

Refactoring Socio- Technical Systems

Streamlining Your Structures & Flows

Dr. Franziska Horn

Umm...what?

- **Socio-Technical (ST) System:**
An organization where people and technology interact
→ focus here: software companies
 - **Refactoring:**
In computer science: changing how code is structured while preserving its purpose and functionality
- ⇒ Improving *how* a company does what it does

What brings me here



- PhD in Machine Learning (ML)
- Started out as a Data Scientist & Python Developer
- Team Lead at a startup:
improved internal processes



Refactoring in Practice

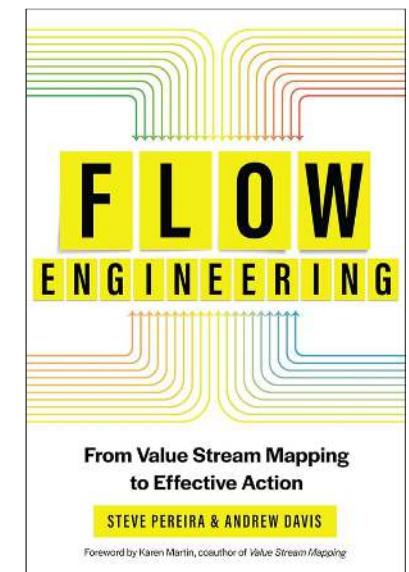
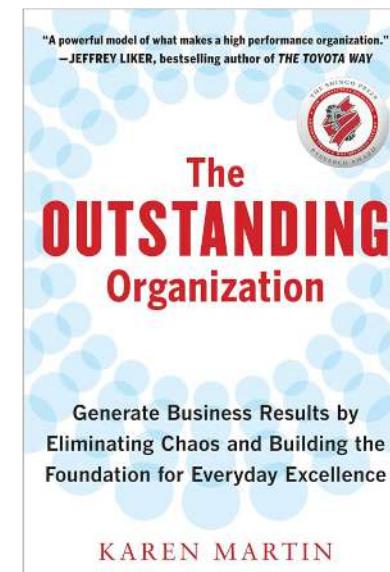
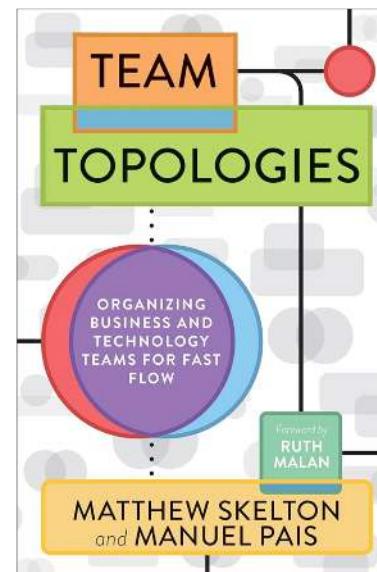
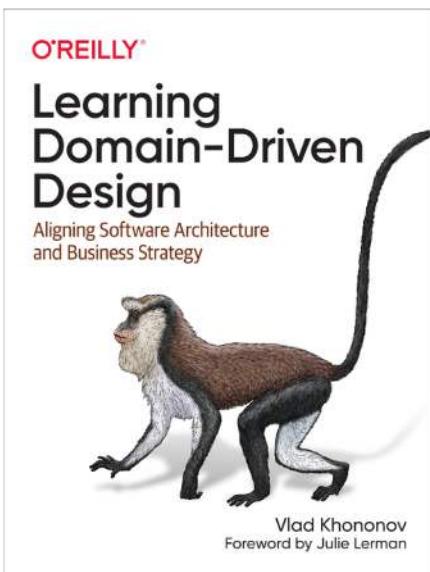
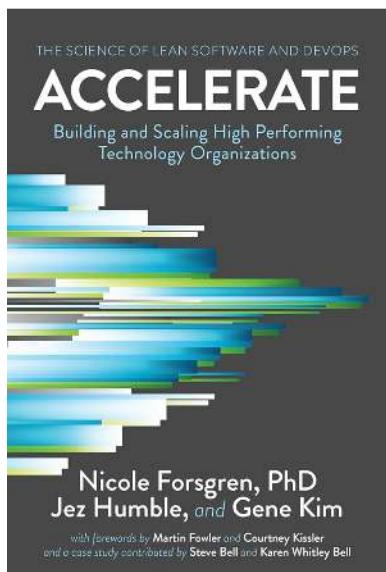
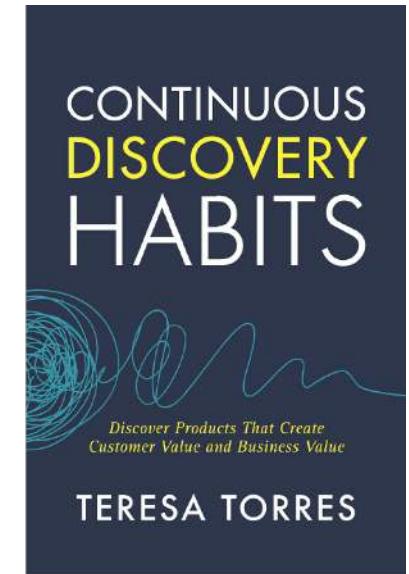
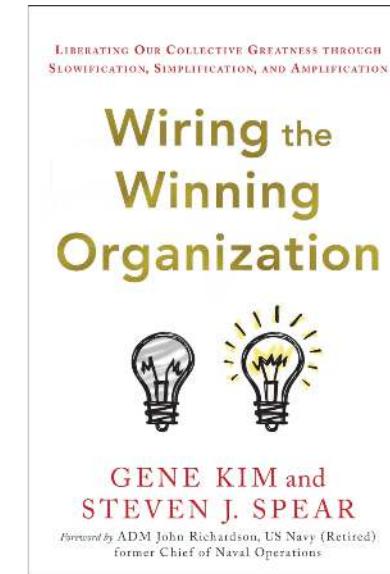
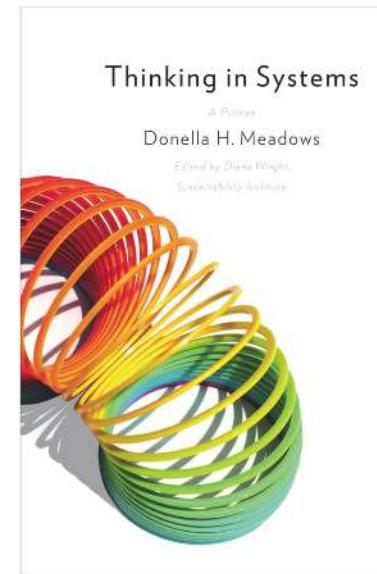
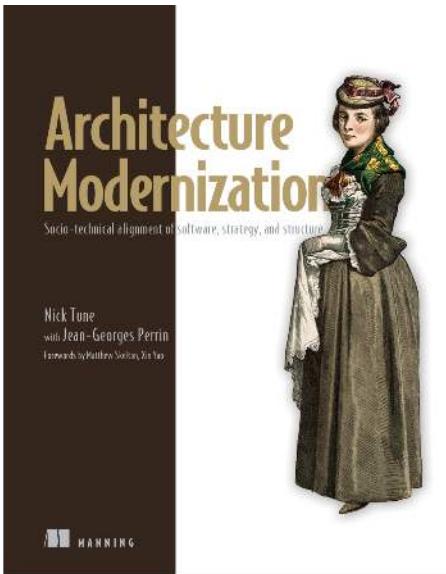
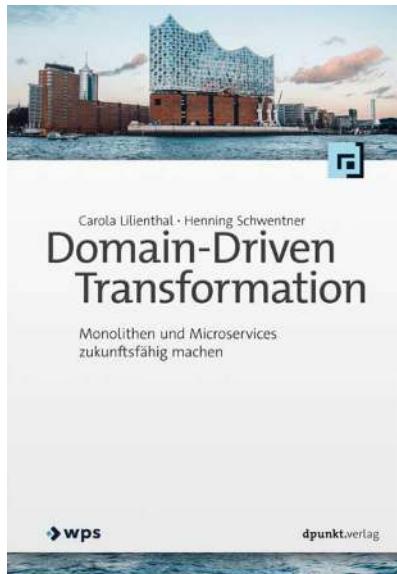
At that startup, many things were great 😊

- Modular software architecture (multiple microservices)
- Deploy to production multiple times per day
- IaC and provision of new test environments via slackbot
- Weekly automated retraining of ML models on new data

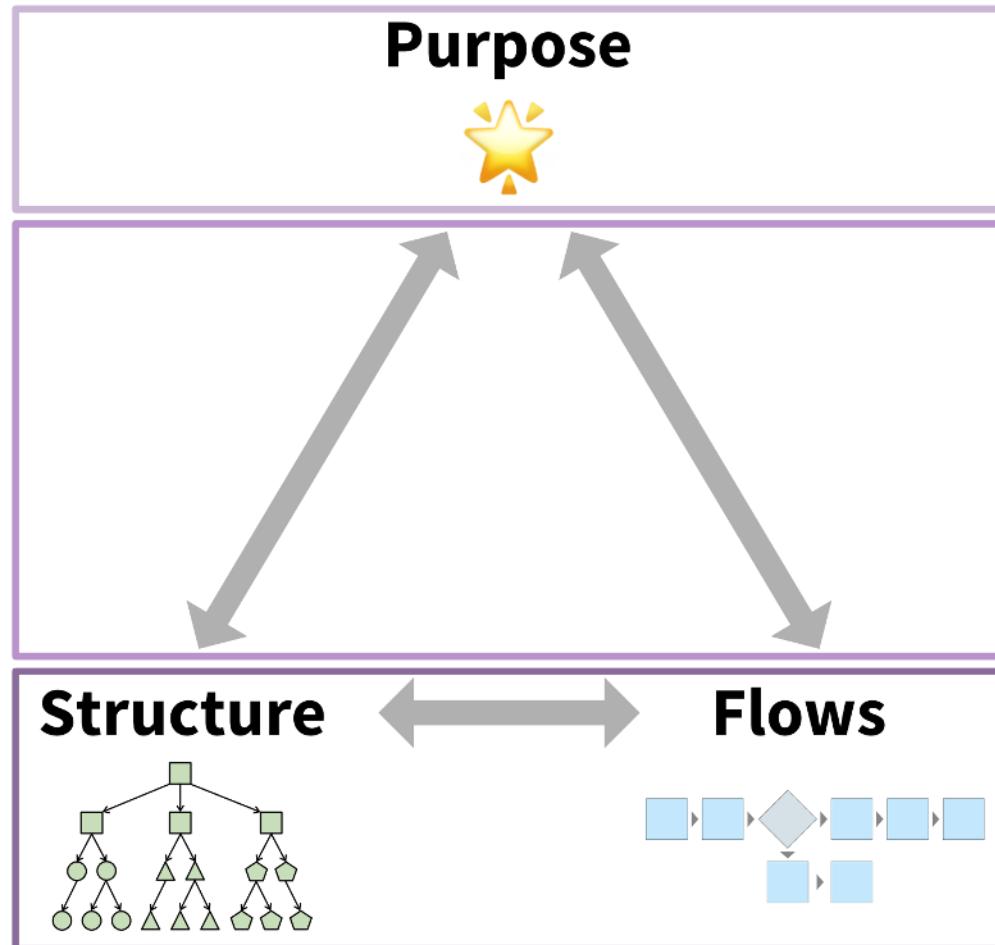
But...

- Customer onboarding & data integration took 50 days 😱
- ⇒ Reduced to 25 days through a series of small refactorings 🚀

A Holistic Perspective on ST Systems



Your Company as a ST System



Why

Outcome

Value for customers
Getting from A to B

What

Output

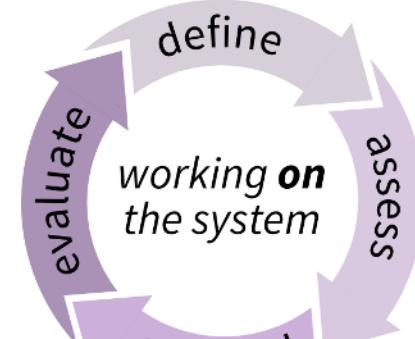
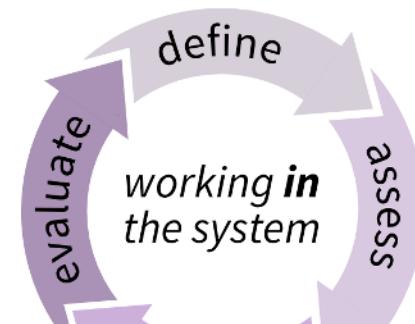
Product / Service
Car

How

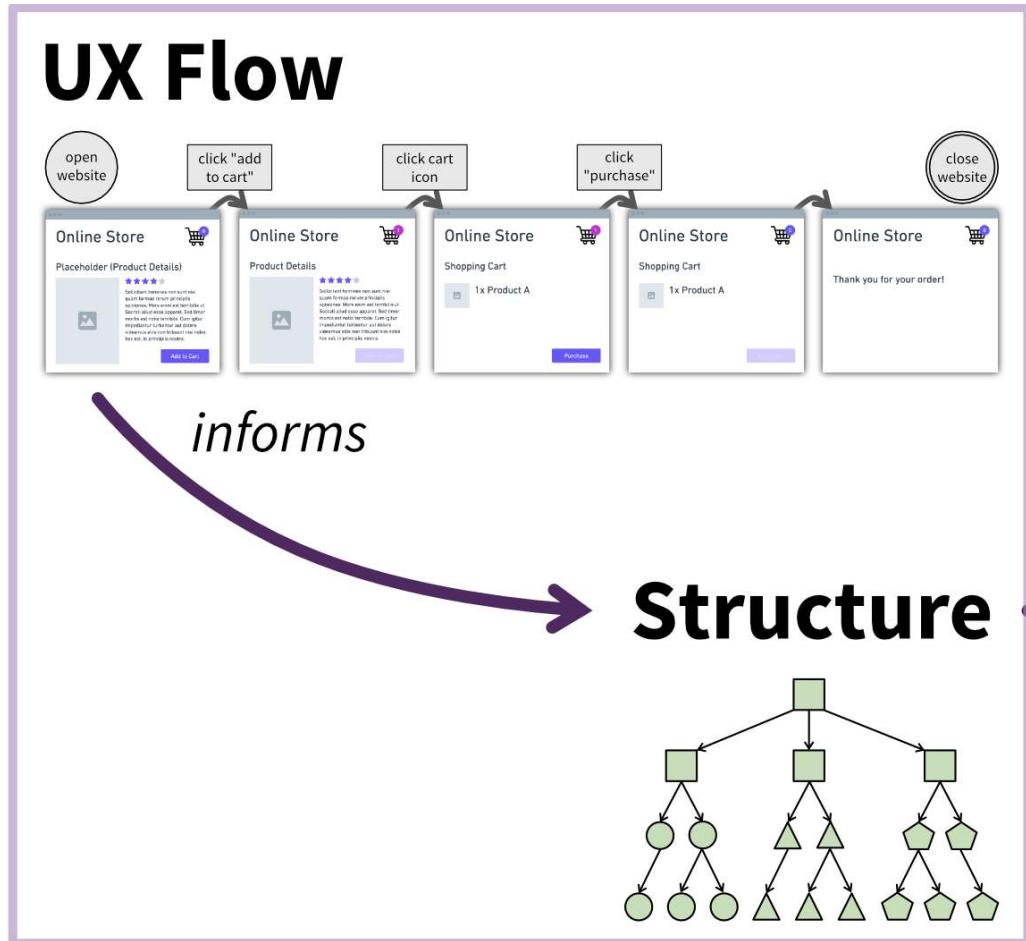
Process

Manufacturing

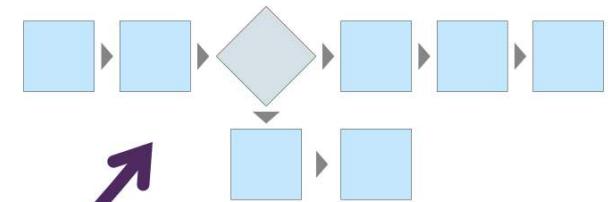
Refactoring



Refactoring ST Systems – Part 1



Internal Flow



supports

Aligning Structures with UX Flow

User

Domains / Use Cases

Product

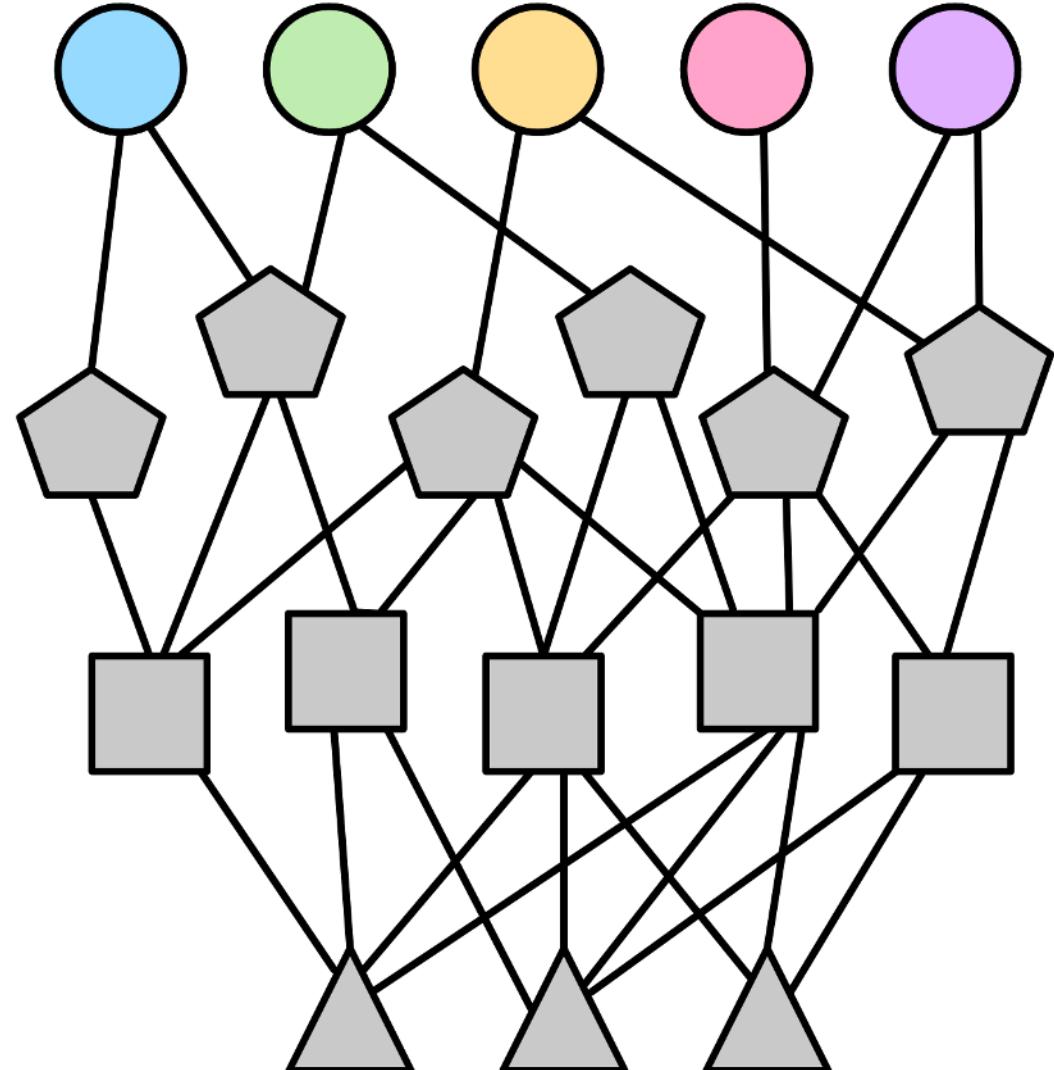
Information Architecture

Teams

Organizational Structure

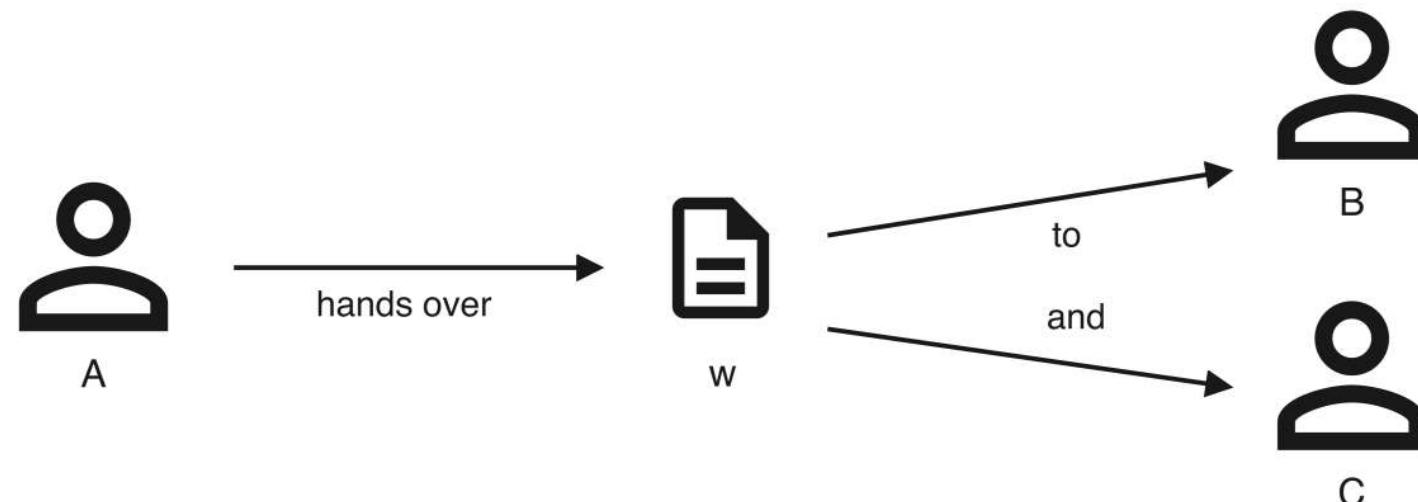
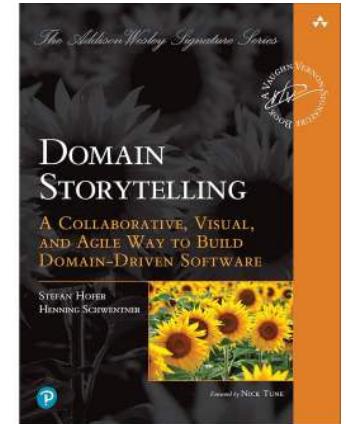
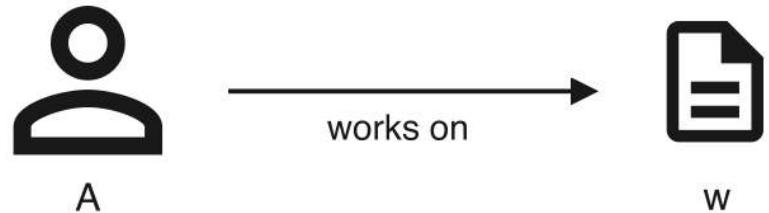
Code

Software Architecture

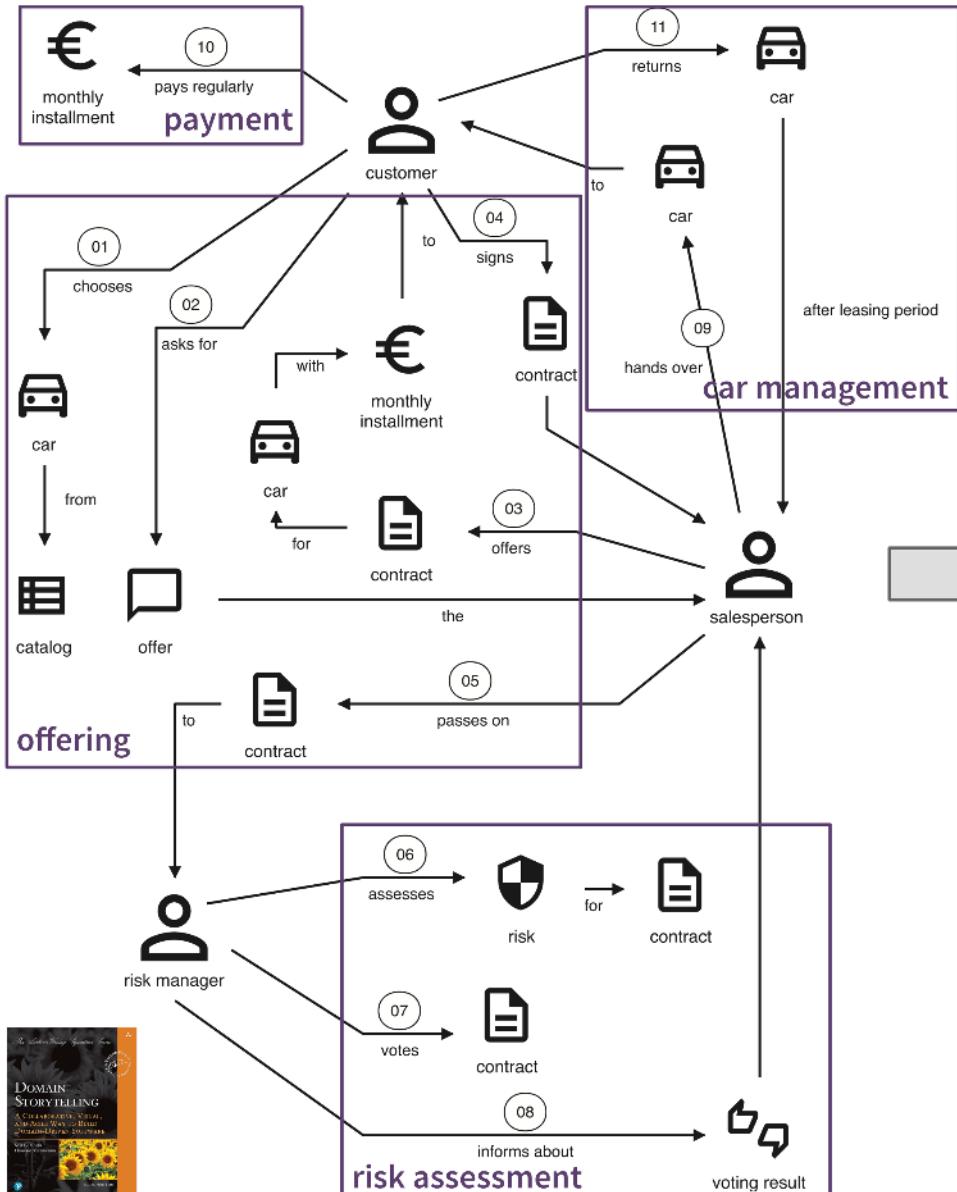


Technique: Domain Storytelling

Collaborative Modeling: Domain Experts + Developers



Domain Discovery



- Completed work object is handed off
- Different groups of domain experts work on different subprocesses
- Subprocesses have different rhythms and trigger events

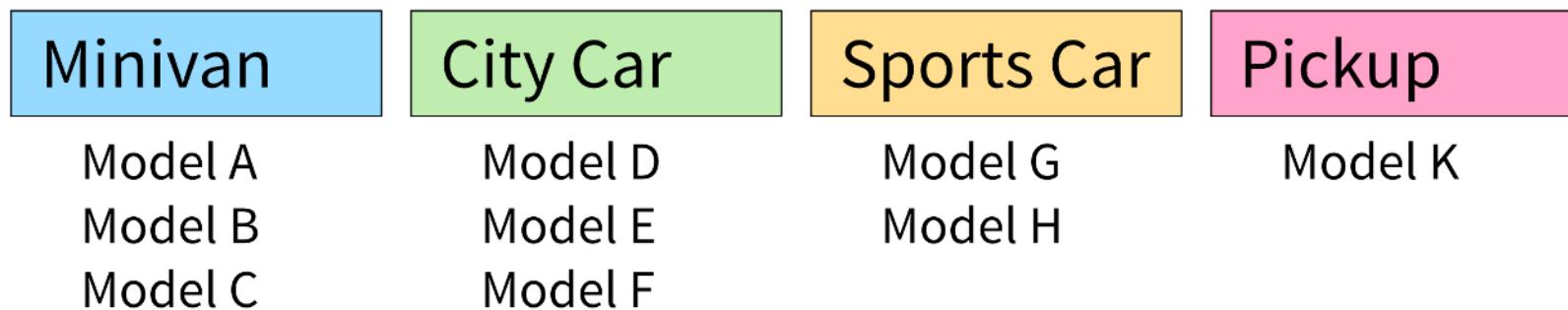
Domains:



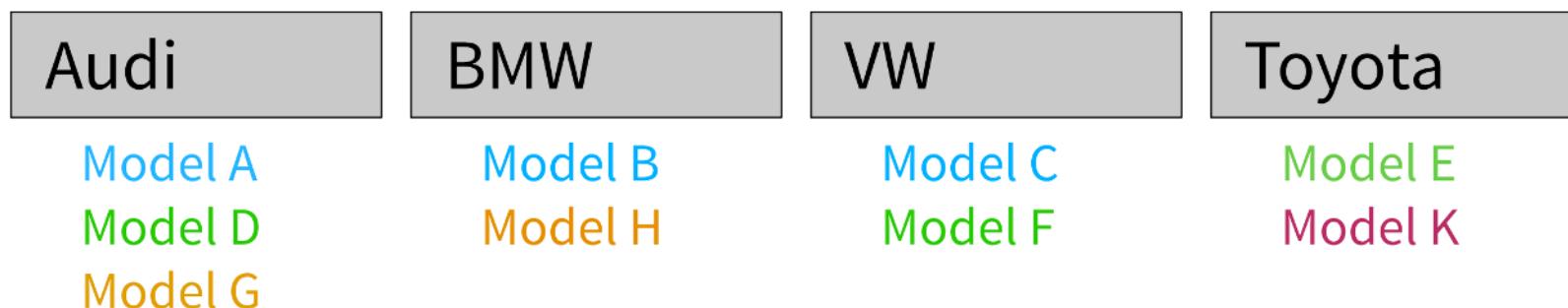
Product UX: Information Architecture

Car Catalog

Information Architecture (IA) aligned with use cases:



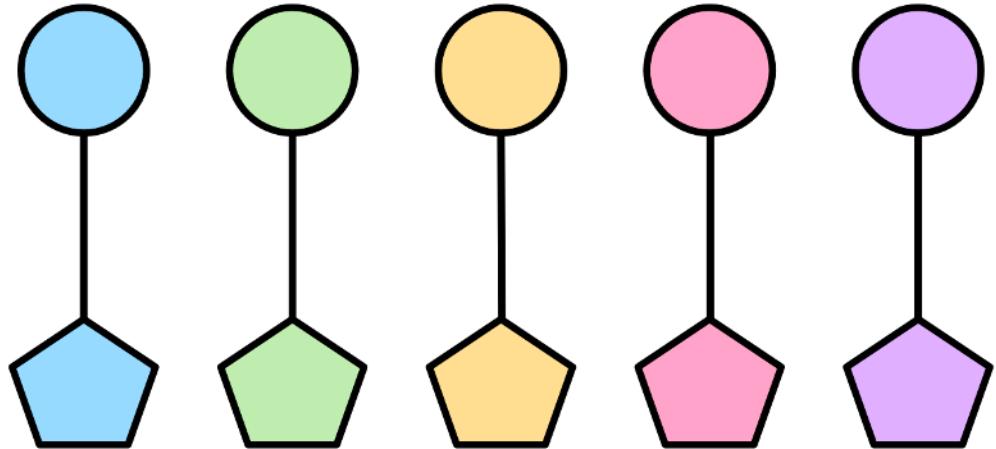
or



Aligning Structures with UX Flow

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Domains / Use Cases



Product

Information Architecture

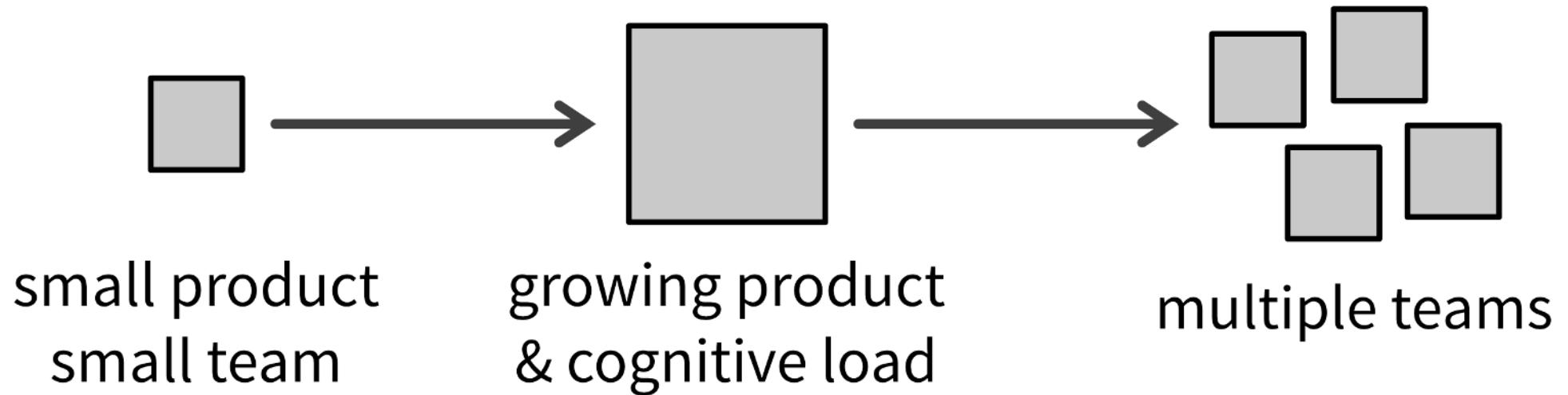
Teams

Organizational Structure

Code

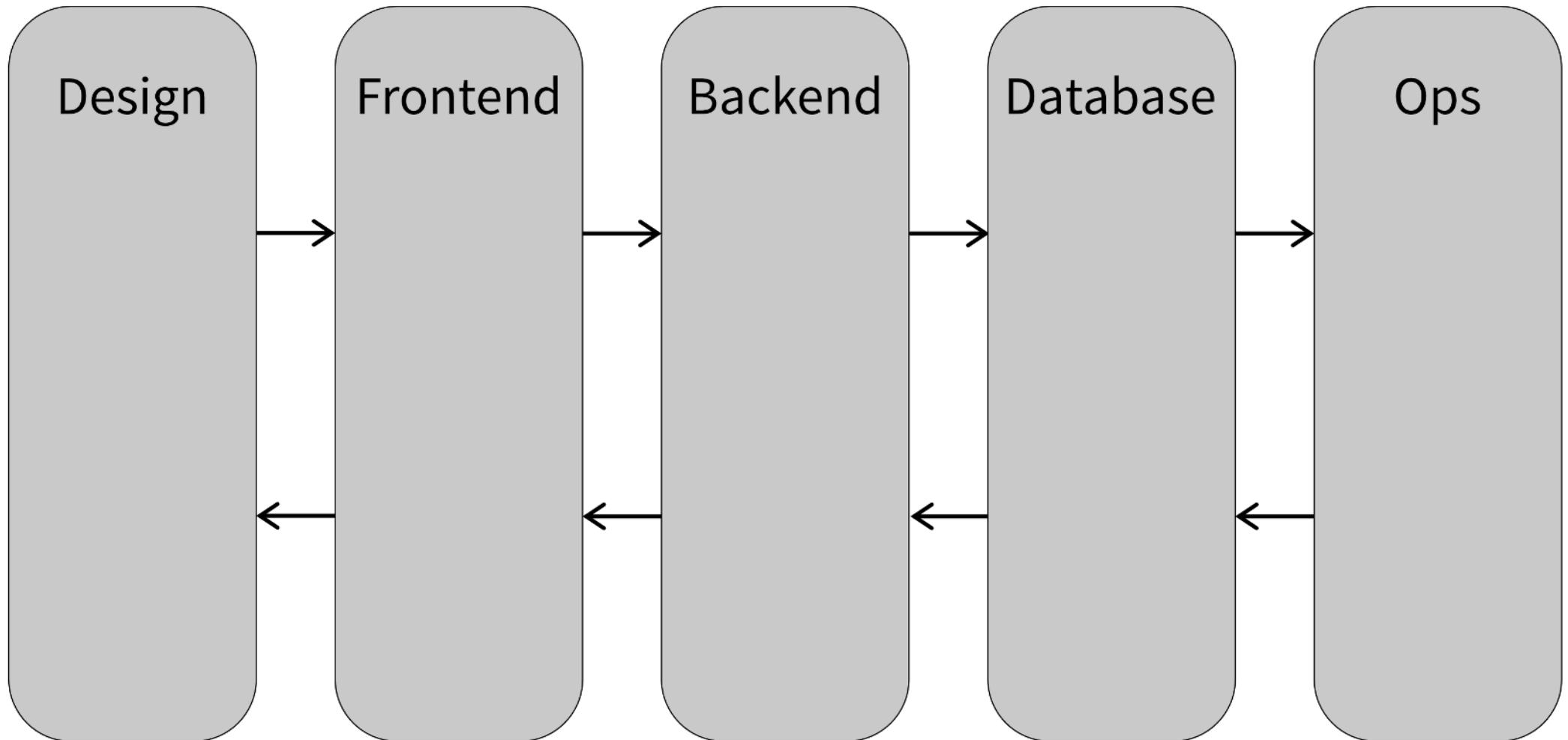
Software Architecture

Growth & Increased Cognitive Load

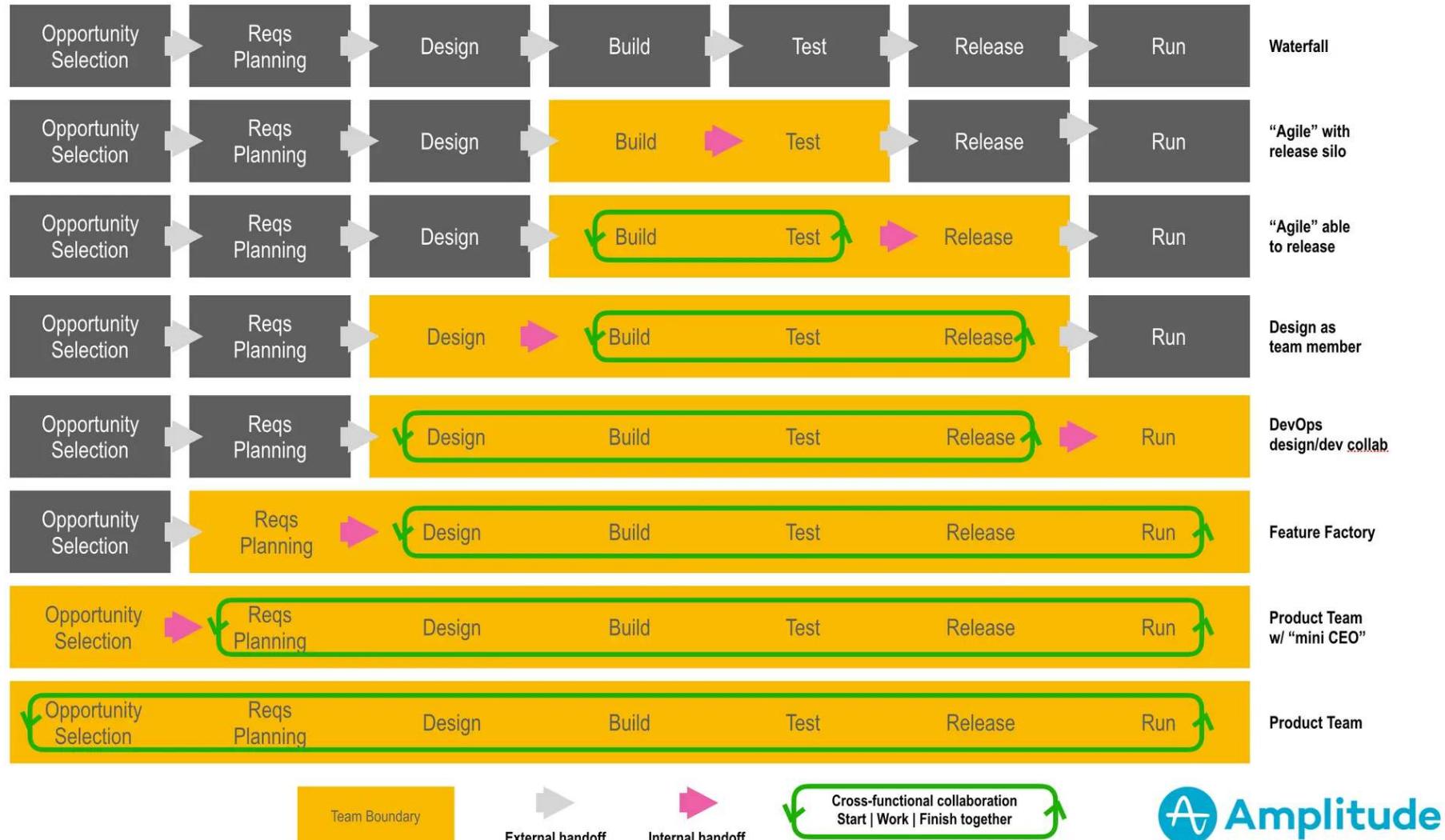


⇒ Goal: minimize hand-offs & dependencies between teams

Functional Teams: Dependencies

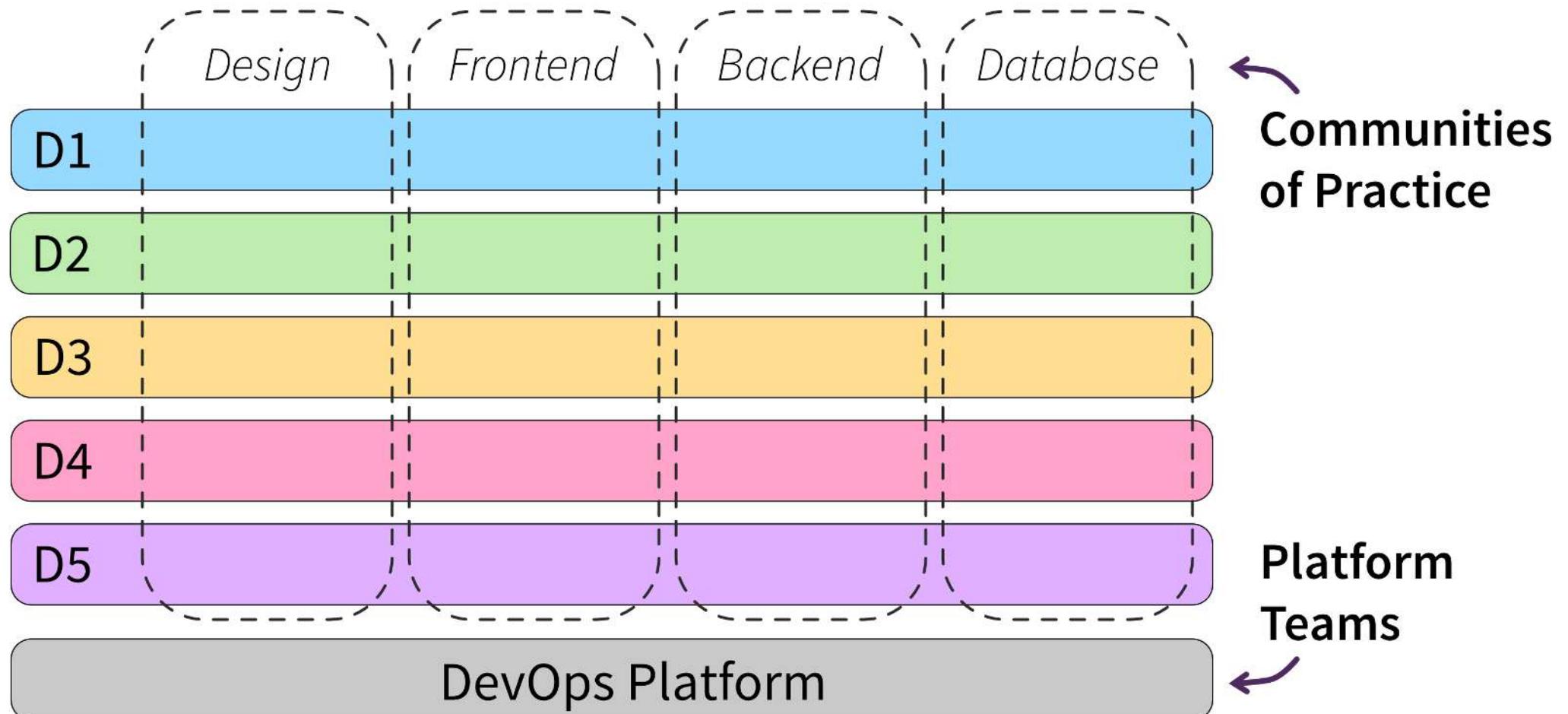


Close the Feedback Loop!

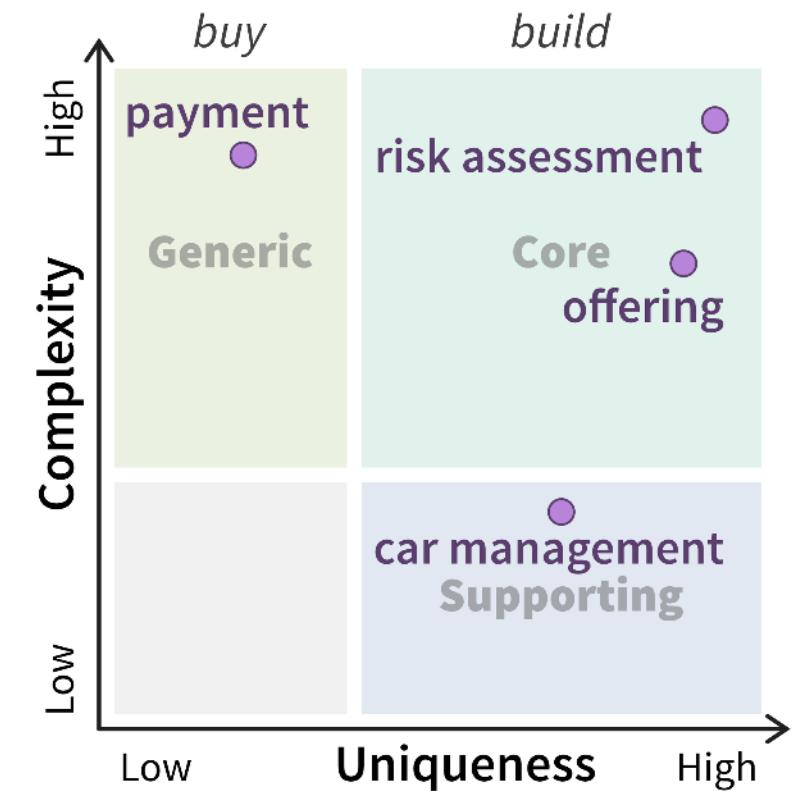
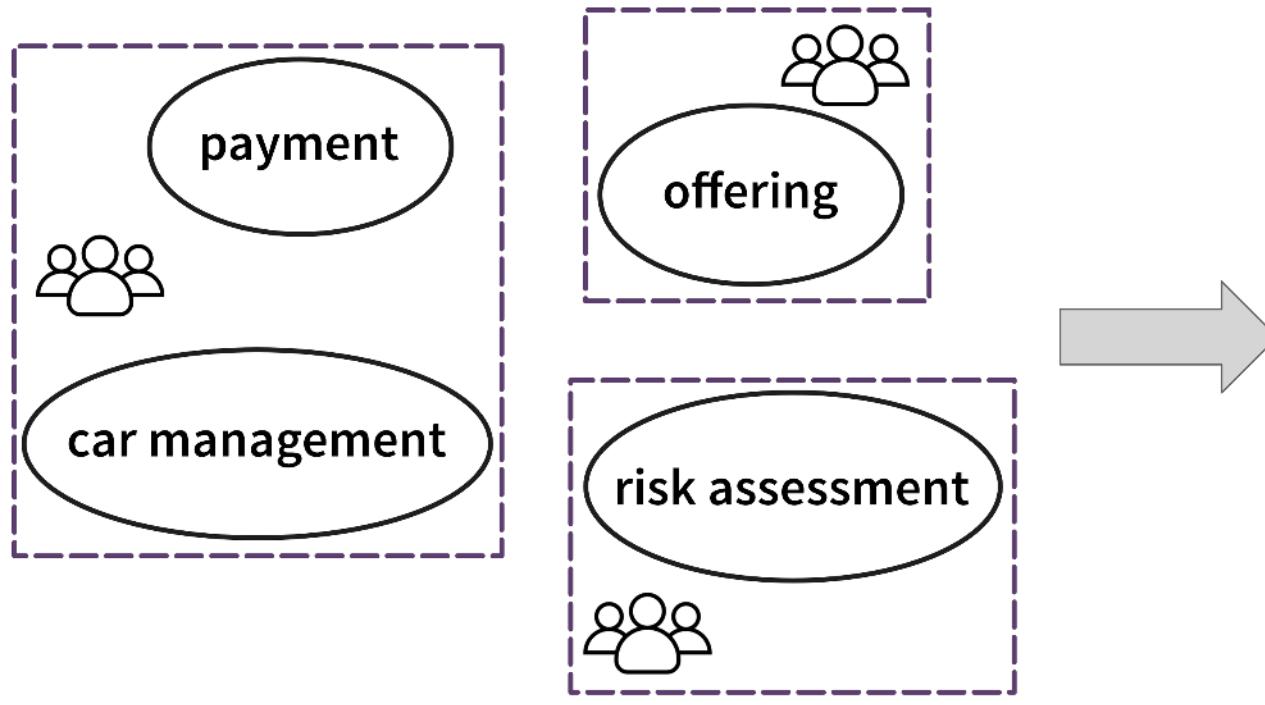


Source: <https://amplitude.com/blog/journey-to-product-teams-infographic>

Cross-Functional Teams (Matrix Org)



But How? Categorize Domains!

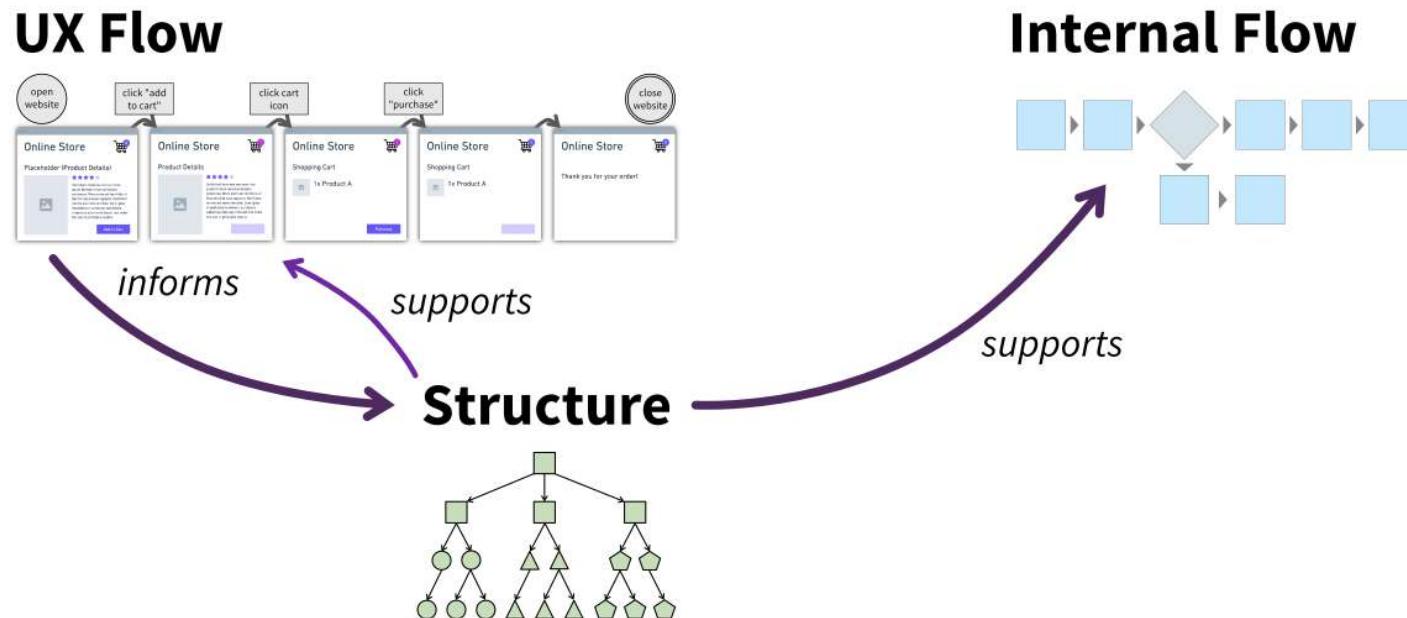


Inverse Conway Maneuver

Conway's Law:

Organizations which design systems are constrained to produce designs which are copies of the communication structures of these organizations.

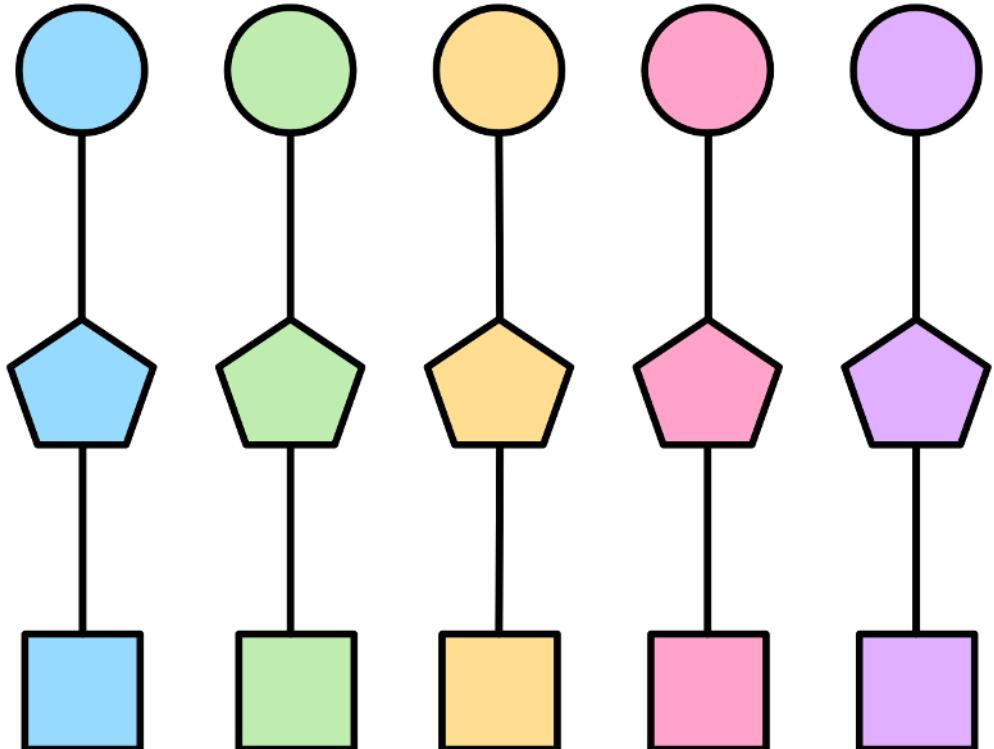
— Melvin E. Conway, How Do Committees Invent? (1968)



Aligning Structures with UX Flow

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Domains / Use Cases



Product

Information Architecture

Teams

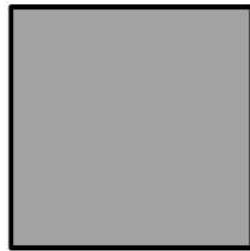
Organizational Structure

Code

Software Architecture

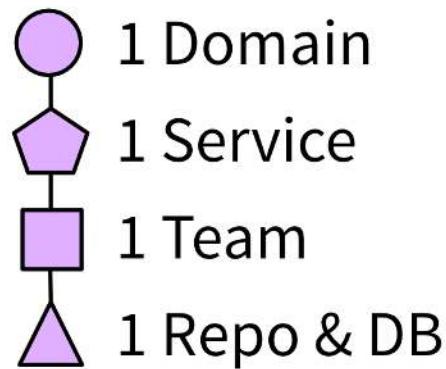
Balance Coupling

High Local Complexity

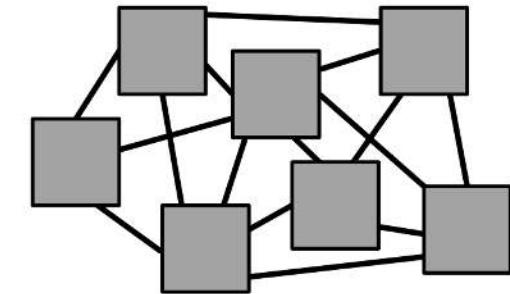


Monolith

Just right



High Global Complexity



Coupled Microservices

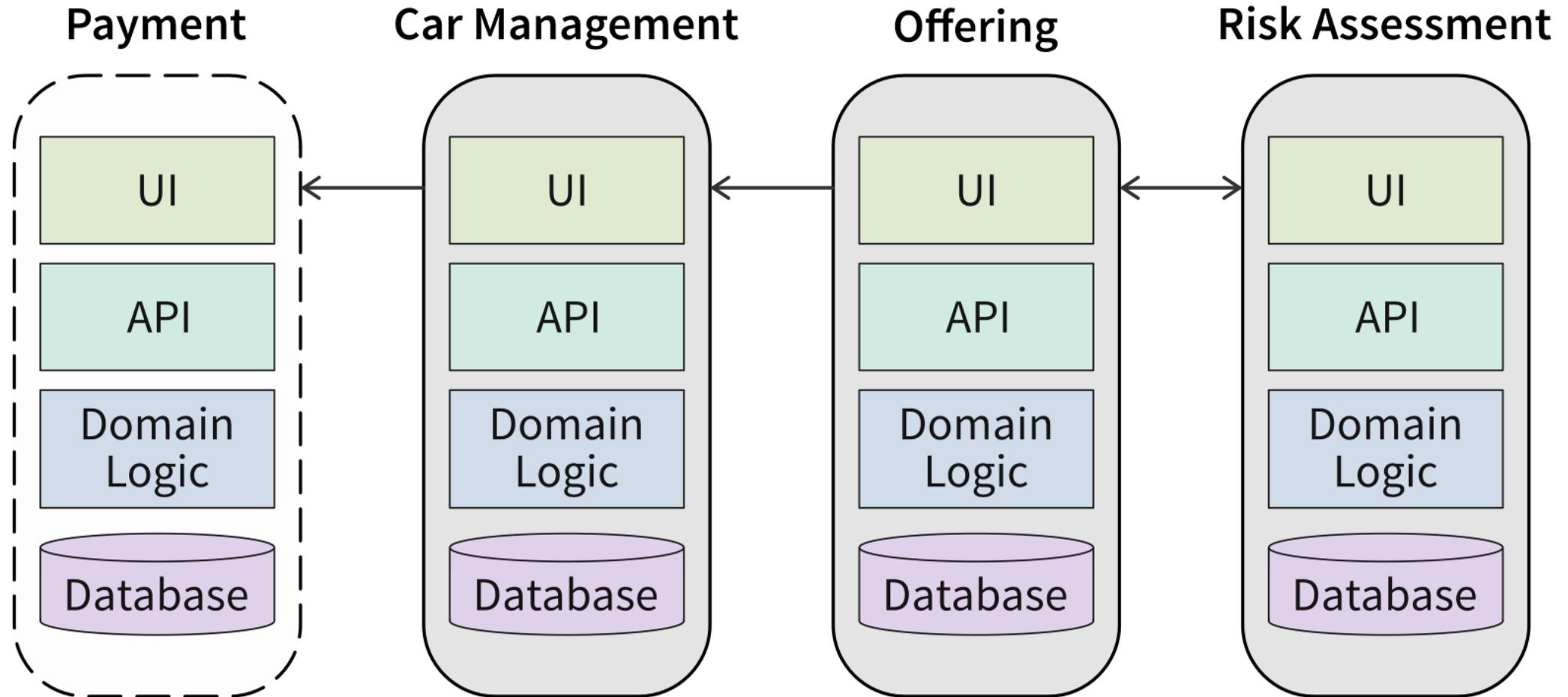


*keep it modular &
needs good CI/CD*

*manageable
cognitive load*

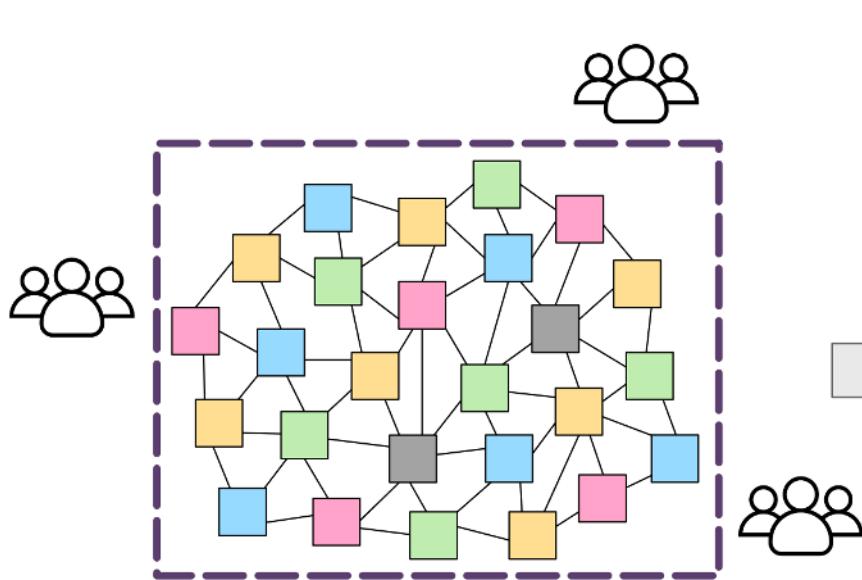
*beware of
coupling at DB*

One Microservice per Domain

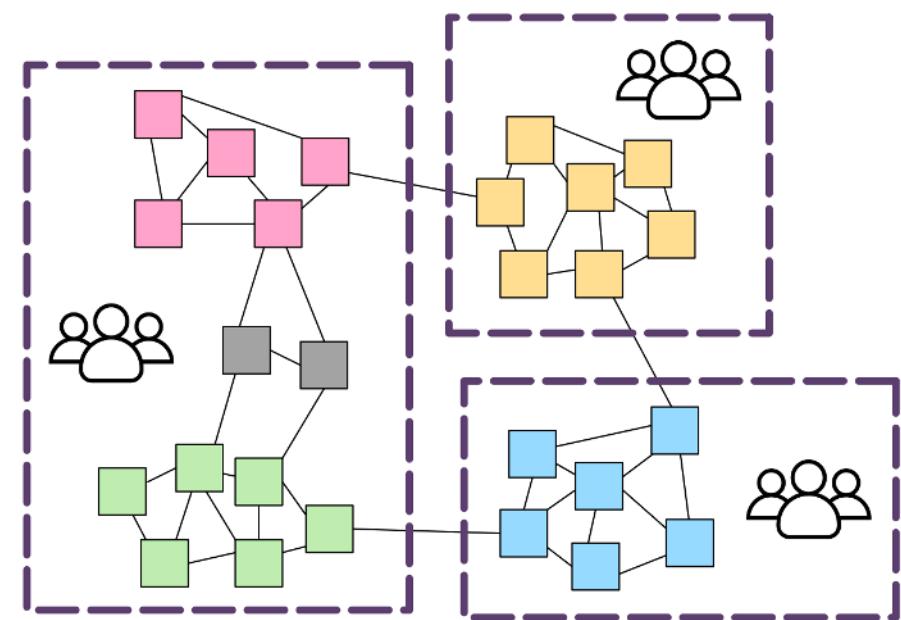
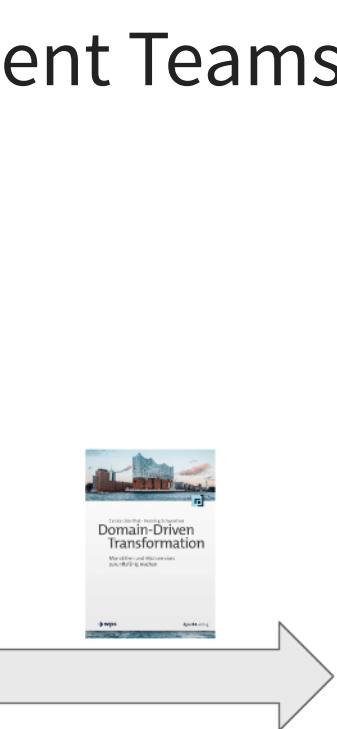


But our Legacy Software...

Coupled Code \Rightarrow Dependent Teams 😱



Big Ball of Mud



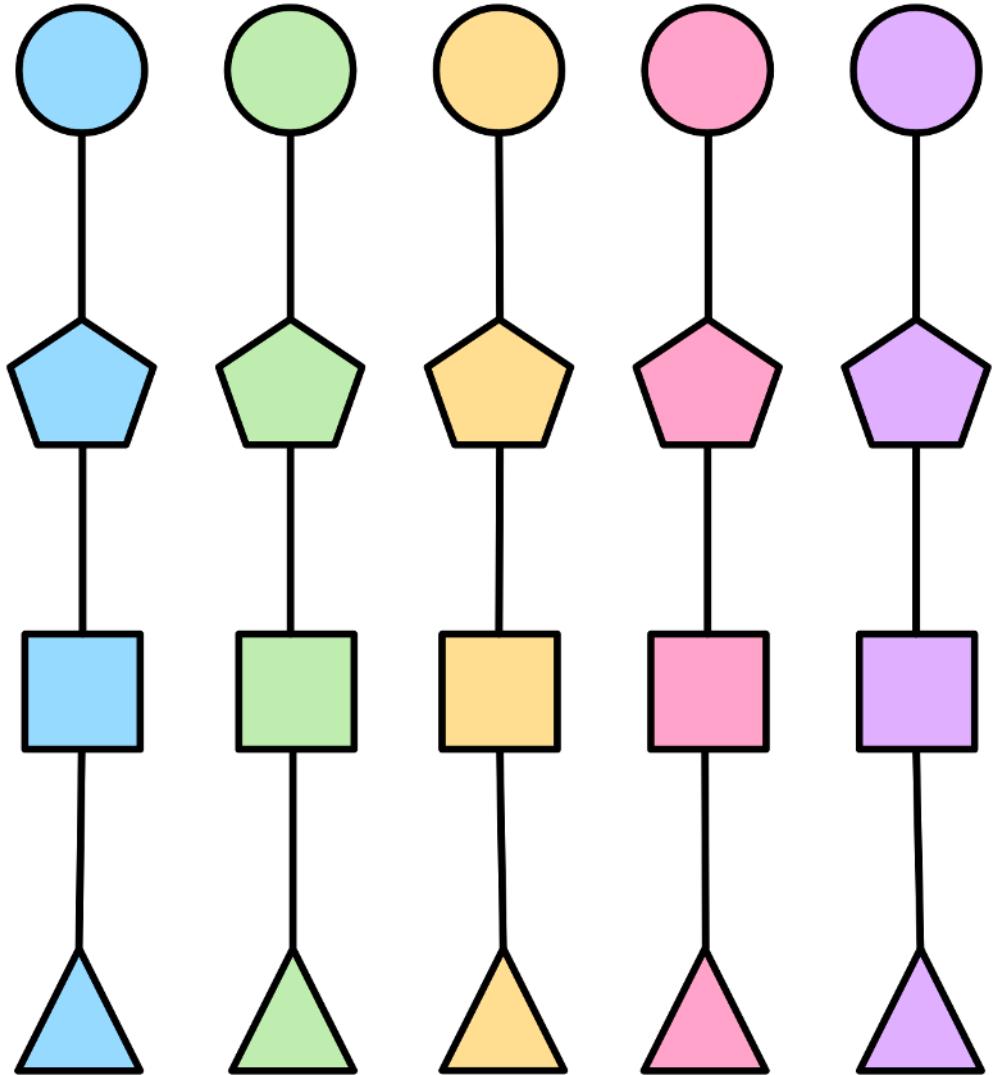
Decoupled Domains

Aligning Structures with UX Flow



User

Domains / Use Cases



Product

Information Architecture

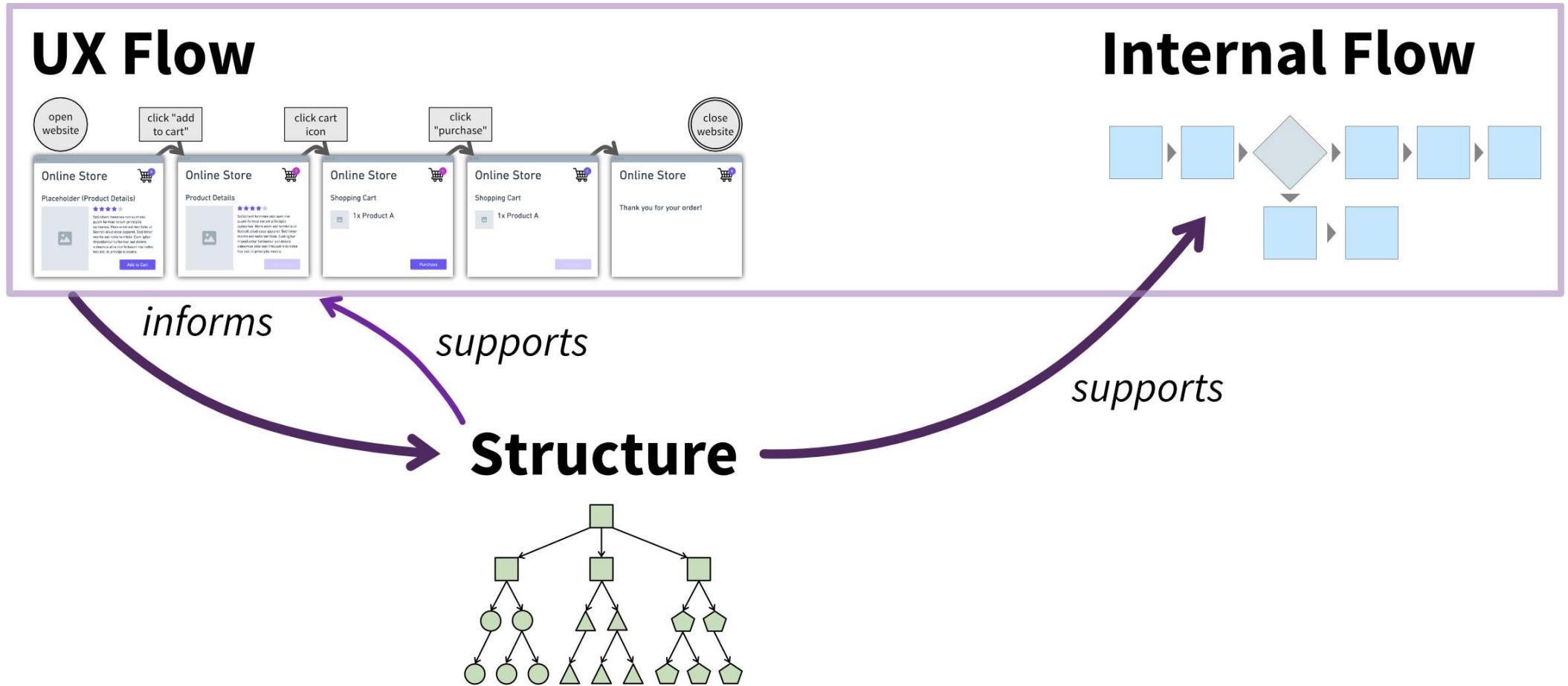
Teams

Organizational Structure

Code

Software Architecture

Refactoring ST Systems – Pt. 2: Flows



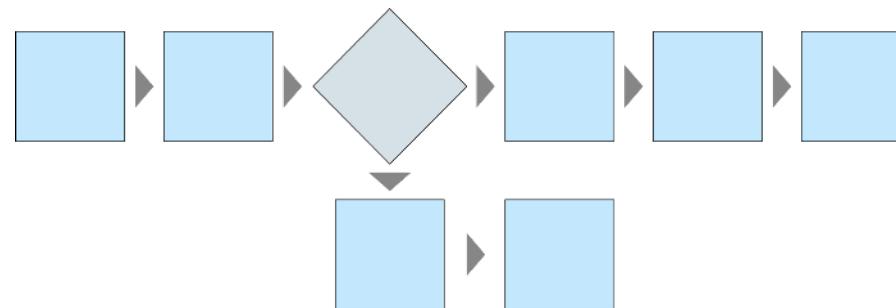
Flows worth looking at

- UX Flows:
 - Account creation & onboarding ... and deletion
 - Purchase / subscription renewal & billing
- Internal Flows:
 - Onboarding of new developers
 - Deployment process (incl. feature flags, A/B tests)
 - Updating content for marketing campaigns
 - Database migrations
 - Rollback & disaster recovery

“Fix the Flow” Workshop

Preparation: Sketch the flow

- No need for formalities (like BPMN or UML)



- Talk to different people to get diverse perspectives

“Fix the Flow” Workshop – Step 1/6

Align on the flow & target outcome:

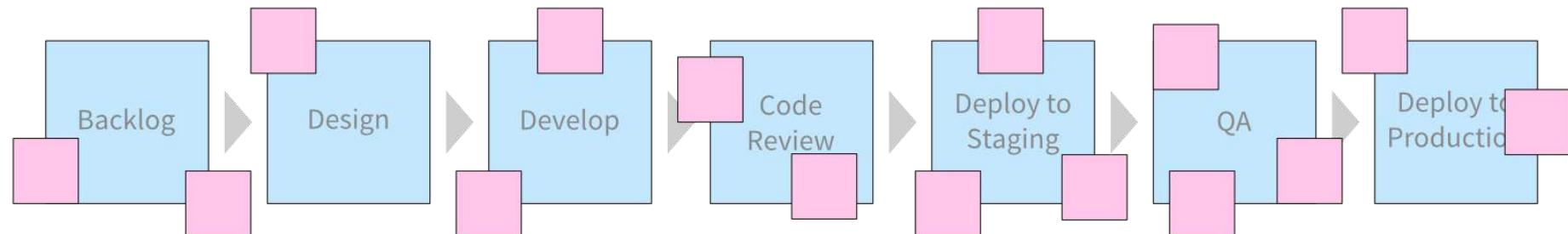
- *How much time does this process take now? What's the goal?*



“Fix the Flow” Workshop – Step 2/6

Brainstorm pain points:

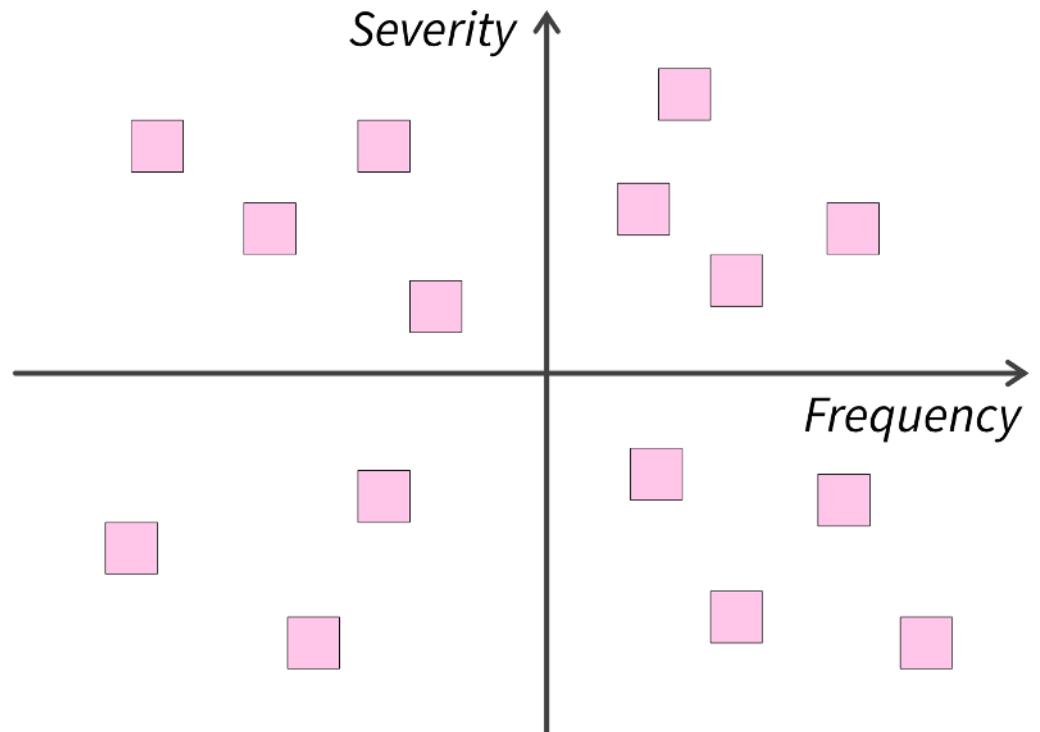
- *What is annoying?*
(e.g., manual steps, dependencies, wait times, complexity)



“Fix the Flow” Workshop – Step 3/6

Prioritize pain points:

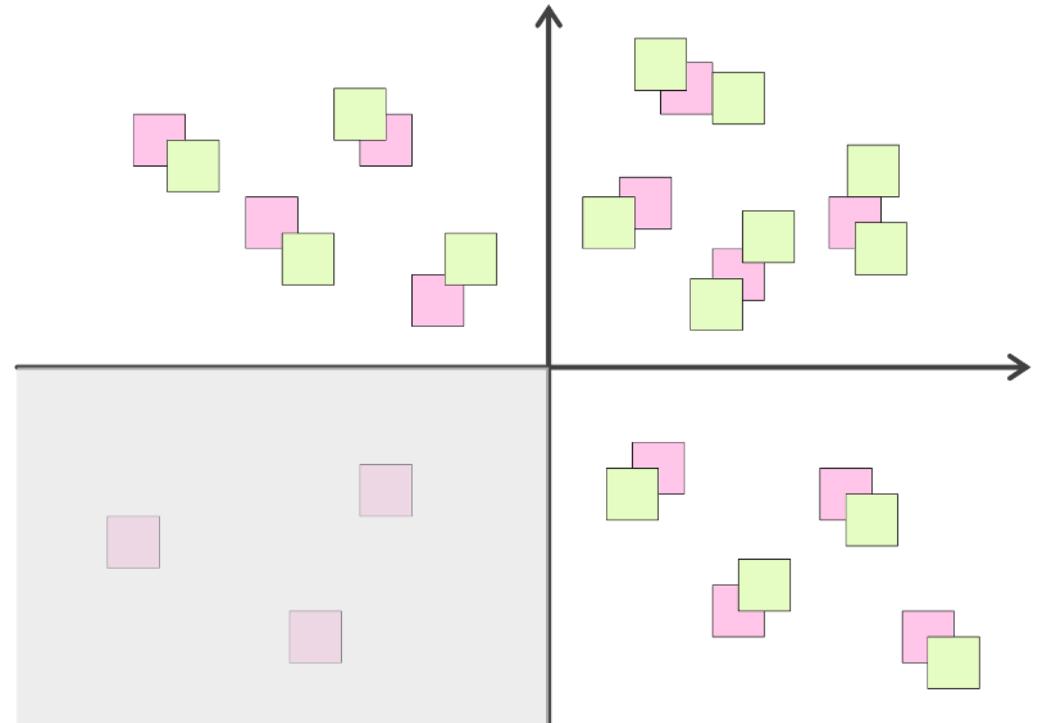
- *How long does it take?*
- *How often does it happen?*



“Fix the Flow” Workshop – Step 4/6

Brainstorm solutions:

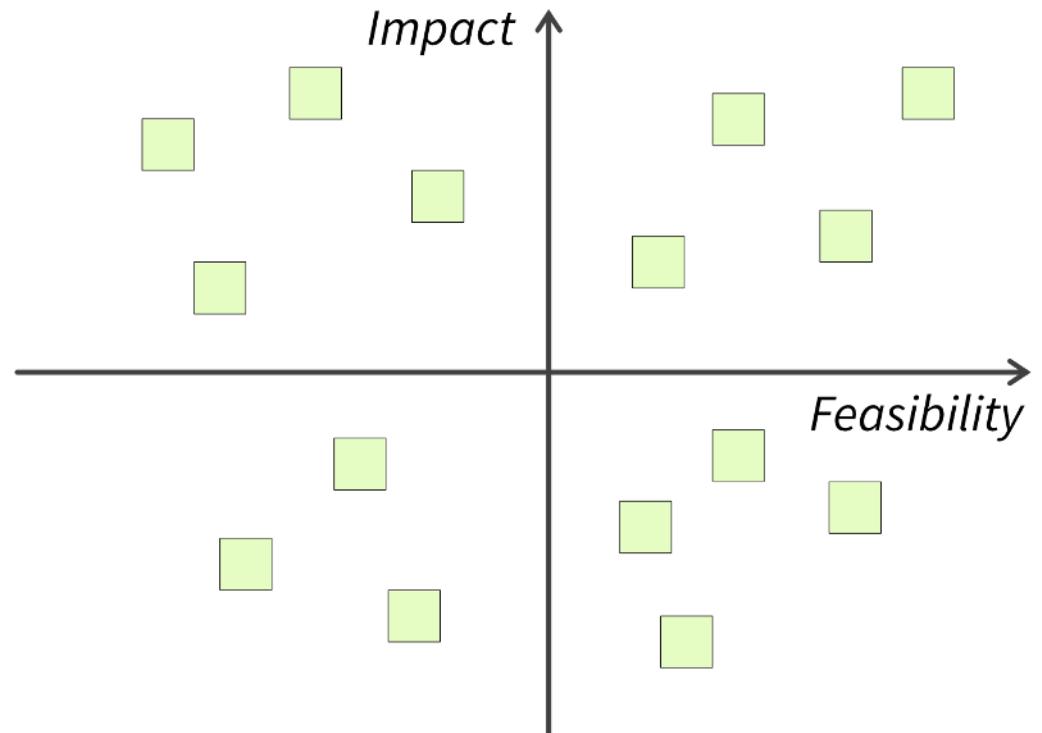
- *What can be improved?*
 - *simplify*
 - *automate*
 - *create self-service options*



“Fix the Flow” Workshop – Step 5/6

Prioritize solutions:

- *What's the impact on our target outcome (e.g., reduced time)?*
- *How easy would it be to implement?*



“Fix the Flow” Workshop – Step 6/6

Make a plan:

Assign owners & deadlines (e.g., in Jira)

1 Owner (by Date)

2 Owner (by Date)

3 Owner (by Date)

4 Owner (by Date)

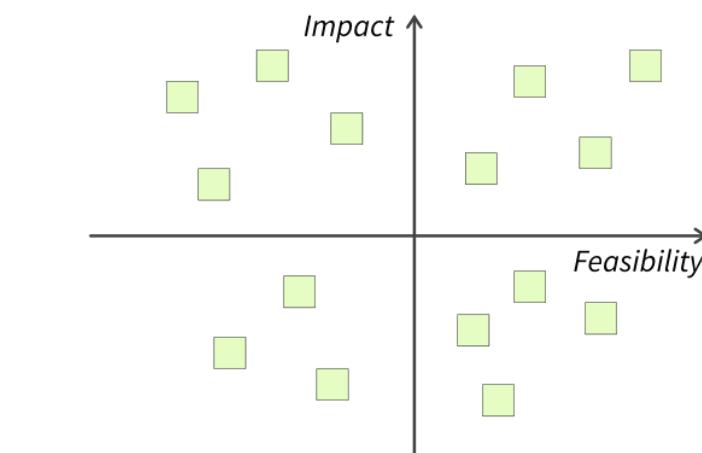
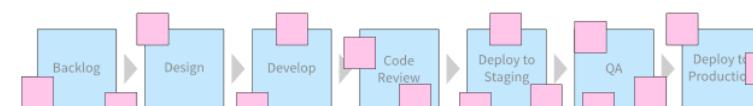
“Fix the Flow” Workshop – Summary

Step 1: Align on Flow & Target Outcome

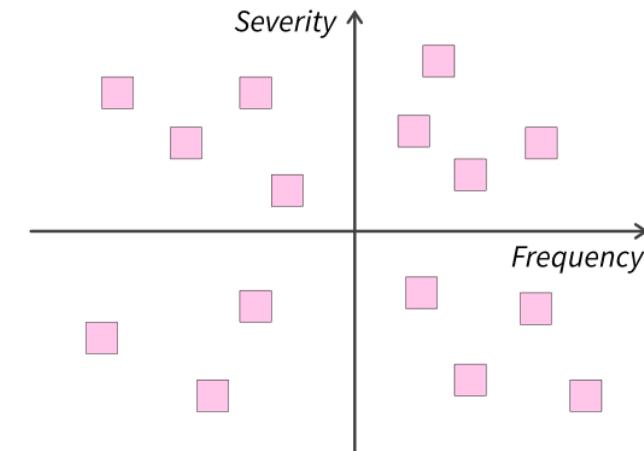


Step 2: Brainstorm Pain Points

(e.g., manual steps, dependencies, wait times, complexity)



Step 3: Prioritize Pain Points



- 1 Owner (by Date)
- 2 Owner (by Date)
- 3 Owner (by Date)
- 4 Owner (by Date)

Step 4: Brainstorm Solutions

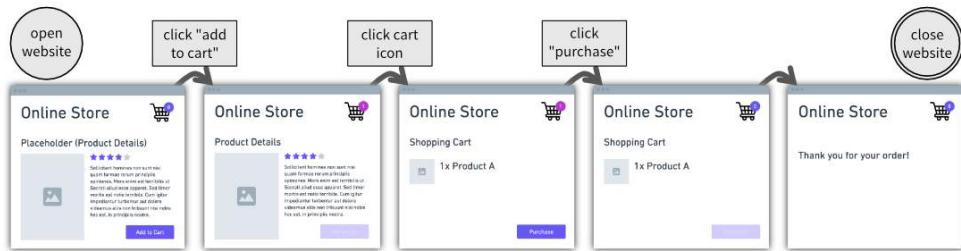
(e.g., simplify, automate, create self-service options)

Step 5: Prioritize Solutions

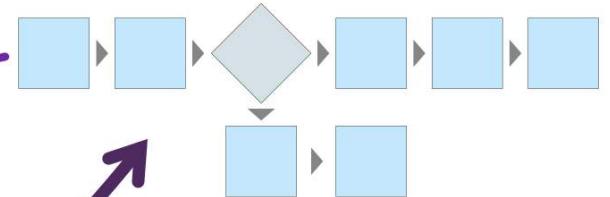
Step 6: Make a Plan

Refactoring ST Systems – Closed Loop

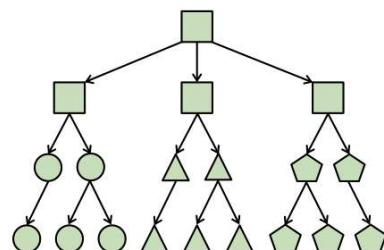
UX Flow



Internal Flow



Structure



Need help? Hire me 😎

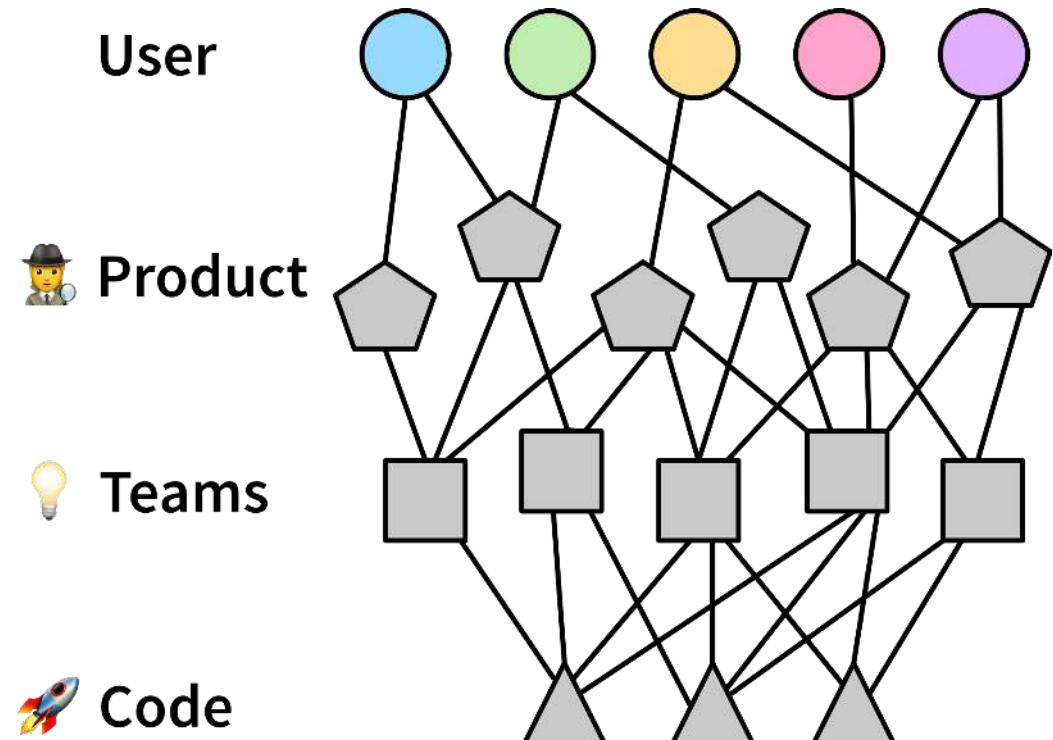
Freelance Consulting Services:

1. System Audit

Identify opportunities

2. Help with refactoring

Hands-on, part of your team



Thank you for your attention!

Slides:



franziskahorn.de/resources.html

Connect:



linkedin.com/in/franziska-horn

Any questions?