

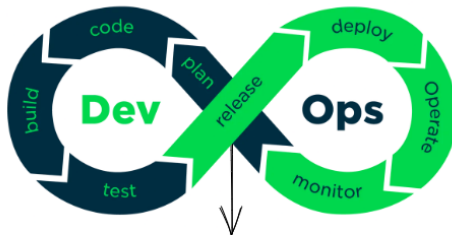
# Strategies for Promoting Releases in GitOps Environments

## Master Thesis

Thomas Stadler, BSc

May 25, 2023

# Research Area



# Problem Description



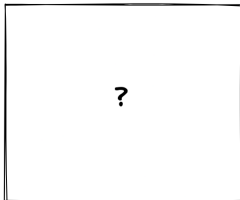
# Proposed Solution



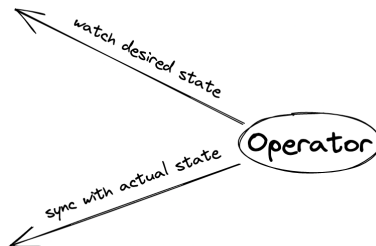
## Custom Resource Definition (CRD)

```
apiVersion: goprom.io/v1
kind: Environment
metadata:
  name: dev
spec:
  path: ./envs/dev
  source:
    url: https://[ ... ]
    ref:
      branch: main
```

desired state



actual state



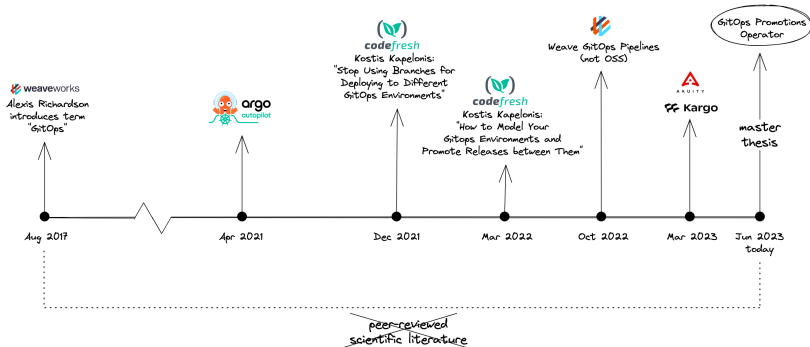
# Big Picture



GitOps Promotions  
Operator

master thesis

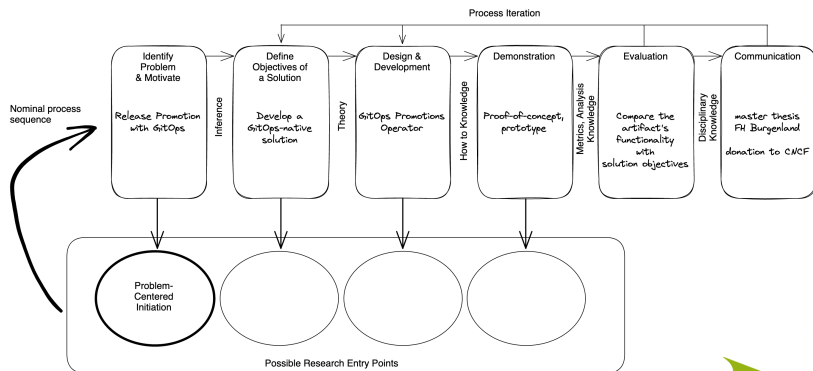
# Related Work



# Research Question

- ▶ How can the promotion of releases in GitOps environments be designed?
  - ▶ How can deployment environments, as well as promotion processes be modeled abstractly?
  - ▶ How can the abstract models be used to implement a standardized solution for promoting releases?

# design science research in information systems (Peffers et al., 2007)



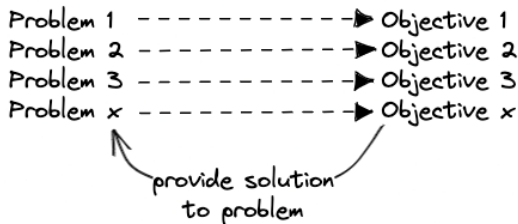


# Interviews

How do you see the problem?  
How do you imagine a solution?  
How do you define release, promotion, environment?  
...

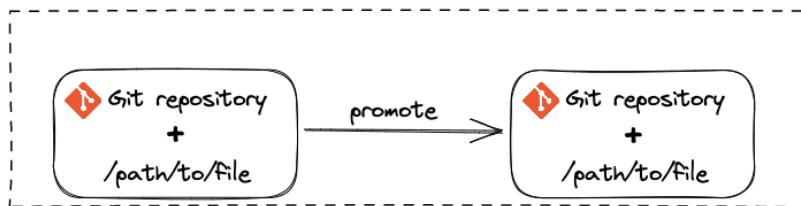


# Problem Definition and inferring solutions



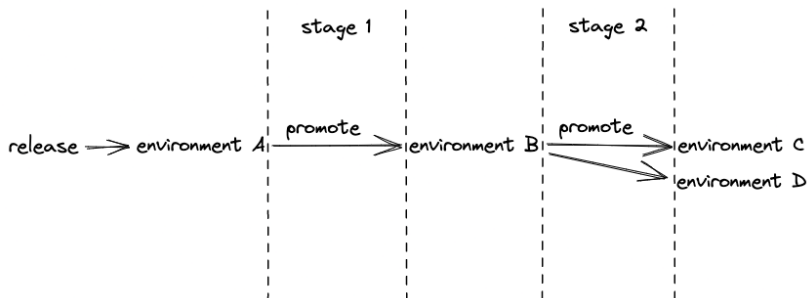
# Solution Objective 1

OBJ1R1

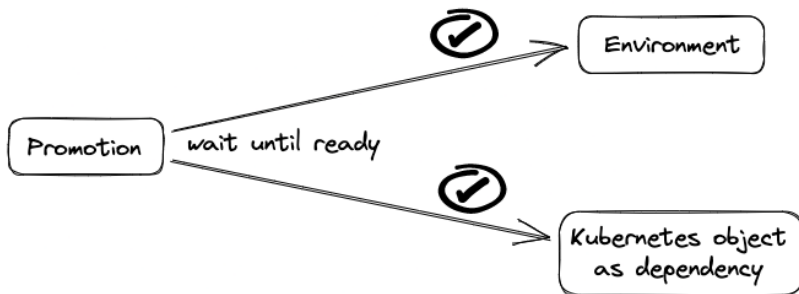


OBJ1R2

# Solution Objective 2



# Solution Objective 3



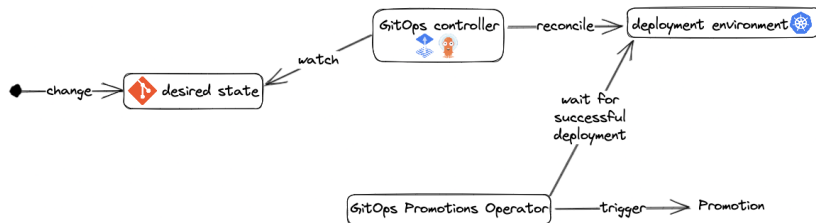
# Solution Objective 4

GitOps Promotions Operator

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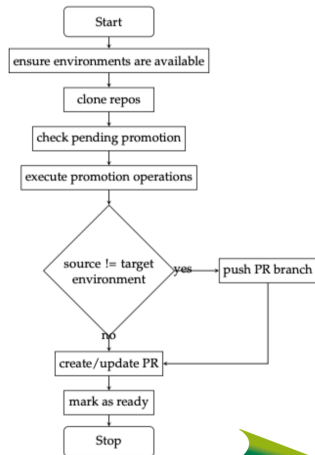
# Asynchronous GitOps Deployments



# Abstract Models, Custom Resources, Controllers

```
apiVersion: promotions.gitopsprom.io/v1alpha1
kind: Promotion
metadata:
  name: my-promotion
spec:
  sourceEnvironmentRef:
    name: my-source-env
  targetEnvironmentRef:
    name: my-target-env
  copy:
    - name: "Application Version"
      source: app-version
      target: app-version
    - name: "Kustomization File"
      source: ./app-version/kustomization.yaml
      target: ./app-version/
  strategy: pull-request
```

+





# Demonstration

chore: promote Application Version from dev to qa #1 Edit <> Code

Open thomasstxyz wants to merge 1 commit into `main` from `promotion/dev-to-qa-2023-04-16-12-10-43`

Conversation 0 Commits 1 Checks 0 Files changed 1 +1 -1

Changes from all commits File filter Conversations Jump to Review changes

**chore: promote Application Version from dev to qa**  
SHA in source environment: 796b06f

`promotion/dev-to-qa-2023-04-16-12-10-43` (#1)

Promotion Bot committed 8 hours ago commit 8a38a6cc43e6dc29cdf7ff73ea982e071b163b85

2 envs/qa/app-version/kustomization.yaml

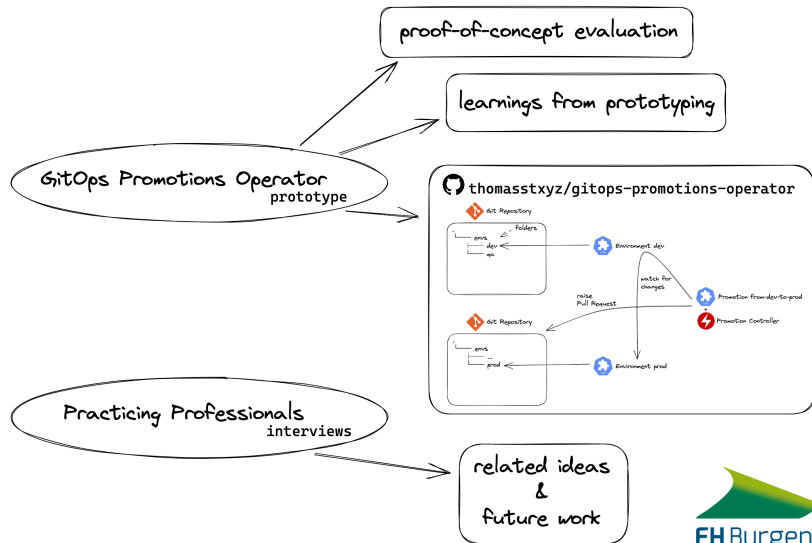
↑	@@ -2,4 +2,4 @@	apiVersion: kustomize.config.k8s.io/v1alpha1
2	2	kind: Component
3	3	images:
4	4	- name: ghcr.io/stefanprodan/podinfo
5	-	newTag: 6.3.3
5	+	newTag: 6.3.4

# Evaluation

How well does the implementation satisfy the solution objective?

- ▶ OBJ1R1 & OBJ1R2 ✓
- ▶ OBJ2R1 ✓
- ▶ OBJ3R1 ✓
- ▶ OBJ4R1 ✓

# Results

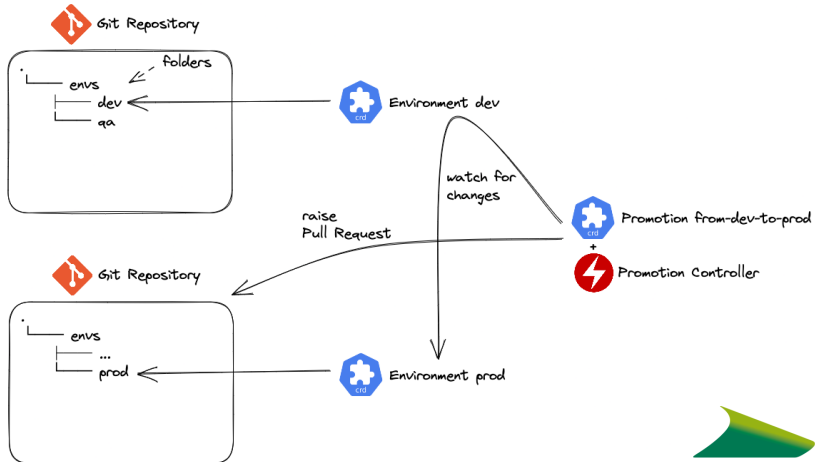


# Learnings from prototyping

- ▶ integration to GitOps tools / user experience, ease of use
- ▶ security implications
- ▶ multi-cluster environments

# Prototype

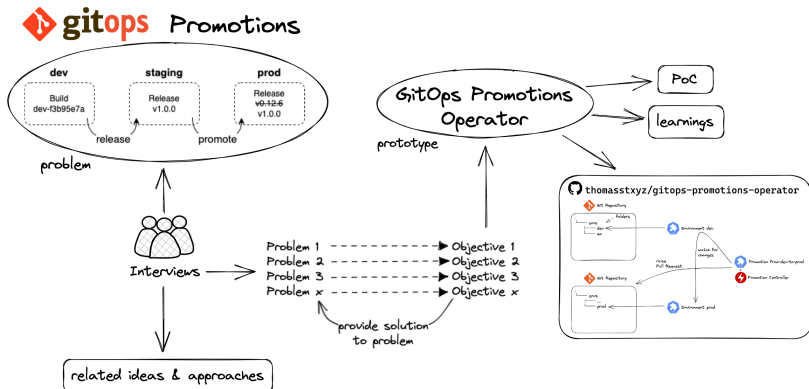
[github.com/thomasstxyz/gitops-promotions-operator](https://github.com/thomasstxyz/gitops-promotions-operator)



# Related Ideas and Approaches

- ▶ Rolling Production Environments
- ▶ Overview of GitOps Repositories

# Conclusion



# Future Work

