Domain Driven Design

And when not to use it

Cincinnati SC 2019-11-06

https://github.com/mwindholtz/presentations/DDD-SC-Cinci

About me

- Built …
  - eCommence site for ~12 years
  - Memberships site for ~8 years
- Elixir: CC Processing, Medical Research, Energy Grid
- DDD Since 2006
- TDD since 1999 — sUnit
  - Learned from Kent Beck, Bob Martin, Eric Evans

About YOU

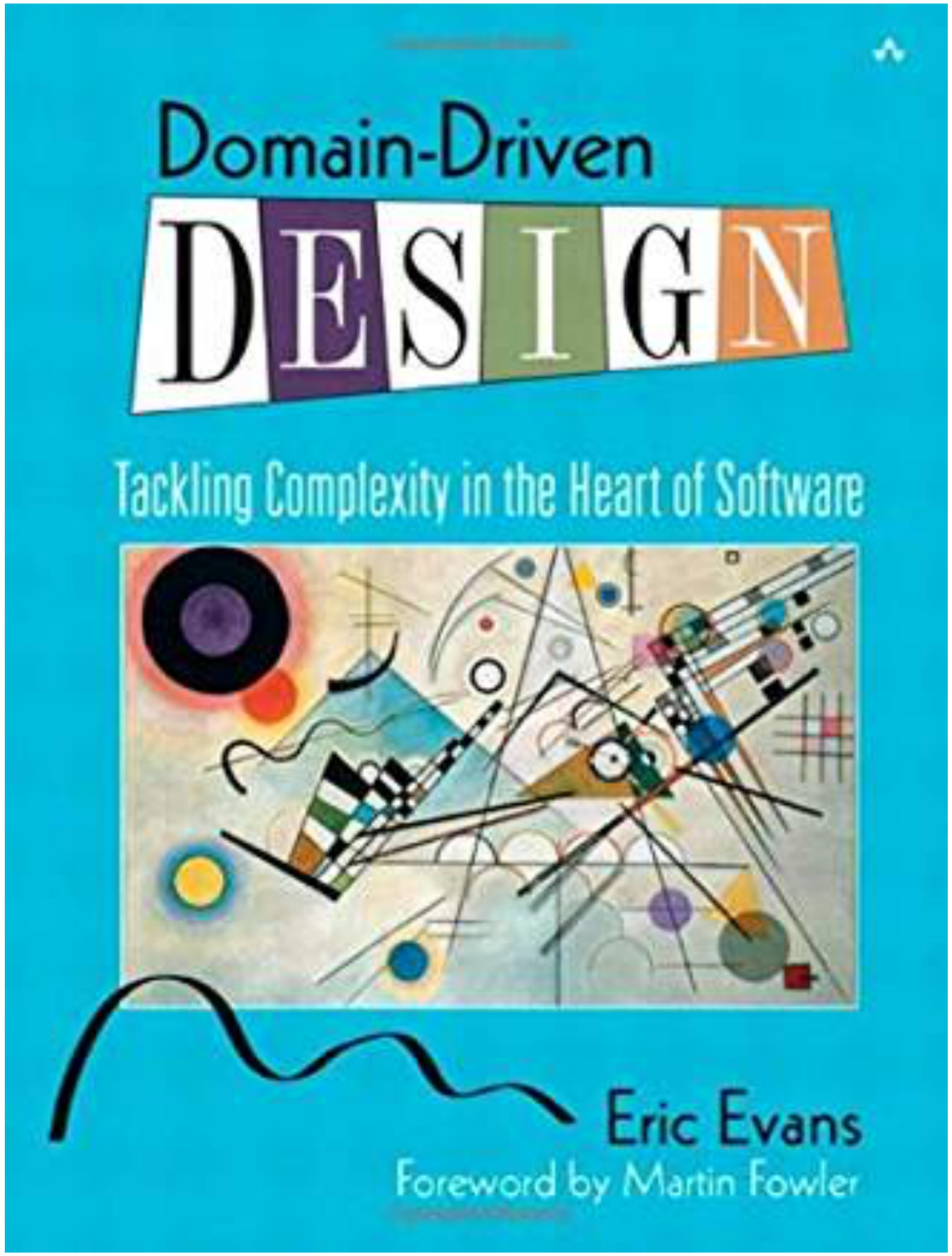
- What Drives Your Product Code Design?

Some Observed Drivers …

- UI Screens / API
- Database Model
- Doing Risk Items First, *or Last*
- Architect's Personal Issues - opposite of last project
- Features, Features, more Features

Domain Driven Design, 2003

- Tackling Complexity in the Heart of S/W
- By Eric Evans
- “The Big Blue Book”



Domain-Driven Design (DDD)

- For …
  - complex needs
  - connects implementation to evolving model
  - **DOMAIN** is the problem space
  - **MODEL** is an abstracted potential solution
  - Code is code

DDD: From Debt to Dividend

- **Tech Debt**
  - Paying interest plus principle to temporarily move faster
- **Tech Dividend**
  - Getting extra value on deep design to unlock extra features

DDD is a Set of Principles

- **Core Domain** - focus here
- **Explore Models** in a Collaboration of
  - Domain experts and the software team
  - Separate Business from Technical
- Speak in a **Ubiquitous Language**
  - within a Bounded Context

When to Apply Domain Design

- **For <u>Simple</u> systems**
  - No worries. It fits inside a person's head.
- **For <u>Medium</u> systems**
  - No worries. Hire smart people so that ..
  - It fits inside a person's head. Oh and write loads of *Documentation! ***
- **For <u>Complex</u> systems**
  - Starting is ok. It initially still fits inside a person's head.
  - Then Documents help a while
  - But As It Grows …

** has an unknown expiration date.
** may also be wrong.
**Other restrictions may apply.

Warning !

- **Simple** Systems …
    - Become **Medium** System …
        - Which Become **Complex** systems

Why “Agile” Software becomes a Mess

- Feature story
- Design, design, design *:-)*
- Feature story, Feature story
- Design. *:-/*
- Feature story, Feature story, Feature story, Feature story, Feature story, Feature story *:-(*
- Feature story, Feature story, Feature story, Feature story, Feature story, Feature story *:-o*

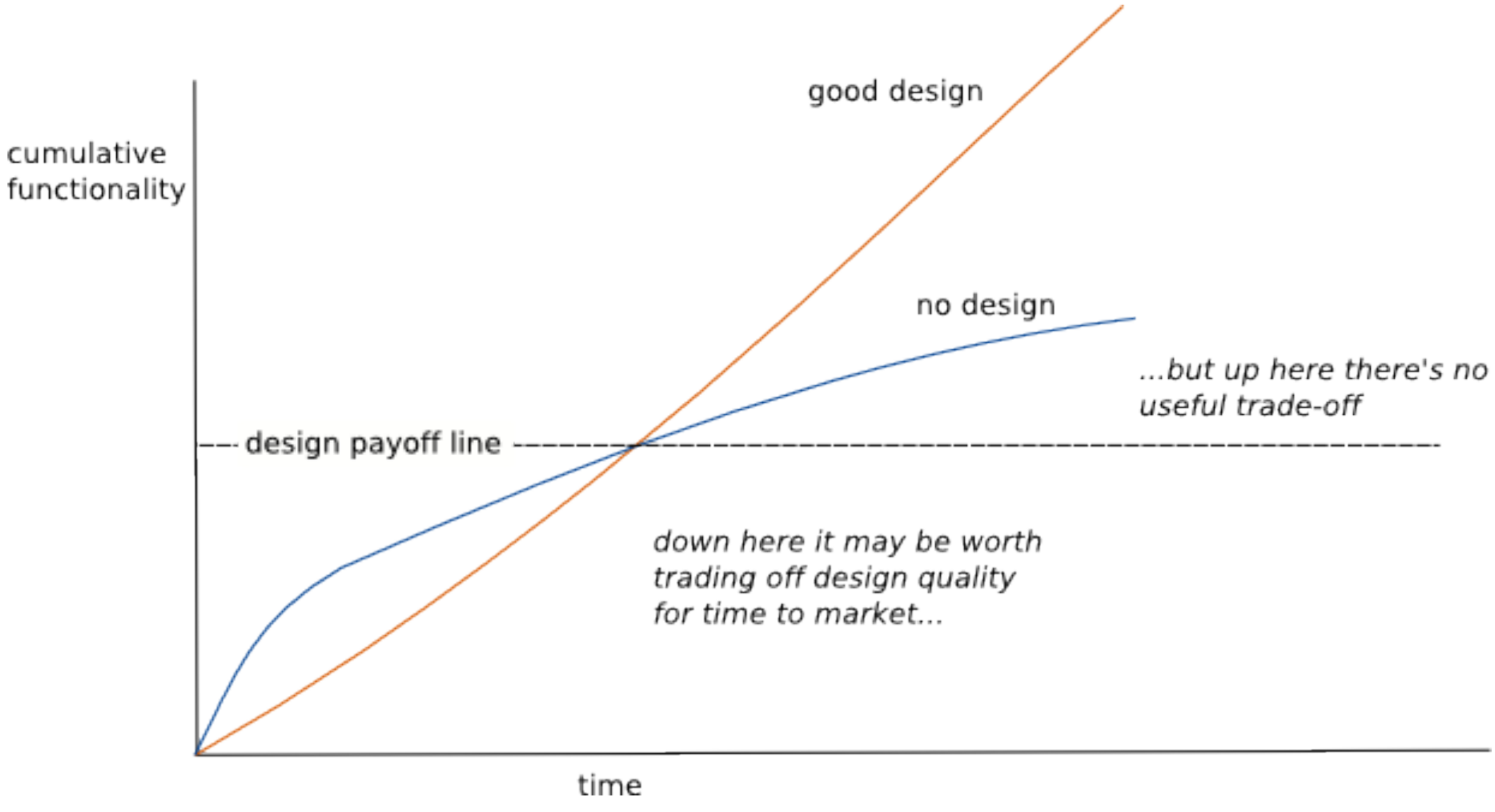
Code Structure:
Big Ball Of Mud

Process Diagnosis:
Featureatitis

Design:
Preventing ripple effects

Design Stamina Hypothesis

- Martin Fowler



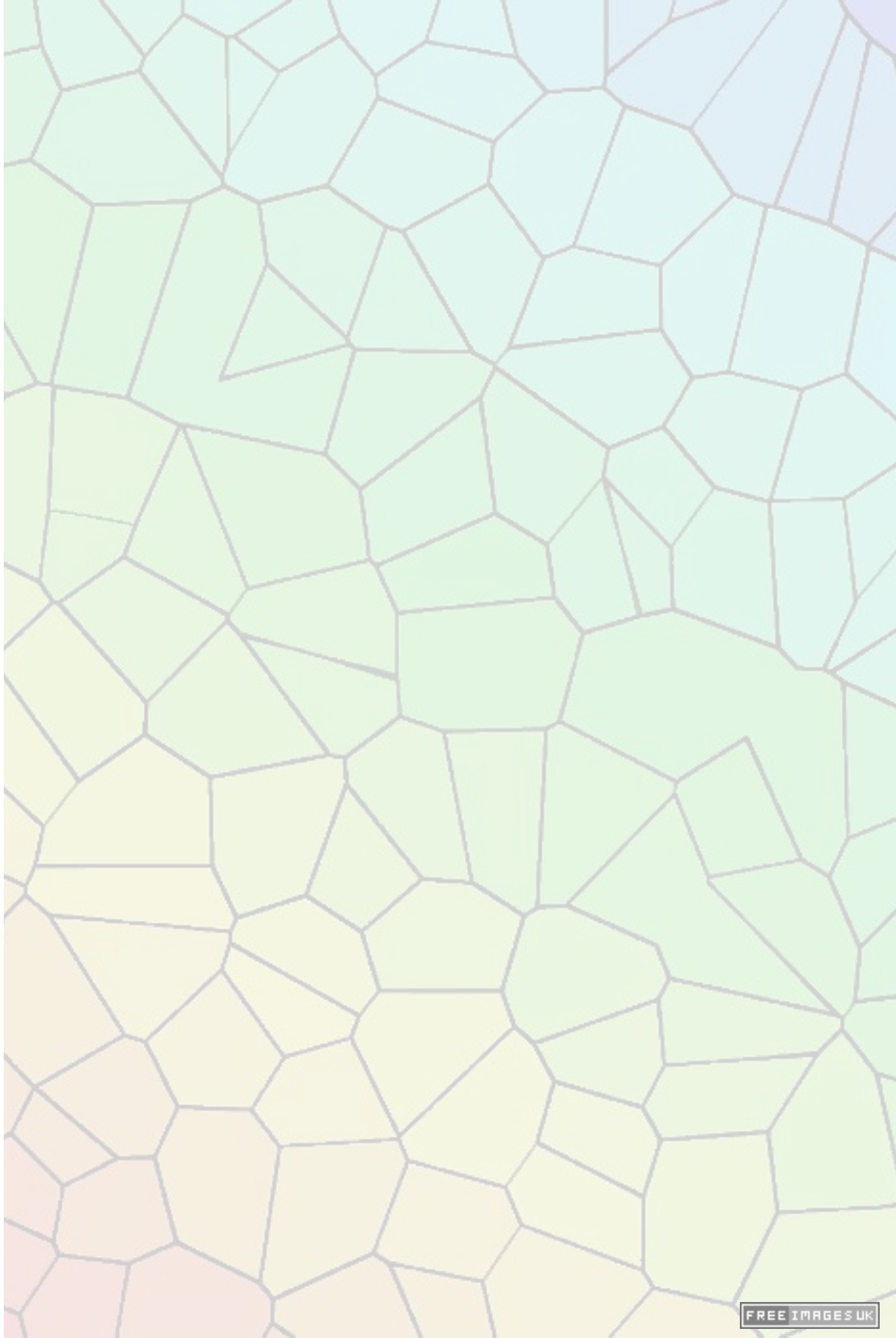
Software Craftsmanship — IS NOT ENOUGH —

- Refactoring
- Better names
- Test Driven Design
- Continuous Single Integration
- Something is still missing

Technical debt isn't technical - Einar Høst - DDD Europe 2019

DDD Prerequisites

- ***Close Collaboration*** of **Business**
- **Development** in **Ubiquitous Language**
- **Iterative Development**

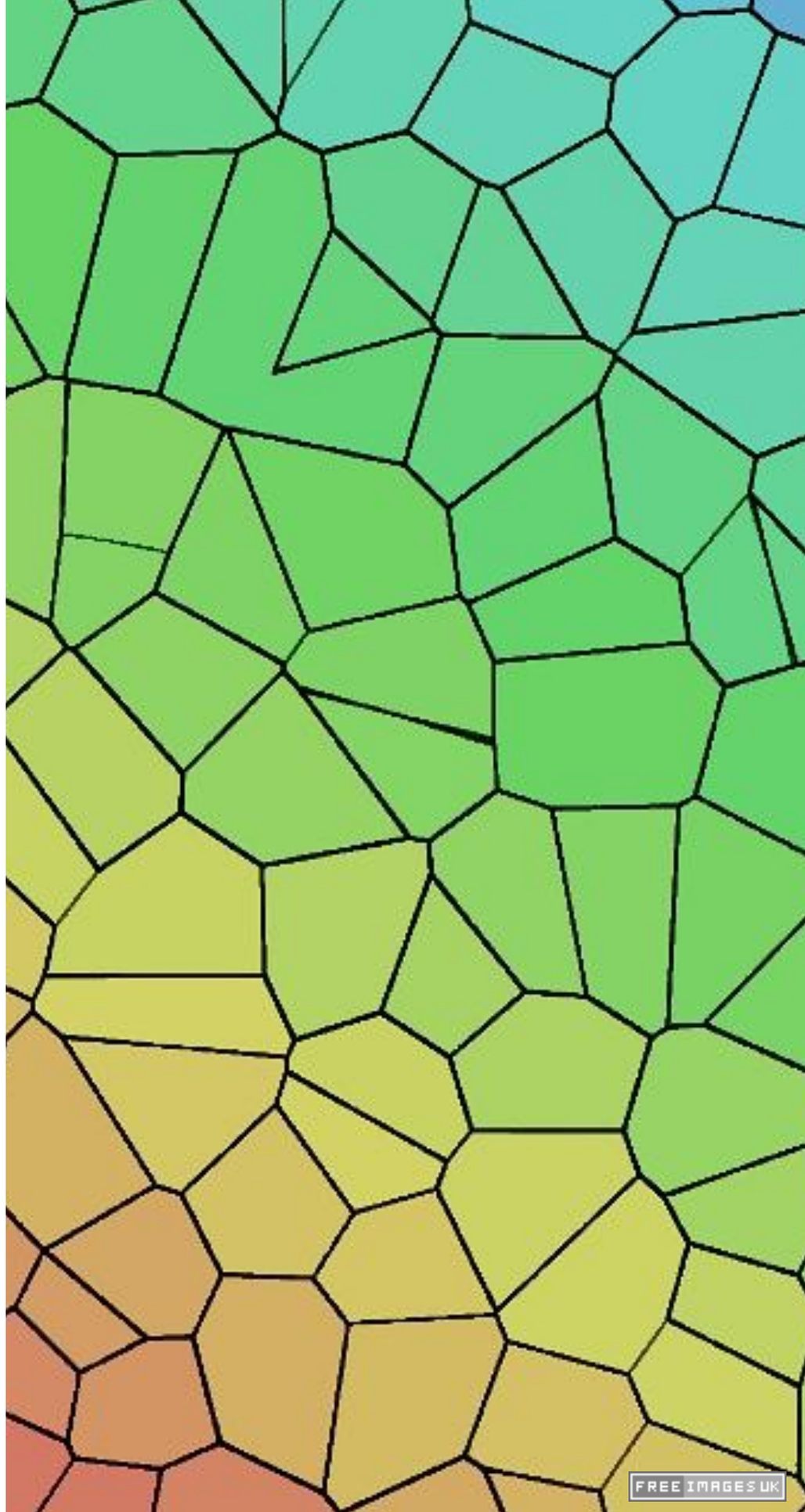


DDD is Difficult to Explain. Why?

- Since the ***Problem*** is Complex and Subtle
- So is the ***Solution***
- Difficult to *scale down* into examples
- **Large Vocabulary of Interrelated Patterns**
  - Pattern Languages

Doing DDD - *mark's version*

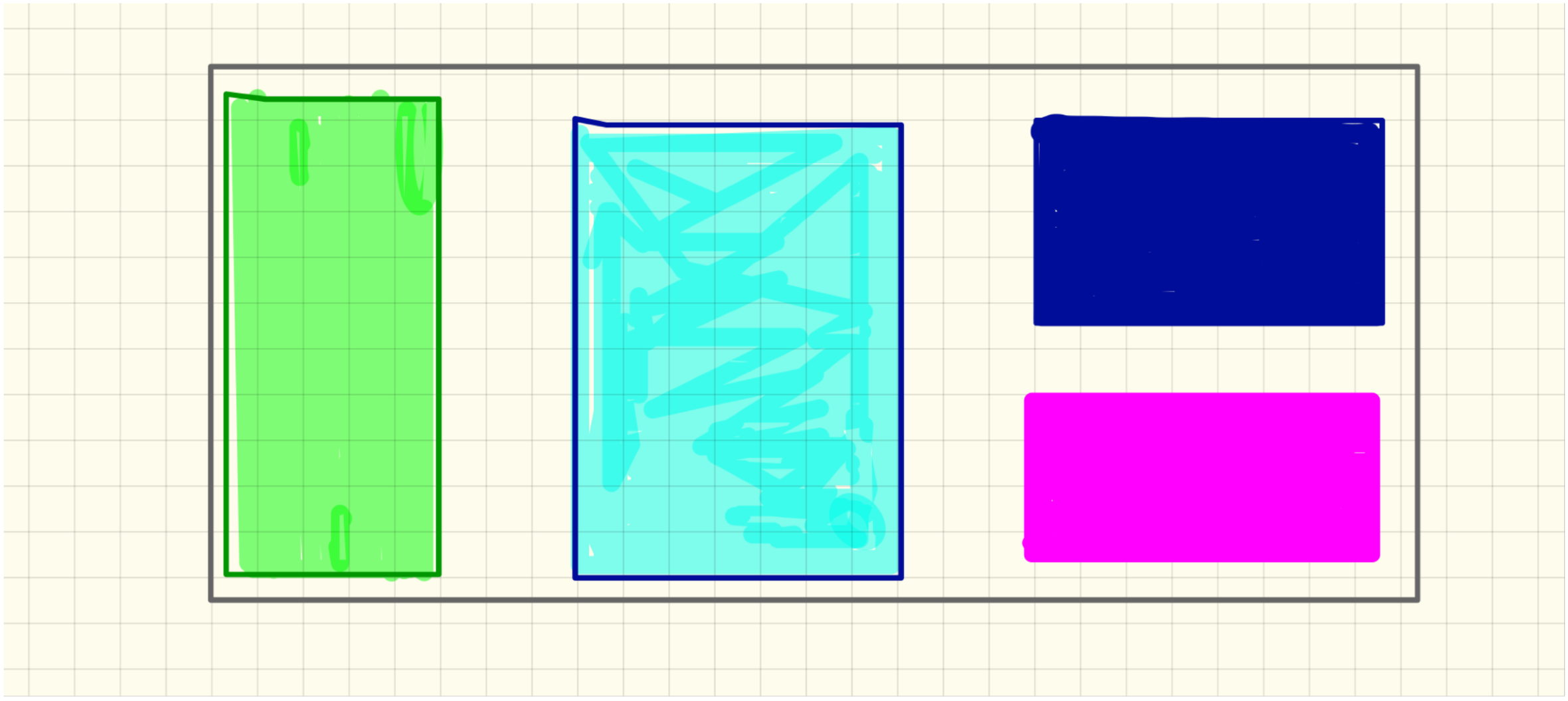
- ***Core Domain***, and SubDomains
- ***Bounded Contexts***
- ***Ubiquitous Language***
- ***Building Blocks*** *are Tactical Patterns*
- Repeat … and Revisit



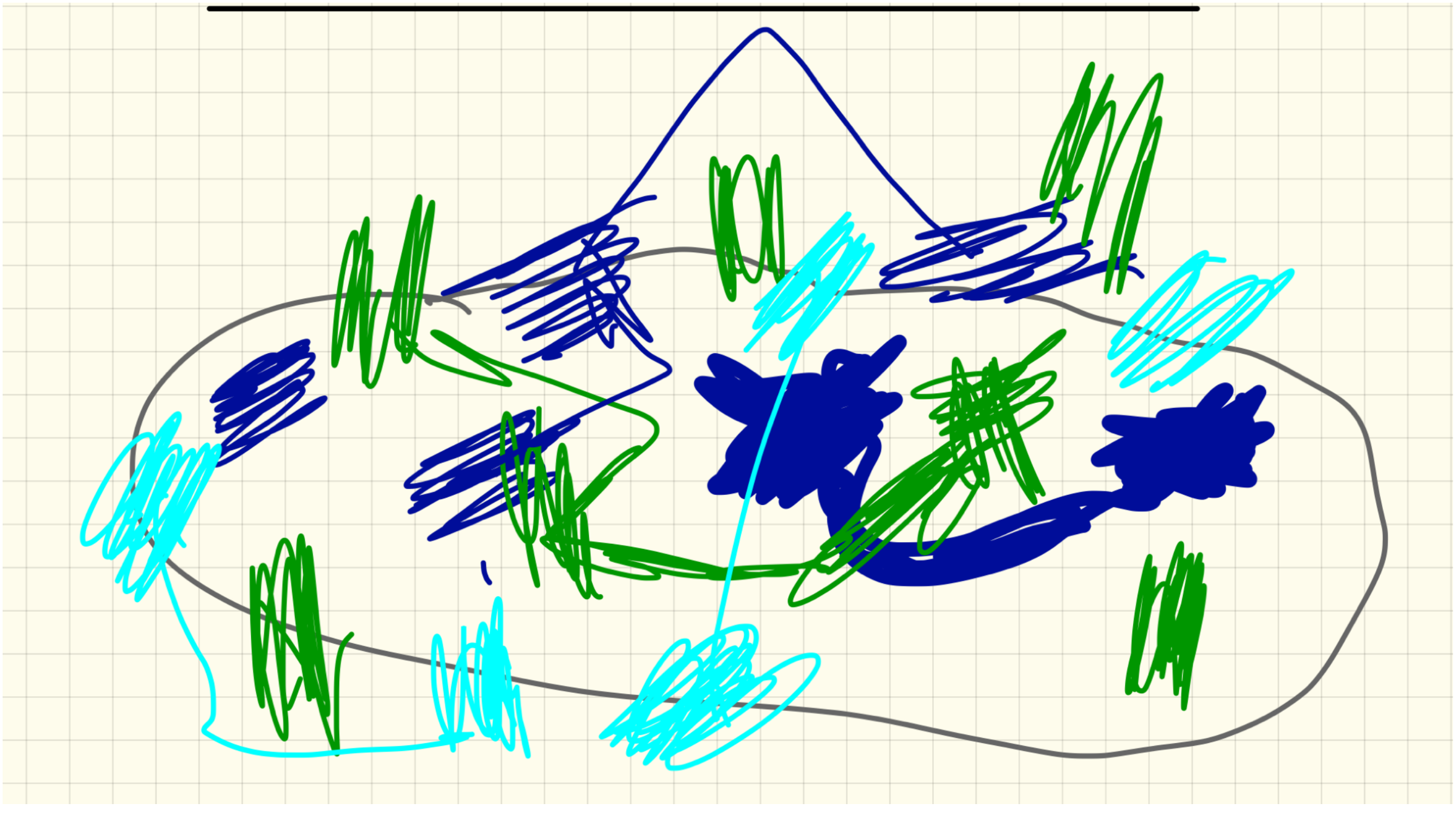
CORE DOMAIN

- A System Hard to understand is hard to change
- Boil down the MODEL
- Skilled developers are drawn to new tech
- Get top talent into the CORE DOMAIN

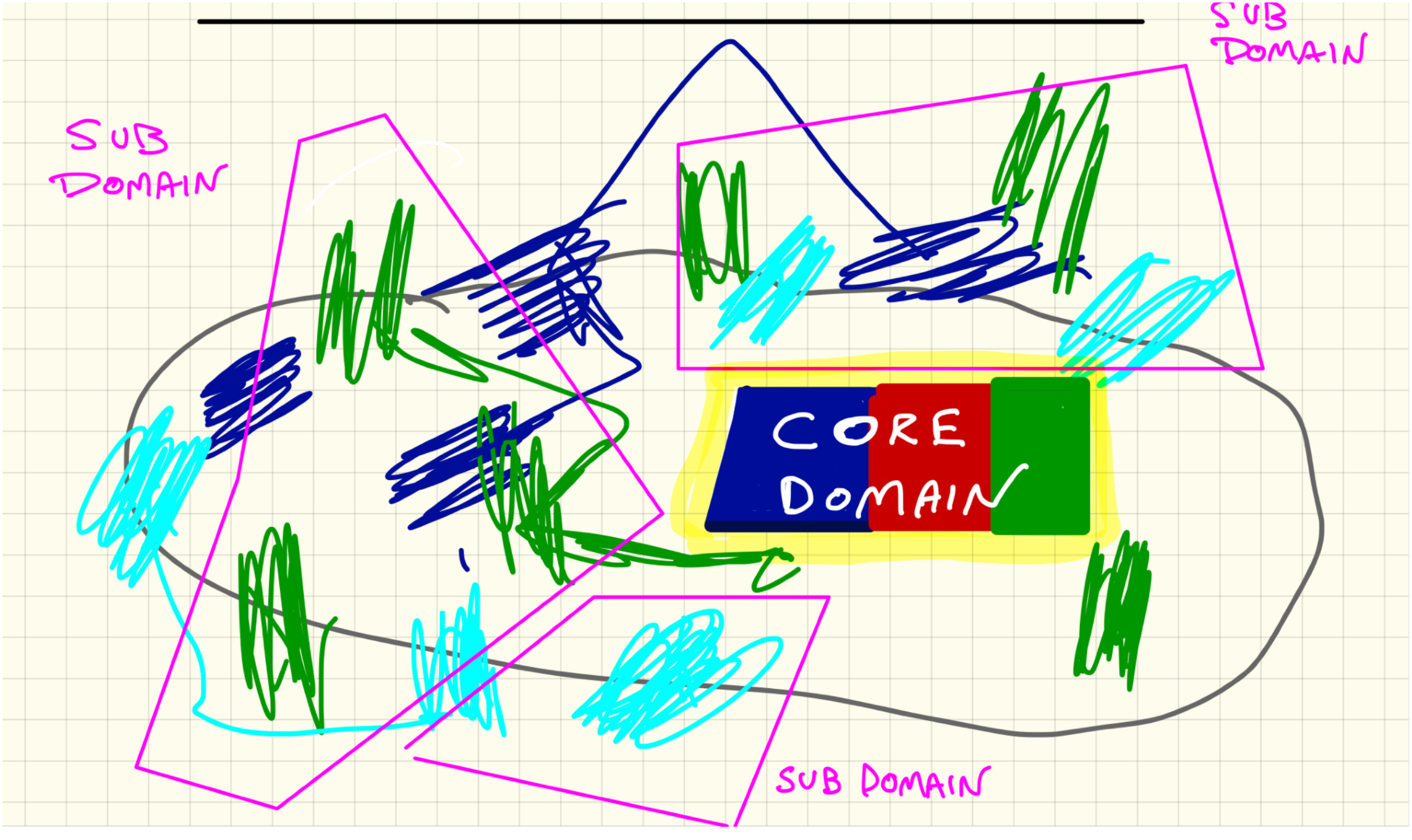
Application, as we Imagine it could be



Application, in Reality



Apply strategic patterns to find the Core Domain



DDD Topic Areas

- ***Strategic Patterns***
- Tactical Patterns
- Communication Tips

Strategic Patterns

CH 15 - DISTILLATION

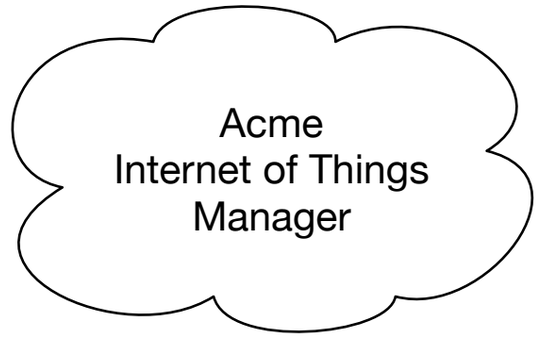
Finding & Separating

The Core Domain

Wikimedia Commons

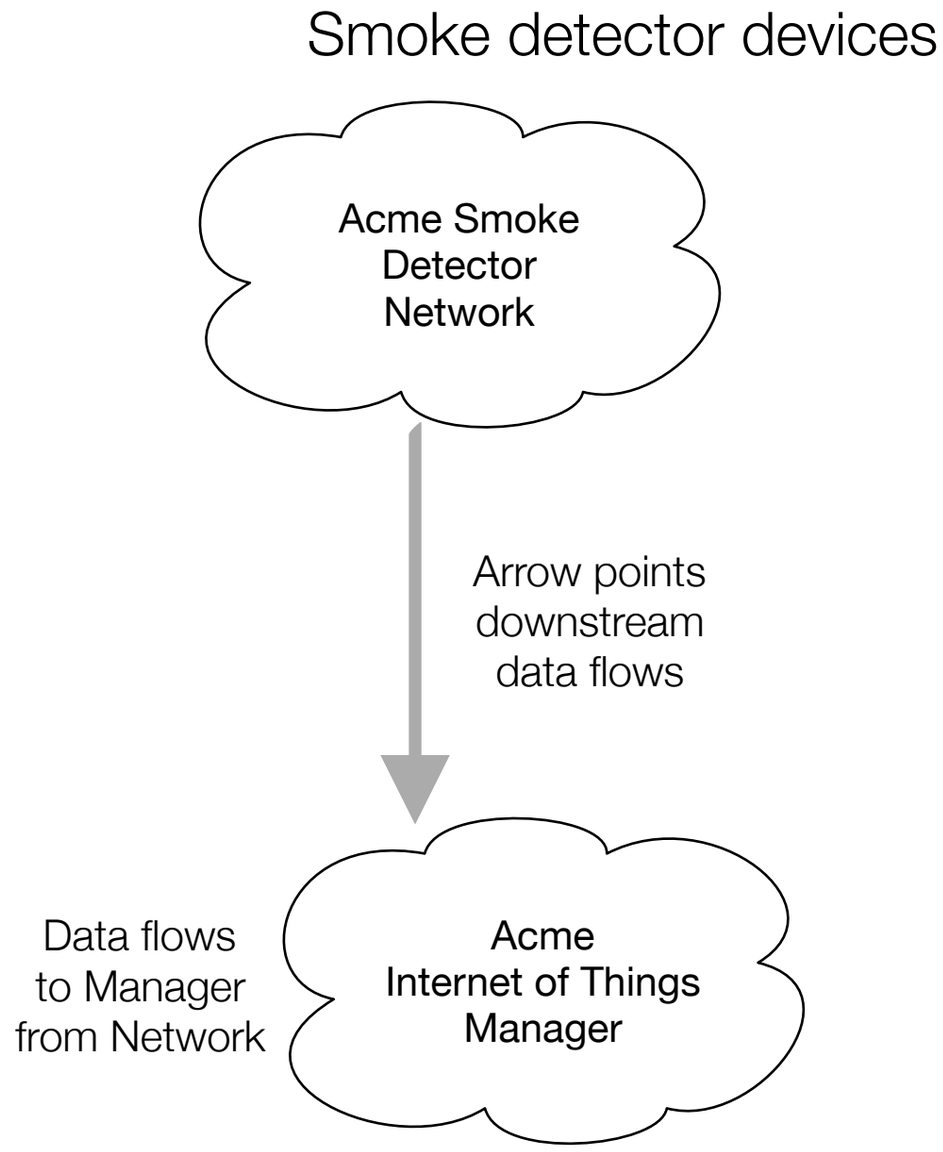
Bounded Context

- Large projects have multiple Models
- Combining Models causes bugs
- Model only has meaning in a context
- **Therefore ...**
- Define the context of the Model
- Set boundaries in terms of
  - team organization
  - parts of the application
  - code bases, git-repositories
  - and DB schemas



ContextMap

- To develop a strategy, we need a large-scale view across our project and others we integrate with.
- **Therefore …**
- Define each Model and it's BoundedContext
- Describe the points of contact between Models. Identify …
  - Explicit translations
  - Sharing
  - Isolation mechanisms
  - Levels of influence



DDD Topic Areas

- Strategic Patterns
- ***Tactical Patterns***
- Communication Tips

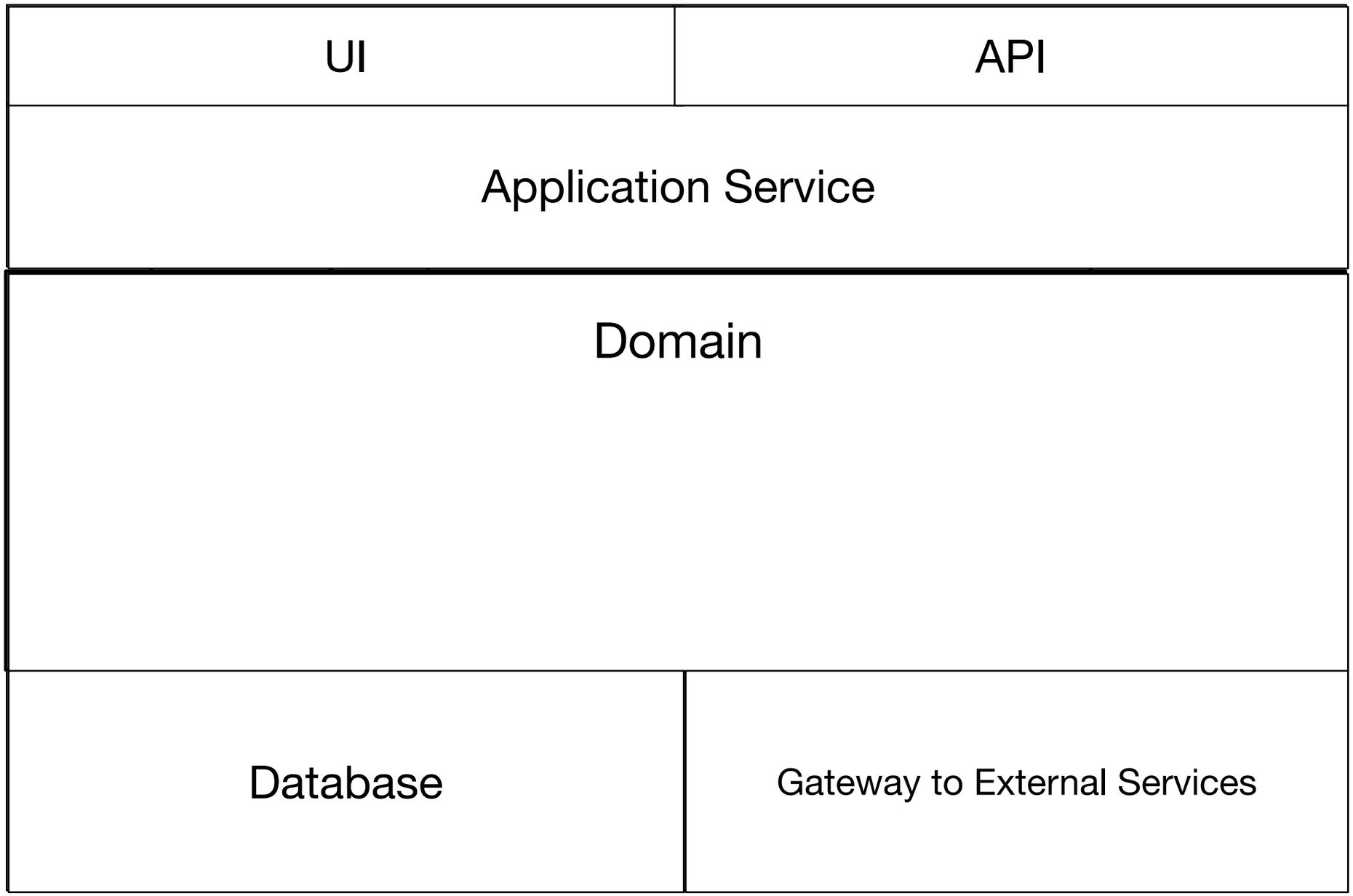
Tactical Patterns
- Building Blocks

- **Layered Architecture**
- **Aggregates**
- Value Objects
- Entities
- Factories
- Repositories
- Services
- Domain Events

Layered Architecture

Name	Description	Example
UI	User Interface or API	Web form Json API
Application	Thin. No Biz Rules. Stateless. Use Cases. Coordinator.	Funds Transfer Service
Domain	Business Concepts, Biz Rules. The heart of the business software.	DDD
Infrastructure	Support for the other layers	Pub-Sub DB

Aggregates in Layers - 1



A few other Building Blocks

Value Object

- Value only

{ :usd, 1000.00 }

{ :watt_hours, 900 }

Entity

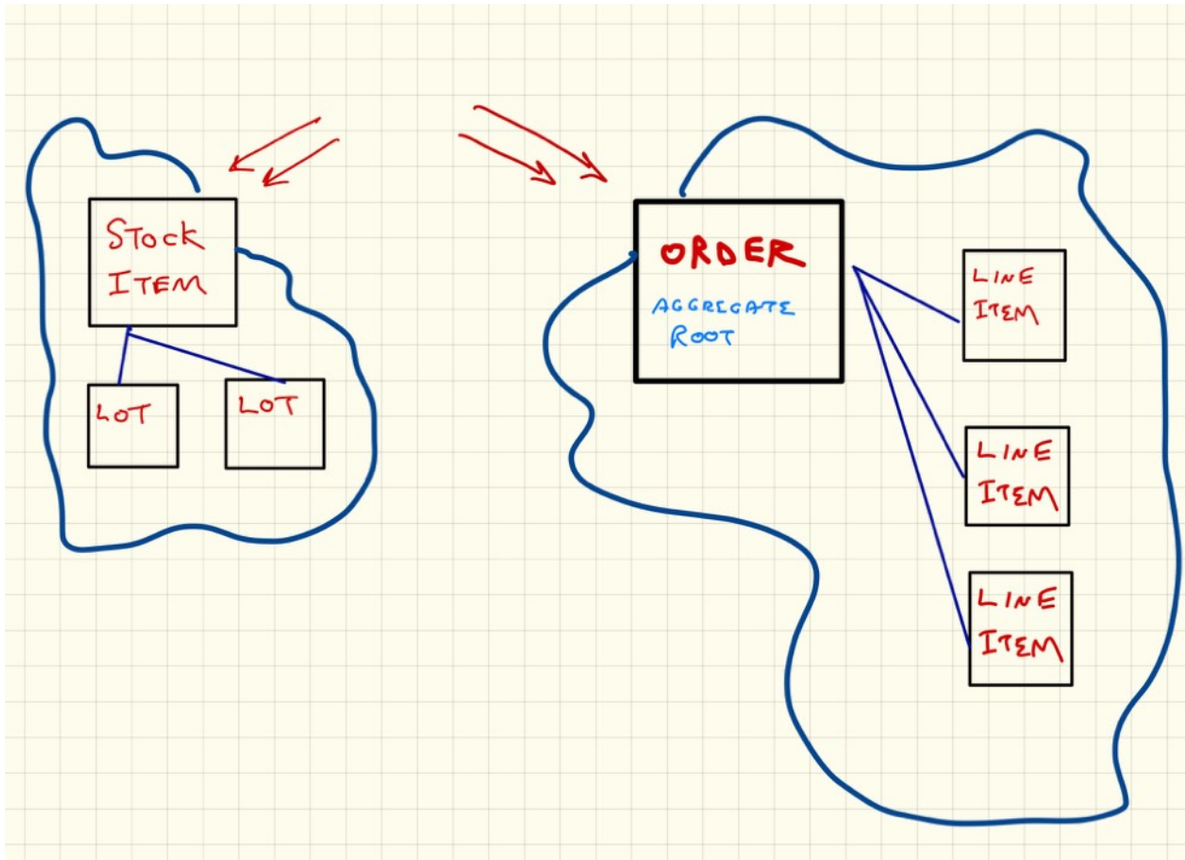
- Life Cycle
- Has Identity field

%Order{ id: 2341334 }

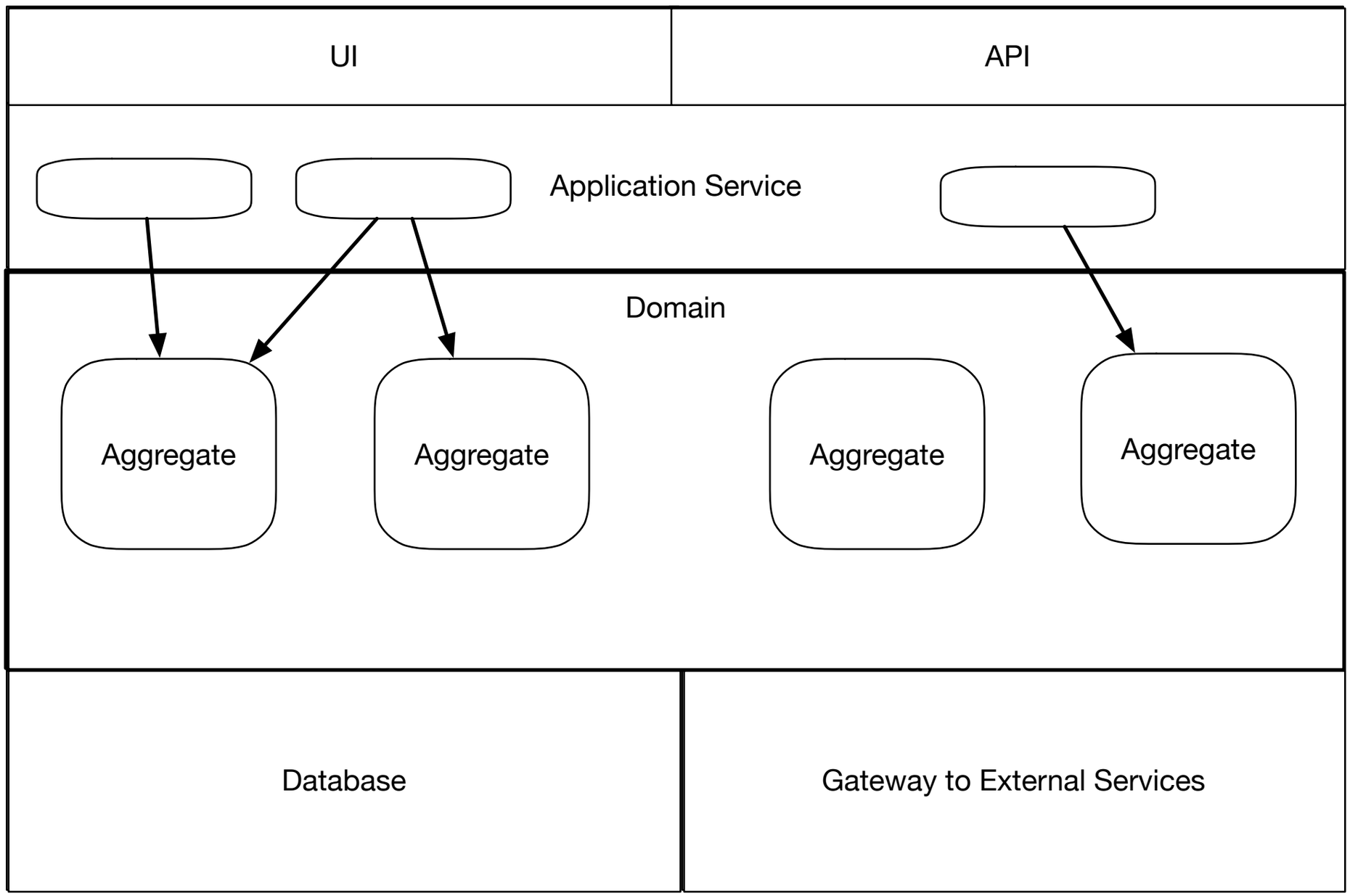
%User{ id: 3421424 }

Aggregate

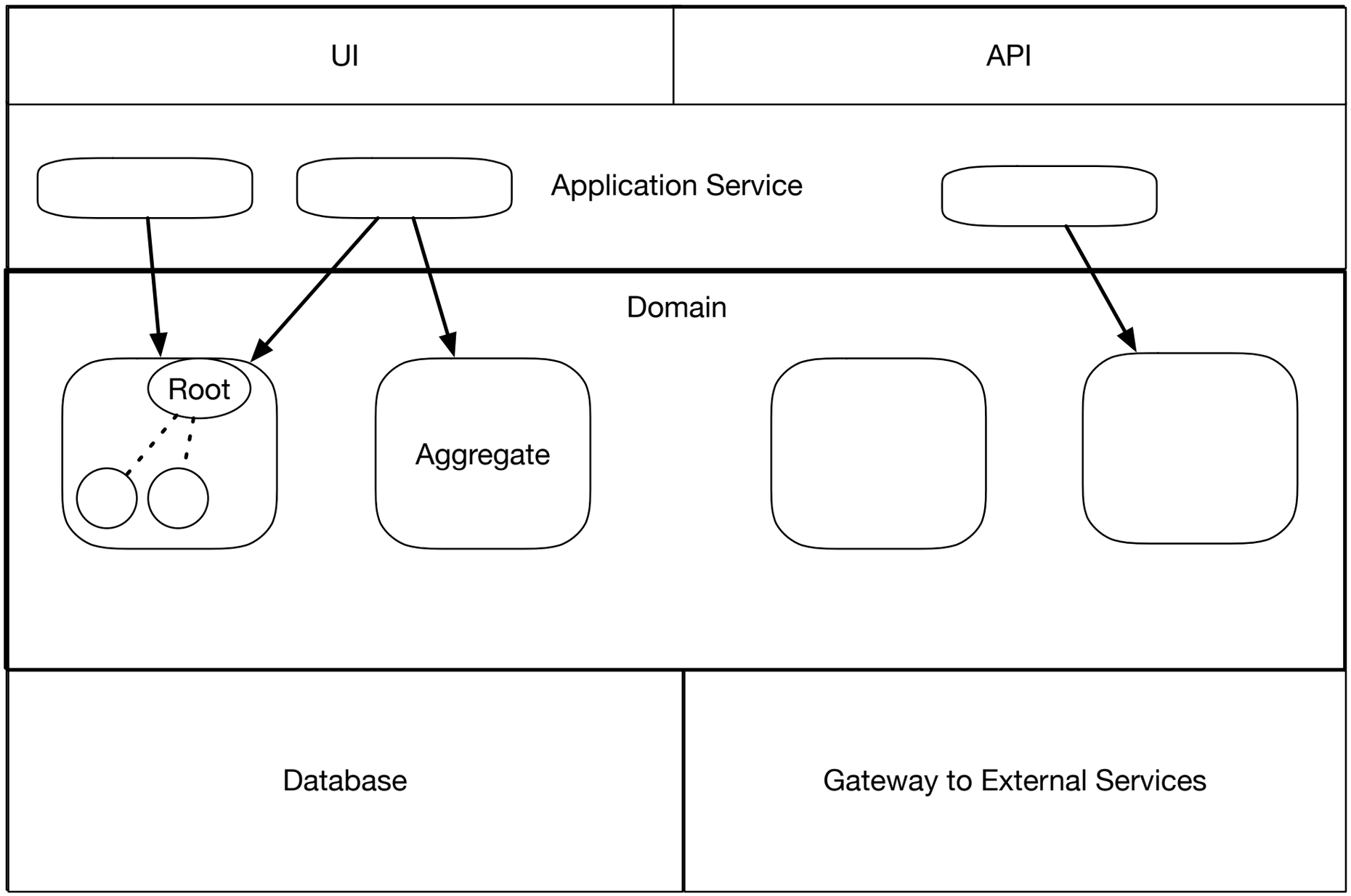
- Keep them Small
- Protect Business Invariants inside Aggregate
- Reference Other Aggregates by Identity only
- Update other Aggregates with Eventual Consistency
-



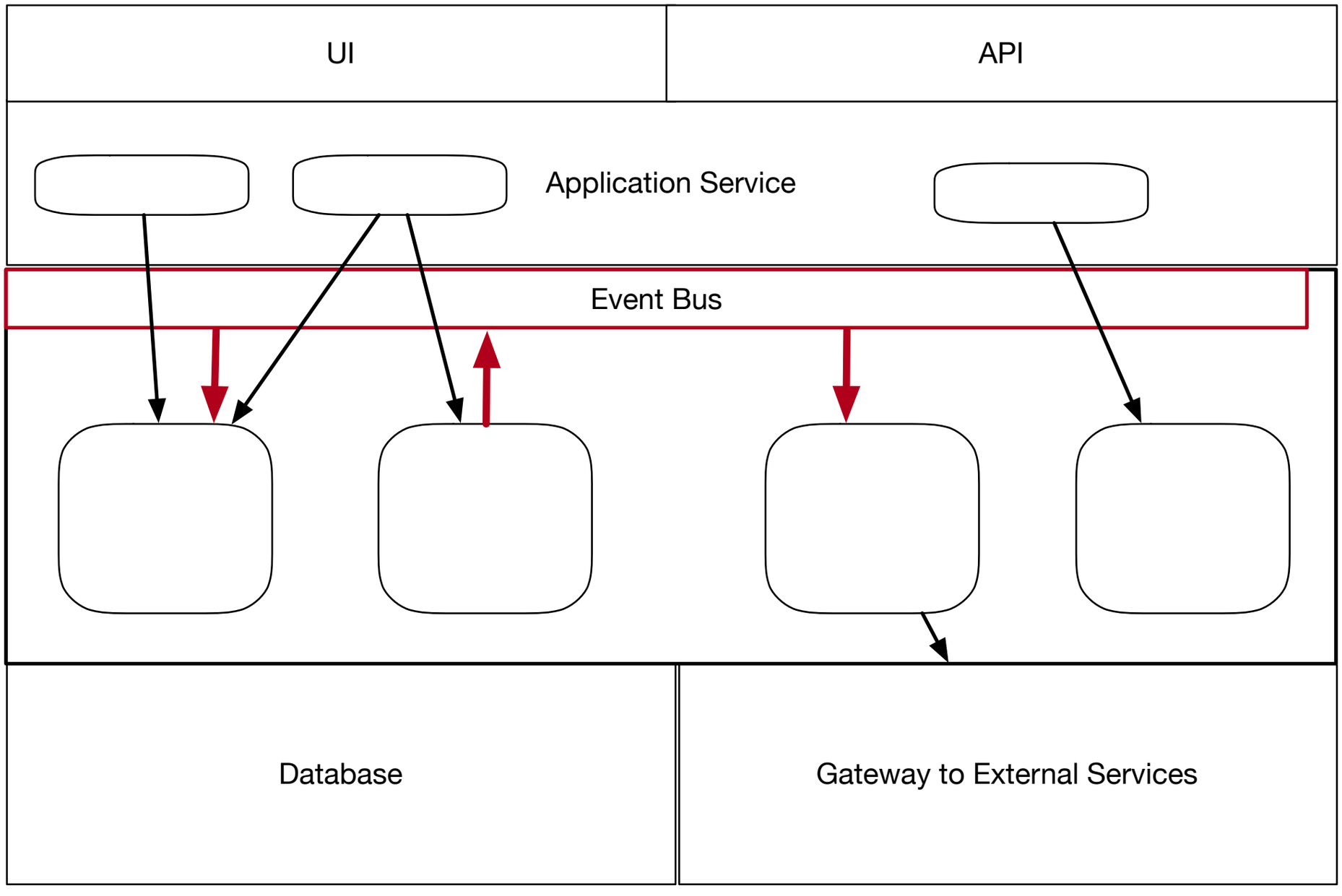
Aggregates in Layers - 2



Aggregates in Layers - 3



Aggregates in Layers - 4



DDD Topic Areas

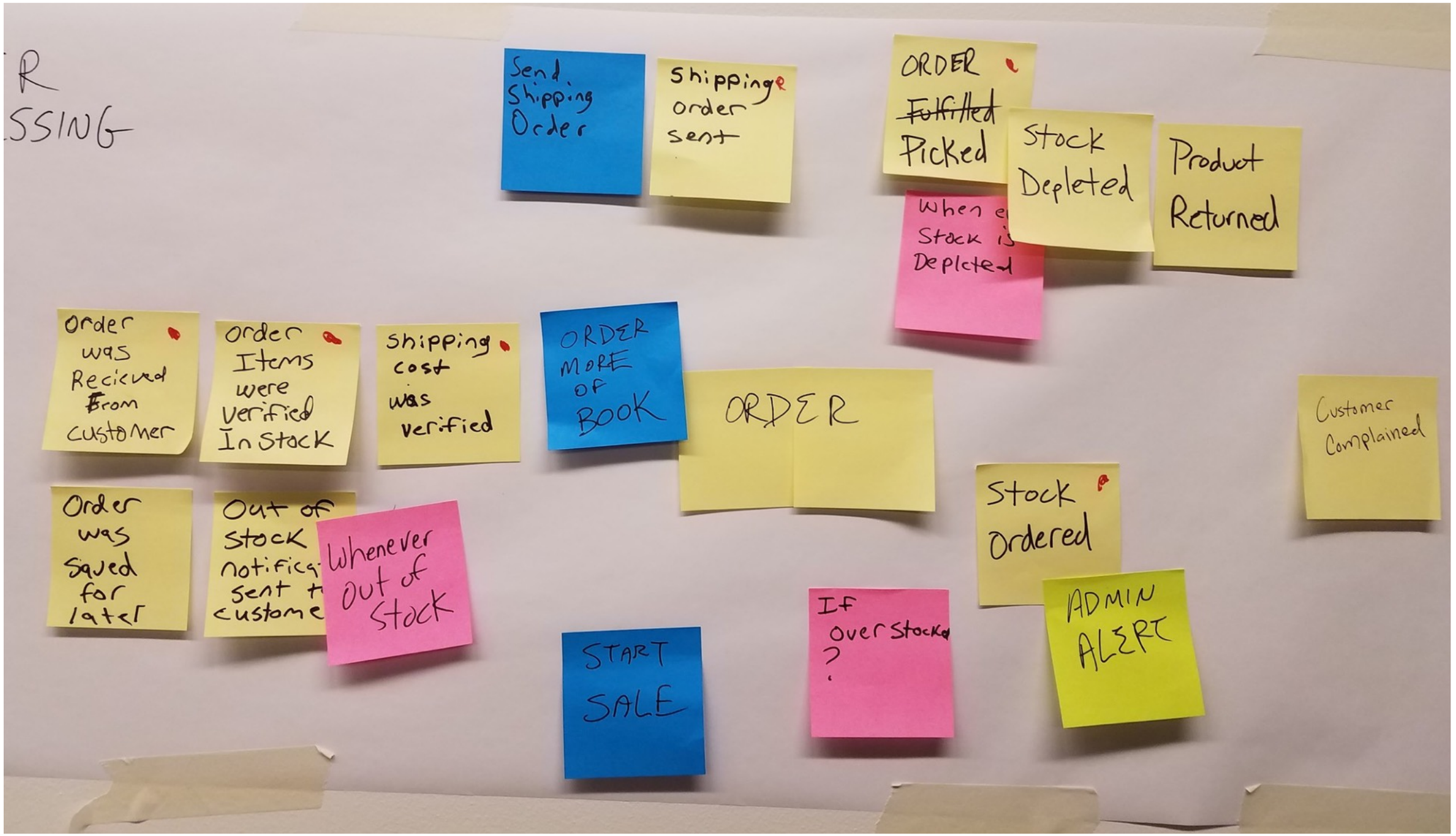
- Strategic Patterns
- Tactical Patterns
- ***Communication Tips***

Communication Tips

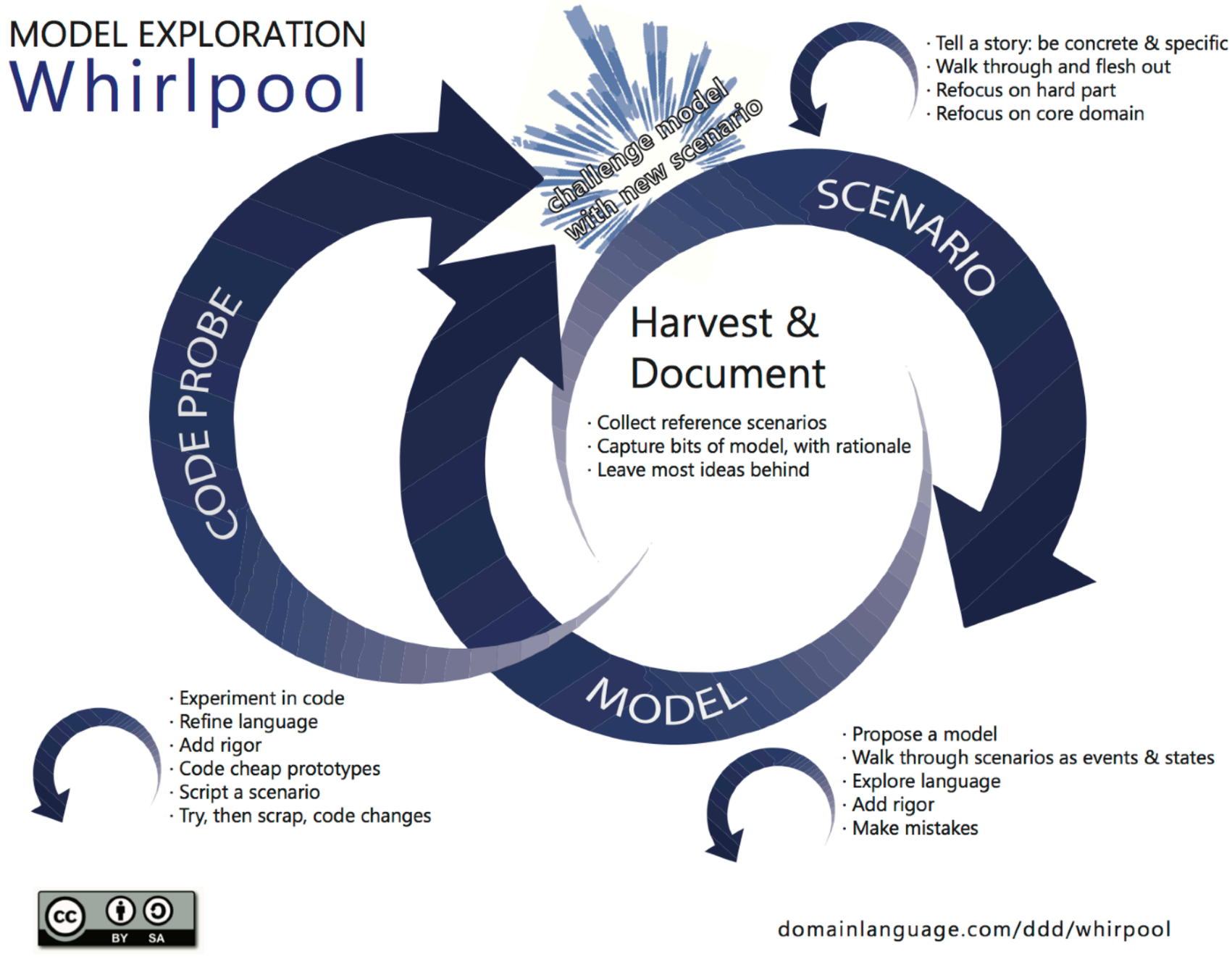
- Investigate, question Constraints
- Listening for missing Words and Concepts
- Ask “Why?”
- Event Storming
- Whirlpool

Event Storming

Event Storming



MODEL Exploration



domainlanguage.com/ddd/whirpool

When to use Full-DDD

- Strategic, Tactical, Communication

- Increasing complexity is slowing down progress

- Defects about fundamental Model are increasing

- Edge Cases are increasing

When to use Partial-DDD - Strategic

- **As an Architect**
- Use Bounded Context to reduce confusion
- Context Mapping to see flow of the MODEL

- When: more then two main modules

When to use Partial-DDD - Tactical

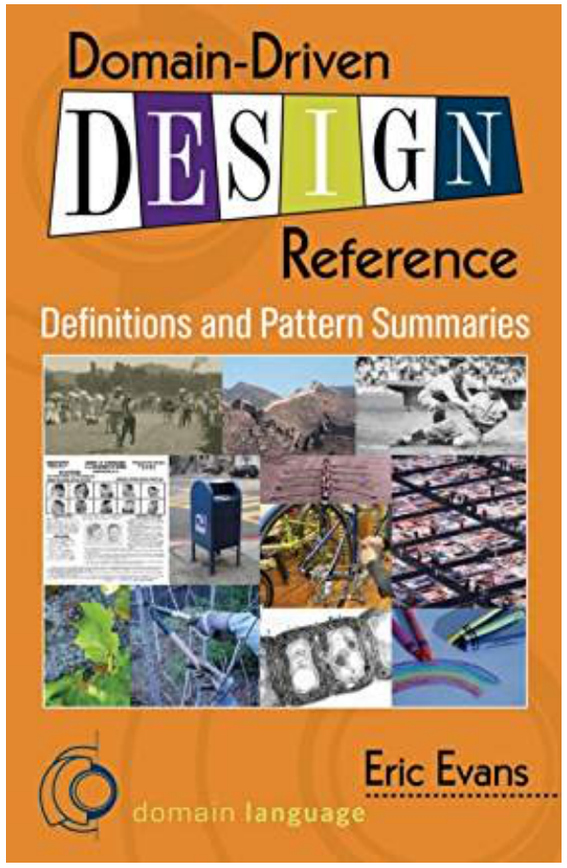
- **As a Developer**: Use Building Blocks
- Layered Architecture, Aggregate
- TDD
- When: Increasing conditional statements
- When: DB accessed everywhere, big test setup
- When: DB Locking issues

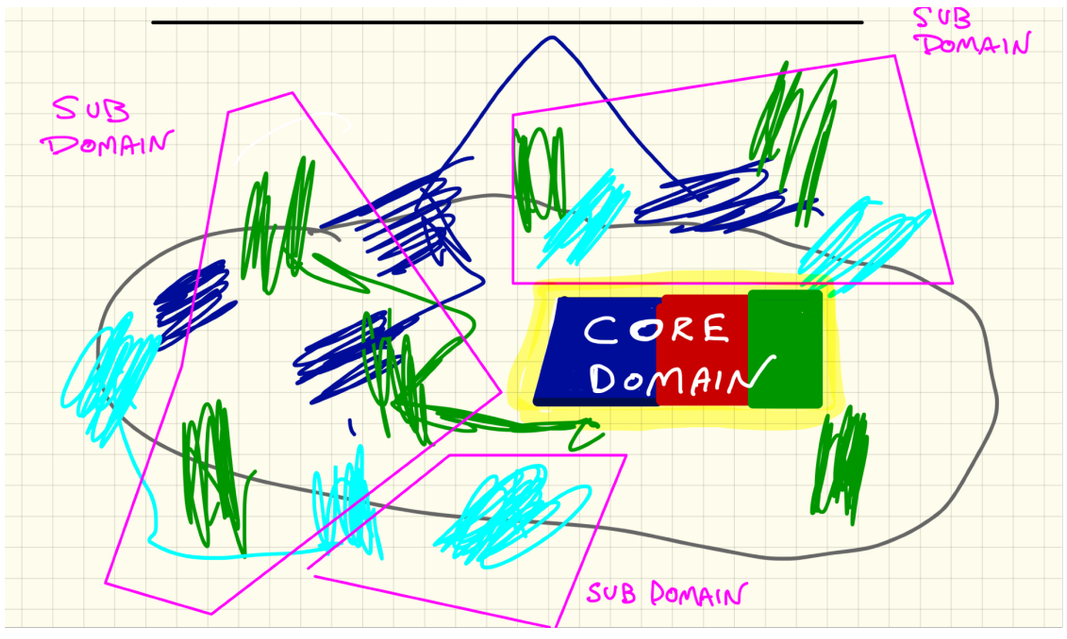
When not to use DDD

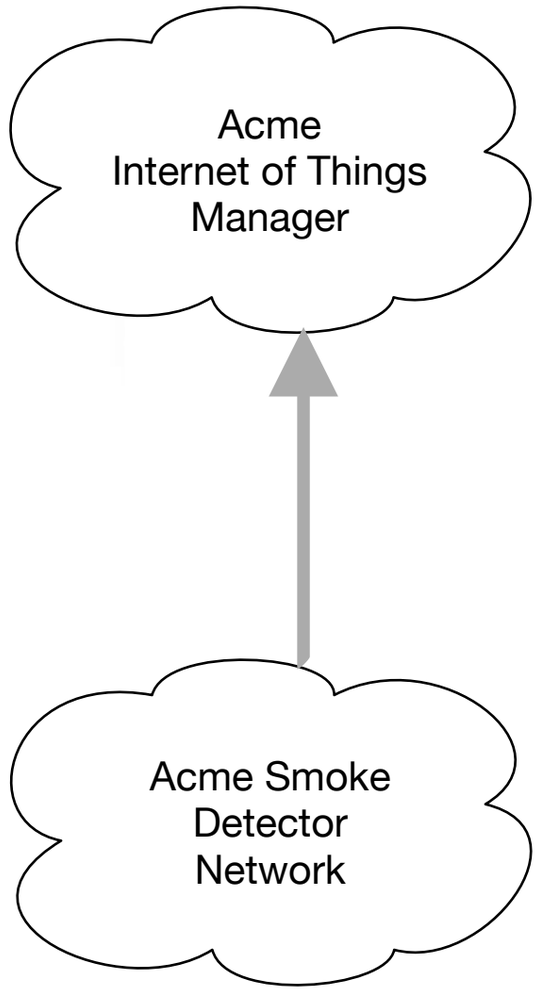
- Simple CRUD / REST application needs
- Not using an iterative process
- Poor access to Domain Experts
- Build and forget apps

CRUD => Active Record => Domain Model => DDD

- Davin Tryon, via stack overflow







Just the beginning …