Building a Telco PaaS with OpenShift

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Red Hat

Use cases are many with variety of requirements

Enterprise

Telco 5G Edge

Public Sector

AI/ML

IoT

(Retail) Remote Office	Radio Access Network (vRAN)	Connected Sensors and Controllers	Video Surveillance	Trading Sensitive Apps
In-field Operations	Content Delivery Networks	Universal Customer Premise Equipment	Connected Car, Train, Plane	Healthcare Monitoring and Data Processing

Network & Core Services

Managed Enterprise	VPN, Security & Subscriber Services	Transport & Connectivity	Metro & Central Office Services	Packet Core - LTE/5G

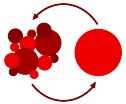
TELCO INFRASTRUCTURE

REQUIREMENTS & ATTRIBUTES FOR CLOUD NATIVE MODELS

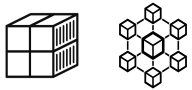
Performance

Latency

Scale Distribution



Partitioning



Workload types VMs/Containers

Timing Synchronization

AI/ML

Hardware Enablement

Real Time Linux

Centralized Logging Monitoring

Multi-Tenancy Namespaces

Re-usability Catalog

Life Cycle Management

Automation

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Kubernetes Done Right is Hard

INSTALL	DEPLOY	HARDEN	OPERATE
• Templating	• Identity & Security Access	• Platform Monitoring & Alerts	• OS Upgrade & Patch
• Validation	• App Monitoring & Alerts	• Metering & Chargeback	• Platform Upgrade & Patch
• OS Setup	• Storage & Persistence	• Platform Security Hardening	• Image Upgrade & Patch
	• Egress, Ingress & Integration	• Image Hardening	• App Upgrade & Patch
	• Host Container Images	• Security Certifications	• Security Patches
	• Build/Deploy Methodology	• Network Policy	• Continuous Security Scanning
		• Disaster Recovery	• Multi-environment Rollout
		• Resource Segmentation	• Enterprise Container Registry
			• Cluster & App Elasticity
			• Monitor, Alert, Remediate
			• Log Aggregation

⚠ **75%**

of enterprise users identify complexity of implementation and operations as the top blocker to adoption

Source: The New Stack, The State of the Kubernetes Ecosystem, August 2017

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OpenShift Container Platform

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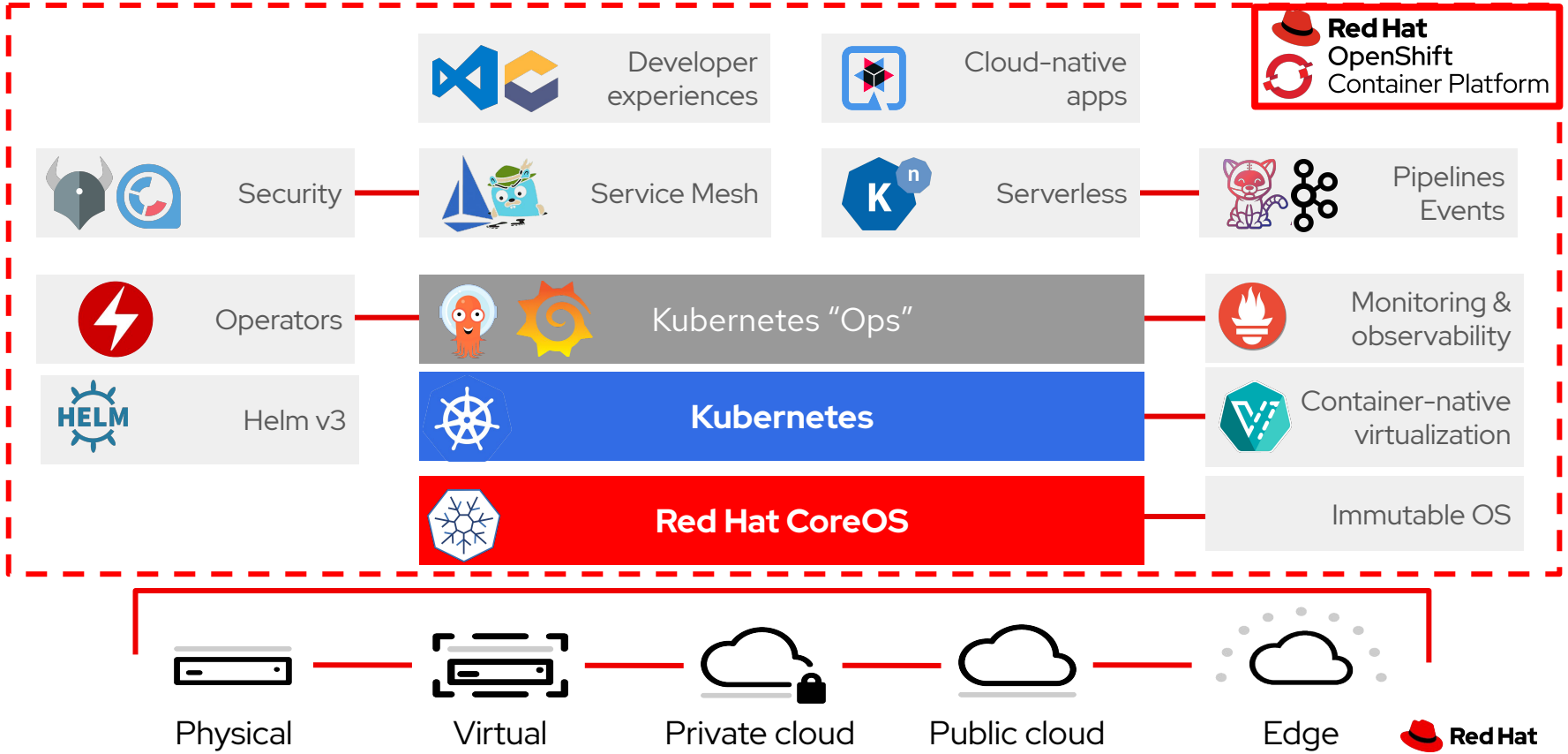
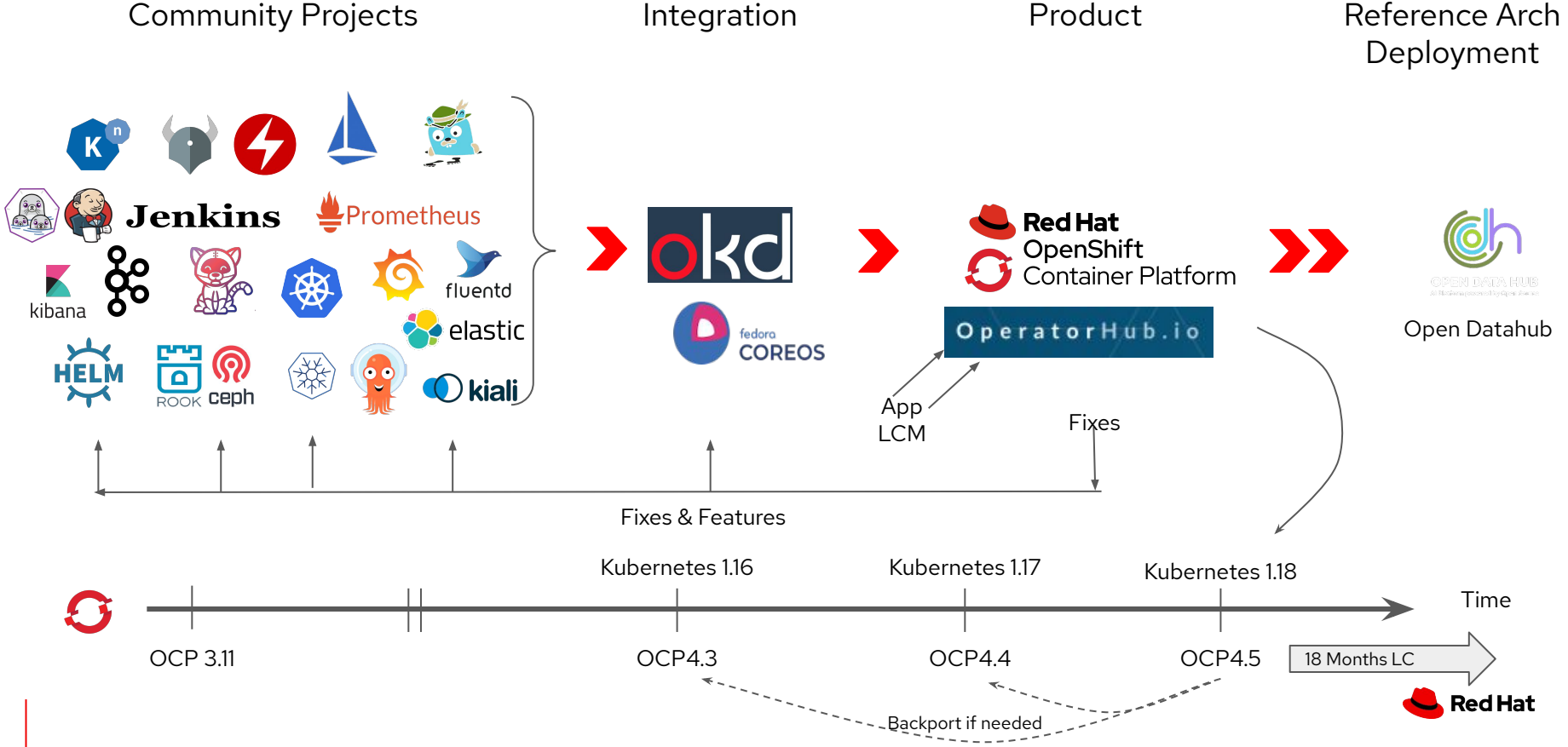
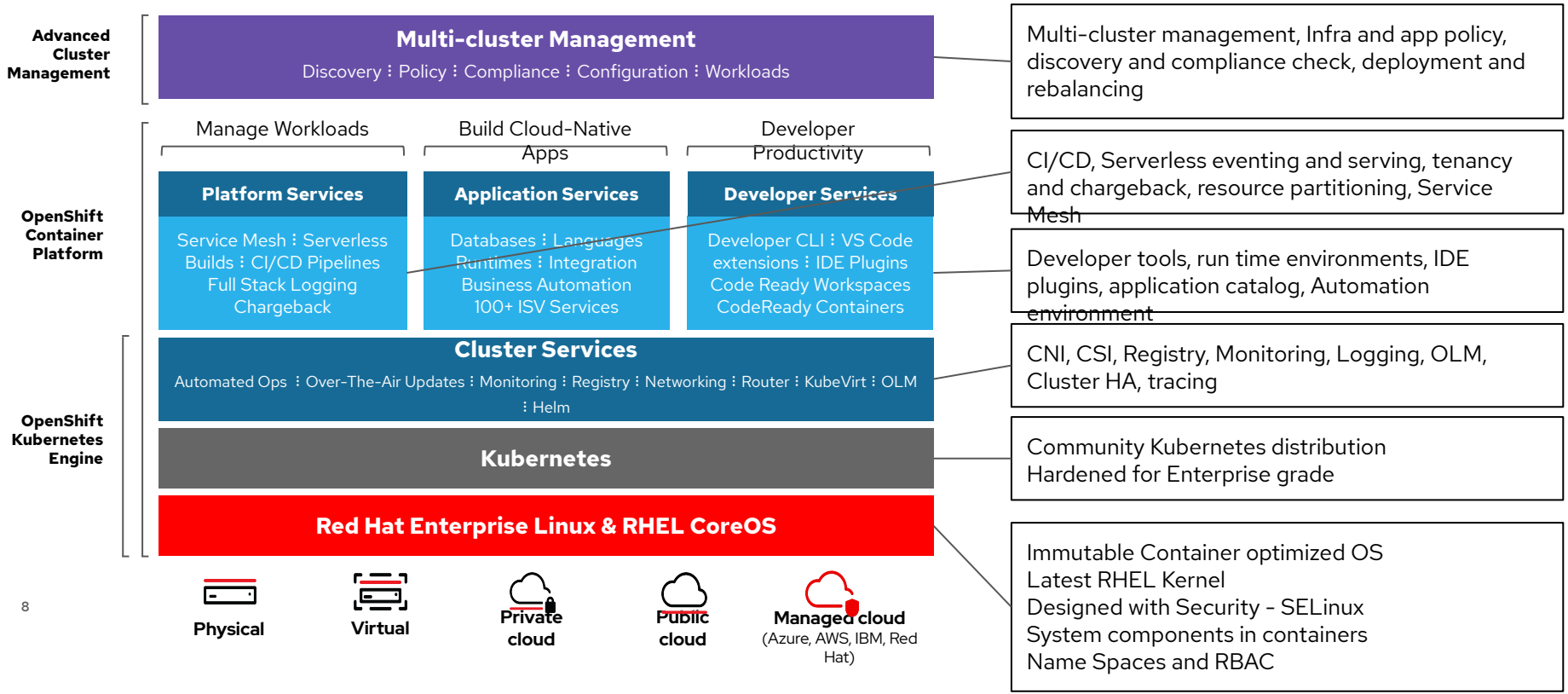
Telco PaaS – Much more than Kubernetes



Projects to Product



OpenShift Container Platform



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OpenShift Container Platform

Increase developer productivity on Kubernetes with developer-focused tools and services

Developer Console
Application-centric dashboard for onboarding applications and visibility into application components.

Helm
Package, install, update and share Kubernetes applications

Developer CLI
Fast and iterative CLI for developers building and deploying apps on OpenShift

Visual Studio Code & IDE Plugins
A set of extensions for interacting with OpenShift services from within VS Code, IntelliJ, etc

CodeReady Containers
Local OpenShift cluster on developer workstation for rapid development iterations

CodeReady Workspaces
Collaborative Kubernetes-native web-based IDE and developer stacks

Developer Services

Helm ⁝ Developer CLI ⁝ VS Code extensions ⁝ IDE Plugins
Code Ready Workspaces
CodeReady Containers

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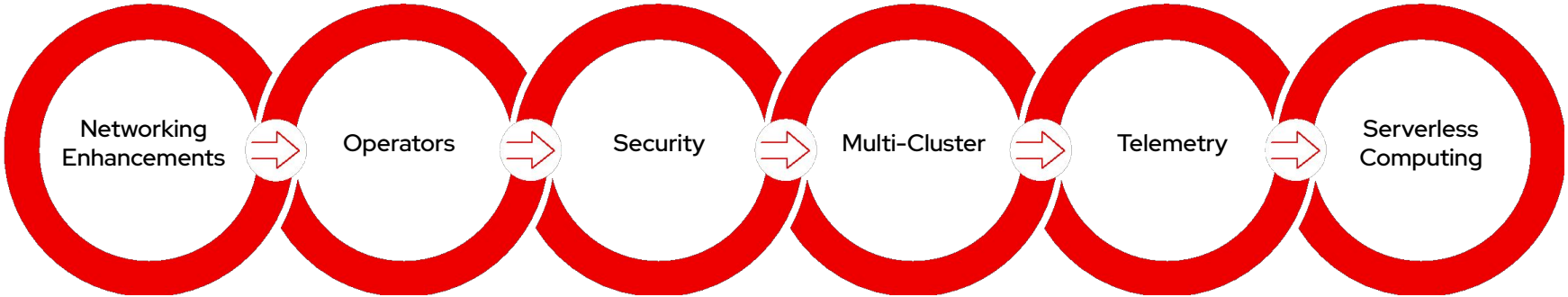
Telco Careabouts

Telco Careabouts



Networking Capabilities

Stability and security

Operators

Traffic isolation

Metrics, alerting, telemetry

Security enhancements

Performance and scale

Hardware Offload

RDMA, GPUDirect

Multicluster

Observability

New features

Multus plug-ins

Ingress v2, IPv6, external DNS

Multi-network

Platform-native support

Telco enablement

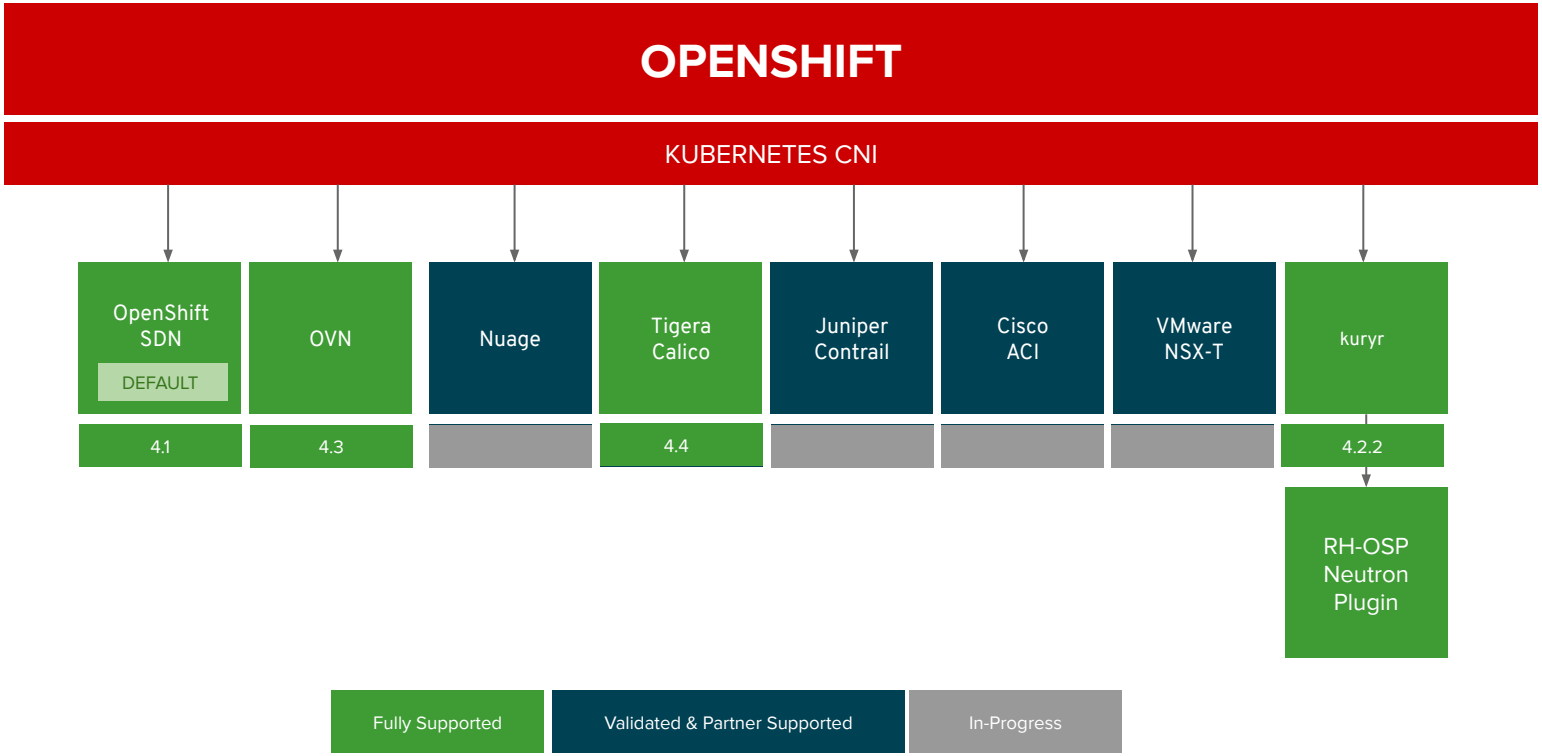
Foundational capabilities

CNF onboarding

Host-level features

Platform footprints

OPENSHIFT 4 NETWORK PLUGINS



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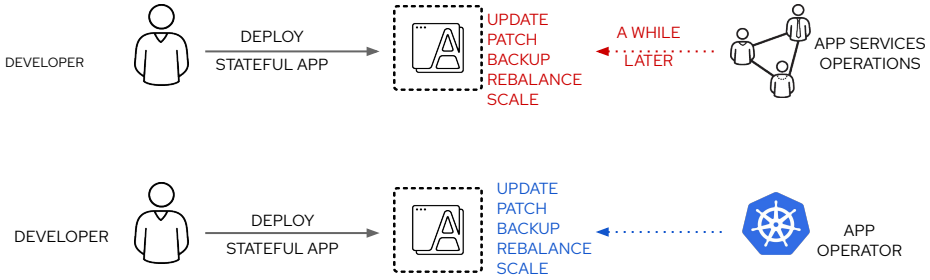
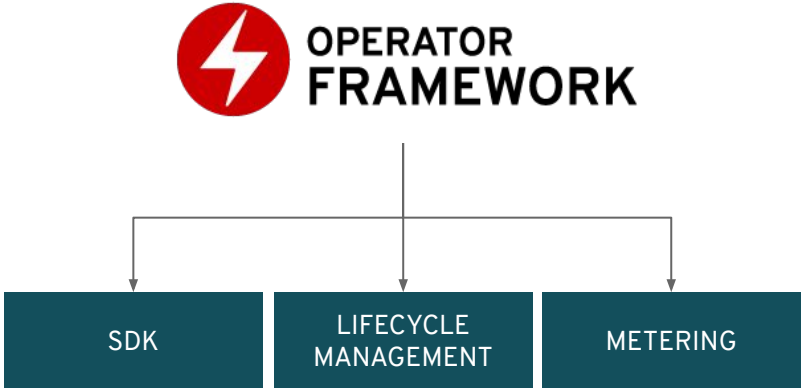
Operator Framework

Codify operations knowledge and automate the app deployment and life cycle management





Notable Operators required for Telco workloads

- Machine Config Operator
- Node Tuning Operator
- Performance Add On operator (SR-IOV)
- Special Resource Operator (FPGA)
- OpenNESS operator
- NVIDIA GPU Operator
- PTP Operator
-

Operatorhub.io

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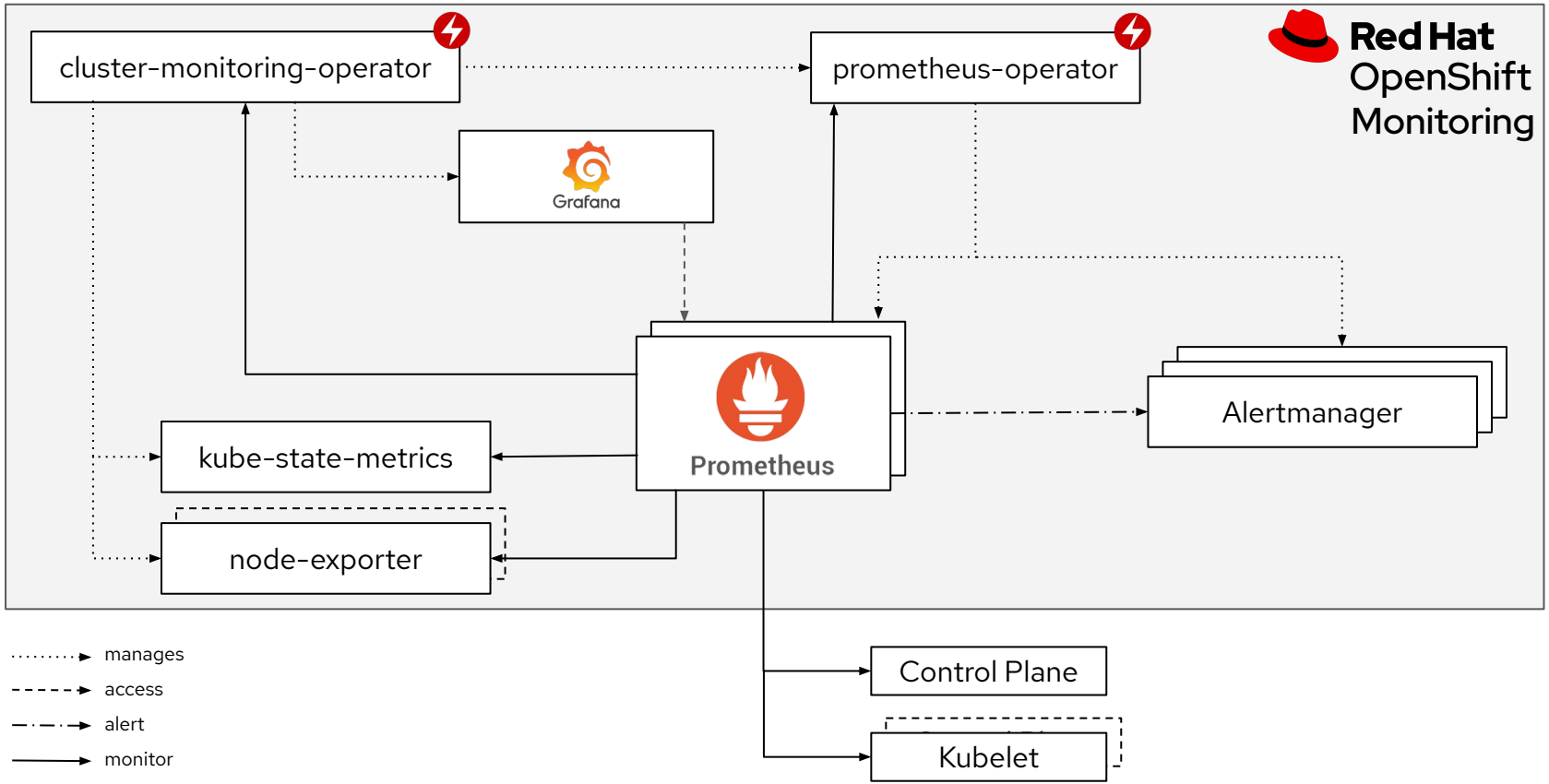
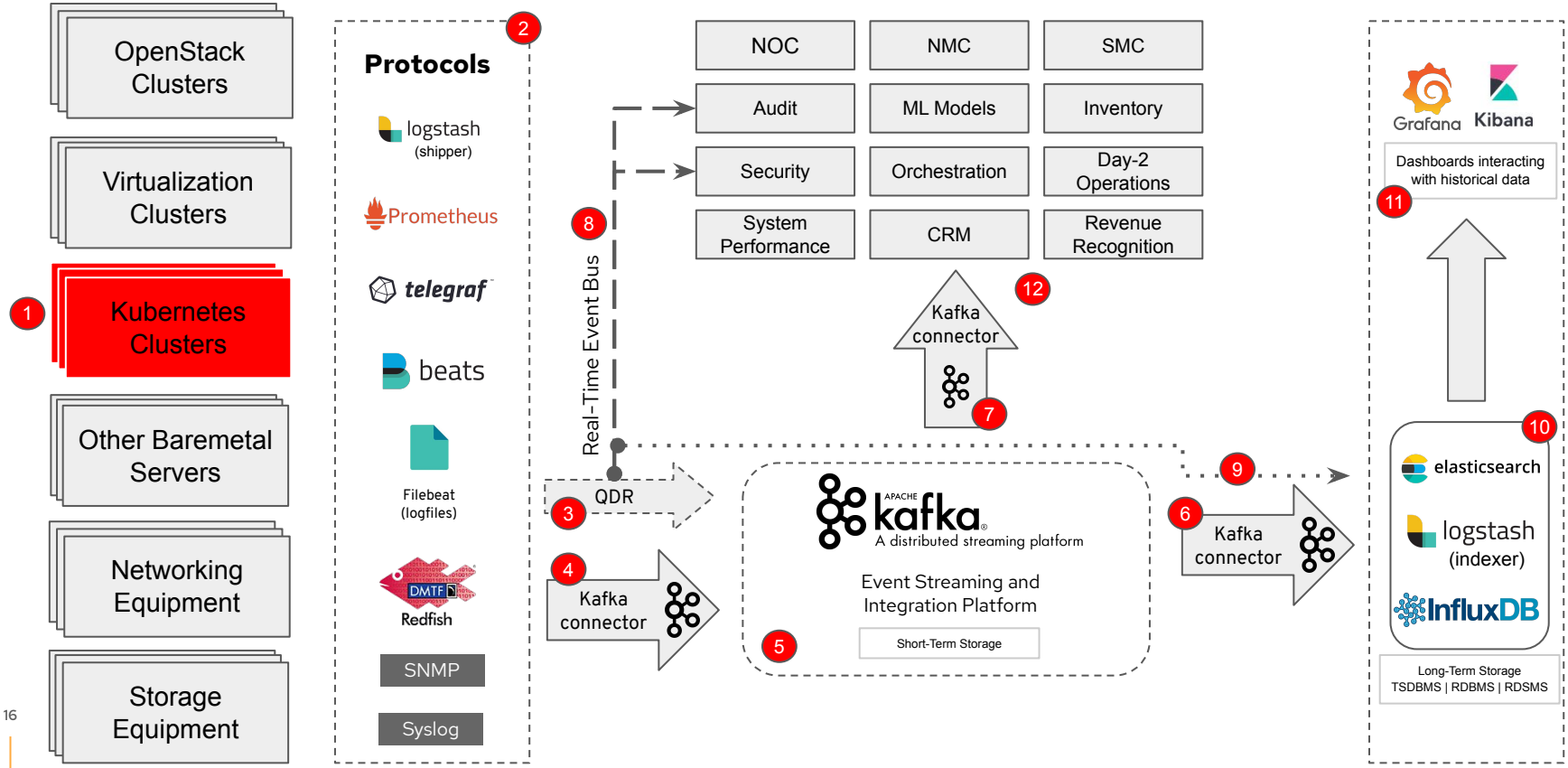
OpenShift Monitoring Architecture



Example of a Telco Monitoring and Logging Architecture



Comprehensive container security

CONTROL
Application security

- Container content
- CI/CD pipeline
- Container registry
- Deployment policies

DEFEND
Infrastructure

- Container platform
- Container host multi-tenancy
- Network isolation
- Storage
- Audit & logging
- API management

EXTEND

- Security ecosystem

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RED HAT OPENSHIFT PLATFORM OPEN SOURCE ECOSYSTEM*

Red Hat OpenShift 4

App Definition & Development

Application Definition & Image Build

OPERATOR FRAMEWORK

podman

buildah

HELM

KubeVirt

App Registry

OperatorHub.io

Continuous Integration & Delivery

argo

GitLab

Jenkins

TEKTON

Orchestration & Management

Scheduling & Orchestration

kubernetes

Coordination & Service Discovery

CoreDNS

etcd

Remote Procedure Call

gRPC

Service Proxy

HAPROXY

envoy

API Gateway

3SCALE

Service Mesh

Istio

Runtime

Cloud Native Storage

CSI

ceph

Amazon Elastic Block Store (EBS)

Azure Disk Storage

ROOK

Google Persistent Disk

Container Runtime

cri-o

Cloud Native Network

CNI

OvS Open vSwitch

MULTUS

Provisioning

Automation & Configuration

ANSIBLE

HELM

Container Registry

Docker REGISTRY

QUAY

Security & Compliance

aqua

clair

OpenSCAP

Key Management

HashiCorp Vault

Infrastructure

aws

Google Cloud

Microsoft Azure

Red Hat Virtualization

Red Hat OpenStack Platform

IBM Cloud

Bare Metal

Observability & Analysis

Monitoring

Prometheus

Grafana

Logging

elastic

fluentd

kibana

Tracing

kiali

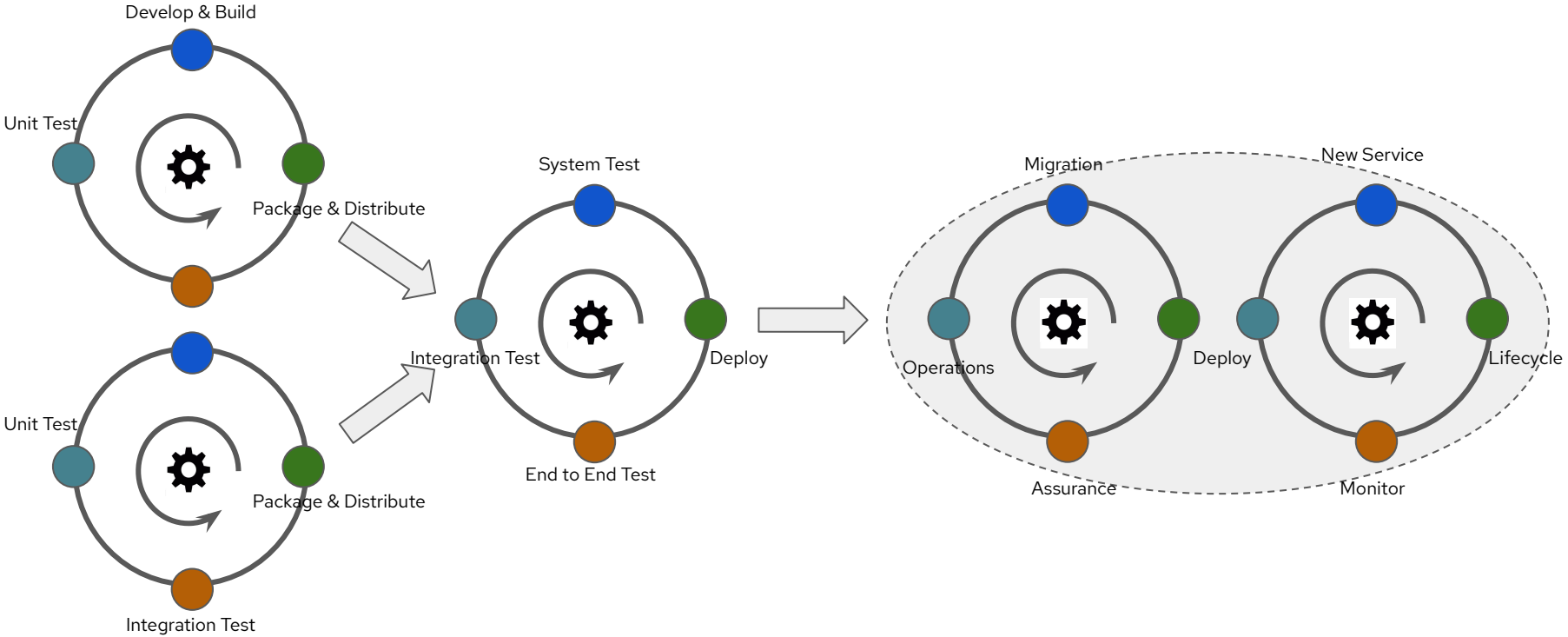
JAEGER

Serverless

Knative

*Based on CNCF Cloud Native Interactive Landscape: https://landscape.cncf.io/

Automated/Distributed CI/CD for multi-vendor Integration



Vendor Labs

Integration Environment

Pre-Production Environment

Production Environment

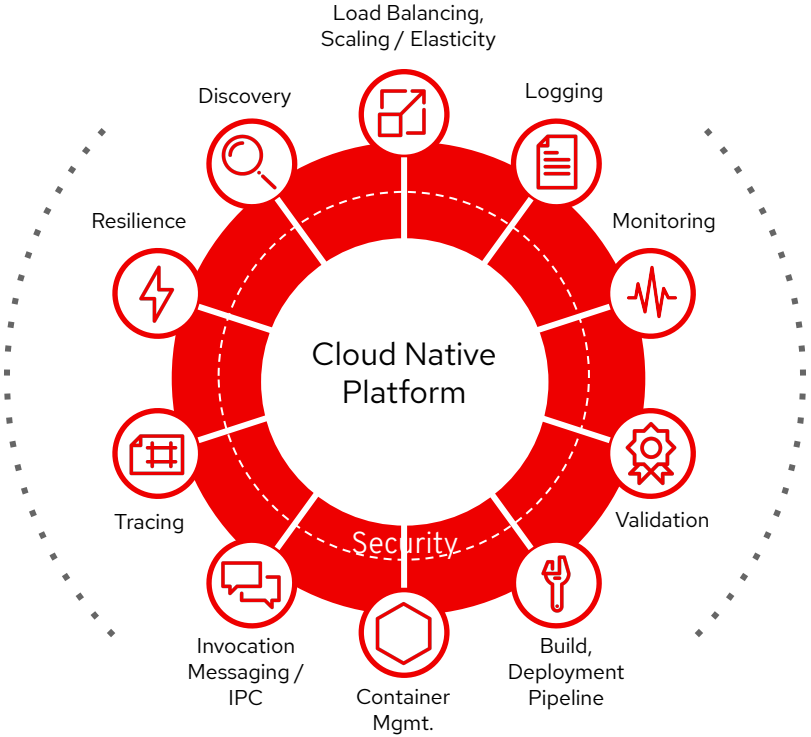
Our Vision: Cloud Native Next Generation Infrastructure for Telco

Imperatives

Cloud-Native

Edge Compute

Application Lifecycle Management



Requirements

- Scale
- Real time data streaming
- Hybrid compute models
- Deployment flexibility
- Efficient UPF redirection
- Modular network design
- Stateless functions

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