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CONTAINERS AND SECURITY: A MATCH MADE IN CYBERSPACE

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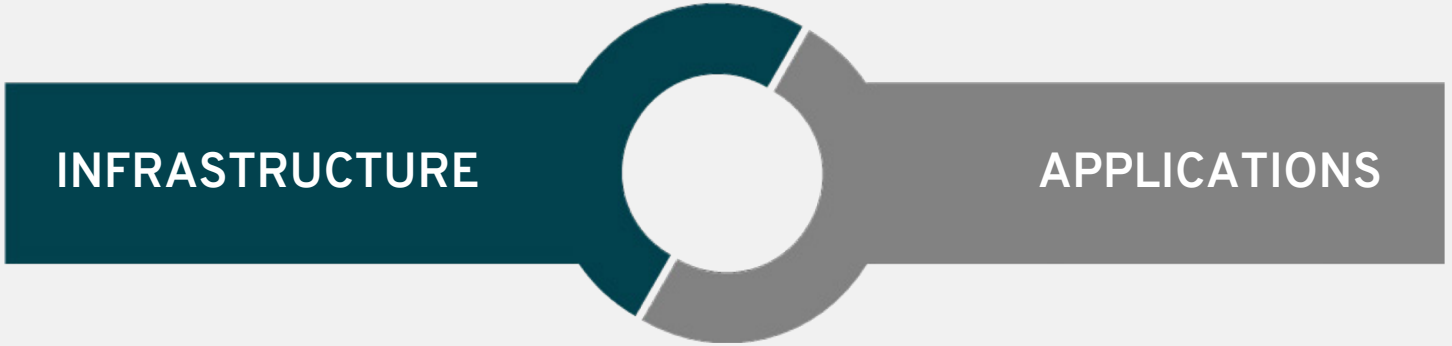
CONTAINERS CHANGE HOW WE DEVELOP, DEPLOY AND MANAGE APPLICATIONS



- Application processes on a shared kernel
- Simpler, lighter, and denser than VMs
- Portable across different environments

- Package apps with all dependencies
- Deploy to any environment in seconds
- Easily accessed and shared

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THEY ALSO CHANGE HOW WE SECURE OUR WORKLOADS

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AUTOMATED & INTEGRATED 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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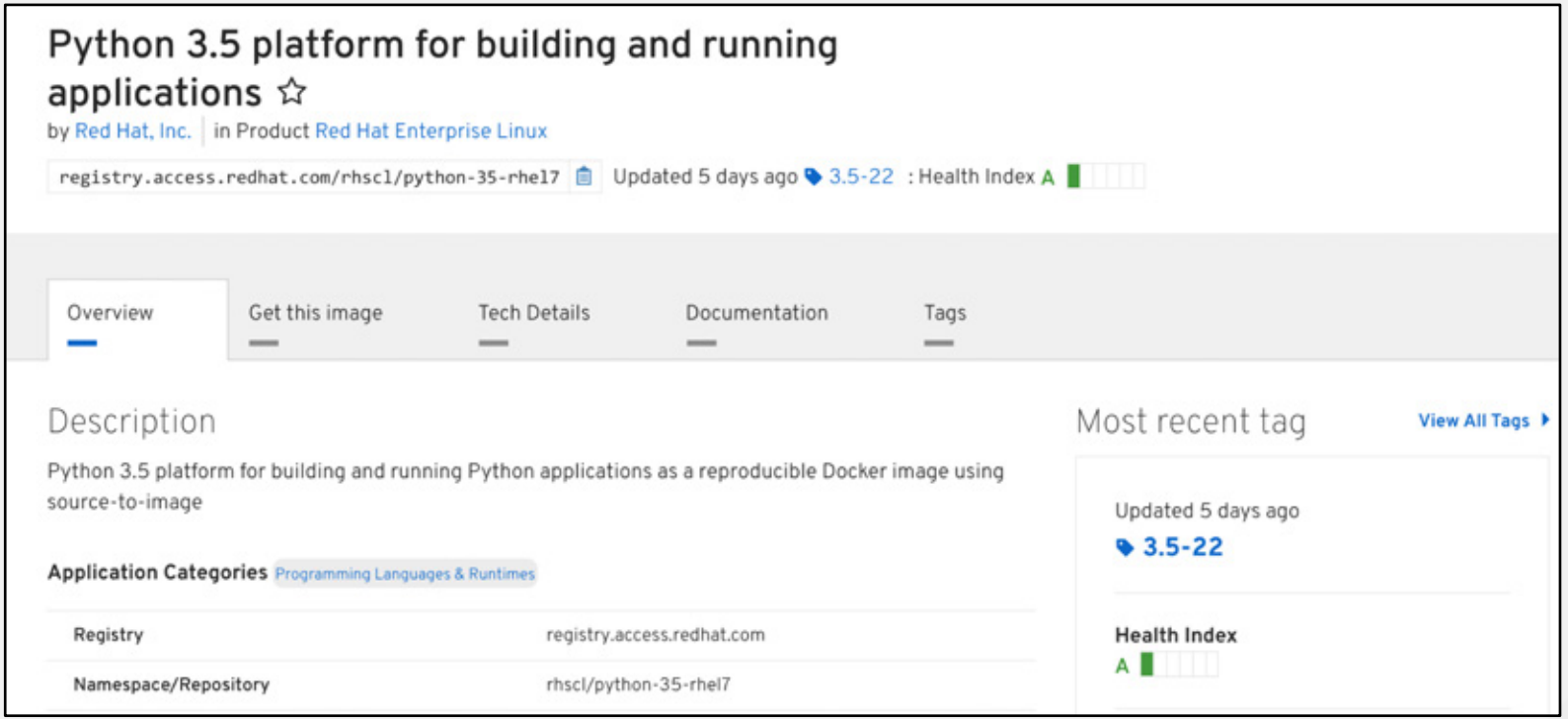
CONTROL

Secure the Pipeline & the Applications

Container Content	CI/CD Pipeline
Container Registry	Deployment Policies

IT STARTS WITH TRUSTED SOURCES



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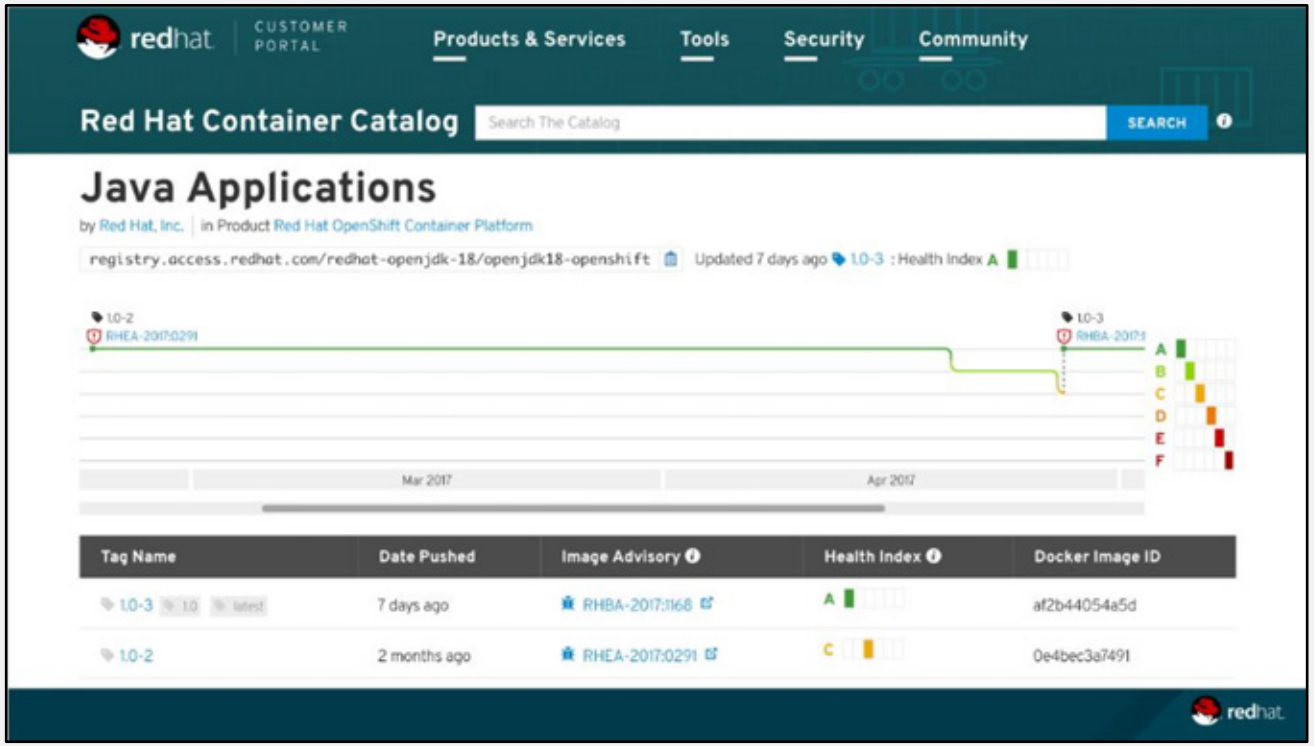
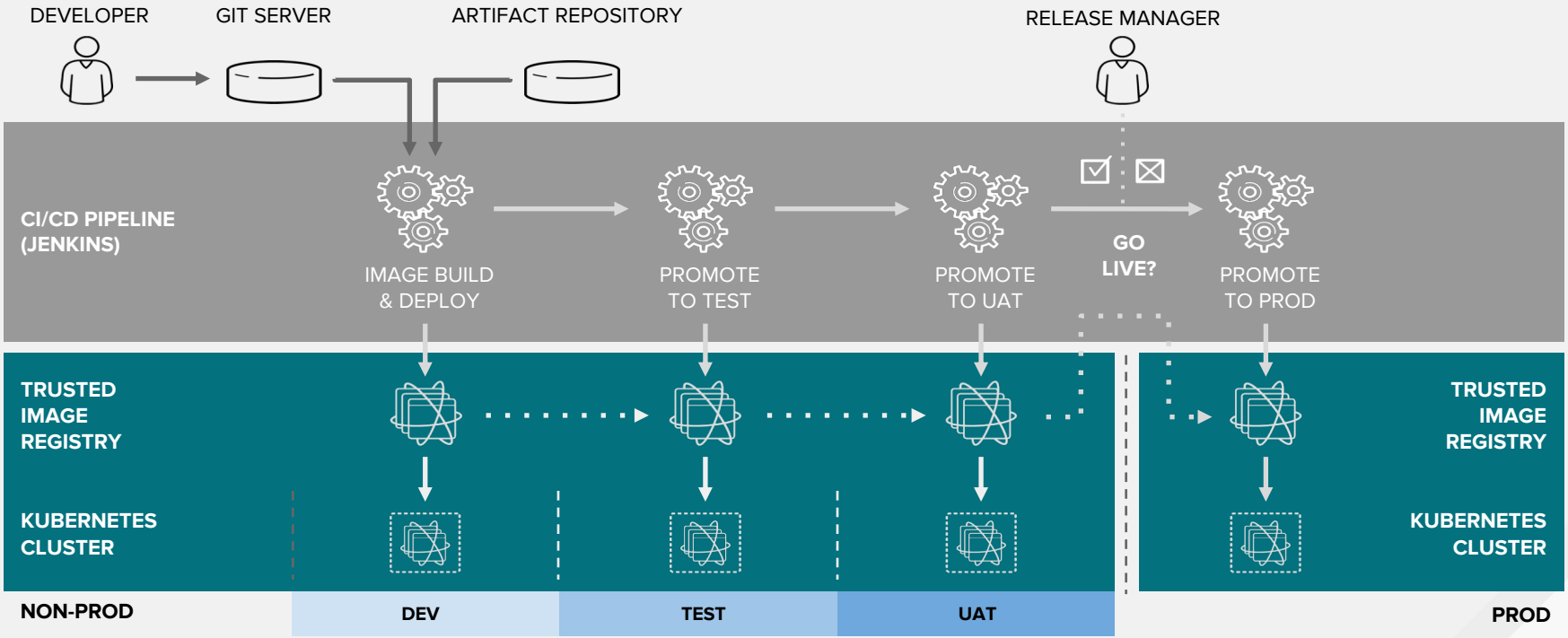
CONTAINER HEALTH CHECKS



https://access.redhat.com/containers/

SECURE CONTAINER LIFECYCLE



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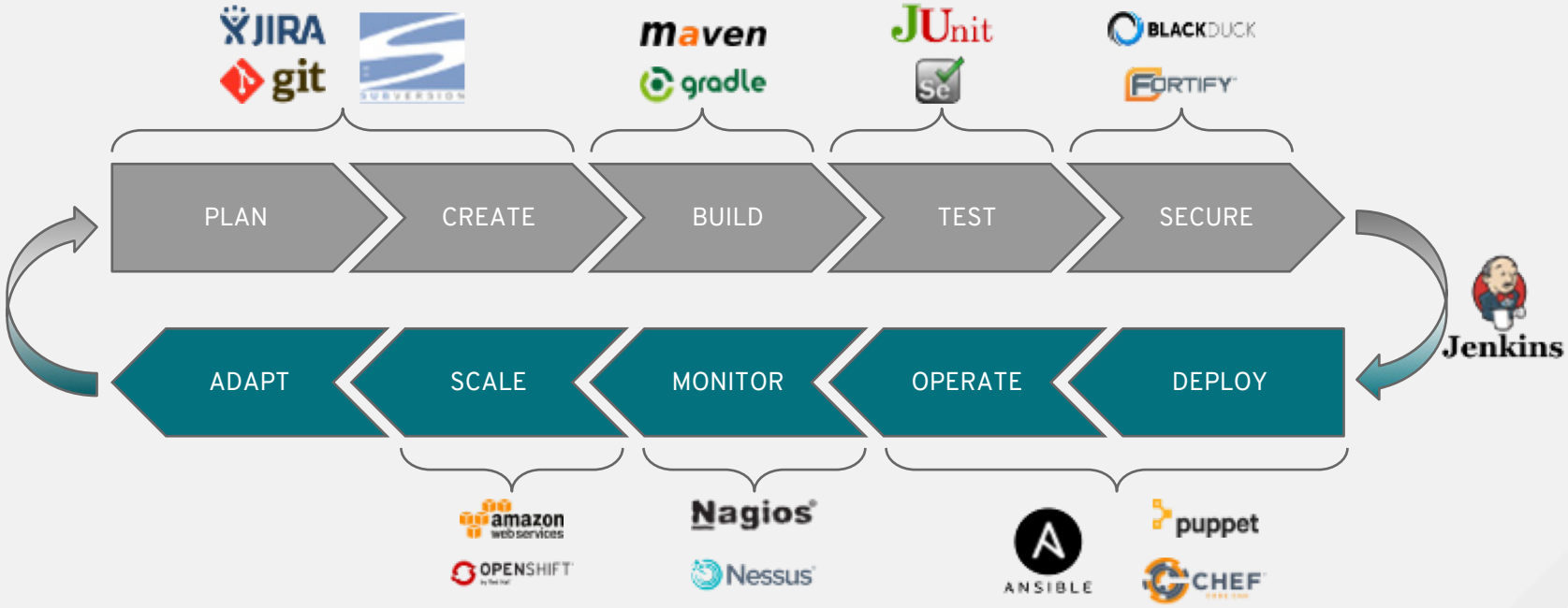
AUTOMATING DEVOPS AND DEPLOYMENT POLICIES



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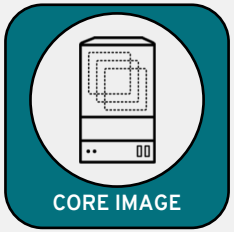
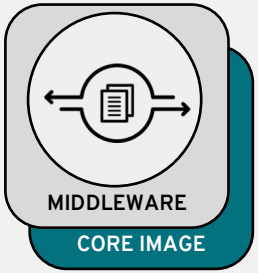
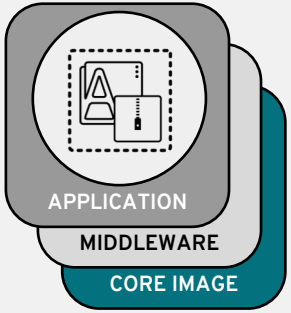
DESIGN FOR SEPARATION OF CONCERNS



IT Operations



Architects



Application Developers

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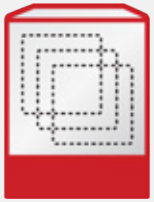
DEFEND

Secure the Infrastructure

Container Platform	Container Host Multi-tenancy
Network Isolation	Storage
Audit & Logging	API Management

THE OS MATTERS: CONTAINER HOST & MULTI-TENANCY

RED HAT ENTERPRISE LINUX



RED HAT ENTERPRISE LINUX ATOMIC HOST

THE FOUNDATION FOR SECURE, SCALABLE CONTAINERS

A stable, reliable host environment with built-in security features that allow you to isolate containers from other containers and from the kernel.

Minimized host environment tuned for running Linux containers while maintaining the built-in security features of Red Hat Enterprise Linux.

SELinux | kernel namespaces | capabilities | cgroups | seccomp

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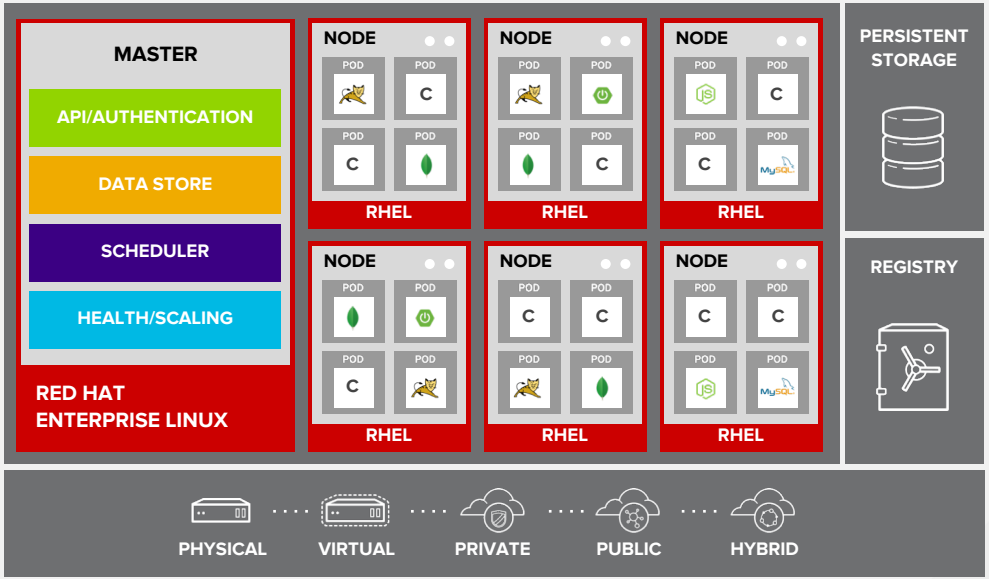
SECURING THE CONTAINER PLATFORM

- Role-based Access Controls with LDAP and OAuth integration
- Secure communication
- Platform multi-tenant security
- Integrated & extensible secrets management
- Logging, Monitoring, Metrics
- Consistency across multiple infrastructures



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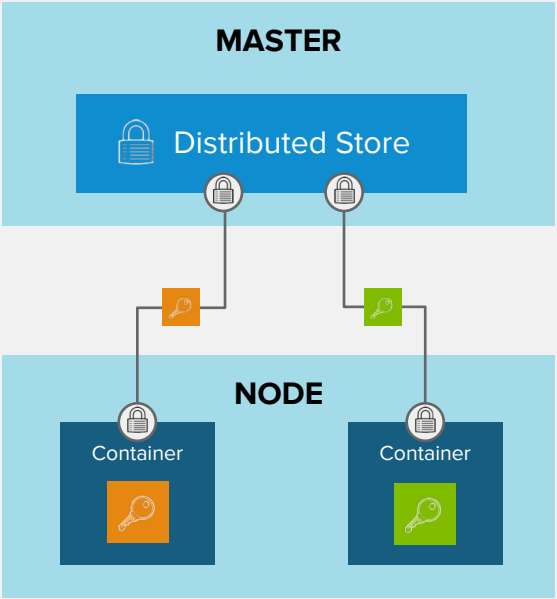
SECRETS MANAGEMENT

- Secure mechanism for holding sensitive data e.g.
  - Passwords and credentials
  - SSH Keys
  - Certificates
- Secrets are made available as
  - Environment variables
  - Volume mounts
  - Interaction with external systems
- Encrypted in transit and at rest
- Never rest on the nodes



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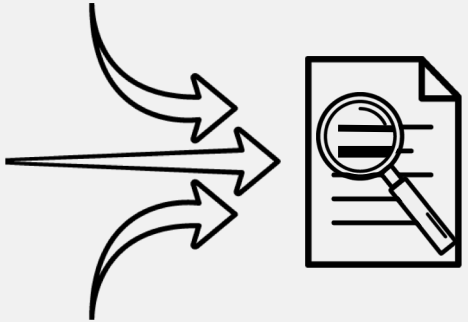
LOGGING and AUDITING

- Aggregate logs for hosts and applications
- Access control
  - Cluster administrators can view all logs
  - Users can view logs for their projects
- Ability to send logs elsewhere
  - External elasticsearch, Splunk, etc



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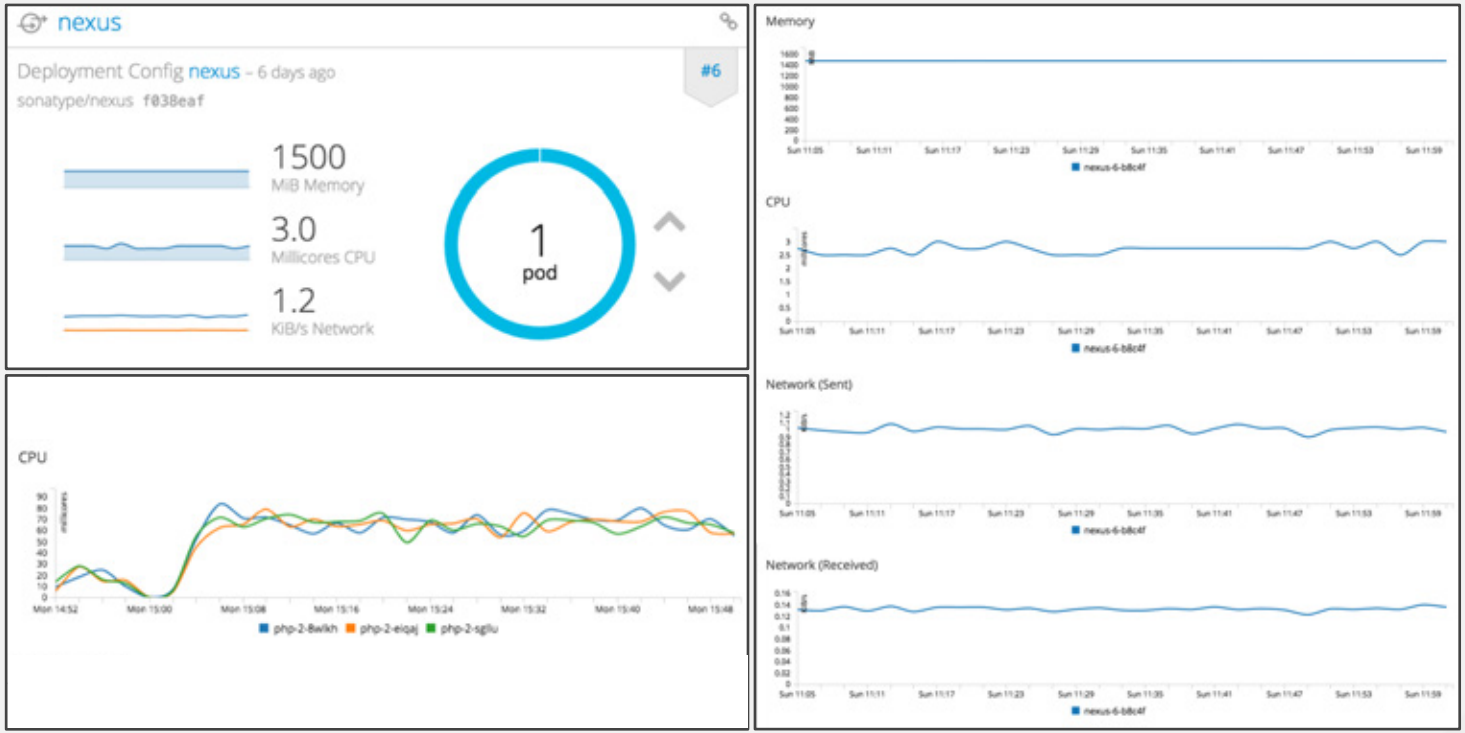
CONTAINER METRICS



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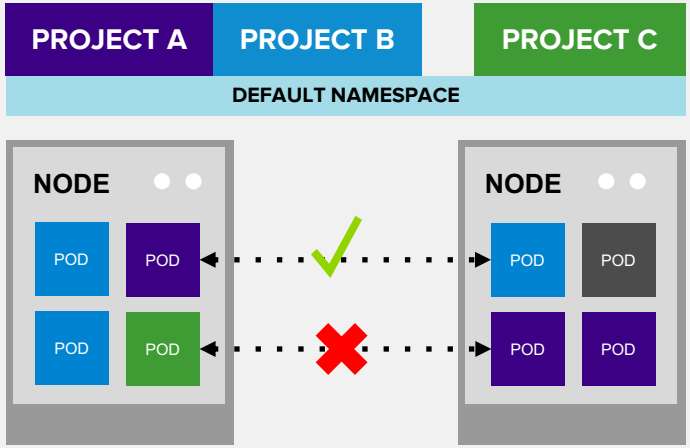
NETWORK DEFENSE

- Multi-tenant Network Support
  - Project-level network isolation
  - Multicast support
  - Egress network policies
- Network Policy
  - Granular policy-based isolation



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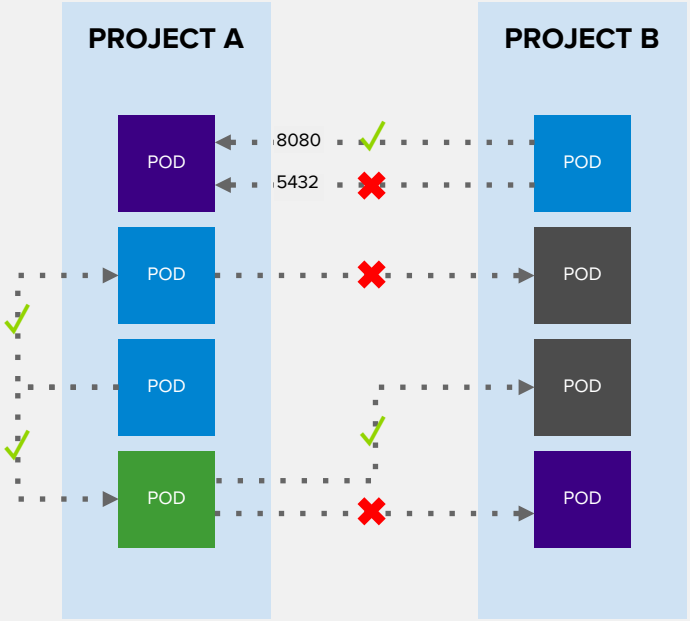
NETWORK POLICY: FINE GRAINED ISOLATION



Example Policies

- Allow all traffic inside the project
- Allow traffic from green to gray
- Allow traffic to purple on 8080

```
apiVersion: extensions/v1beta1
kind: NetworkPolicy
metadata:
  name: allow-to-purple-on-8080
spec:
  podSelector:
    matchLabels:
      color: purple
  ingress:
  - ports:
    - protocol: tcp
      port: 8080
```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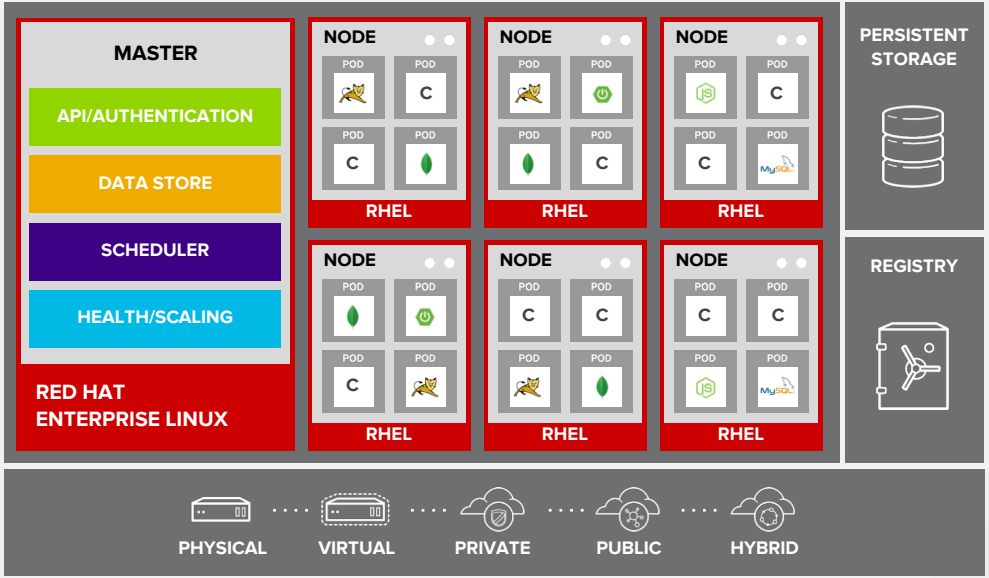
ATTACHED STORAGE

Secure storage by using

- SELinux Mandatory Access Controls
- Secure mounts
- Supplemental group IDs for shared storage



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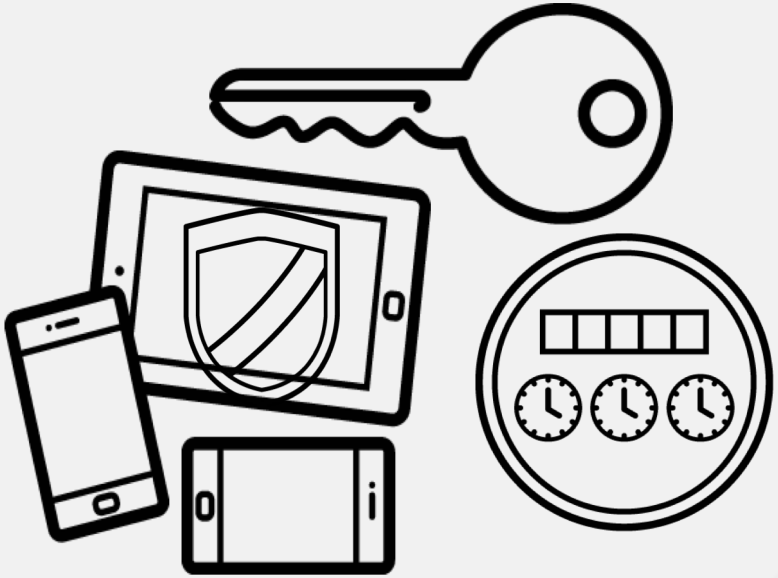
API MANAGEMENT

- Authentication and authorization
- LDAP integration
- End-point access controls
- Rate limiting



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EXTEND

Leverage the Ecosystem

THE SECURITY ECOSYSTEM

For enhanced security, or to meet existing policies, integrate with enterprise security tools, such as

- Identity and Access Management / Privileged Access Management
- External Certificate Authorities
- External Vaults / Key Management solutions
- External Hardware Security Modules (HSM)
- Filesystem encryption tools
- Container content scanners & vulnerability management tools
- Container runtime analysis tools
- Security Information and Event Monitoring (SIEM)

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Aporeto

Black Duck

Cisco Contiv

NGINX

Sonatype

Sysdig

Tigera

Tremolo

Twistlock

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LOOKING INTO THE NOT SO DISTANT FUTURE

CONTAINER CHALLENGES

Enterprise Build, Pipeline and Runtime concerns

- Supply chain needs further security policy services
- Microservices have special networking and governance needs
- Build and runtime tools and services need decoupling

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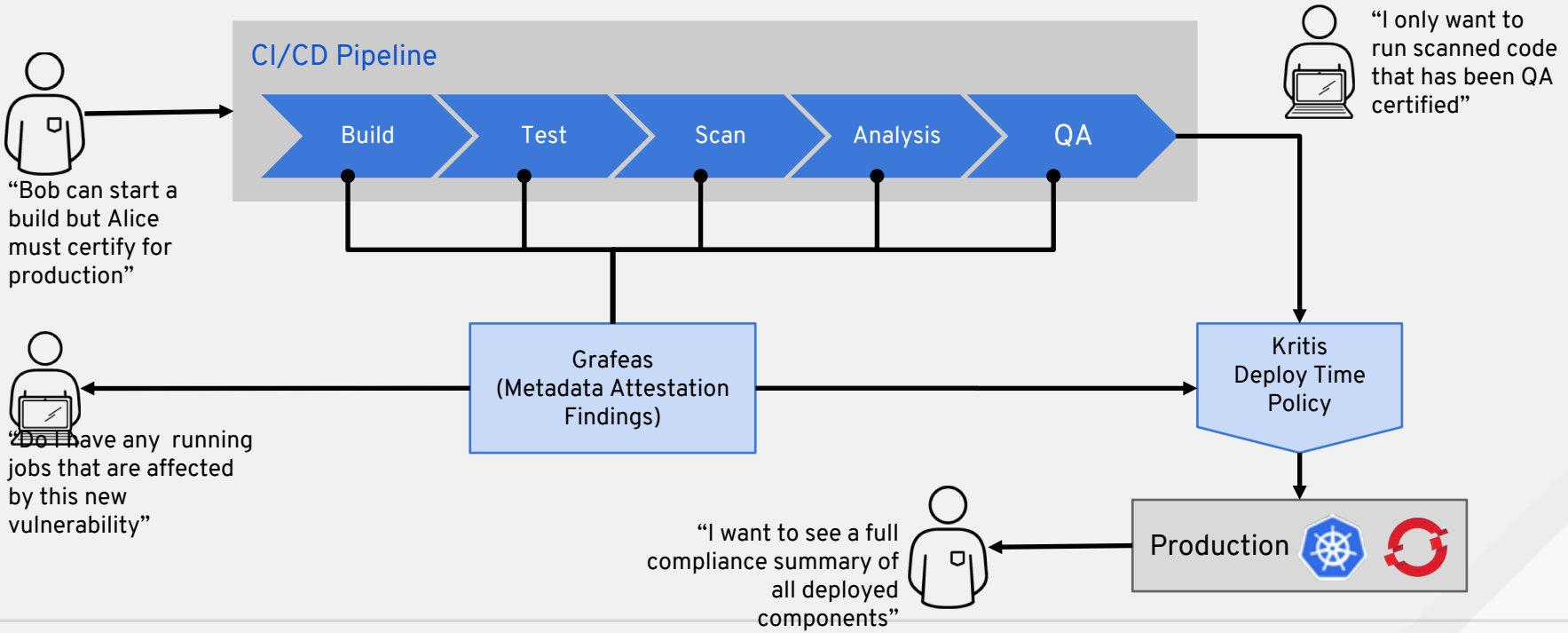
ATTESTATION OF SECURITY POLICY

Grafeas (Scribe) and Kritis (Judge)



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ISTIO AND MICROSERVICES

Connect, manage, and secure microservices.

- Collaborative offert between Red Hat, Google Cloud and IBM
  - Sidecar container with the features and functions for creating and managing microservices
    - Monitoring
    - Tracing
    - circuit breakers
    - Routing
    - load balancing
    - fault injection
    - Retries
    - Timeouts
    - Mirroring
    - Access control
    - Rate limiting
    - ...And more

v1.0 ANNOUNCED 07/31/2018!

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OCI BASED INNOVATION

- A lightweight, OCI-compliant container runtime designed for Kubernetes
- Runs any OCI / Docker container from any OCI / Docker registry
- Focus on stability and life cycle *with* the platform
- Improve container security & performance at scale

- OCI-compliant, daemon-less tool for building/modifying OCI/Docker images.
- Enables fine-grain control over the commands and content of each image layer
- Container host utils. can optionally be leveraged as part of the build
- Can use a Dockerfile
- Shares the underlying image and storage components with CRI-O

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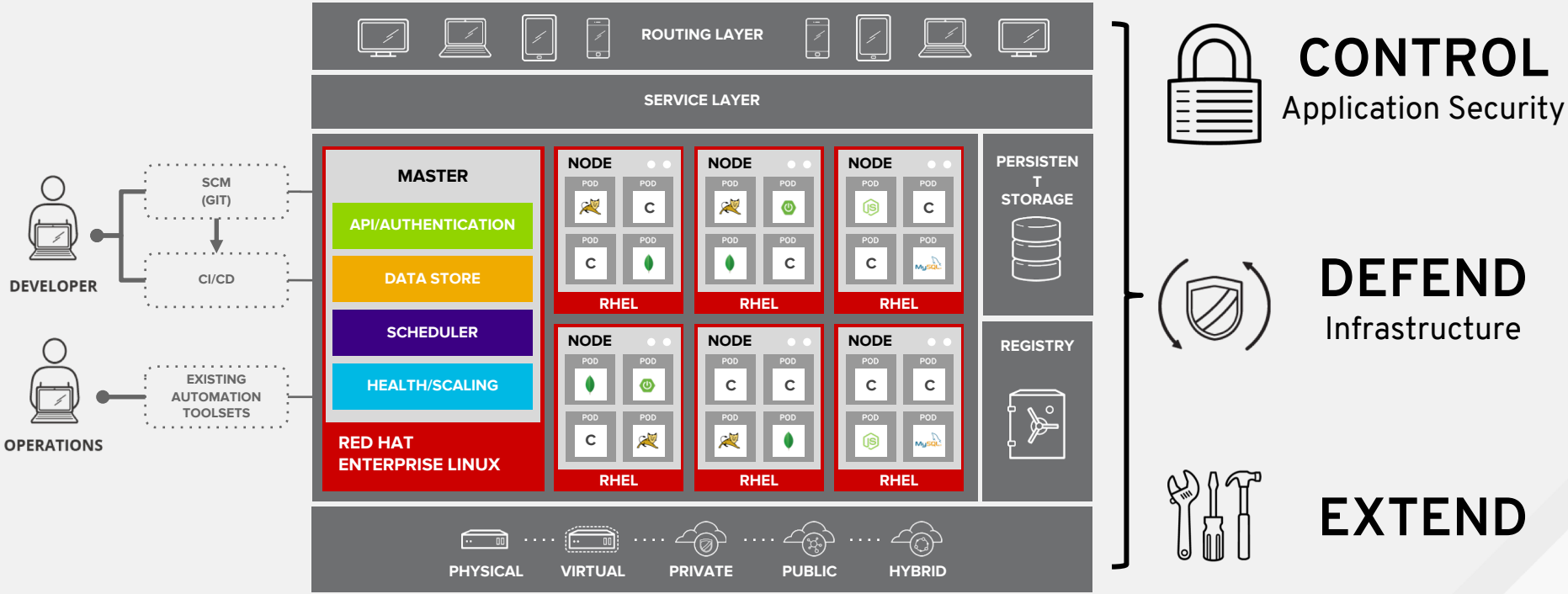
BRINGING IT ALL TOGETHER



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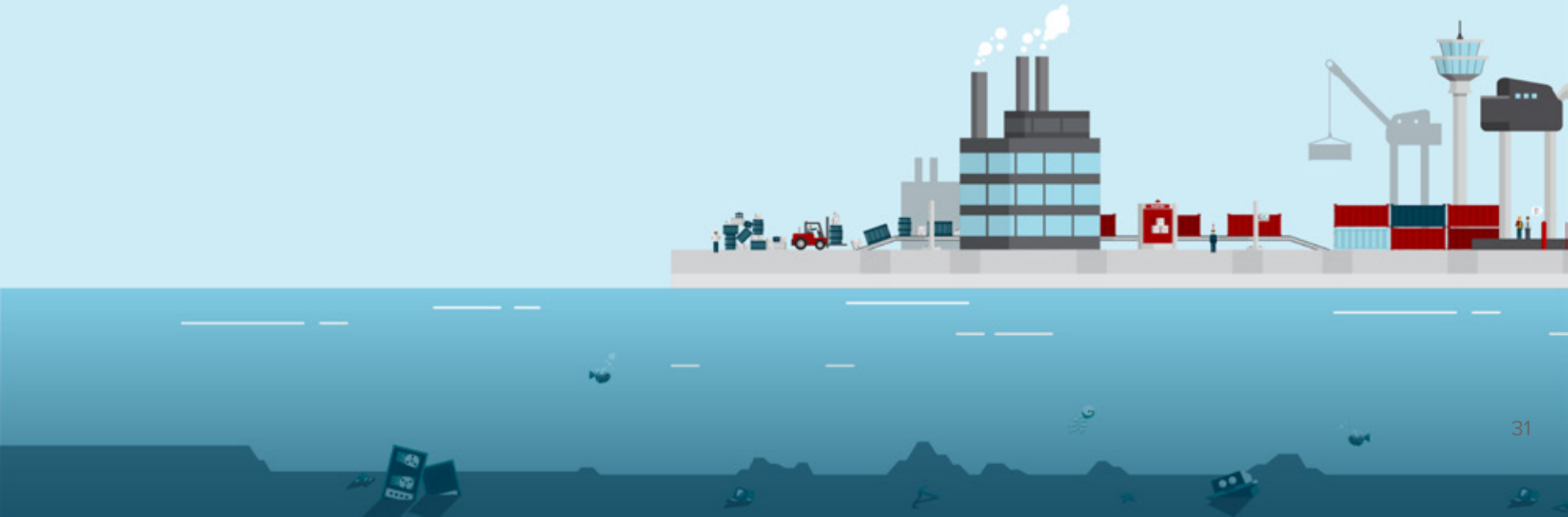
THANK YOU