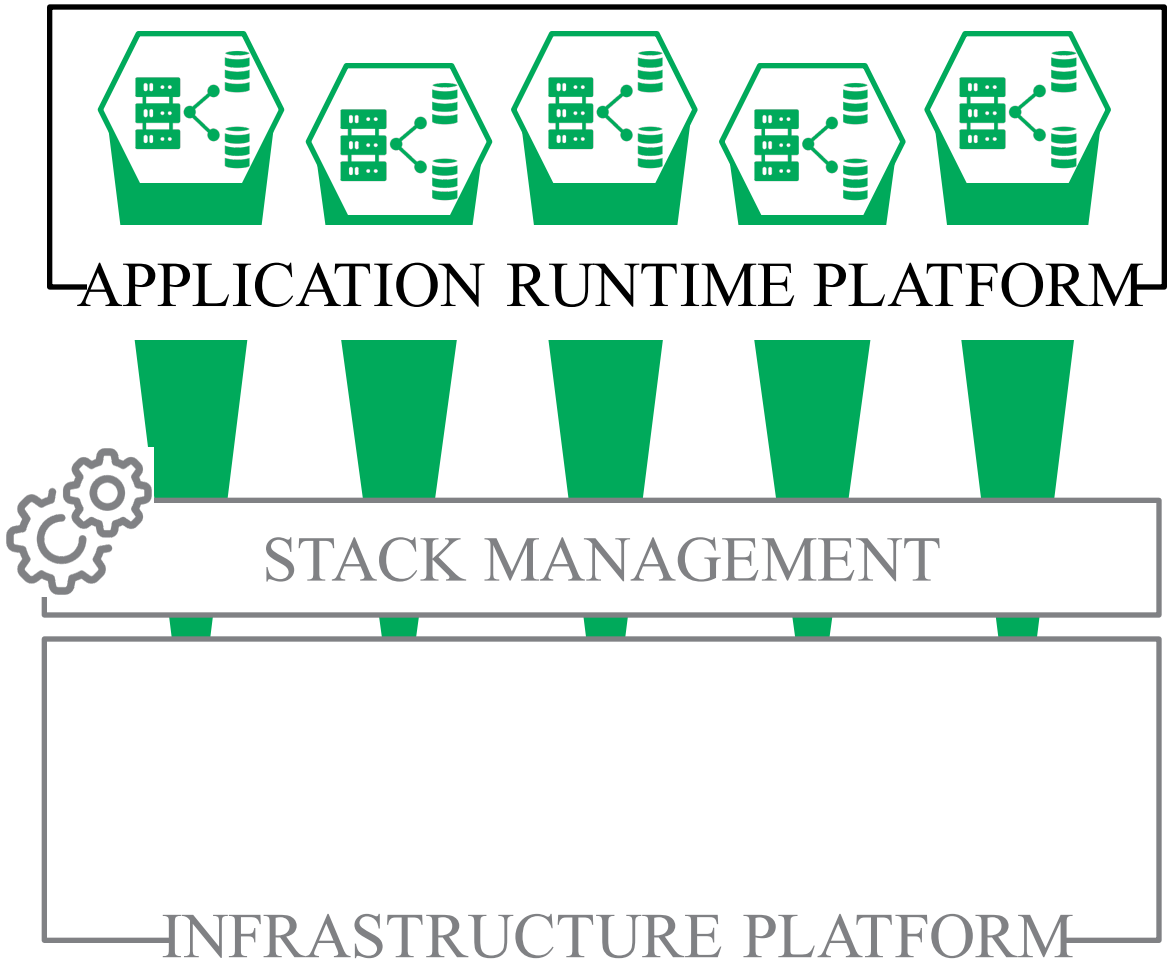


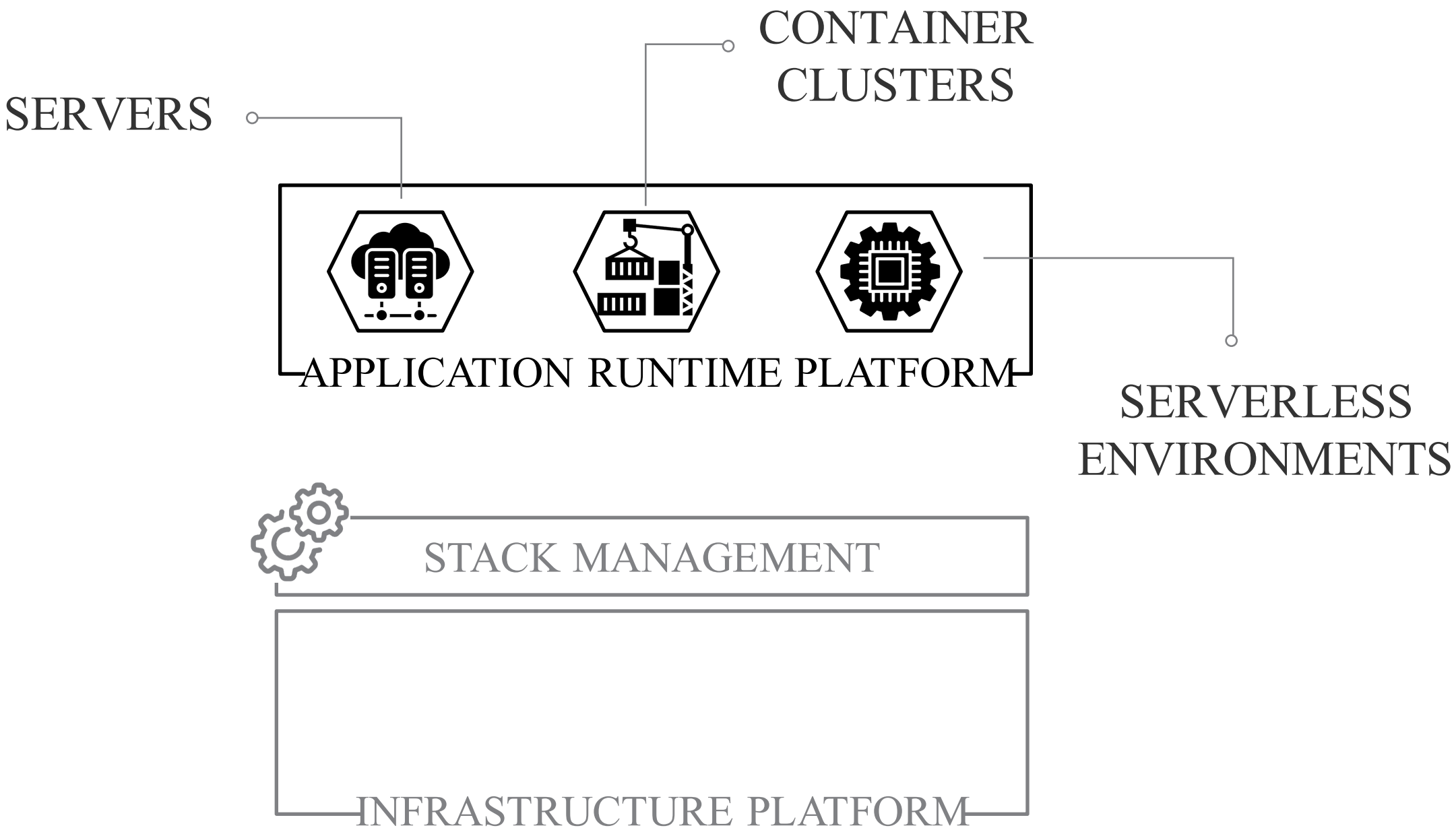
INFRASTRUCTURE STACK



EXAMPLES:

- Terraform
- AWS CloudFormation
- Azure Resource Manager
- GCP Cloud Deployment Manager
- Pulumi
- OpenStack Heat
- Chef Provisioning
- Puppet Automated Provisioning
- Ansible Provisioning


APPLICATION RUNTIME PLATFORM
STACK MANAGEMENT
INFRASTRUCTURE PLATFORM


SERVERS
CONTAINER CLUSTERS
SERVERLESS ENVIRONMENTS
APPLICATION RUNTIME PLATFORM
STACK MANAGEMENT
INFRASTRUCTURE PLATFORM

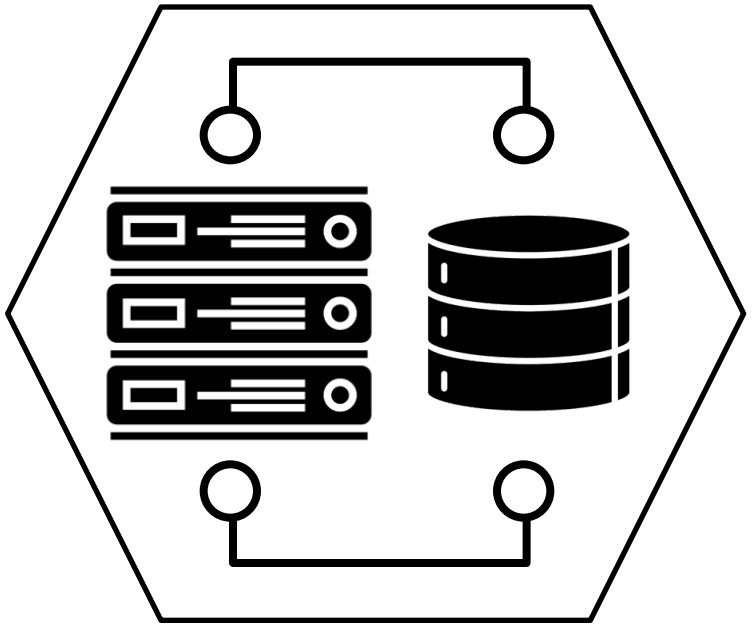
SERVERS AS CODE

AN EXAMPLE STACK

APPLICATION INFRASTRUCTURE

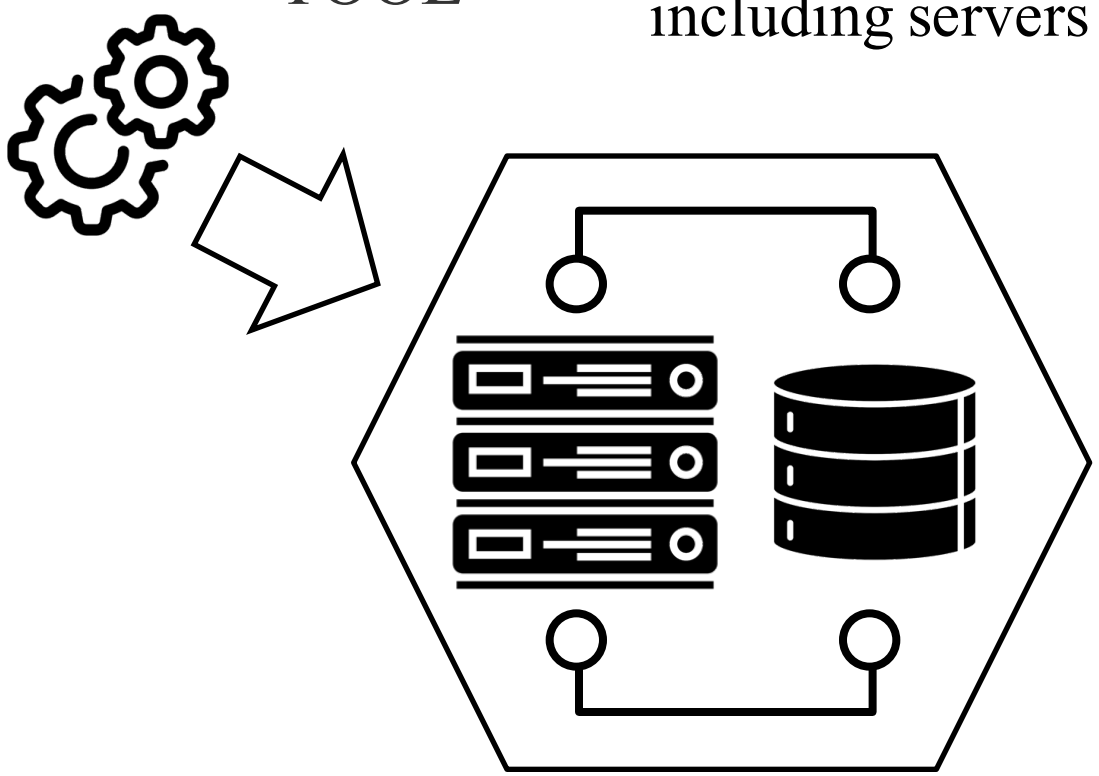
INCLUDES

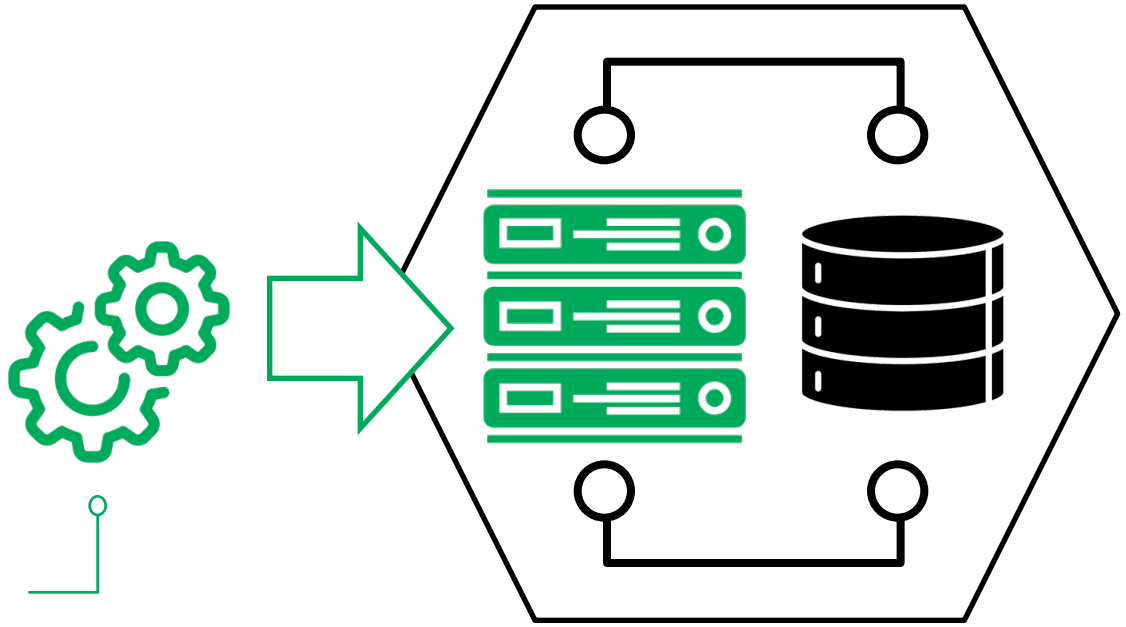
- Application Servers
- Network Routing
- Database Instance



STACK TOOL

Provisions and updates the stack elements, including servers



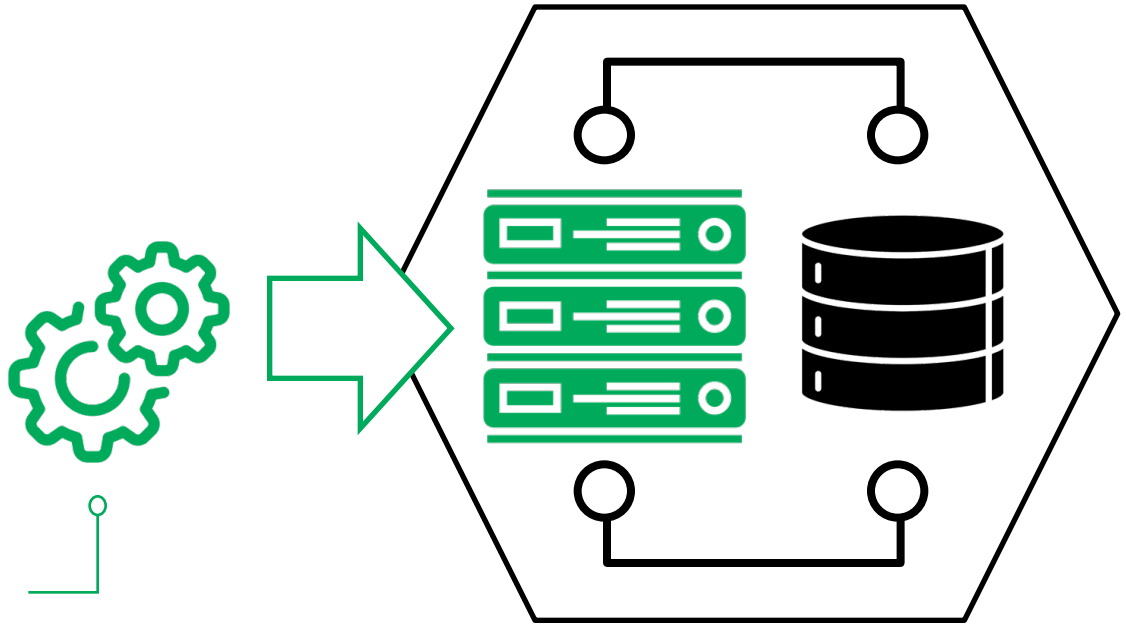


SERVER CONFIGURATION TOOL

Configures and updates elements on each server

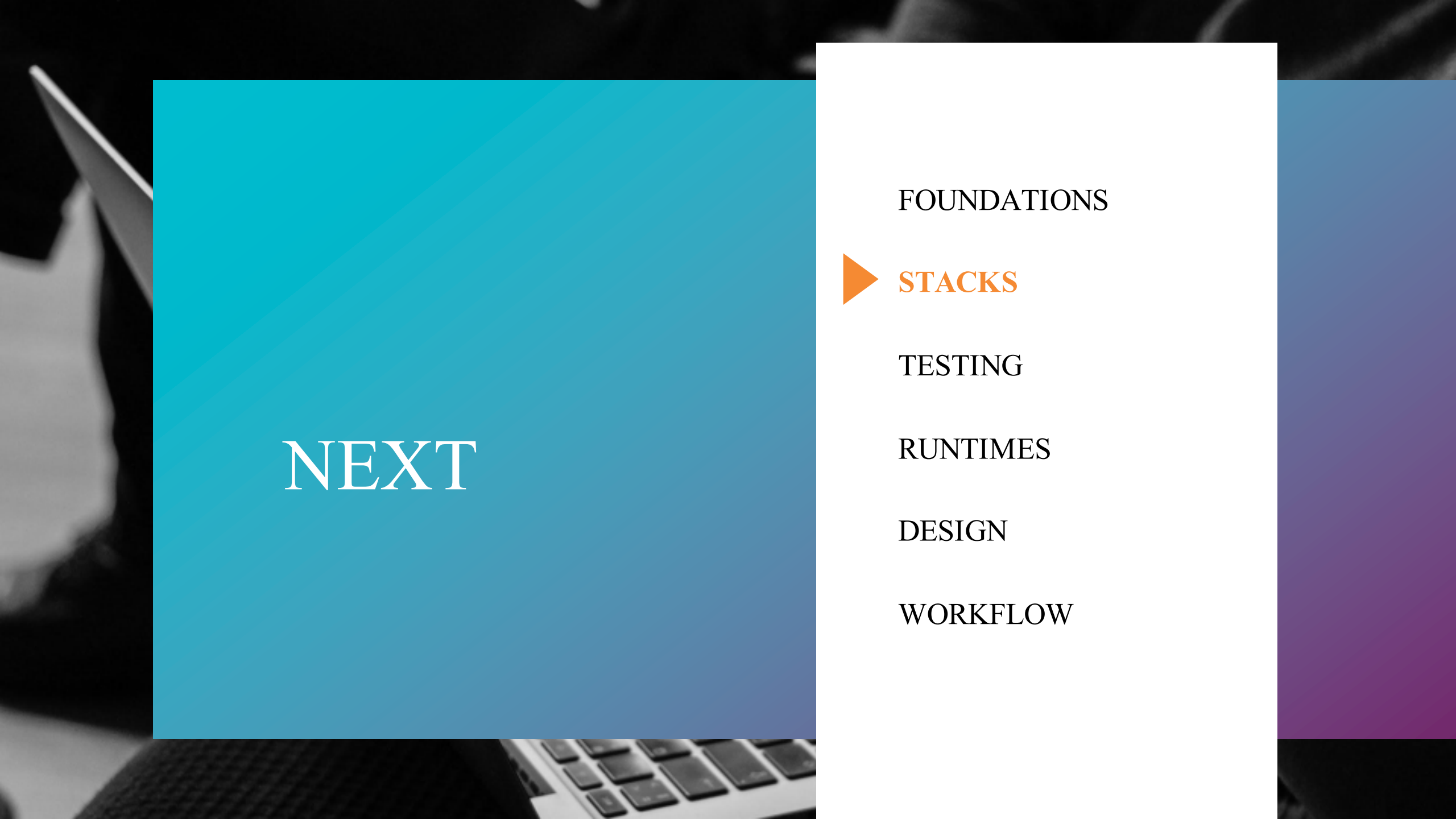
EXAMPLES:

- Ansible
- Chef
- Puppet
- Saltstack
- Packer



SERVER CONFIGURATION TOOL

Configures and updates elements on each server



NEXT

- FOUNDATIONS
- **STACKS**
- TESTING
- RUNTIMES
- DESIGN
- WORKFLOW