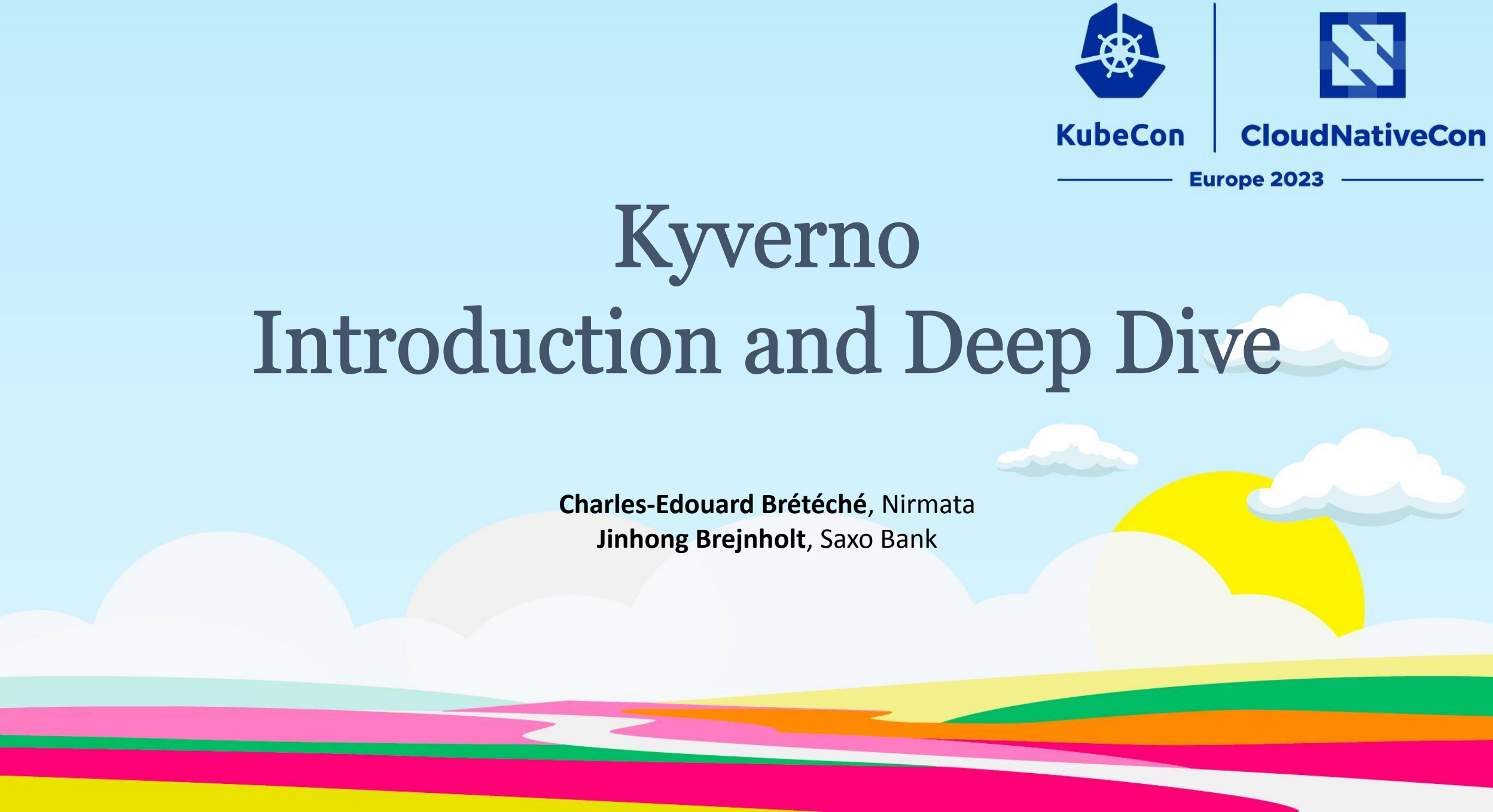

Kyverno
Introduction and Deep Dive

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KubeCon | CloudNativeCon

Europe 2023

SAXO

BE INVESTED

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Agenda

- **Intro to Kyverno**
  - Why do we need a policy engine ?
  - What is Kyverno and how does it work ?
  - More than an admission webhook
- **Saxo Bank & VELUX Use cases**
  - Why Kyverno
  - How
  - Demo
  - Learnings
- **Advanced features**
  - Notary V2
  - Internal service API calls
  - Validating Admission Policies

Intro to Kyverno

Why do we need a policy engine ?

Security

Multi tenancy

Collaboration

Cost control

Plenty of other things too…

What is Kyverno ?

Open-source

Kubernetes native

Easy to use

Declarative

GitOps friendly

Kyverno policy types

Validation

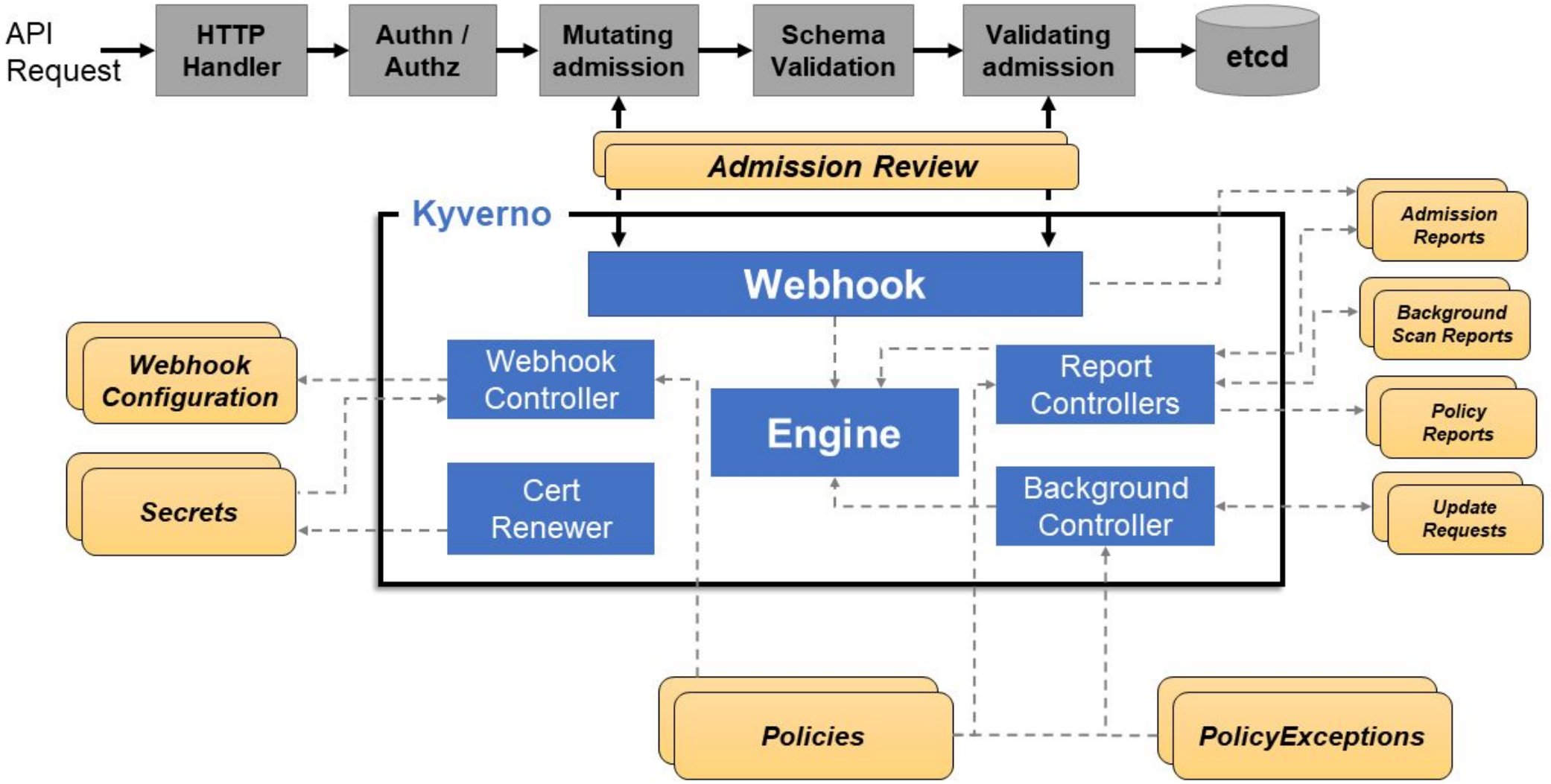
Generation

Image verification

Mutation

Cleanup

Kyverno architecture



Anatomy of a Policy


```yaml
apiVersion: kyverno.io/v1
kind: ClusterPolicy
metadata:
 name: require-labels
spec:
 validationFailureAction: Enforce
 background: true
 rules:
   - name: require-team
     match:
       any:
         - resources:
             kinds:
               - Pod
     validate:
       message: 'The label `team` is required.'
       pattern:
         metadata:
           labels:
             team: '?*'
```

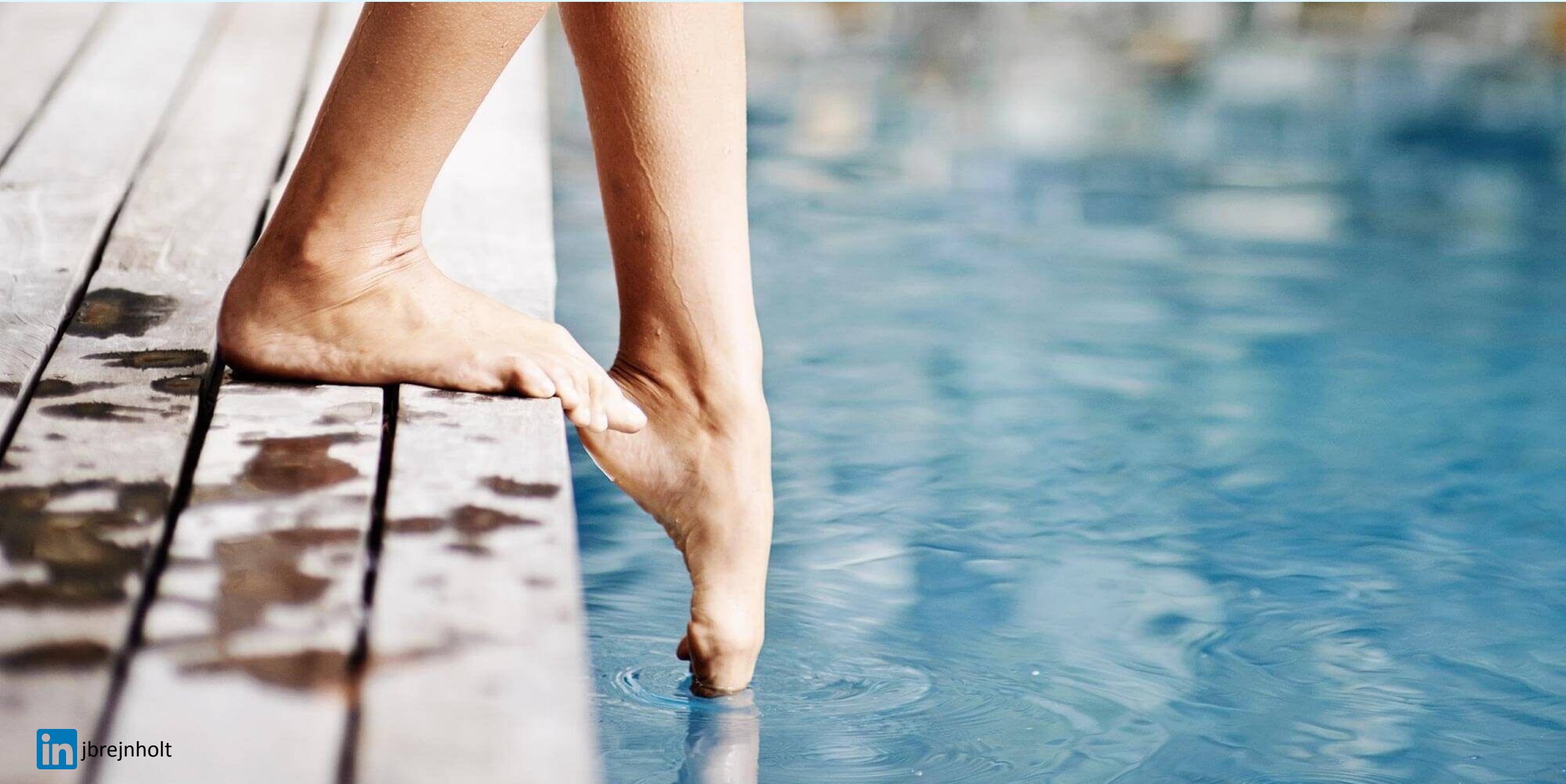
From policy definition to live enforcement

DEMO TIME

More than an admission webhook

Beside Kyverno being an admission webhook it can do a lot more !

- Generate **reports** in the background
  - For all resources, not just the ones created after a policy was installed
- Create **events** corresponding to detected violations
  - When running in the background
  - At admission time, when a resource is blocked
- Run **offline** with Kyverno CLI
  - The Kyverno CLI can run against file manifest with or without a running cluster
  - Perfect to evaluate manifests in your CI pipelines
- **Visualise** violations in real time with policy reporter
  - By installing the policy reporter optional component
- Large policy catalog available
  - Accelerate Kyverno adoption



At Saxo Bank, we do!

VELUX®

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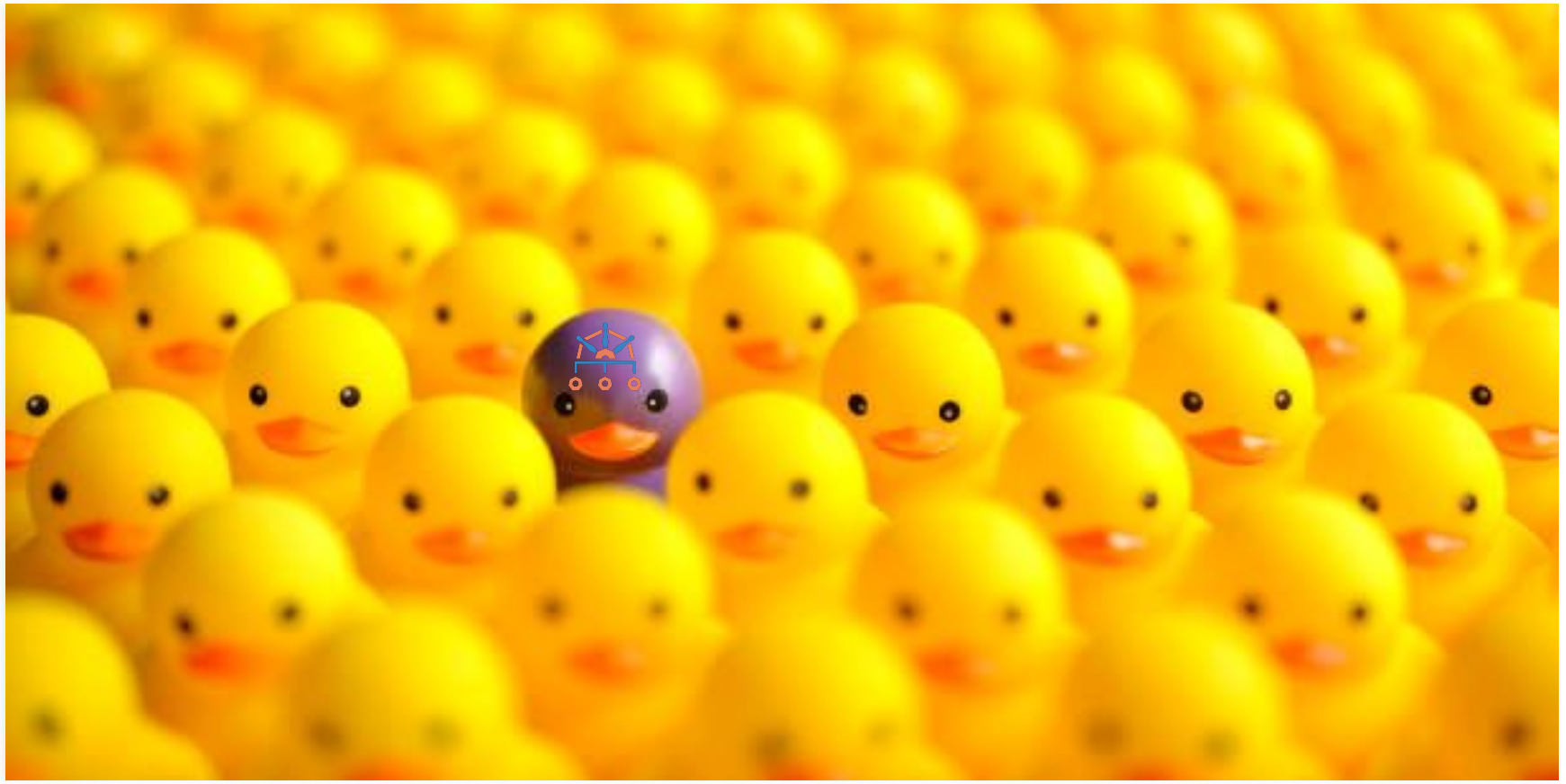


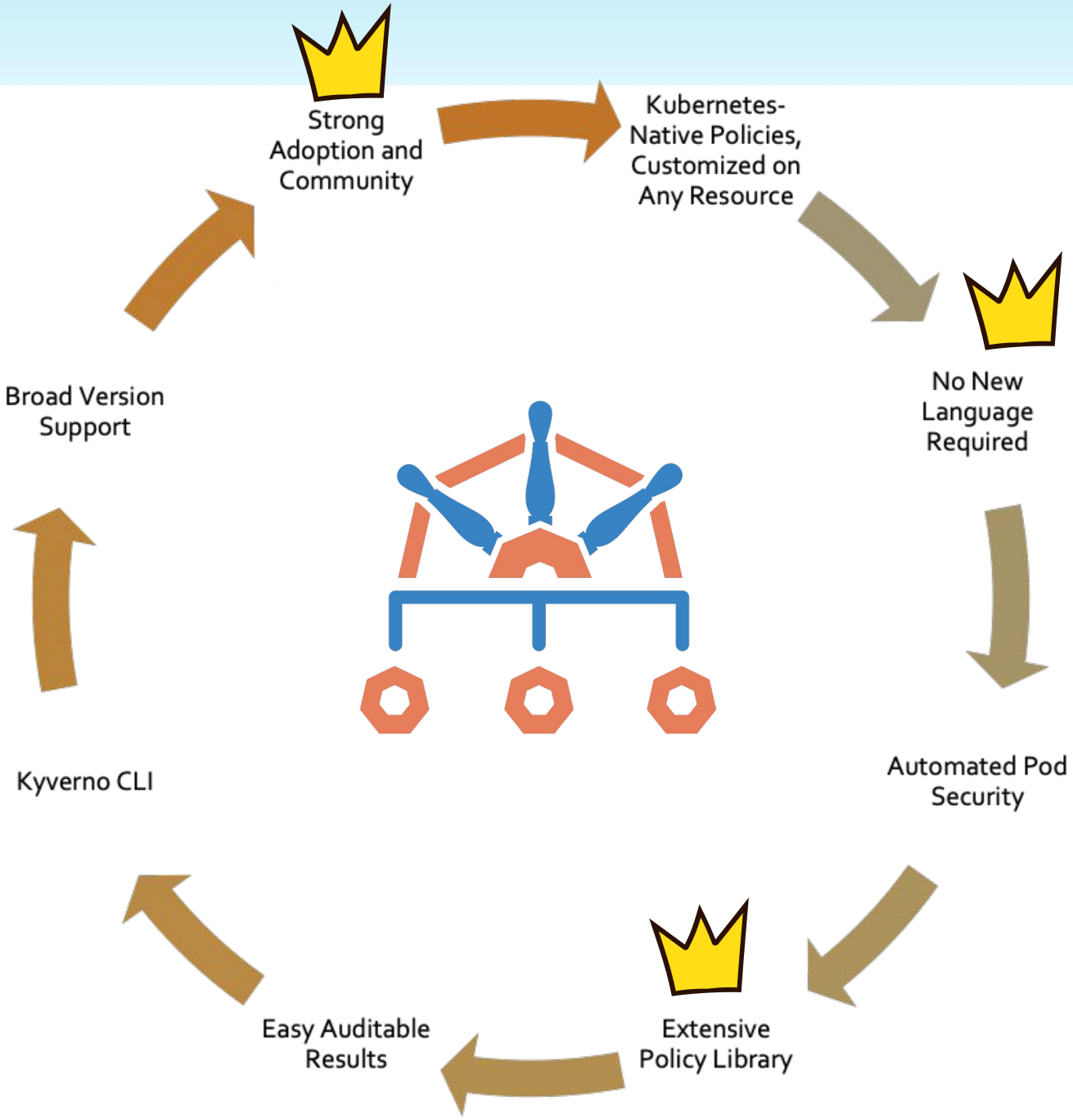
OPA

VS

Kyverno

VS

VAP/PSP


Strong Adoption and Community
Kubernetes-Native Policies, Customized on Any Resource
No New Language Required
Automated Pod Security
Extensive Policy Library
Easy Auditable Results
Kyverno CLI
Broad Version Support

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Step by step

Additional security enforcement

Process automation

Out of the box policies

SHARING

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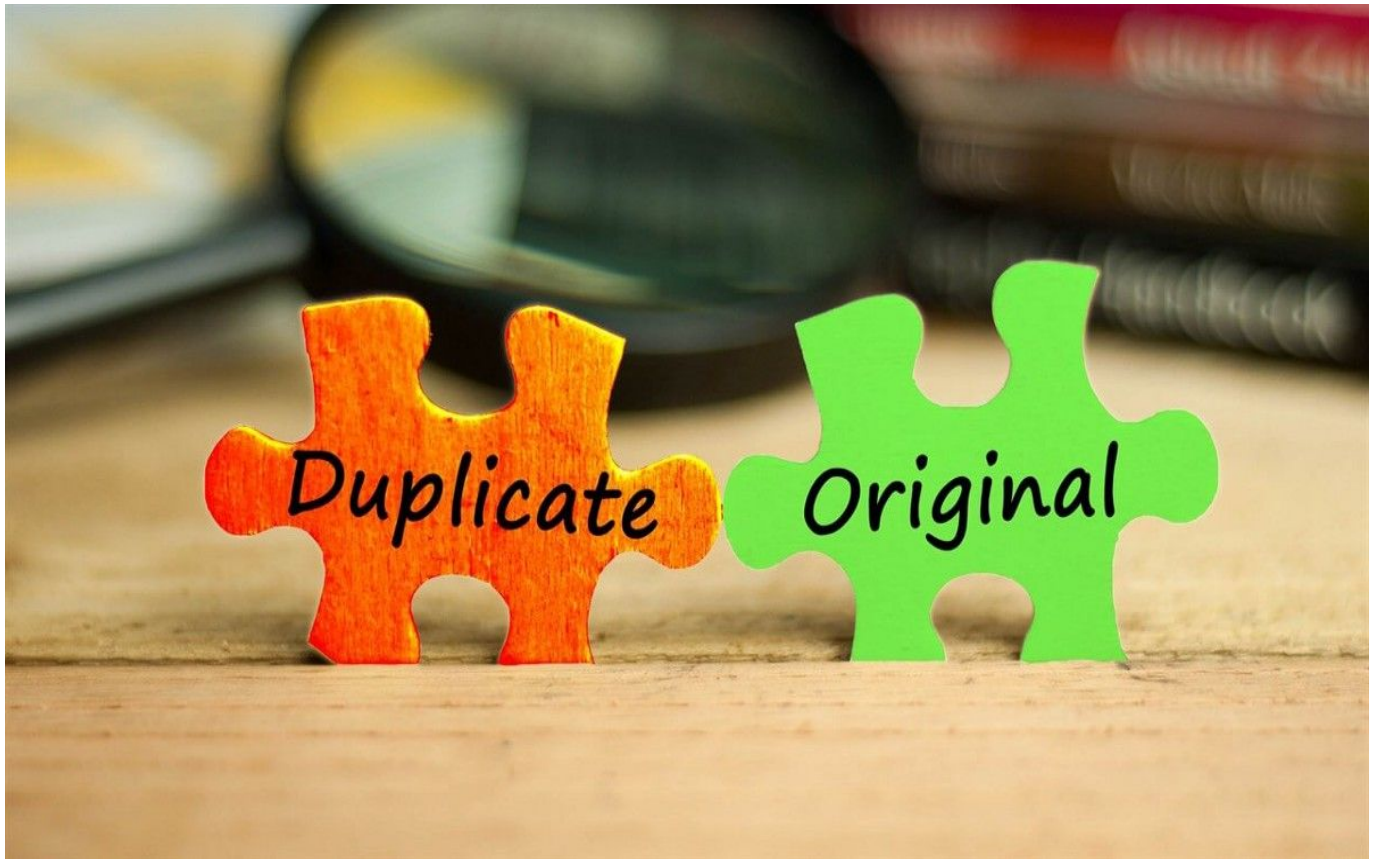
1 Multi-tenancy

2 Resource Management

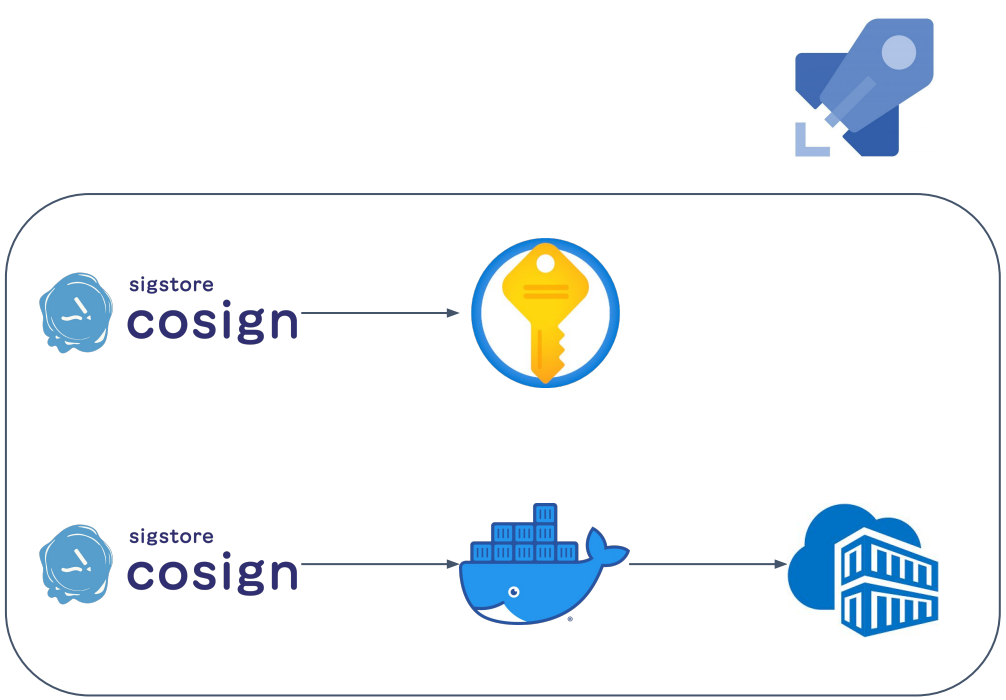


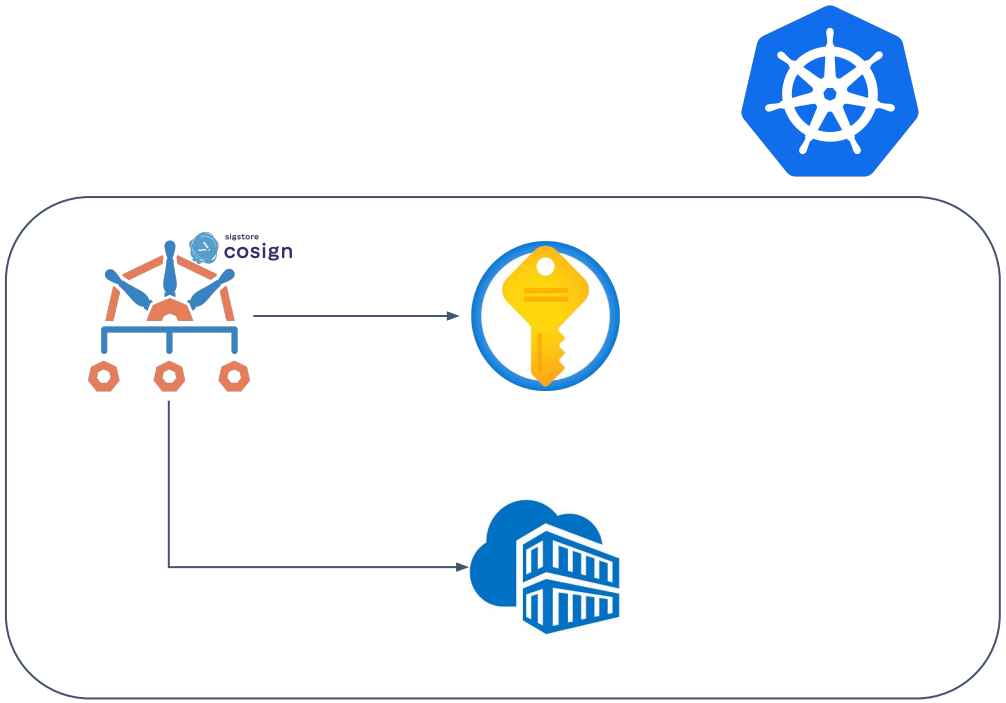
3 Resource Validation

4 Image Signature Verification

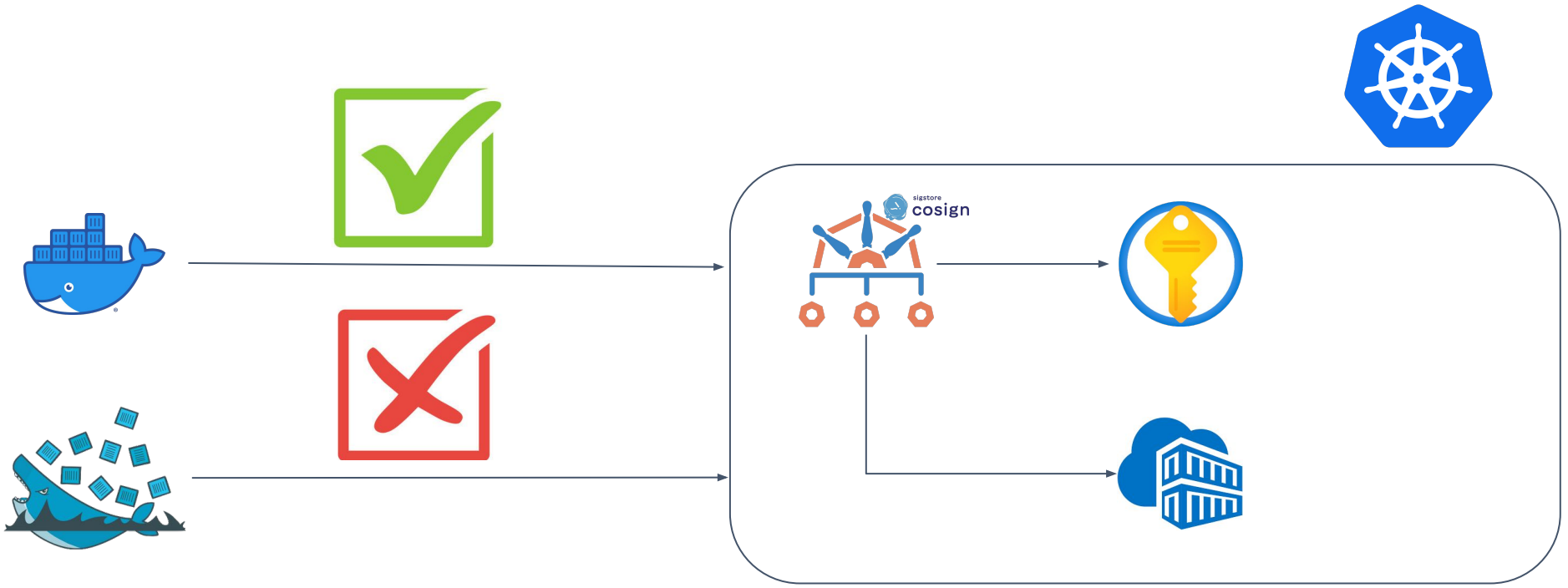
DEMO

The Setup

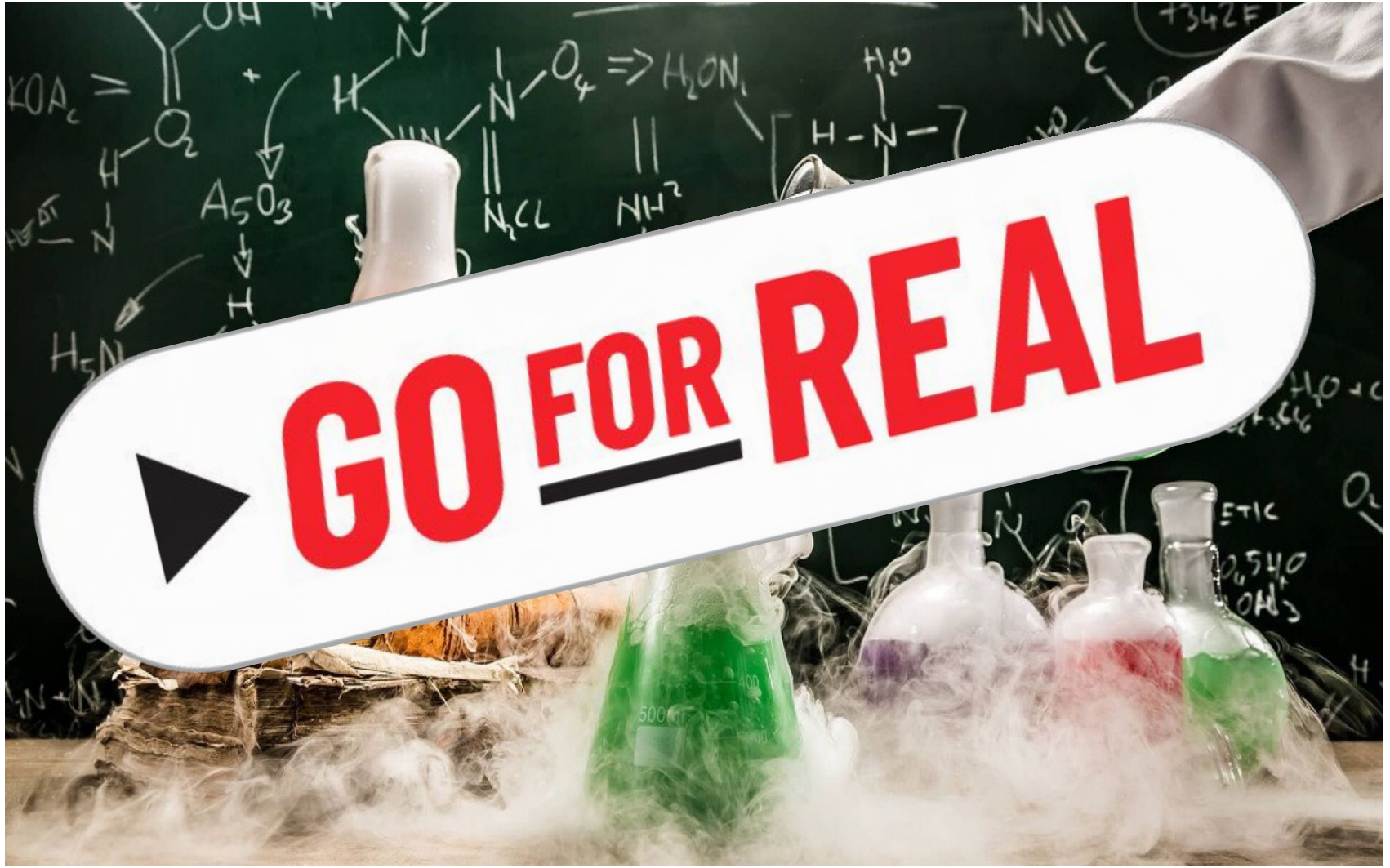




The Target



DEMO



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Learnings

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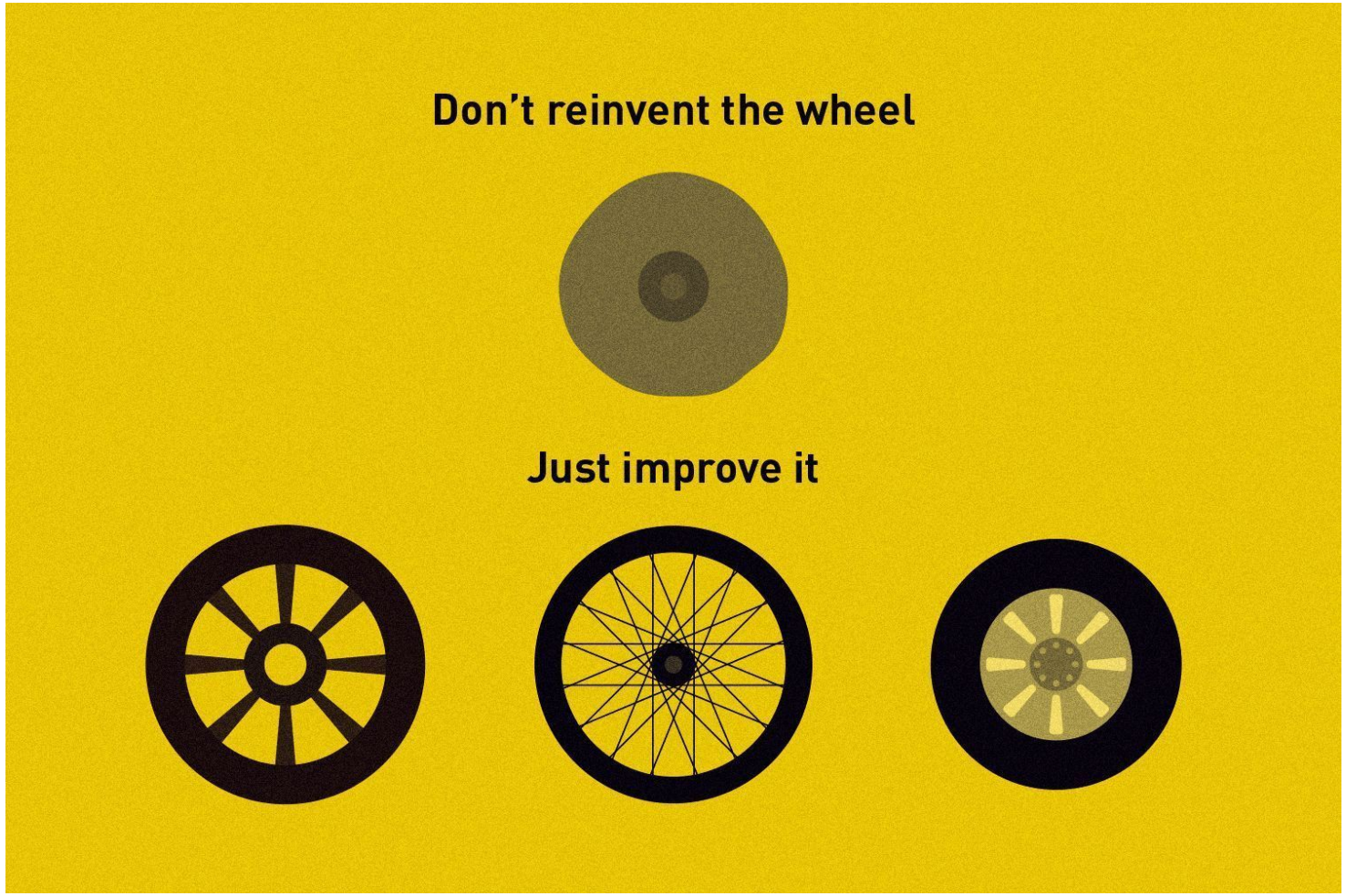
Learning 1

–

Take advantage of the recommended policies.



Learning 2

–

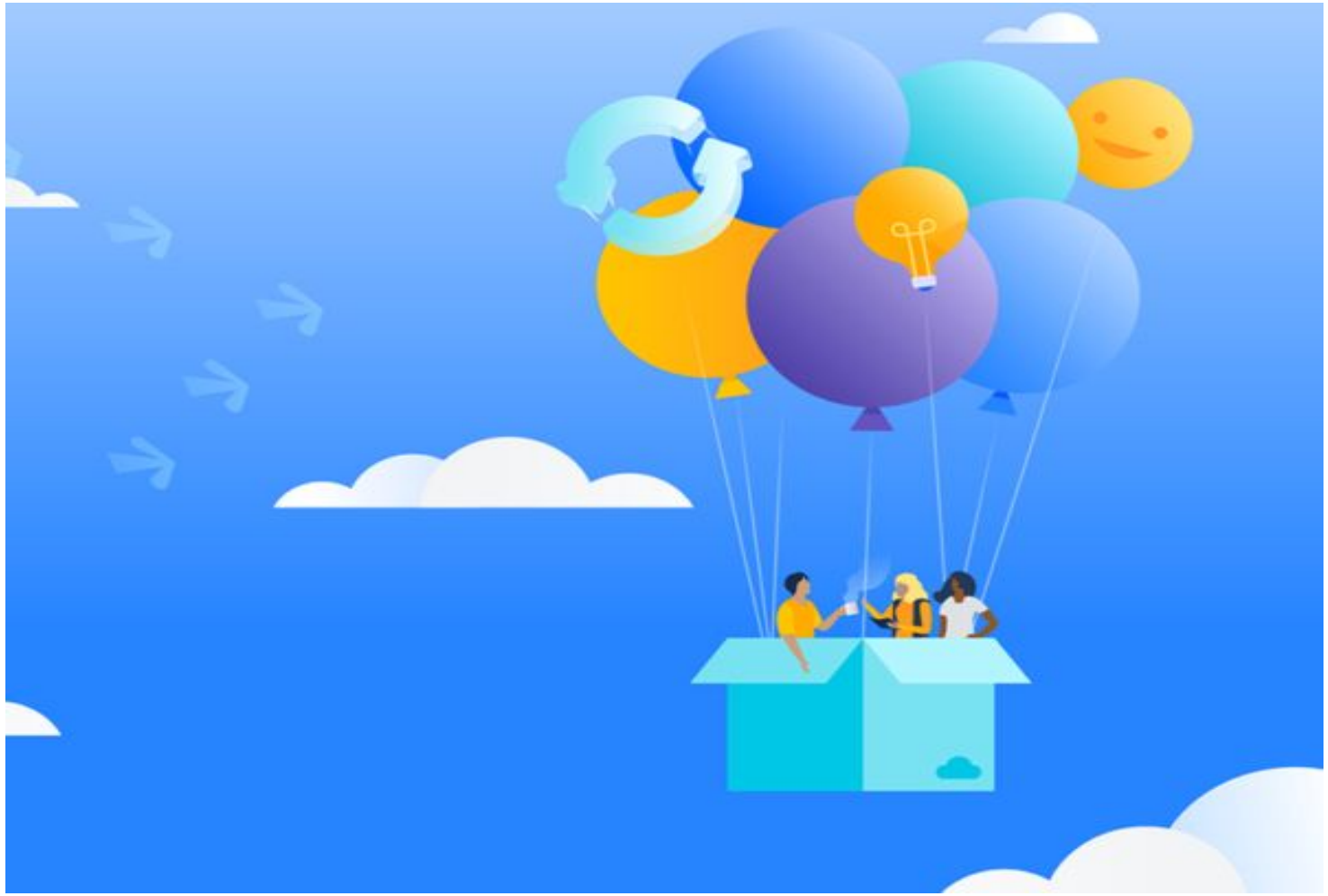
Start with:

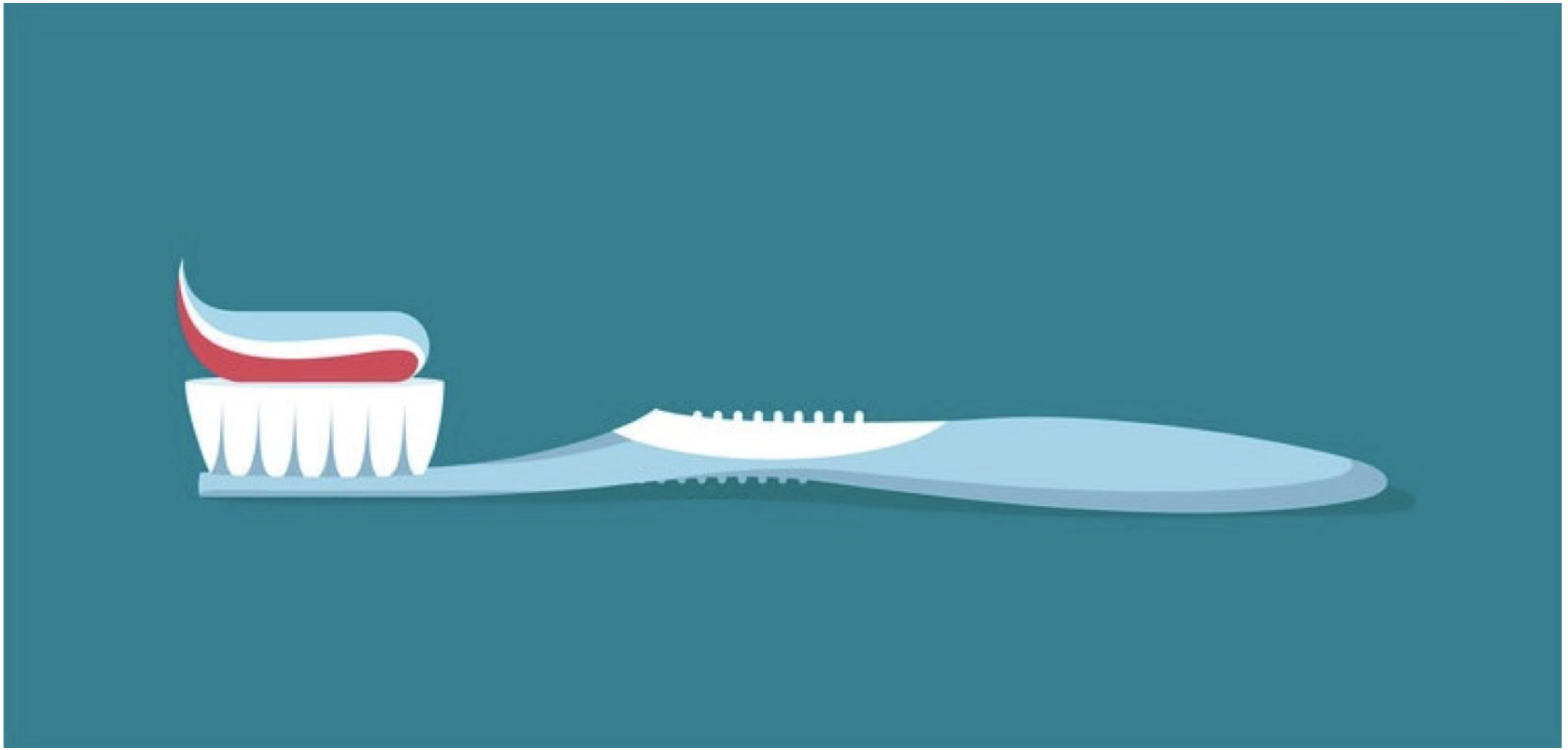
validationFailureAction: **Audit**

Learning 3

–

Migration from OPA doesn’t mean exact 1 to 1.





Advanced use cases / Upcoming features

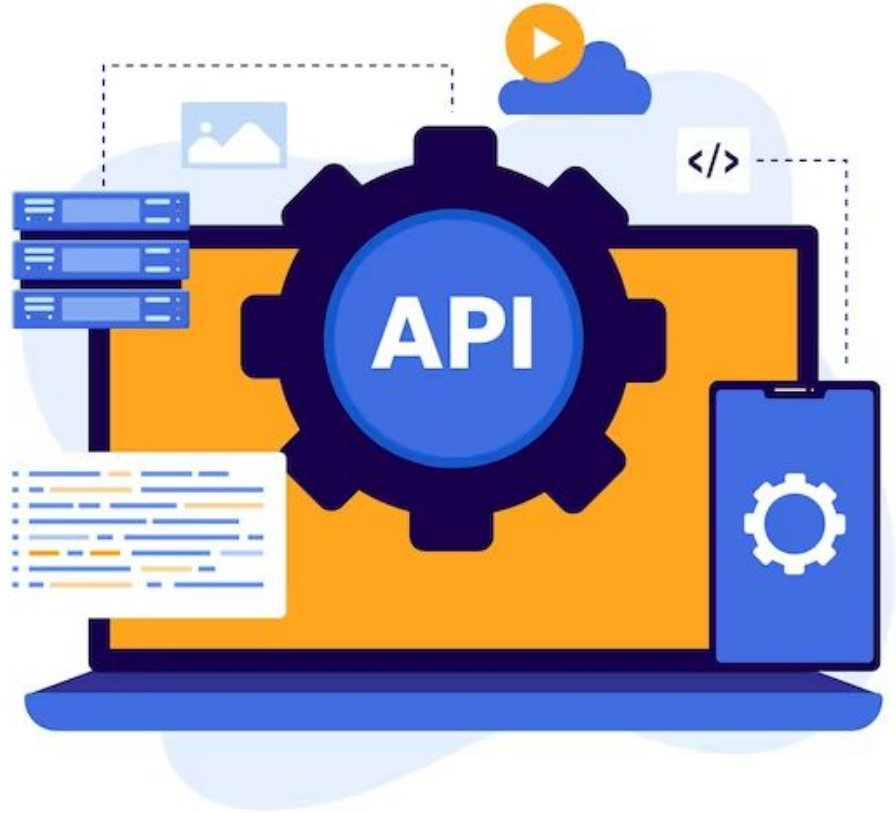
Initial support coming in 1.10

Advanced use cases / Upcoming features

- Notary uses OCI artifacts and referrers API (now part of the OCI standard)
- Not supported everywhere yet (ecr, acr, dockerhub)
- No keyless signature in Notary

```
oras discover -o tree jimnotarytest.azurecr.io/jim/net-monitor:v1
jimnotarytest.azurecr.io/jim/net-monitor@sha256:ba7000206594c2d72c3ab550453004c0dc50961157
e5ebd2fb8ea1890099d02d
├── vuln-scan
│   └── sha256:10c0b24faa551466b708d1677694eb65bbe4679ba10c3a5290ecec2e4f0af6c8
│       └── application/vnd.cncf.notary.signature
│           └── sha256:22aed3423fda62d88a09c47cbf1e4ca0441376fbc0270cafb193d4b9146eedc4
└── application/vnd.cncf.notary.signature
    └── sha256:e9277c9696d262e699583b7f4304eb9a3e7899a0d6c6b3c6b88327926347aaec
```

Advanced use cases / Upcoming features



Advanced use cases / Upcoming features


```yaml
rules:
- name: call-extension
  match:
    # ....
  context:
  - name: result
    apiCall:
      service:
        requestType: POST
        urlPath: http://sample.kyverno-extension/check-namespace
        data:
        - key: namespace
          value: "{{request.namespace}}"
  validate:
    message: "namespace {{request.namespace}} is not allowed"
    deny:
      conditions:
        all:
        - key: "{{ result.allowed }}"
          operator: EQUALS
          value: false
```

- Supports GET and POST methods
- Supports HTTP and HTTPS protocols
- Can POST and receive any JSON data
- Request result is available in the rule context

Advanced use cases / Upcoming features

Advanced use cases / Upcoming features

- Initial support should come in 1.11
- Currently experimenting with VAP in the CLI
- Can be challenging in certain areas like event generation
- Not all kyverno policies can be translated to VAP
  - Rule context equivalent is not possible yet
- But we are convinced it will improve overtime
- CEL itself is a great addition and users might want to bring CEL expressions in Kyverno policies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Thank you
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Links:

Kyverno GitHub: https://github.com/kyverno/kyverno

Image Signature verification: https://kyverno.io/docs/writing-policies/verify-images/

PDB verification: https://main.kyverno.io/policies/other/pdb-minavailable/pdb-minavailable/

Require labels: https://main.kyverno.io/policies/best-practices/require_labels/require_labels/