

**7 YEARS OF DDD:  
TACKLING  
COMPLEXITY  
IN LARGE SCALE  
MARKETING SYSTEMS**

# Vladik Khononov

Twitter: @vladikk

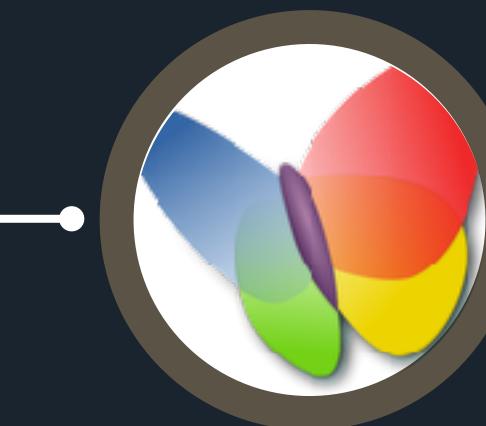
Blog: vladikk.com



IAF



Malam Team



MSN-IL



Cellcom



Internovus

# Vladik Khononov

Twitter: @vladikk

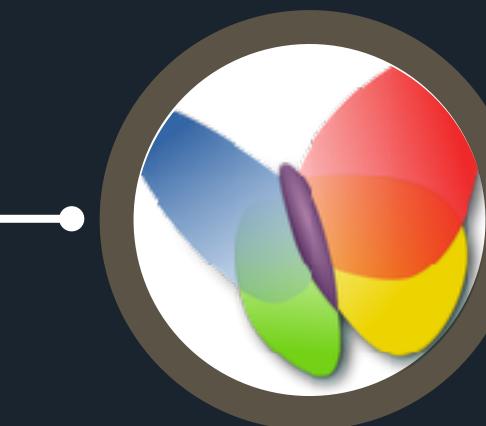
Blog: vladikk.com



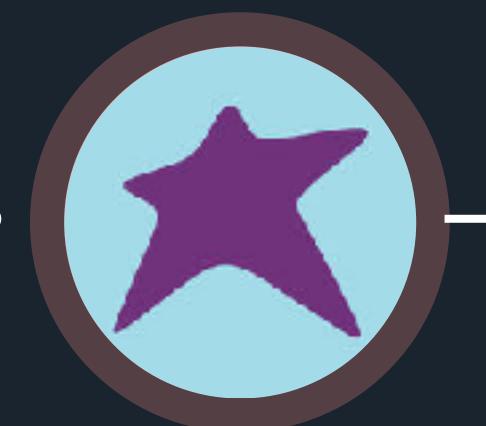
IAF



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Cellcom



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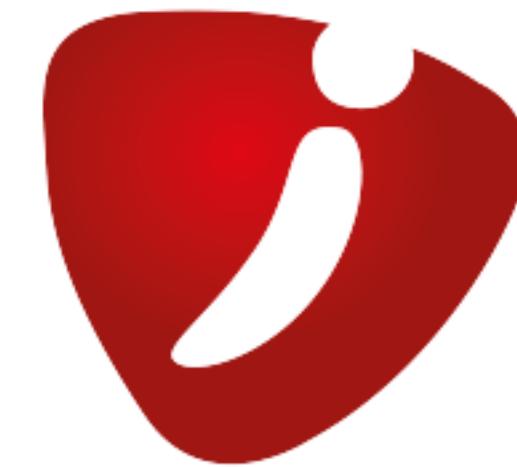
# AGENDA

PART 1

5 BOUNDED  
CONTEXTS

PART 2

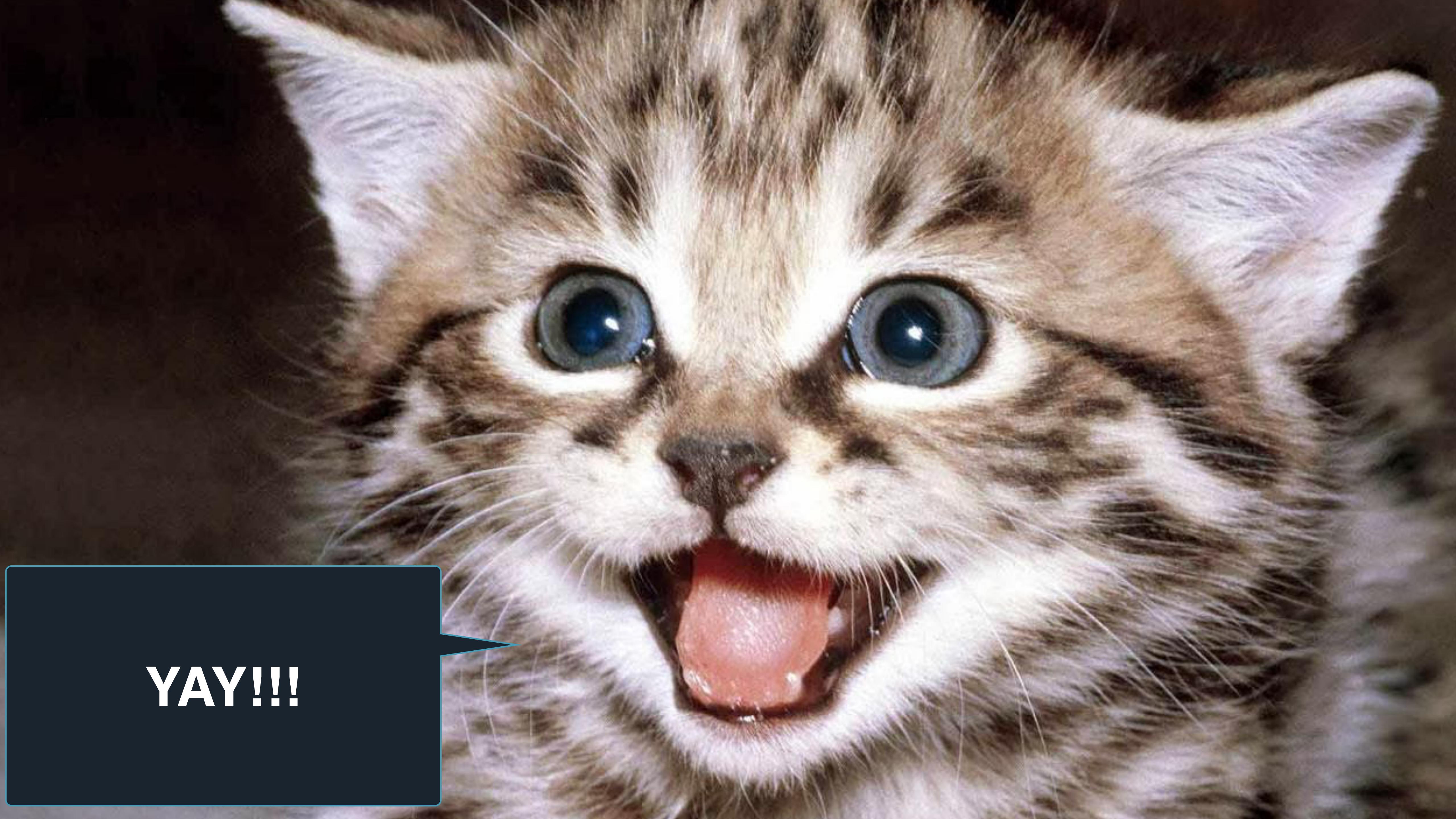
PRACTICAL  
ADVICE



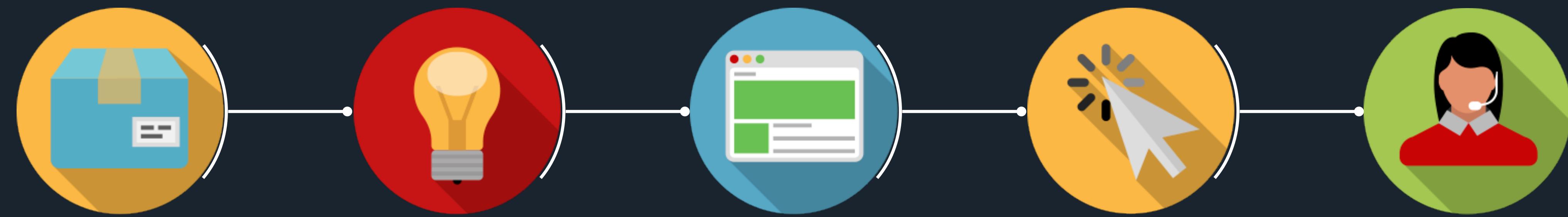
# INTERNOVUS

The Ultimate Acquisition Solution

THE ULTIMATE ACQUISITION SOLUTION



**YAY!!!**



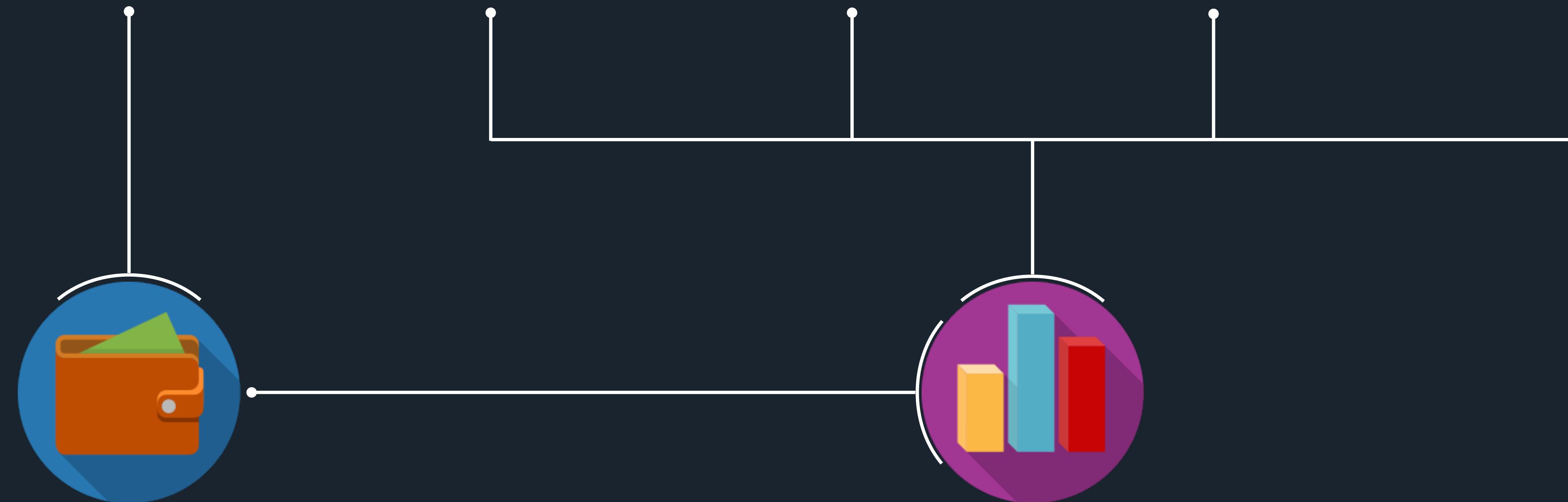
Your Product

Marketing  
Strategy

Creatives

Campaigns

Sales  
Agents



Profits

Optimization

# THE FIRST BOUNDED CONTEXT

01

# VER 1.0



Media Buying



Creatives Catalog



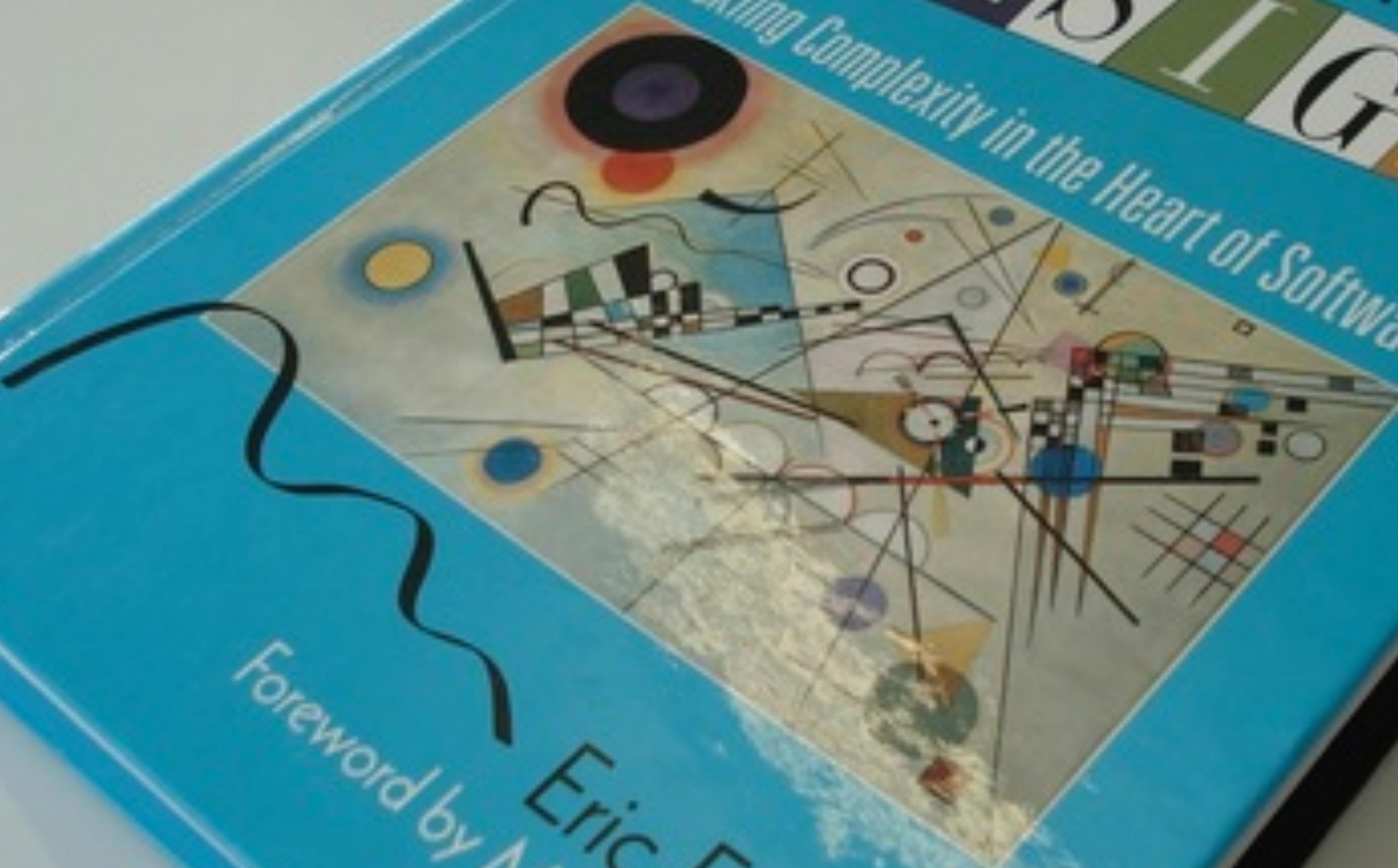
Campaign Management

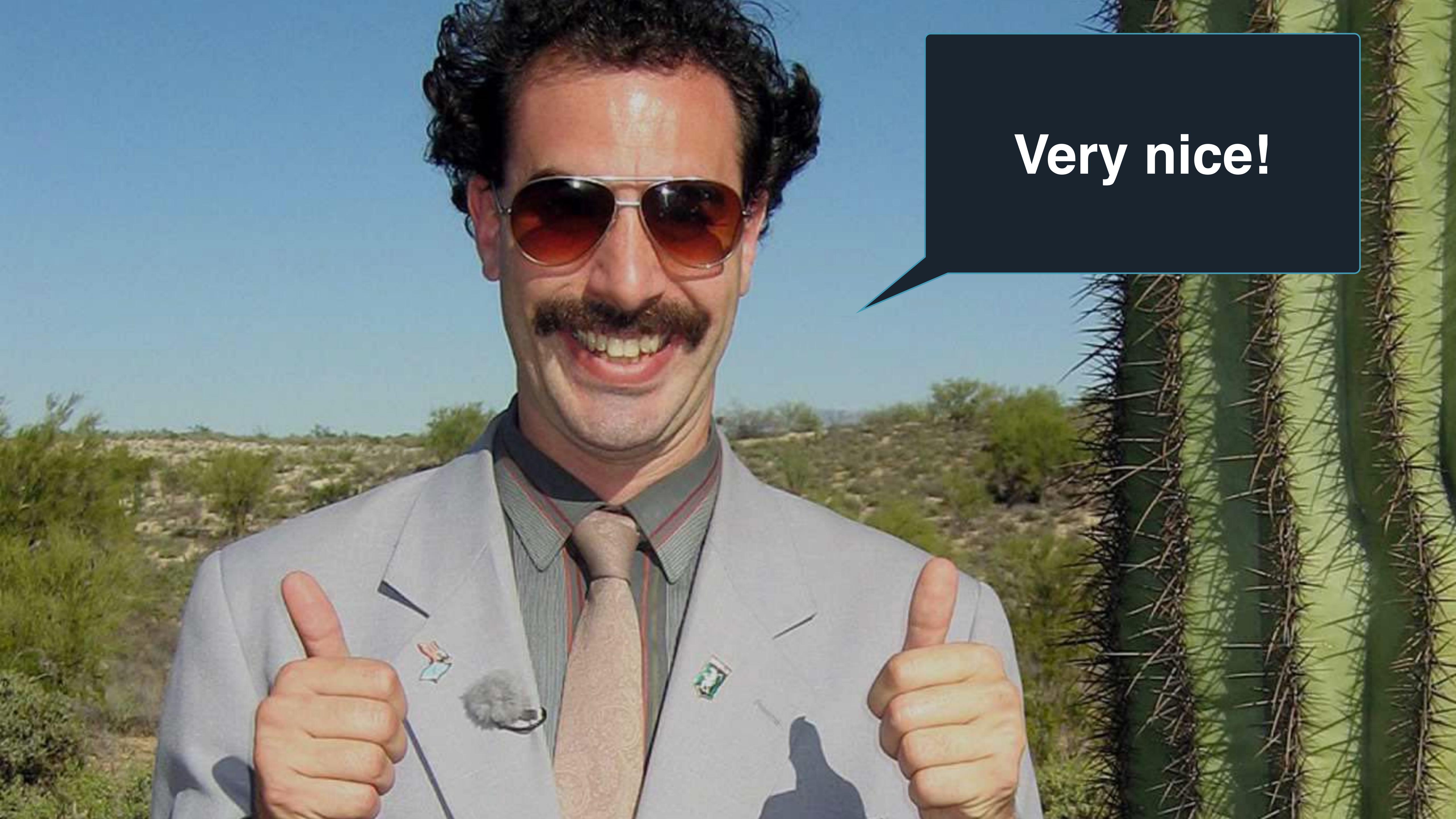


# Object-Driven DESIGN

Tackling Complexity in the Heart of Software

Foreword by Eric E.



A photograph of Borat Sagdiyev, played by Sacha Baron Cohen, standing in a desert landscape. He has dark curly hair, a mustache, and is wearing sunglasses and a light gray suit with a striped shirt and tie. He is smiling and giving two thumbs up. A speech bubble originates from his mouth, containing the text "Very nice!"

Very nice!

# Aggregates everywhere!!!

Advertiser

Group

Ad Type

Creative

Agency

Target Market

Aggregates everywhere...

Contract

Website

Funnel

Zone Type

Budget Unit

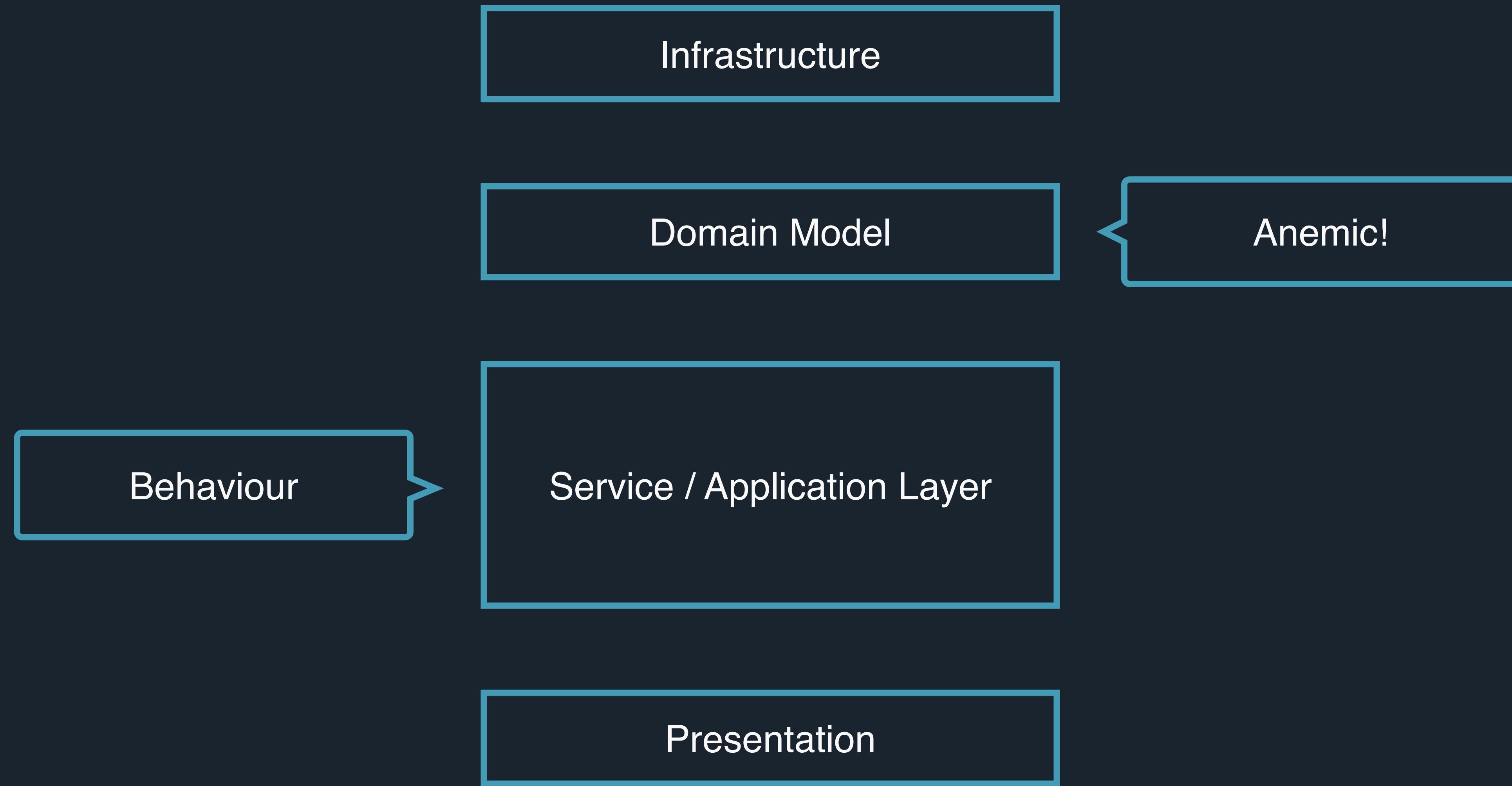
Placement

Campaign

Ad Zone

Publisher

Creative	Ad Type	Placement
Agency	Target Market	Ad Zone
Advertiser	Group	Contract
Publisher	Zone Type	Budget Unit
Website	Funnel	Audience



# Imperfect architecture

“QA is for cowards”

BUT IT WORKED!

# UBIQUITOUS LANGUAGE

Has no experience in online marketing



Software Developer



Domain Expert

Nice people!

Smooth communication

Strong grasp of the business domain

Working software

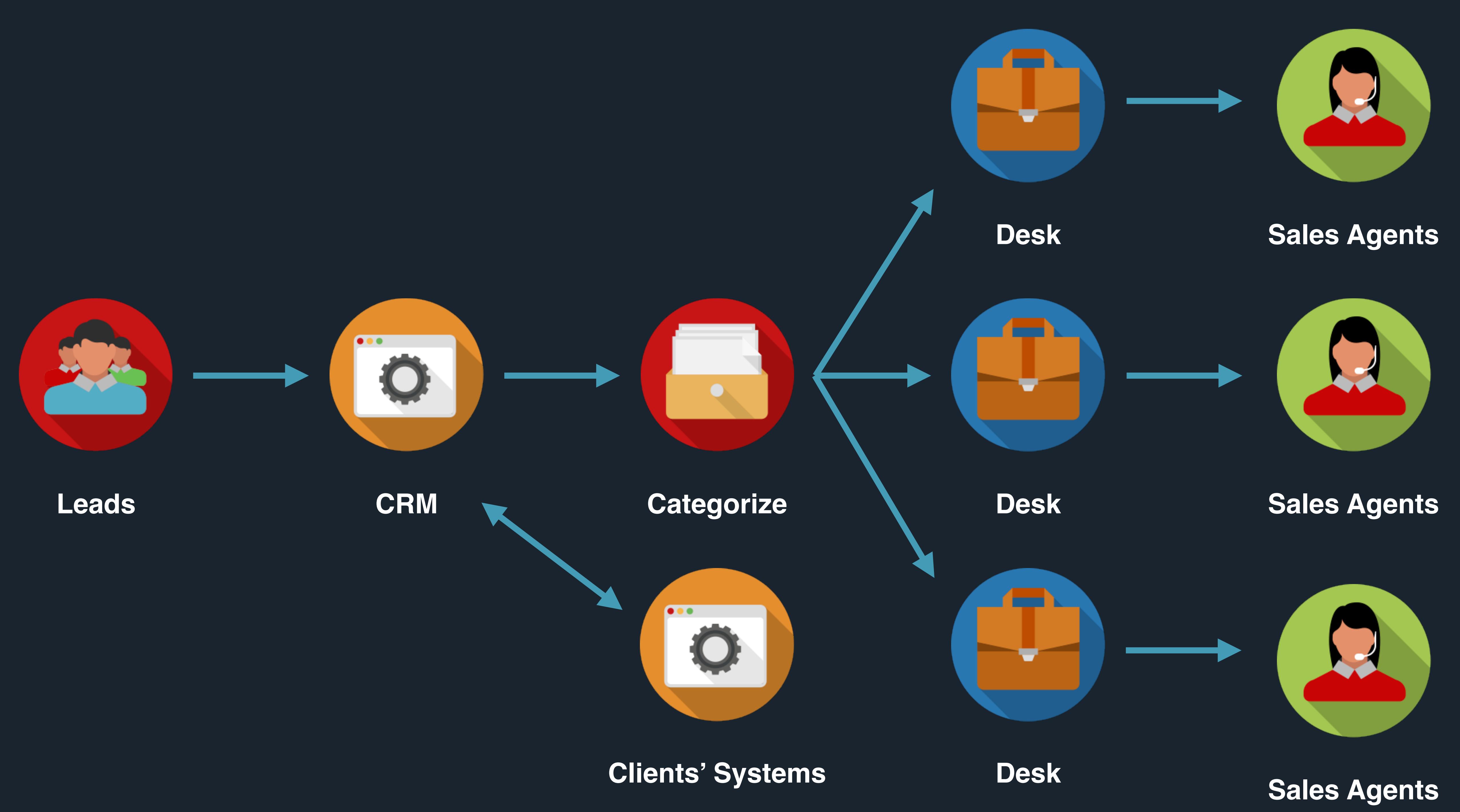
Aggressive time to market

Ubiquitous Language

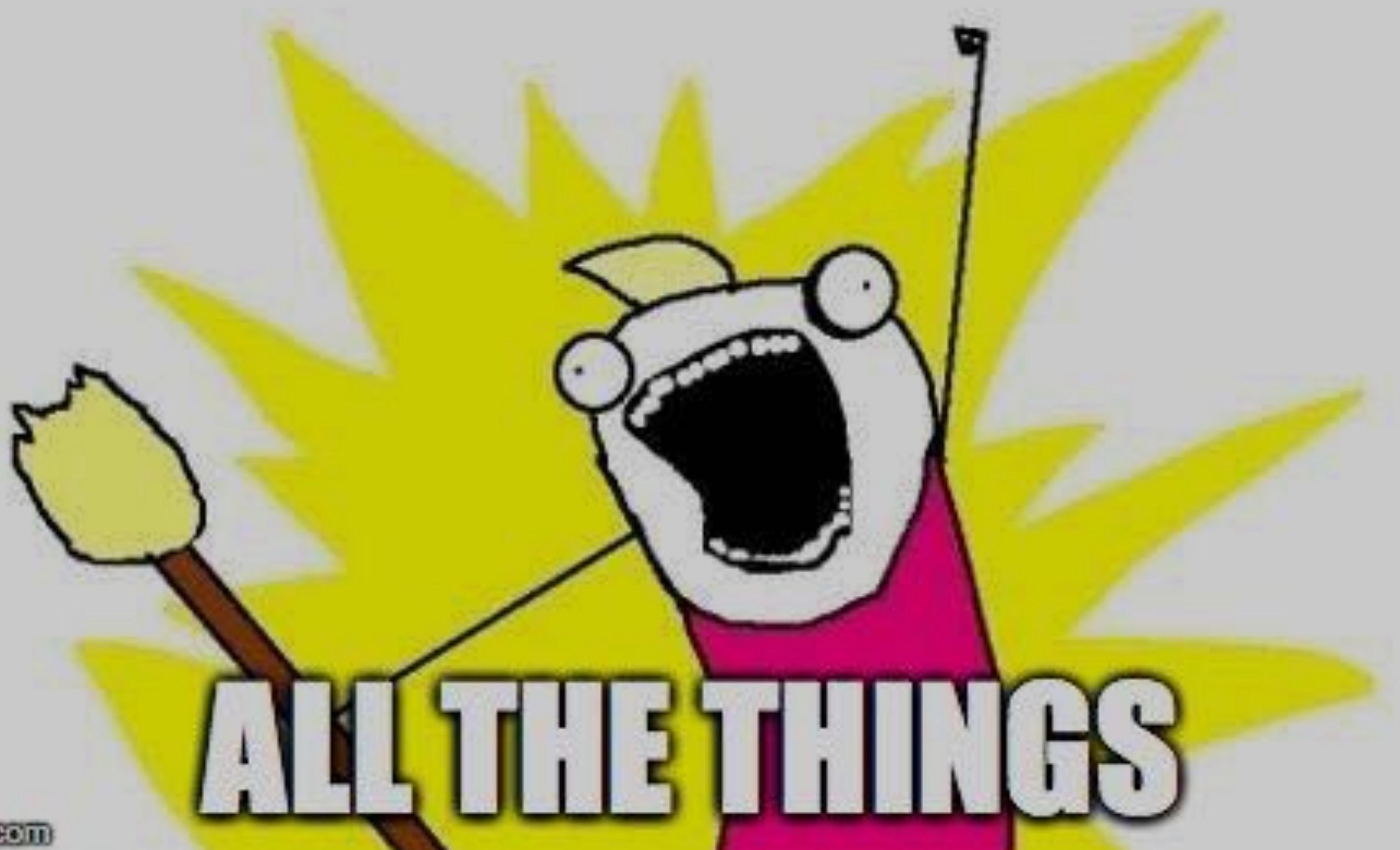


Anemic Domain Model





# OPTIMIZE



**ALL THE THINGS**

Lead qualification

Agent qualification

Agents' commissions

# THE CRM BOUNDED CONTEXT

02

Ubiquitous Language



Anemic Domain Model

Creative	Ad Type	Advertiser	CRM Lead	Organization Unit
Agency	Target Market	Ad Zone	Group	Assignment
Marketing Lead	Group	Contract	Desk	Rank
Publisher	Zone Type	Budget Unit	Qualification	Message
Website	Funnel	Audience	Assessment	On-site Activity
Placement	Marketing Campaign	Visit	CRM Campaign	Brand



.... Lead ....

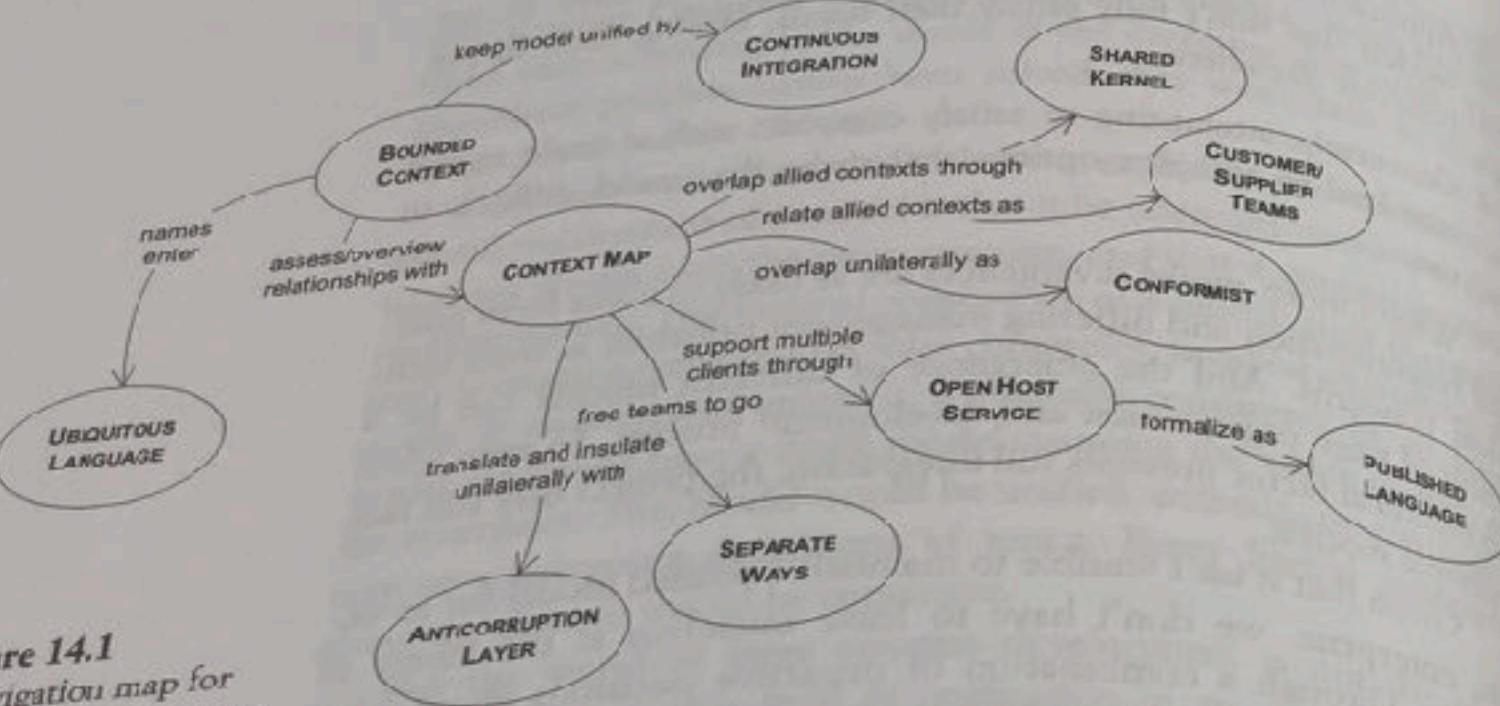


.... Campaign...

Software Developer

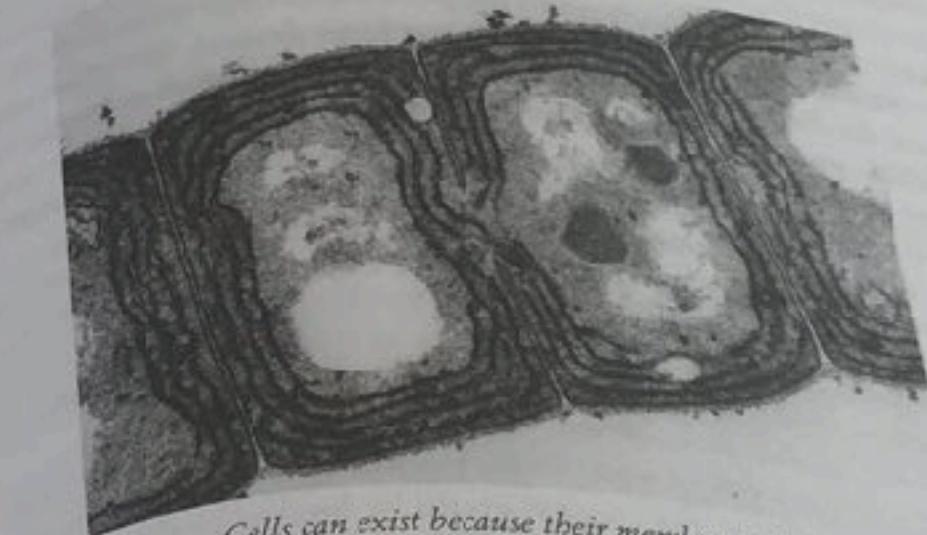
Domain Expert

**Figure 14.1**  
A navigation map for  
model integrity patterns



#### CHAPTER 14: MAINTAINING MODEL INTEGRITY

#### BOUNDED CONTEXT



Cells can exist because their membranes define what is in and out and determine what can pass.

Multiple models coexist on big projects, and this works fine in many cases. Different models apply in different contexts. For example, you may have to integrate your new software with an external system over to everyone as a distinct context where the model under development doesn't apply, but other situations can be more vague and confusing. In the story that opened this chapter, two teams were working on different functionality for the same new system. Were they working on the same model? Their intention was to share at least part of what they did, but there was no demarcation to tell them what they did or did not share. And they had no process in place to hold a shared model together or quickly detect divergences. They realized they had diverged only after their system's behavior suddenly became unpredictable.

Even a single team can end up with multiple models. Communication can lapse, leading to subtly conflicting interpretations of the model. Older code often reflects an earlier conception of the model that is subtly different from the current model.

Everyone is aware that the data format of another system is different and calls for a data conversion, but this is only the mechanical dimension of the problem. More fundamental is the difference in the

#### BOUNDED CONTEXT



Achievement unlocked  
Read the blue book

BOUNDED CONTEXTS  
PROTECT THE LANGUAGE

AGGREGATES PROTECT  
CONSISTENCY OF DATA

Creative	Ad Type	Advertiser	CRM Lead	Organization Unit
Agency	Target Market	Ad Zone	Group	Assignment
Marketing Lead	Group	Contract	Desk	Rank
Publisher	Zone Type	Budget Unit	Qualification	Message
Website	Funnel	Audience	Assessment	On-site Activity
Placement	Marketing Campaign	Visit	CRM Campaign	Brand

# Marketing

Creative	Ad Type	Advertiser
Agency	Target Market	Ad Zone
Lead	Group	Contract
Publisher	Zone Type	Budget Unit
Website	Funnel	Audience
Placement	Campaign	Visit

# CRM

Lead	Organization Unit
Group	Assignment
Desk	Rank
Qualification	Message
Assessment	On-site Activity
Campaign	Brand

# Aggregates will:

- Protect transactional boundaries
- Encompass business logic and invariants

Infrastructure

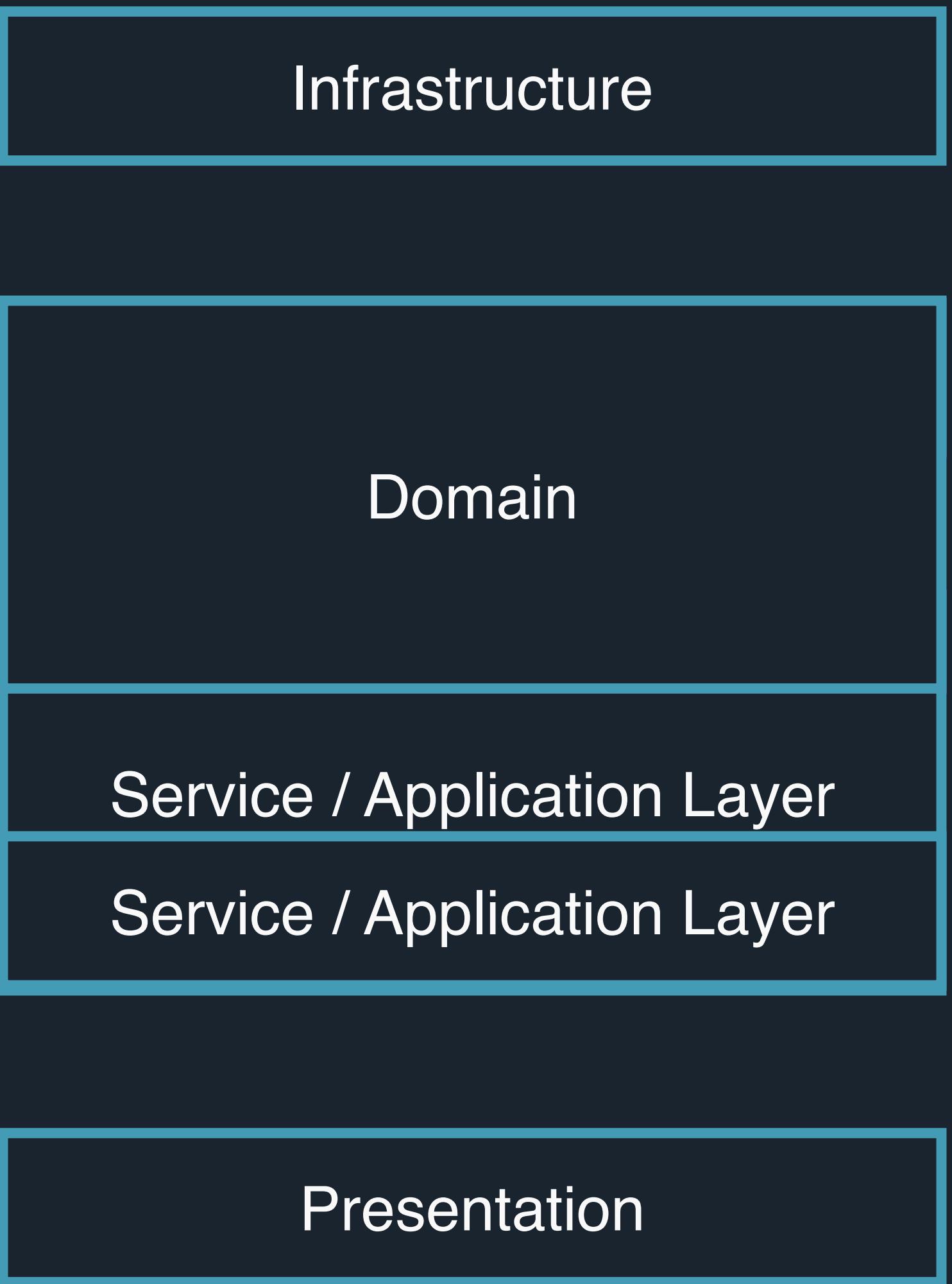
Domain

Service / Application Layer

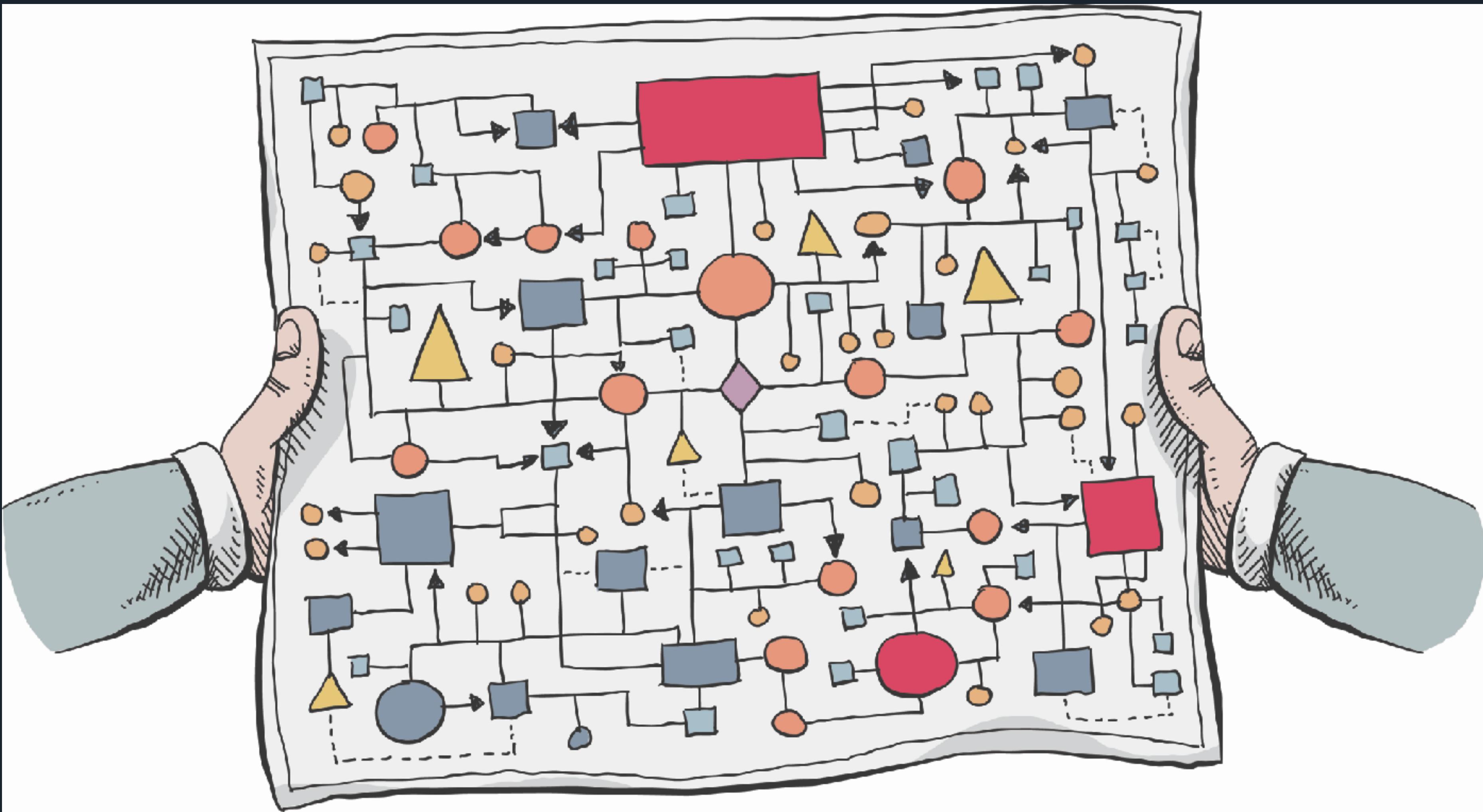
Presentation

# Aggregates will:

- Protect transactional boundaries
- Encompass business logic and invariants



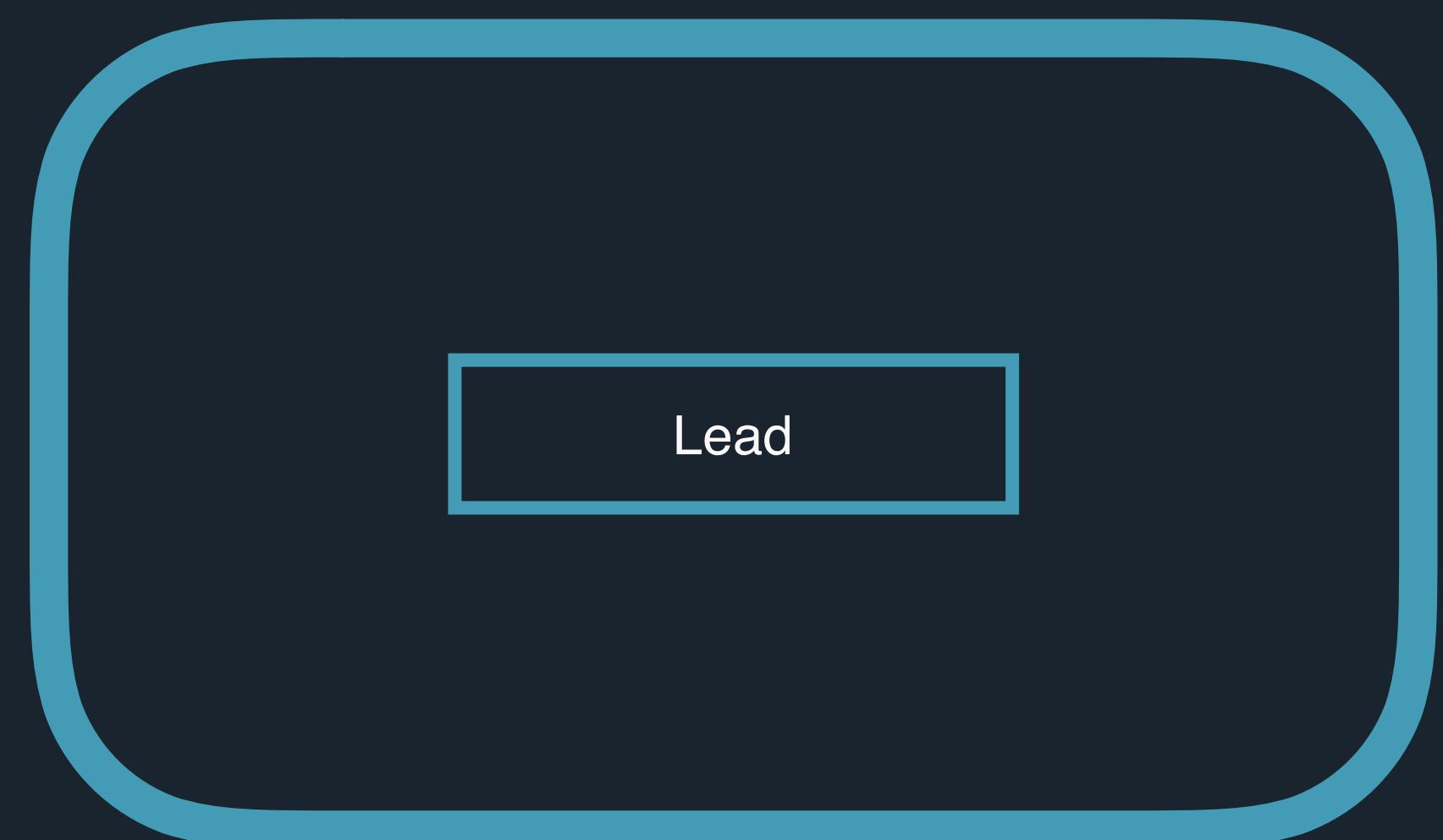






**Stored  
procedures???**







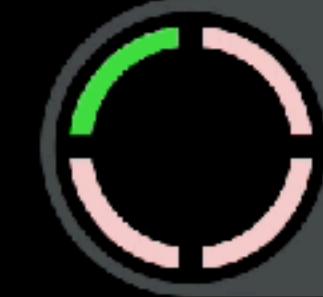
Lead



CRM Team



DBA Team



Achievement unlocked  
Pwned by the Conway's Law

Inconsistent models

No shared understanding

Duplication of knowledge

Went out of sync quickly

**NIGHTMARE**

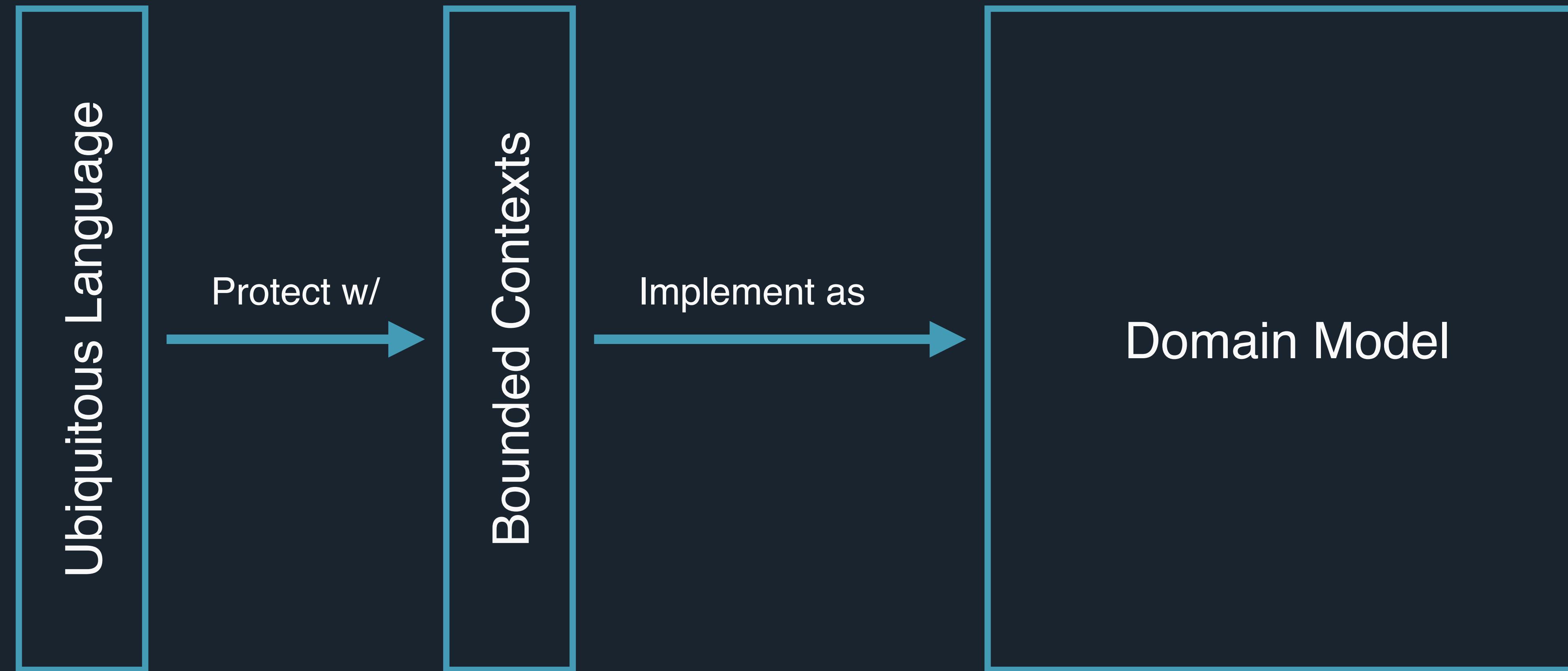
Wasn't delivered on time

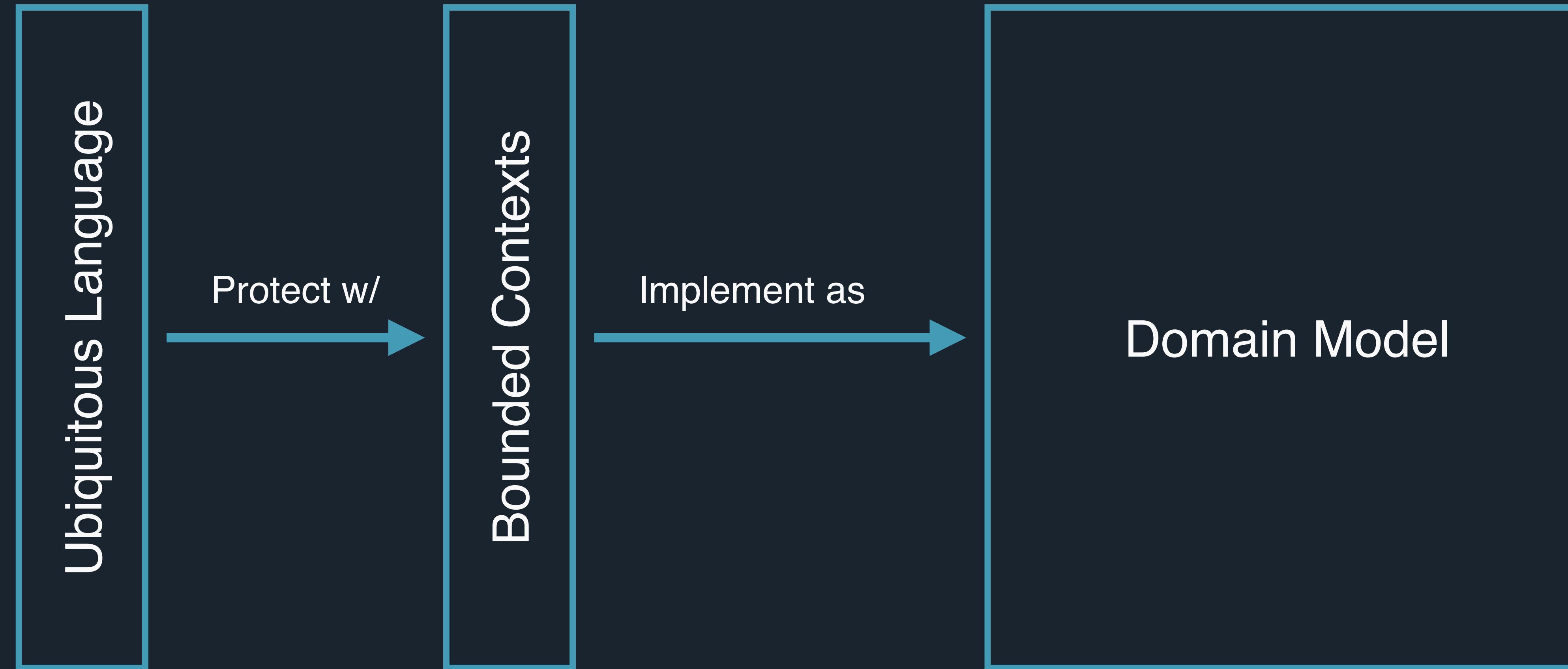
Production issues

Data corruption

**Thrown away and reimplemented**







...Dude, where are Sub-Domains?



Not all of a large system will be well designed

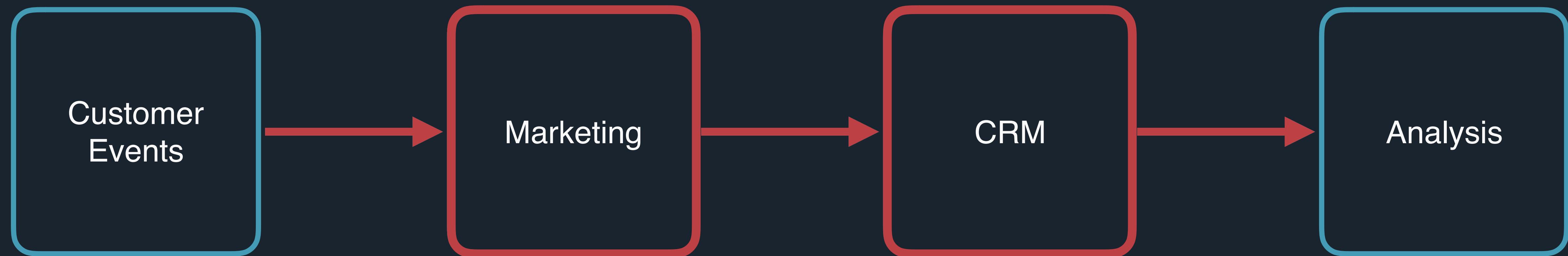
“

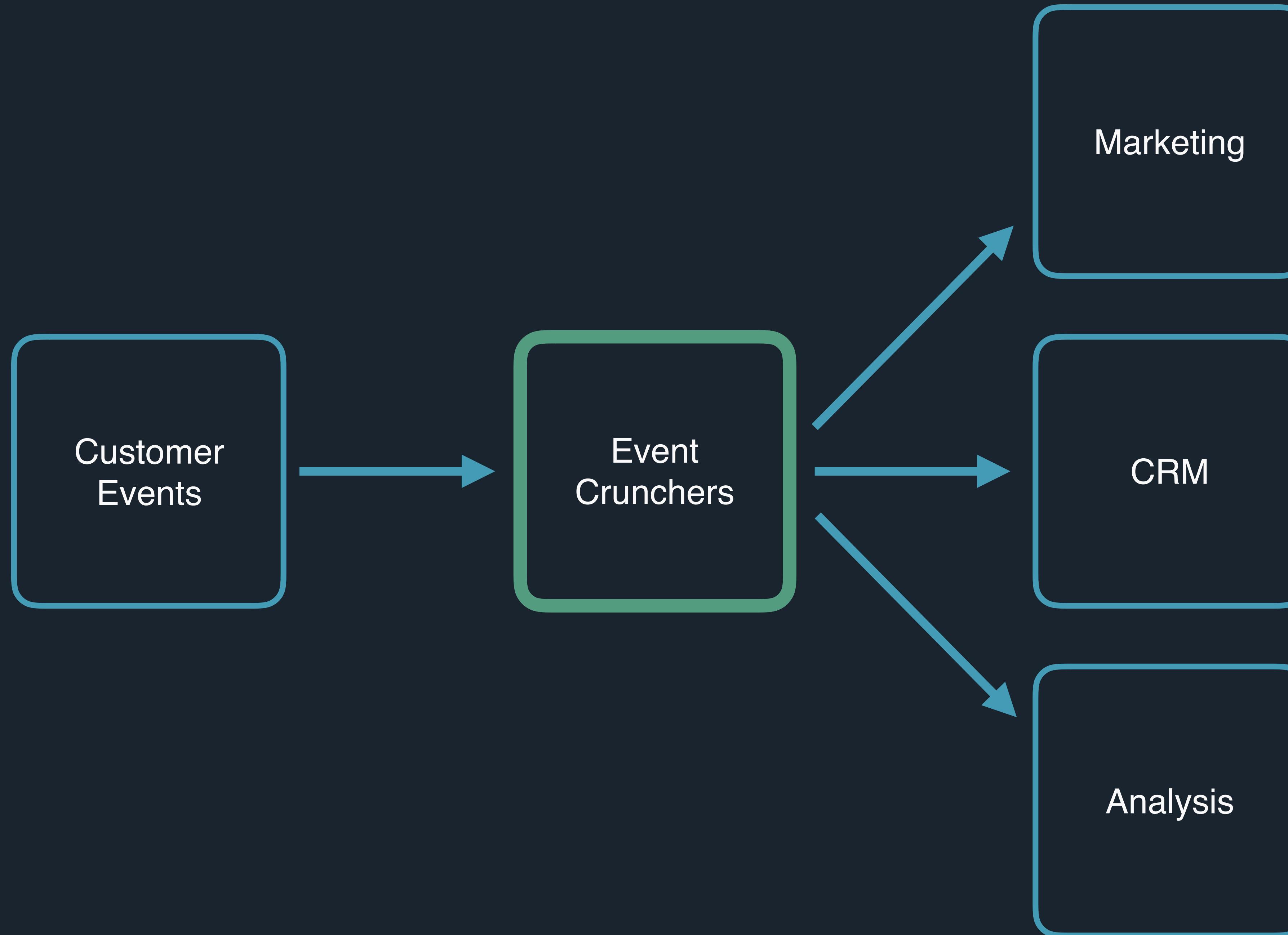
Eric Evans

# THE CRUNCHERS

## BOUNDED CONTEXT

03





Competitive advantage? - No

Off-the-shelf solution? - No

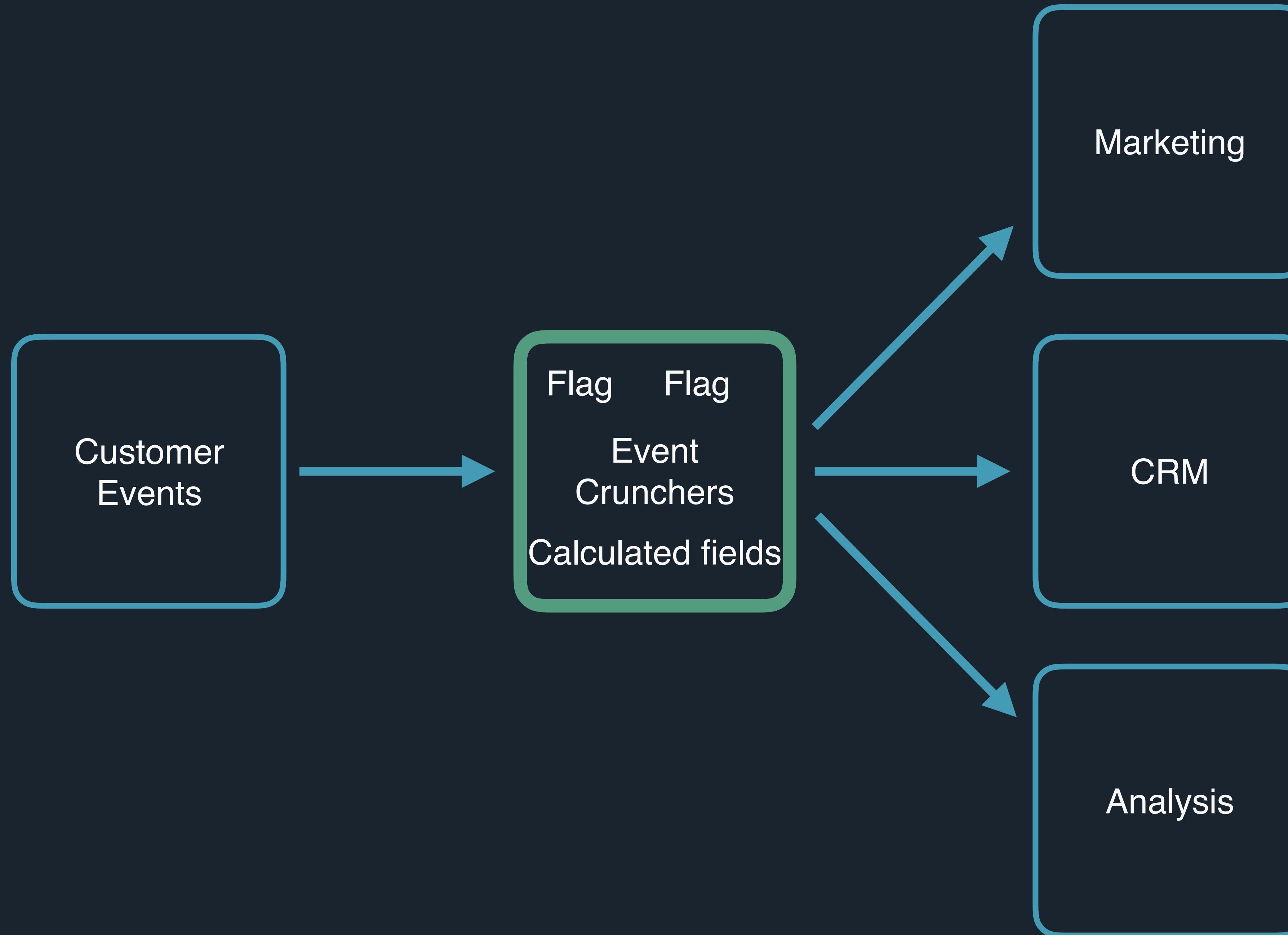
=> Supporting sub-domain

Layered Architecture

Transaction Script

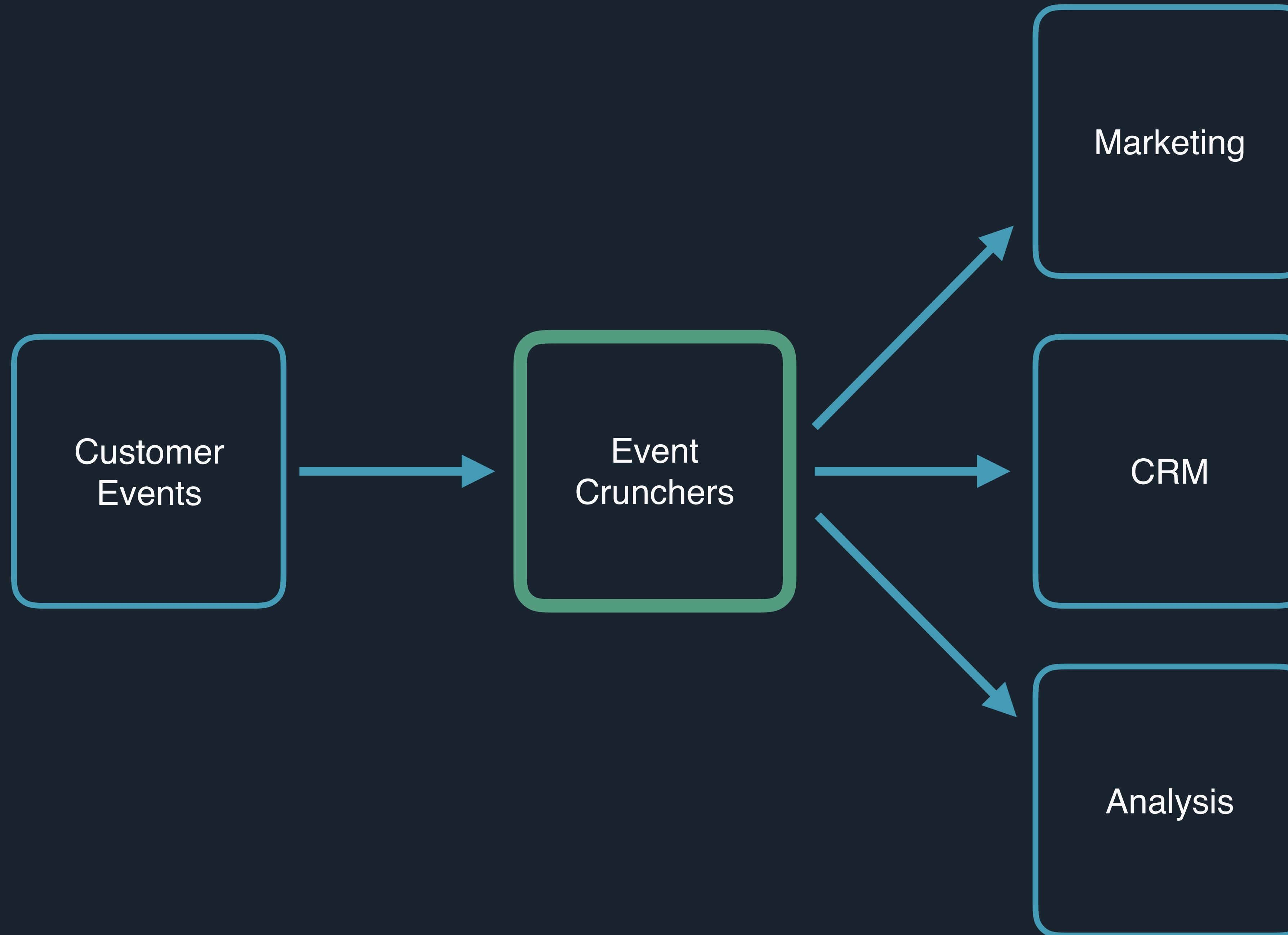
Worked

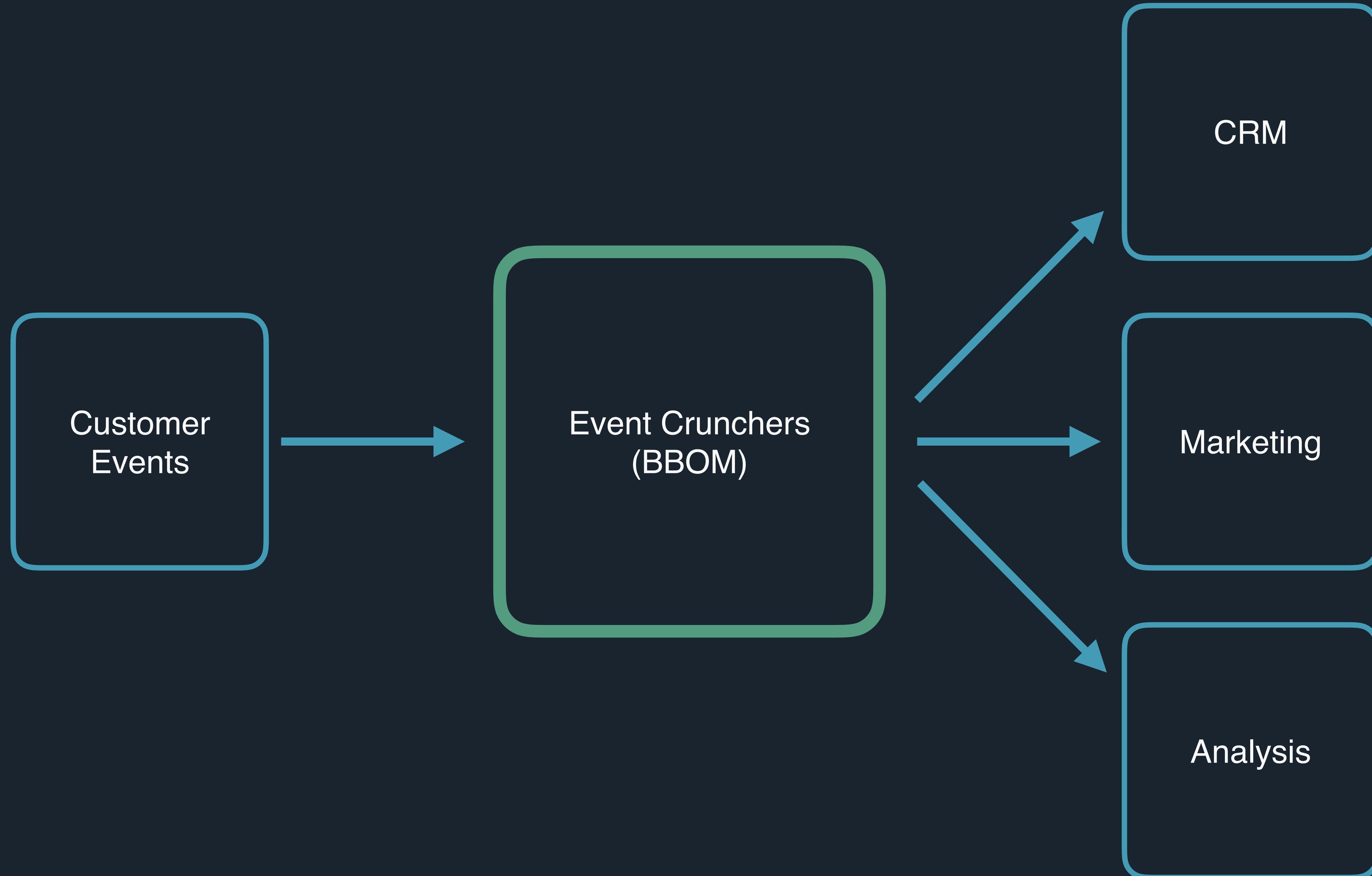
.... for a while

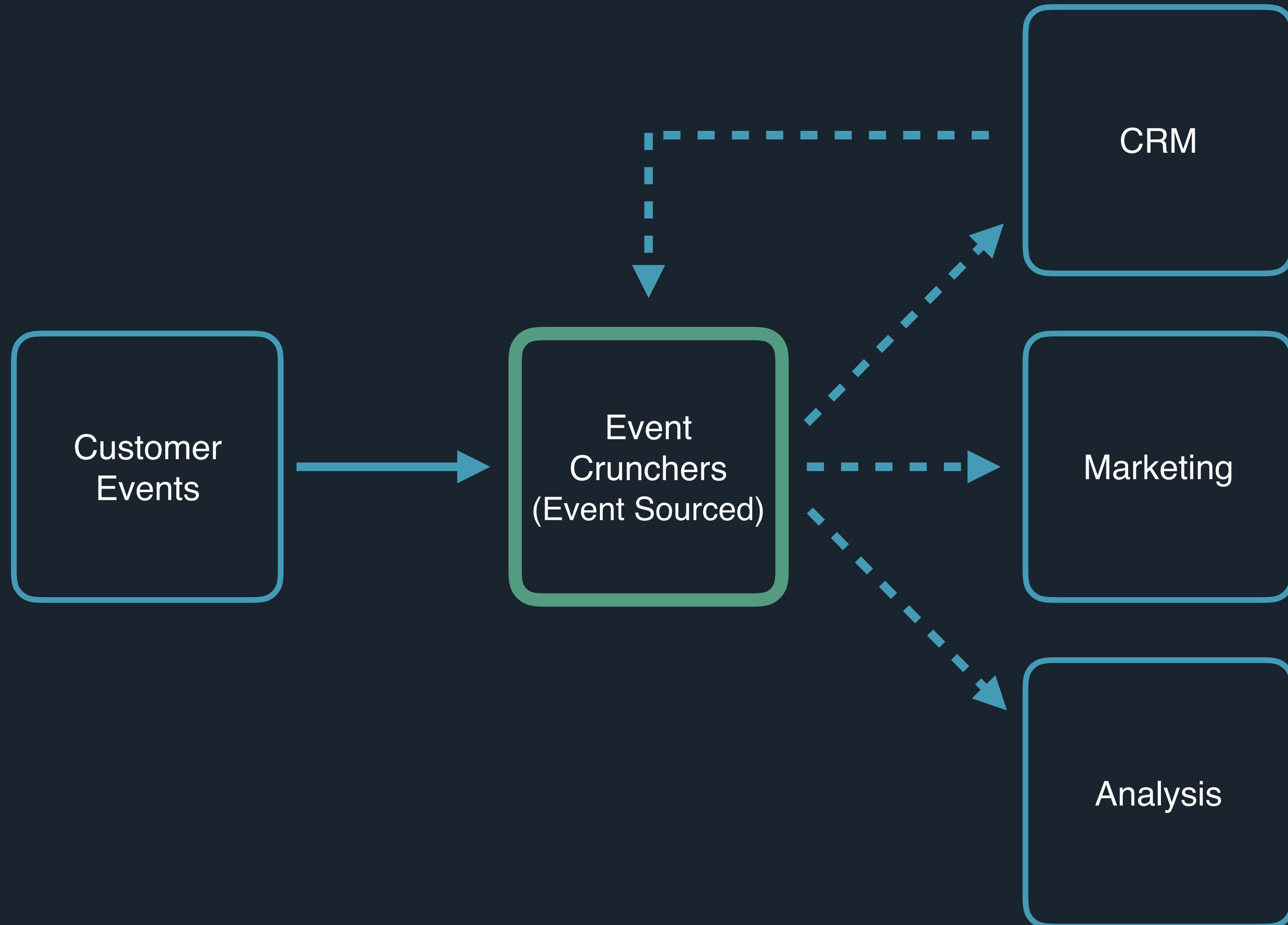




kiszkloszki







# THE BONUSES BOUNDED CONTEXT

04



Competitive advantage? - No

Off-the-shelf solution? - No

=> Supporting sub-domain

Infrastructure

Active Record

Service / Application Layer

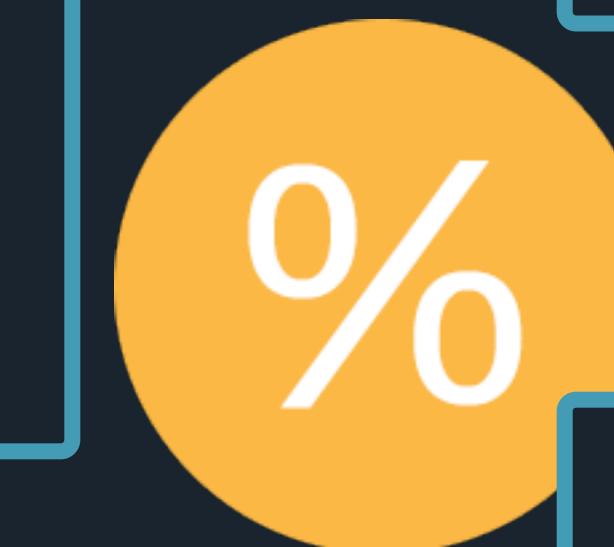
Presentation

Let's try different percentages

No, what if the percentage is a function of  
number of sales?

Sales

But we will upgrade the percentage if there  
are more than X sales per month!



Commission

What if the percentage could be a function of  
a price?



No, no, the percentage will be a function  
both of number of sales and sale amount

And another upgrade if there are more than Y  
sales per week!

Infrastructure

BIG BALL OF MUD

Presentation

## Event Crunchers

## Bonuses

Infrastructure

Transaction Script

Service / Application Layer

Presentation

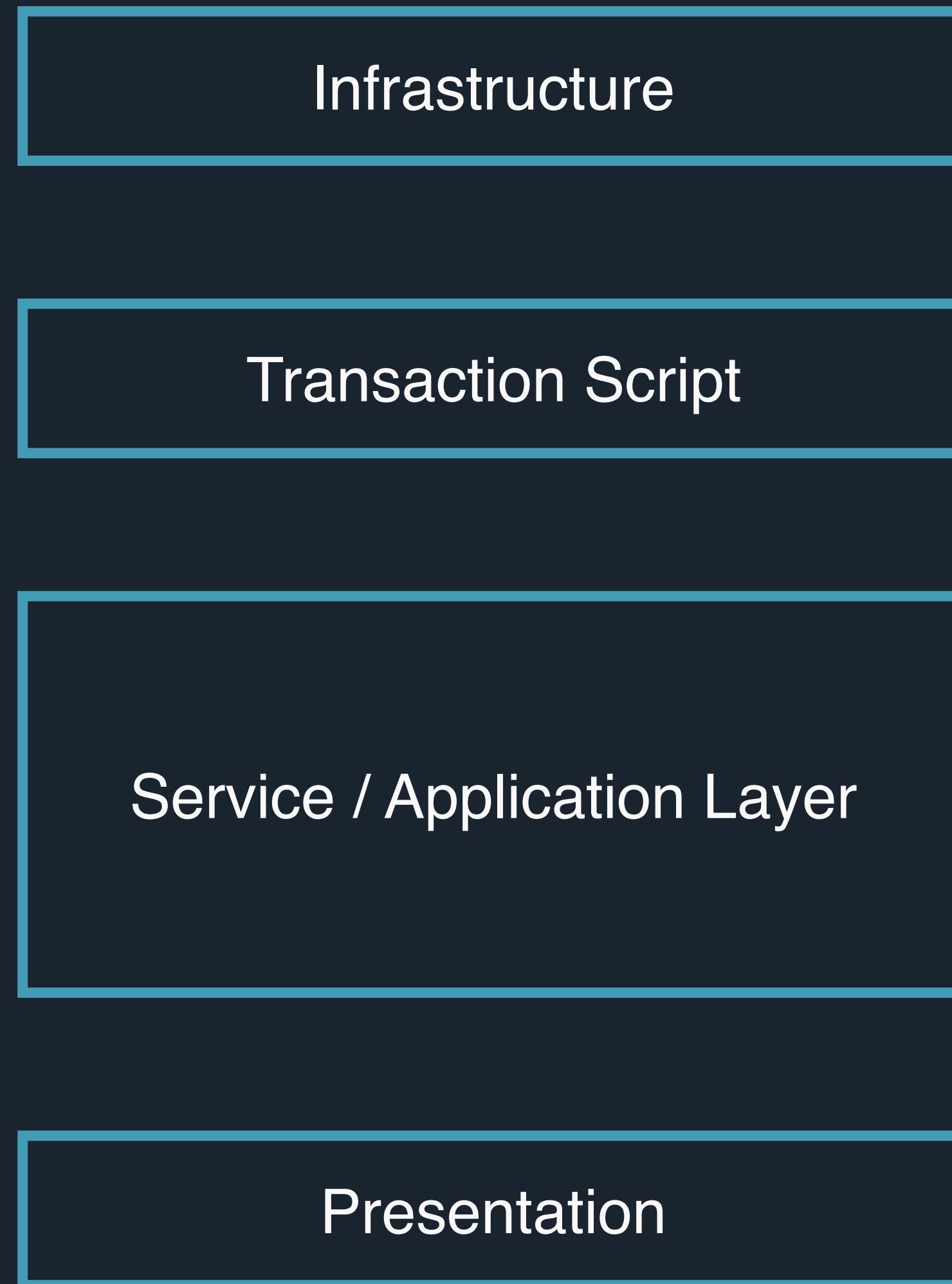
Infrastructure

Active Record

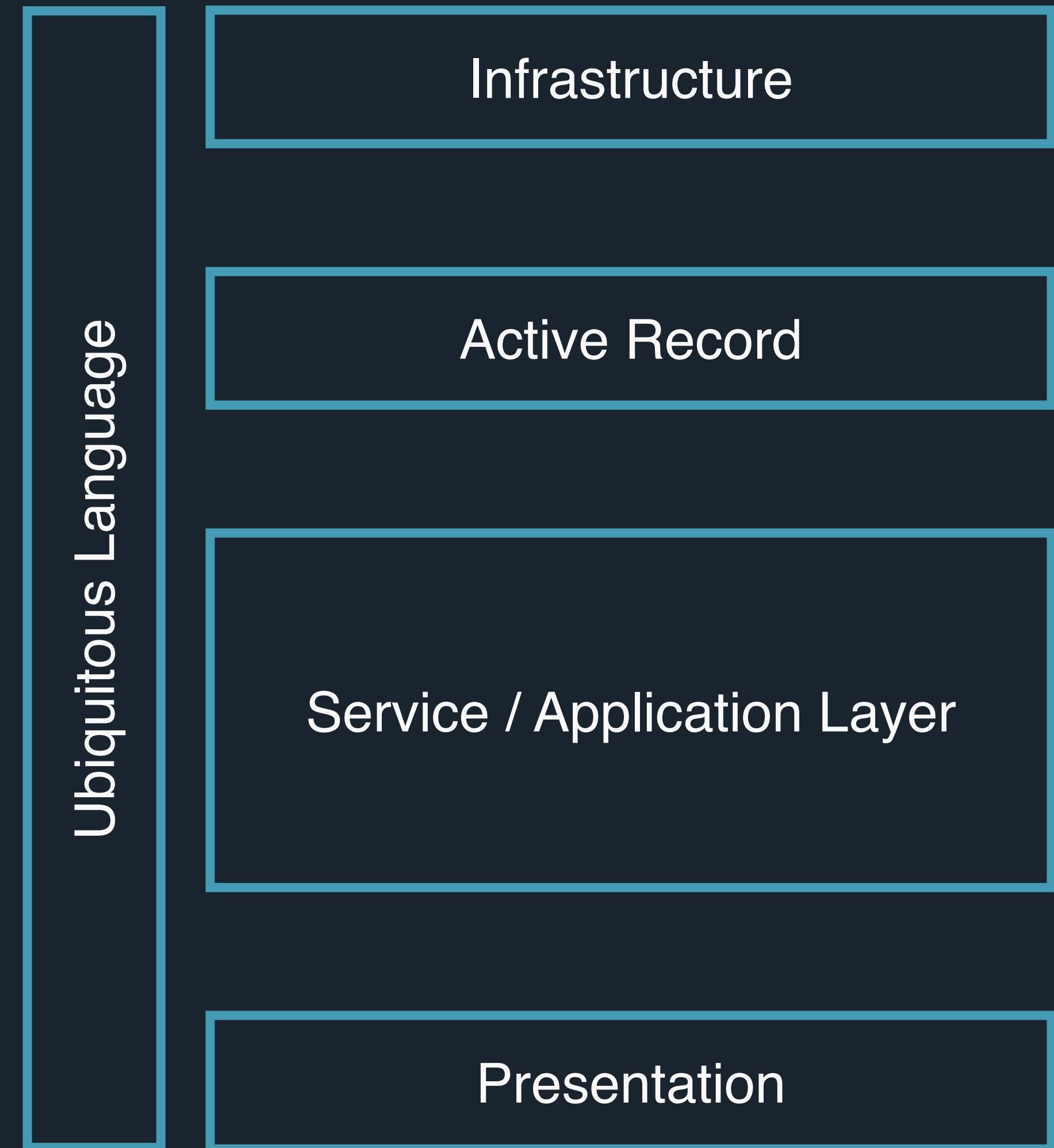
Service / Application Layer

Presentation

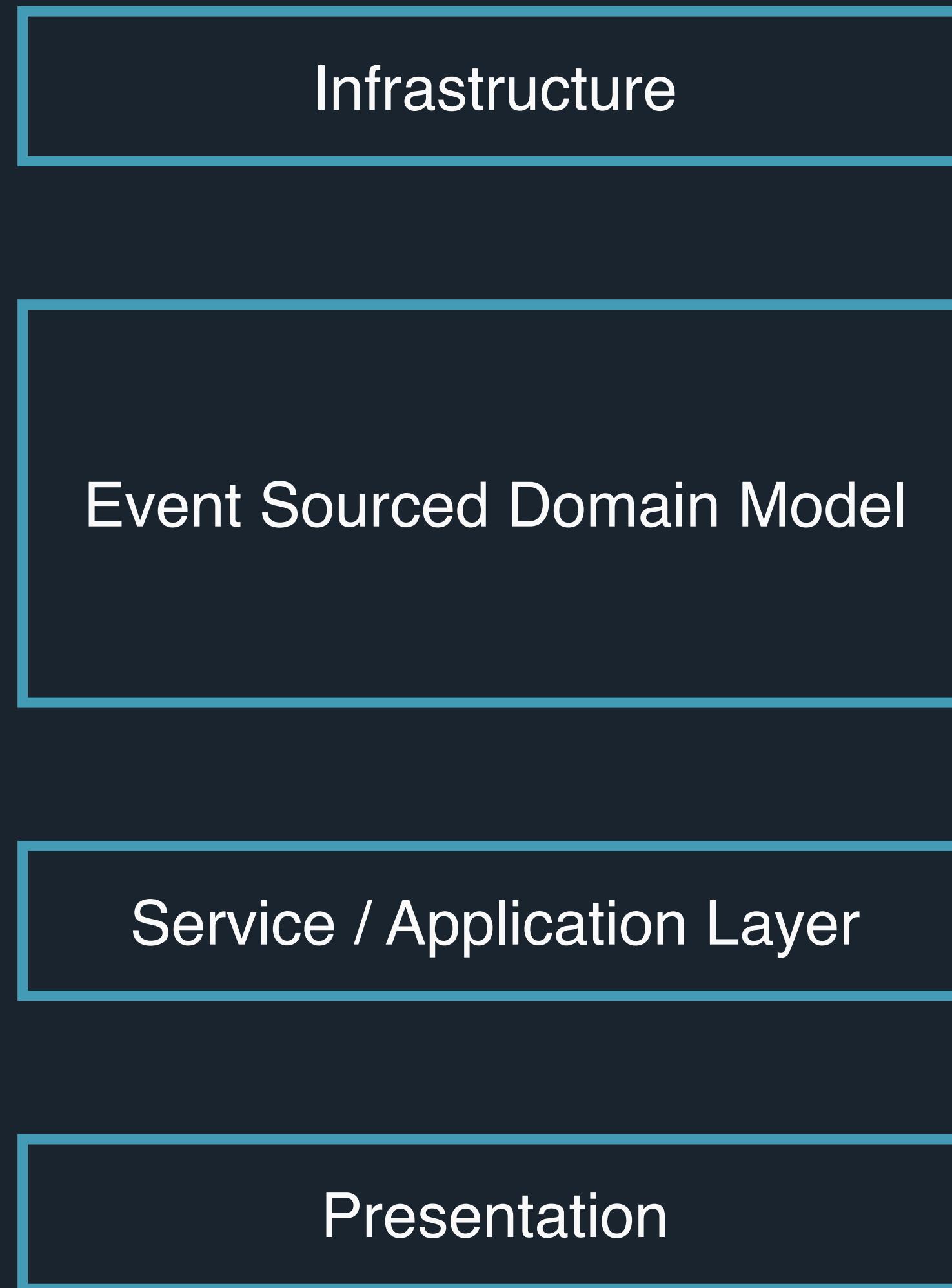
## Event Crunchers



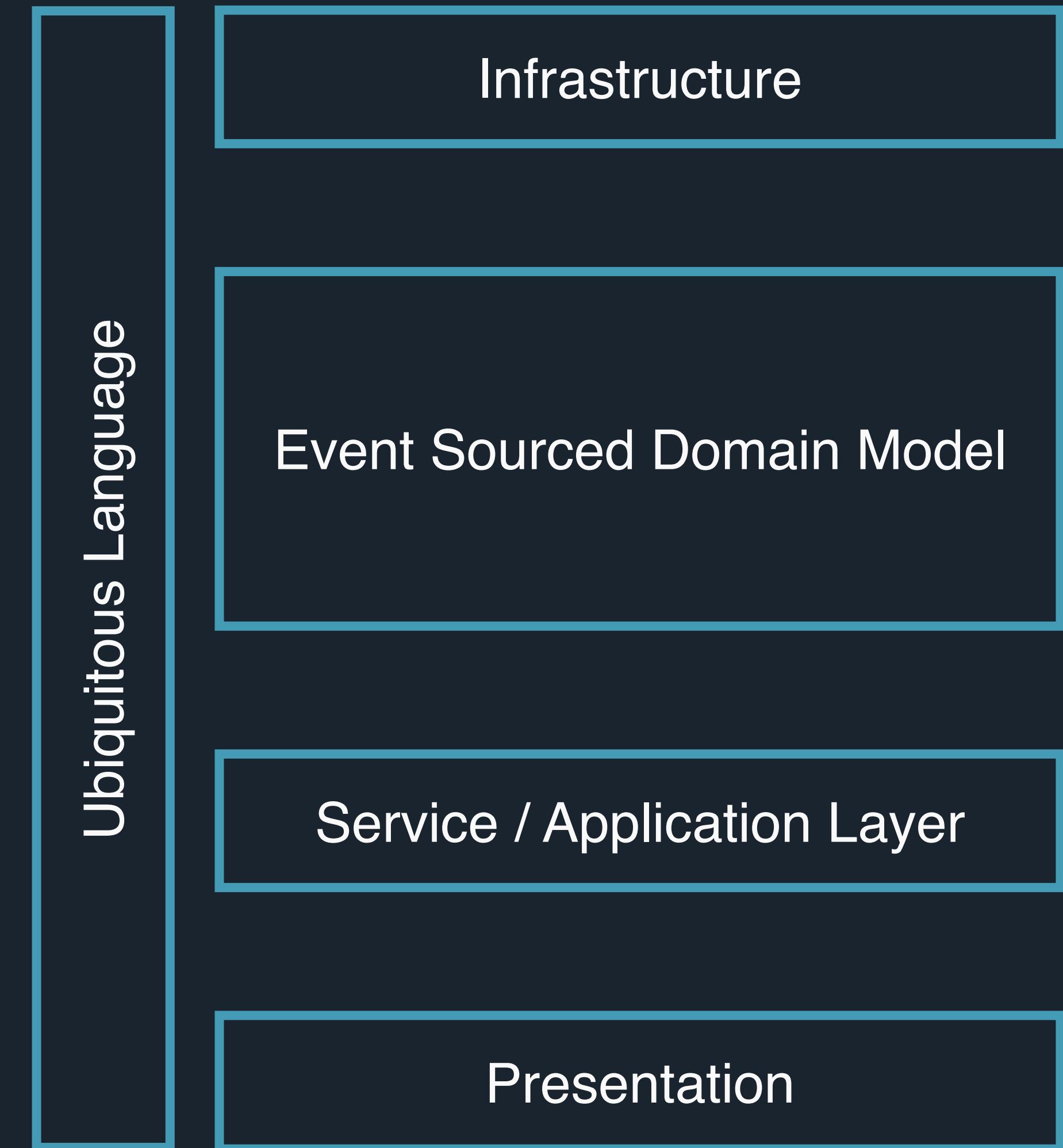
## Bonuses

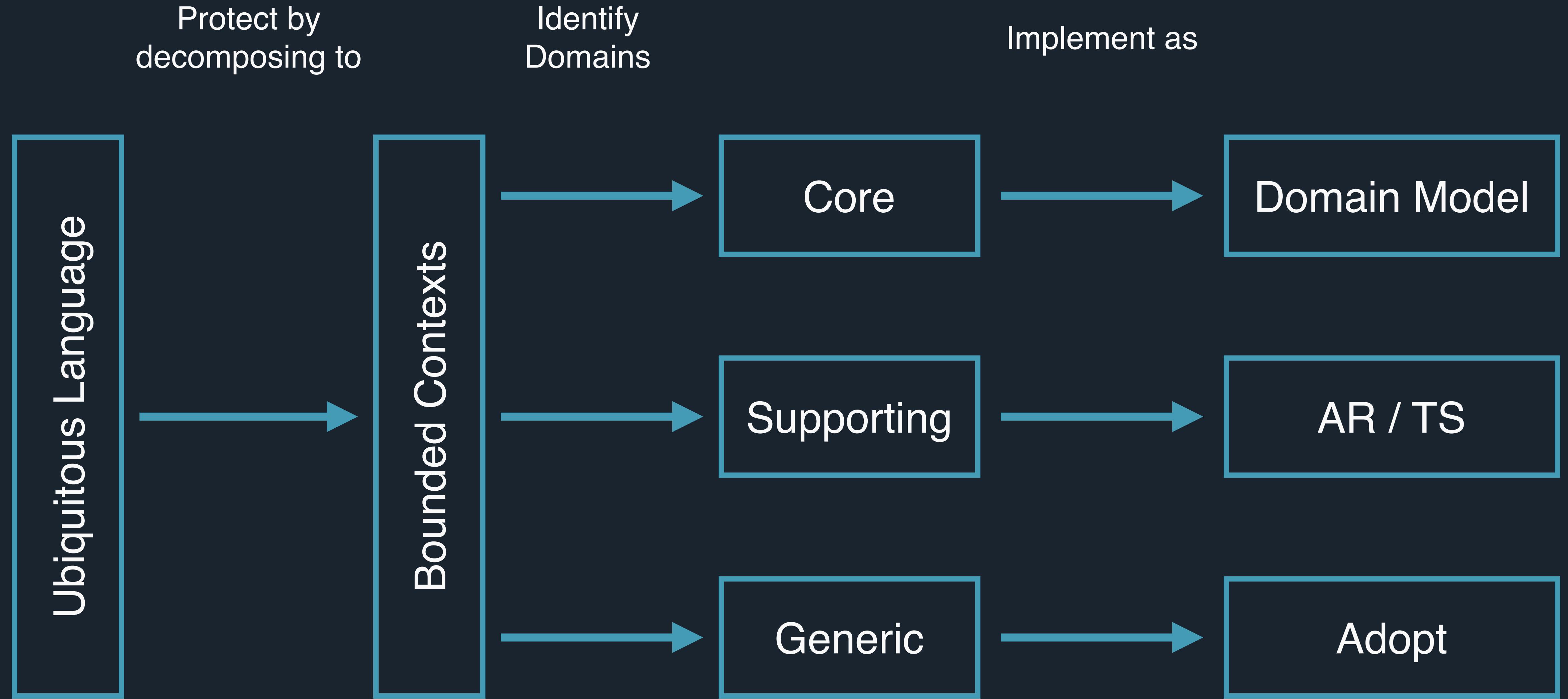


## Event Crunchers



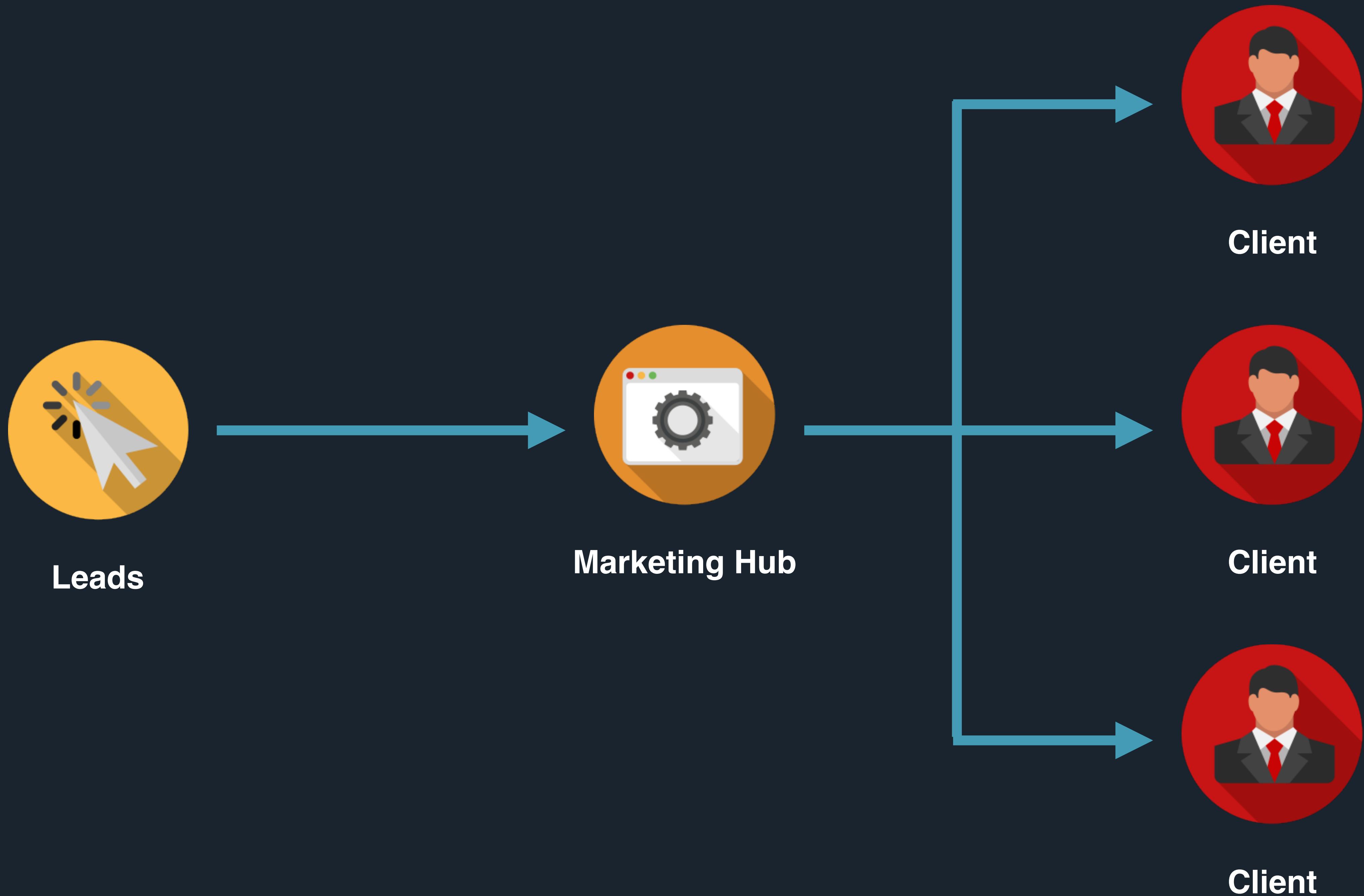
## Bonuses





# THE MARKETING HUB BOUNDED CONTEXT

05



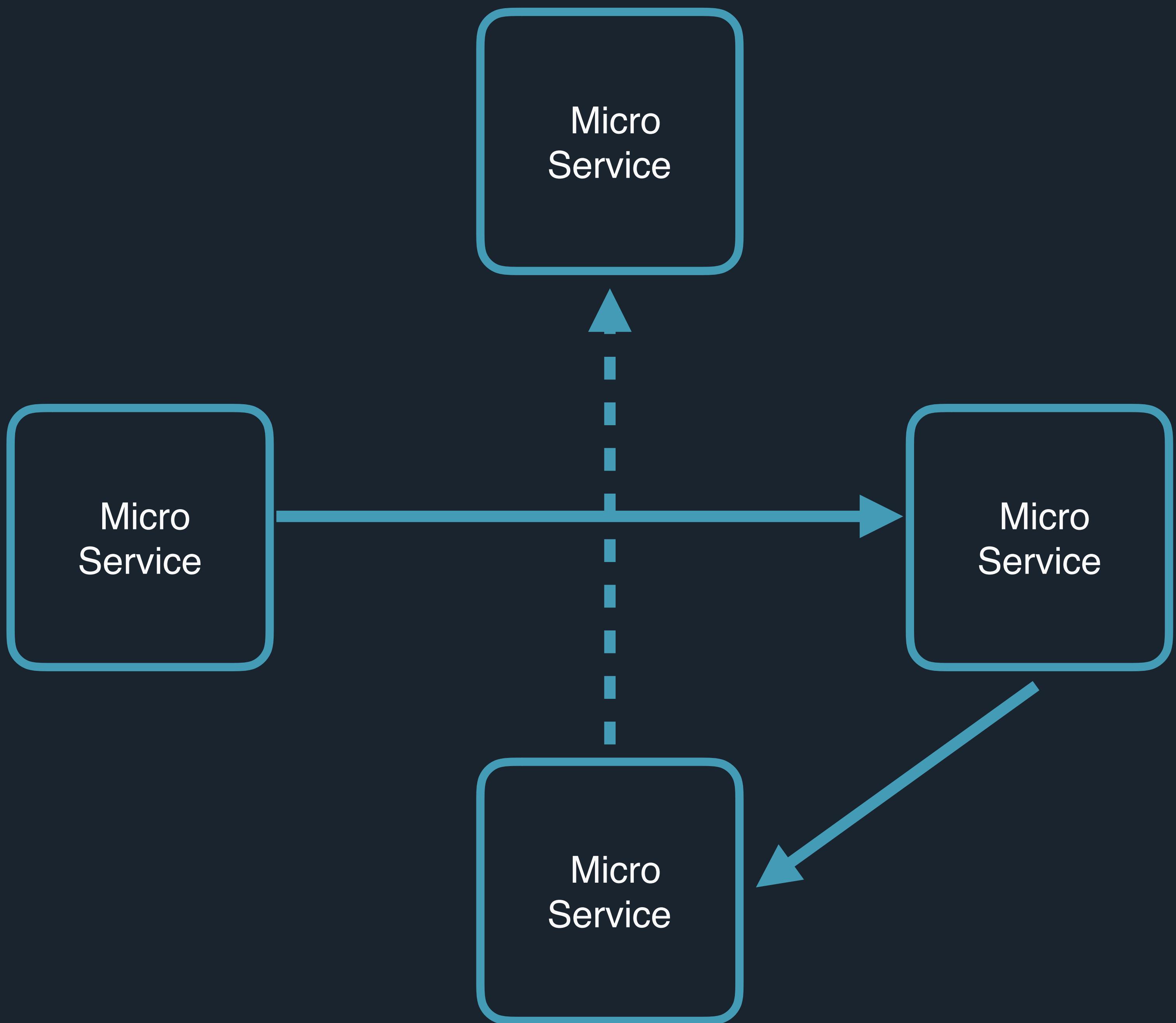
Competitive advantage? - Yes

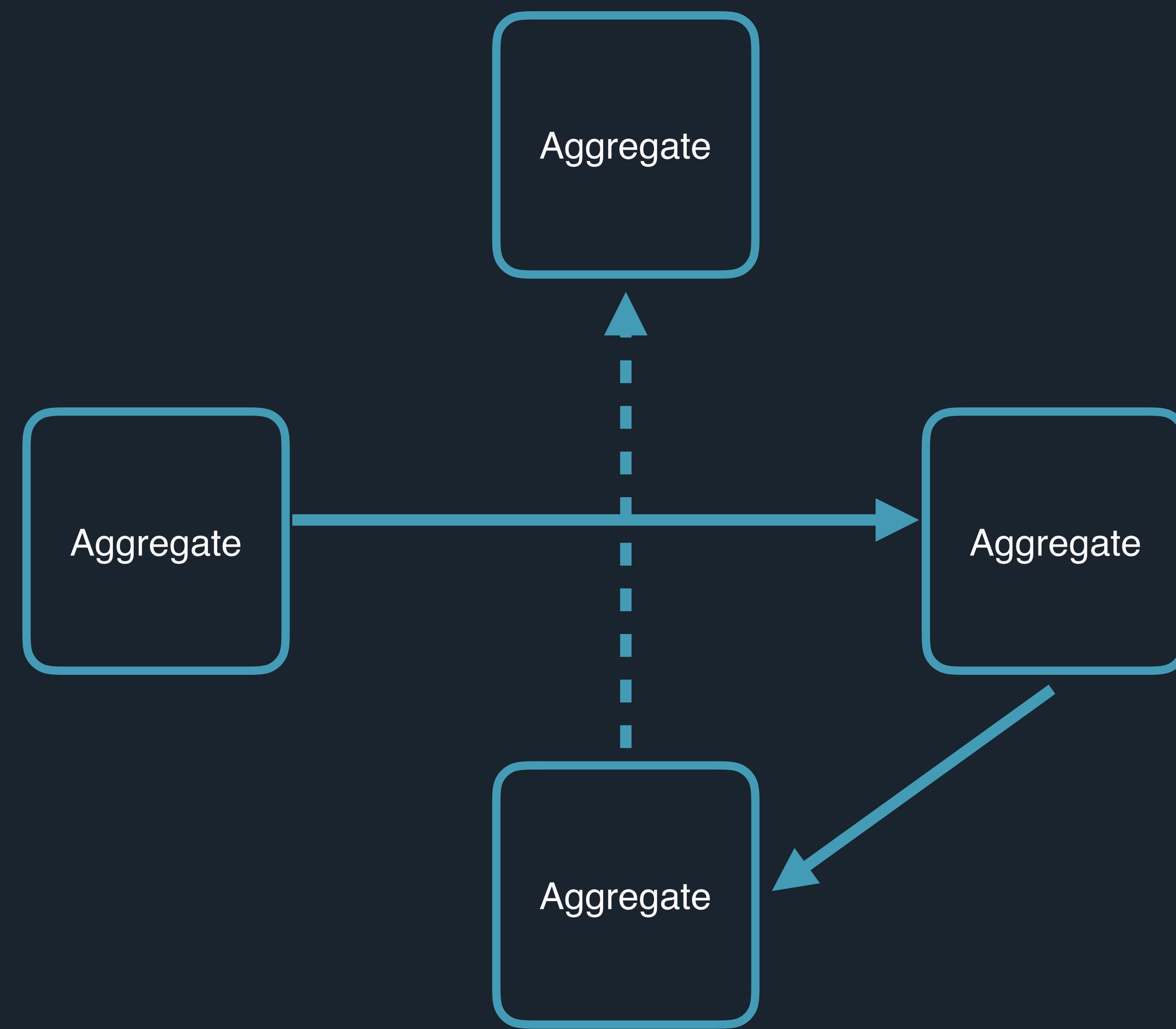
=> Core Domain

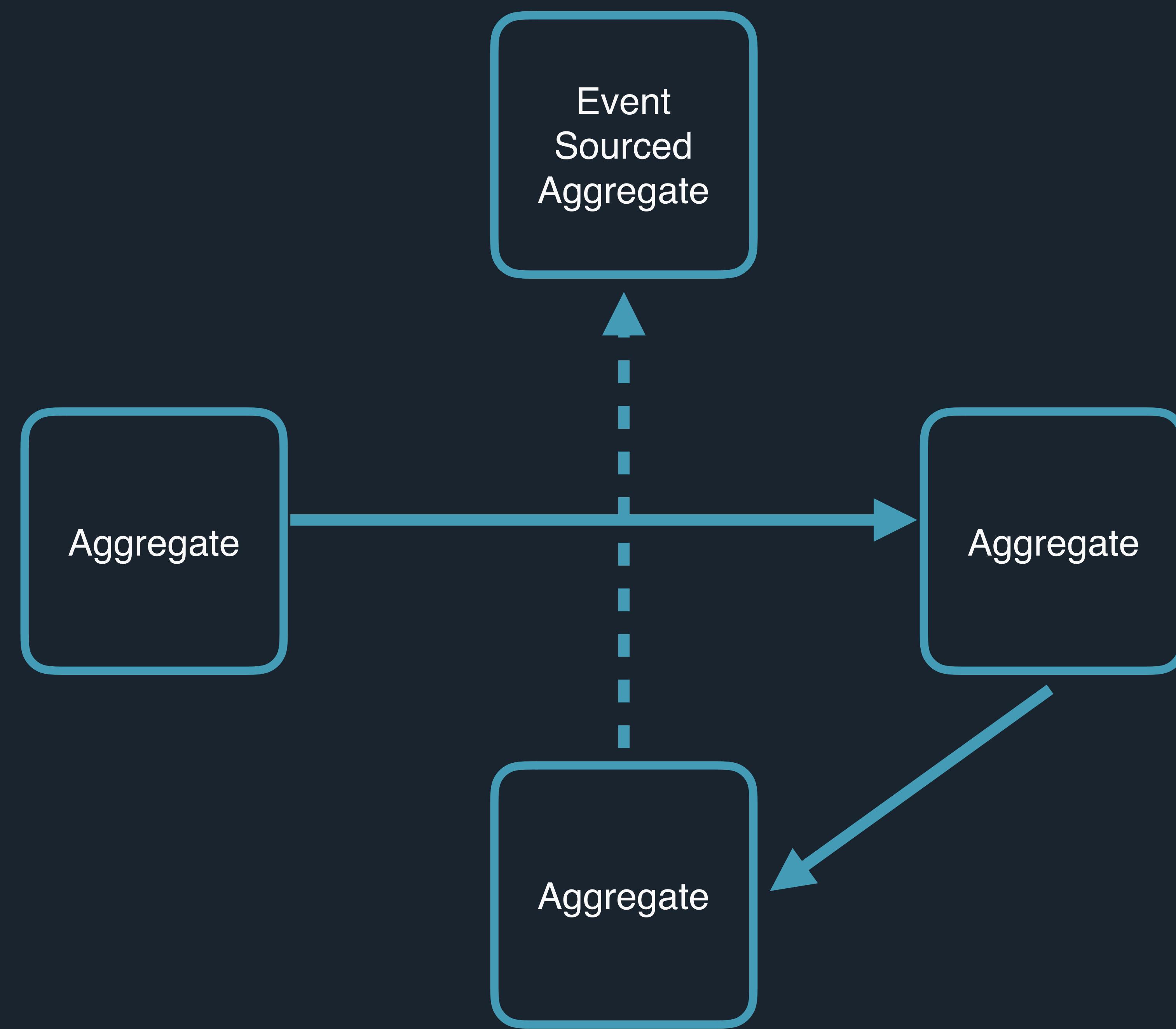
Event Sourced Domain Model

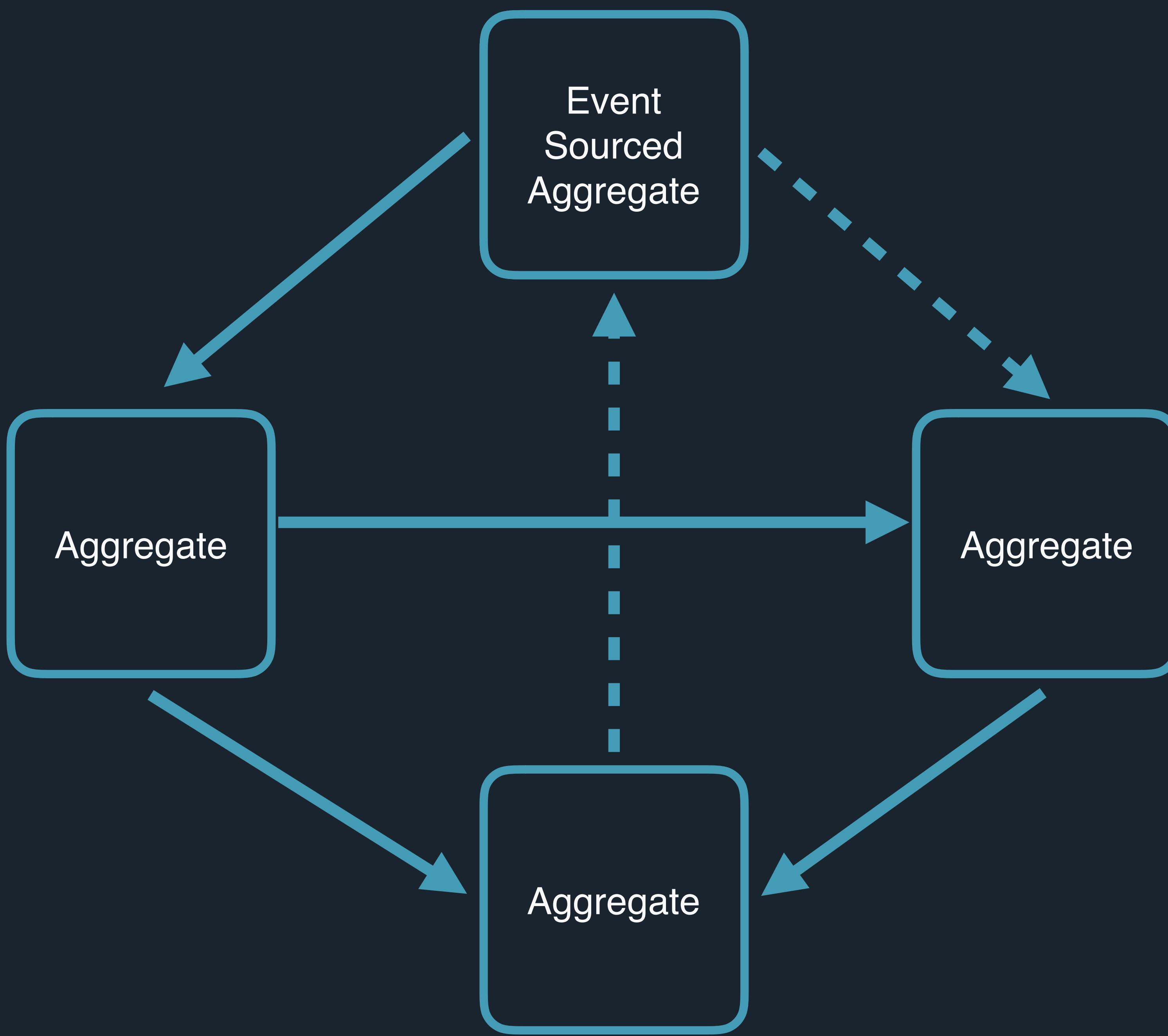
CQRS

Microservices





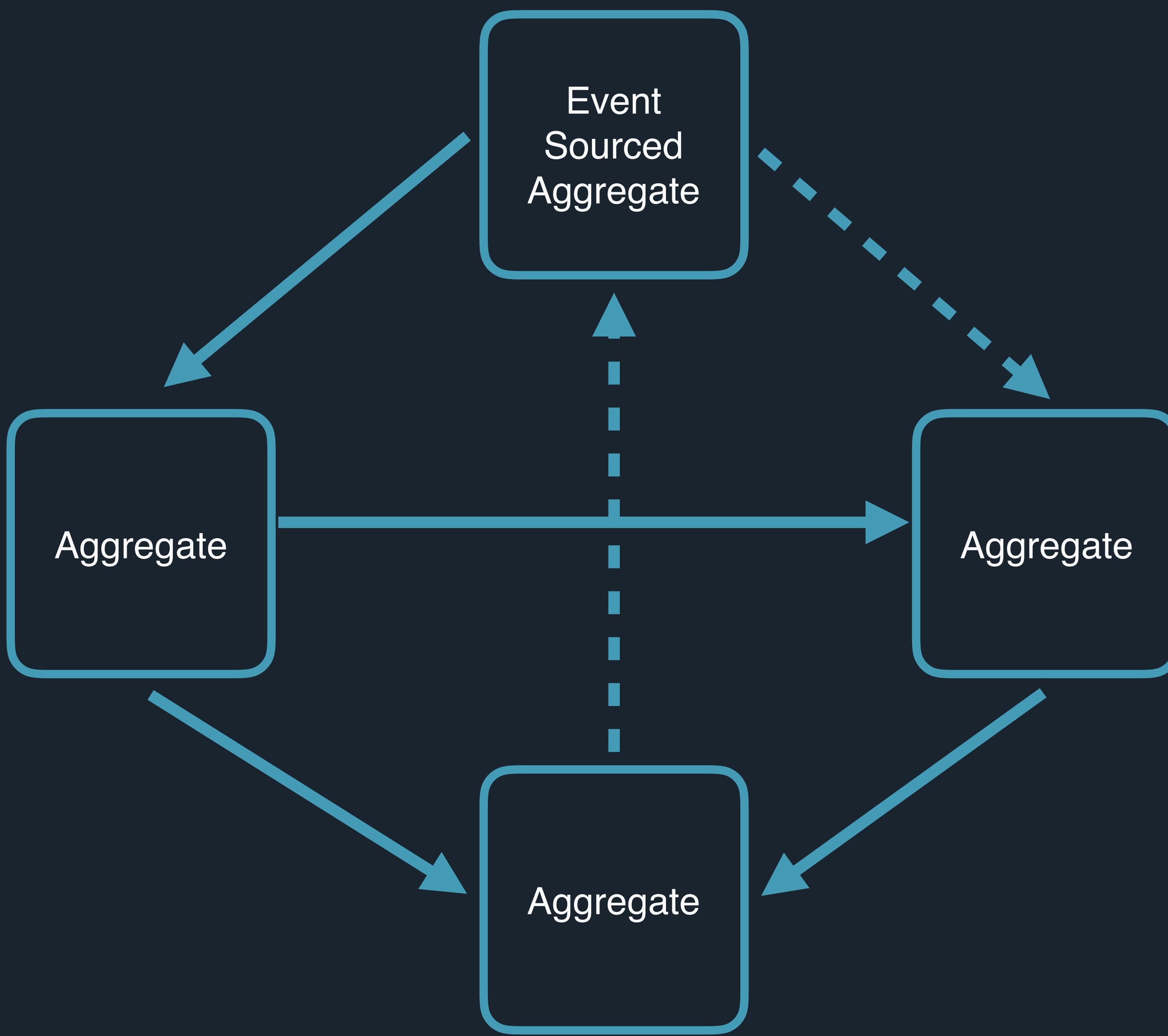




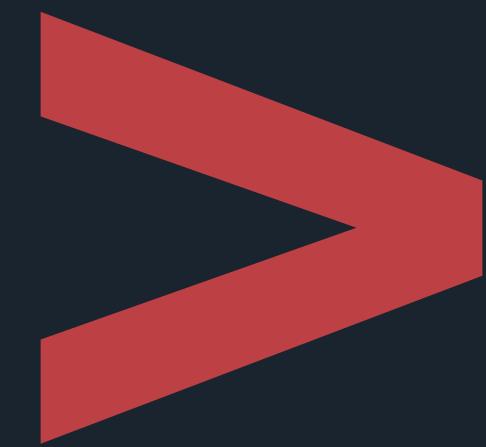
Event Sourced Domain Model

CQRS

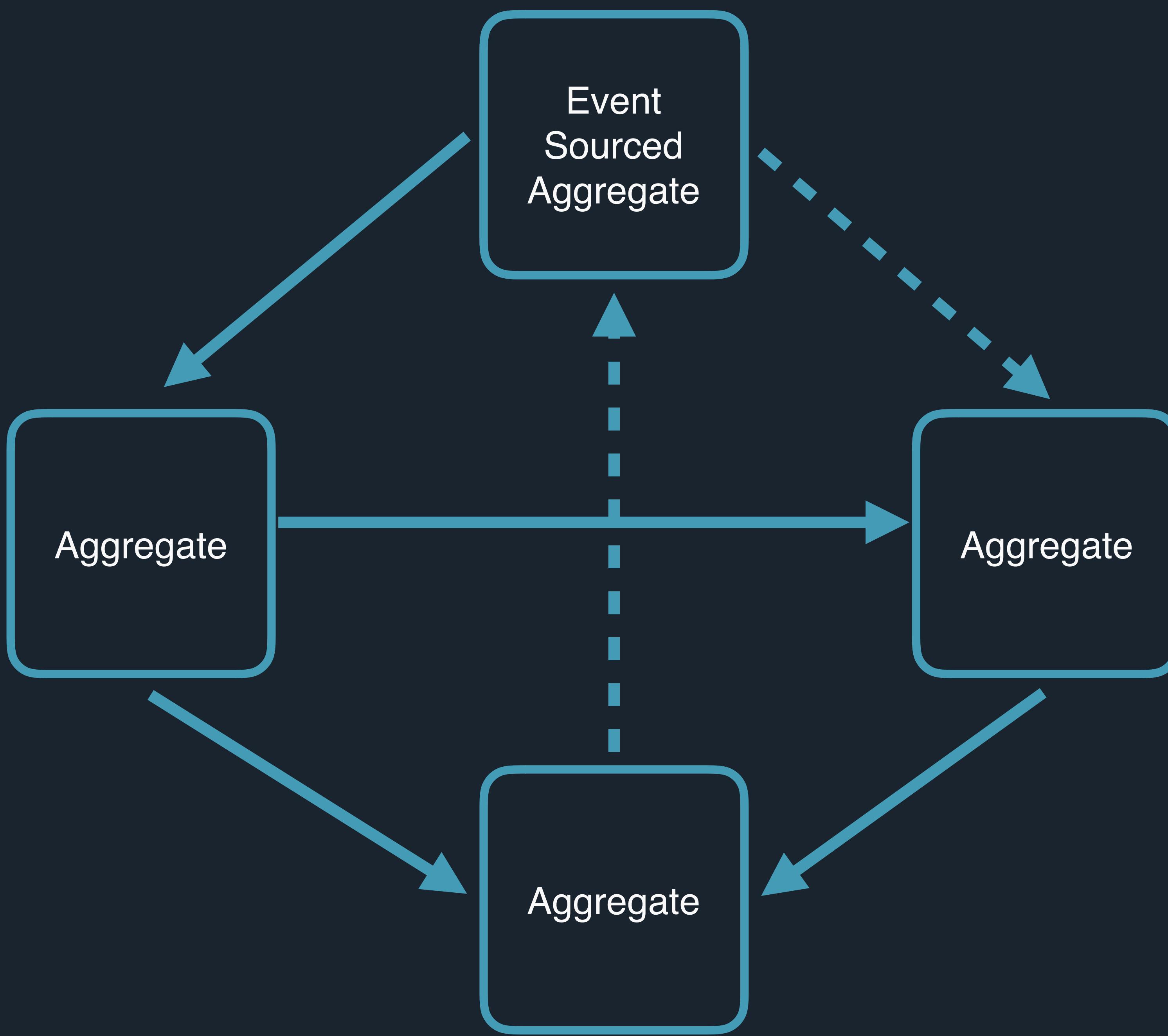
Microservices



TECHNICAL  
COMPLEXITY



BUSINESS  
COMPLEXITY





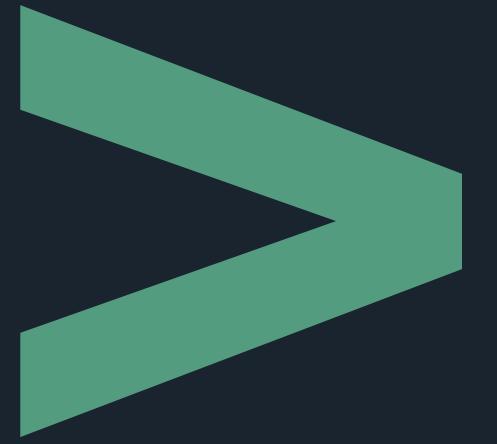
**WHAT  
WE HAVE  
LEARNED**

# UBIQUITOUS LANGUAGE

01

# Ubiquitous Language: The Core Domain of Domain-Driven Design

UBIQUITOUS  
LANGUAGE



DOCUMENTS  
TESTS  
JIRA

# Marketing

- ✓ Ubiquitous Language
- ✓ Business goals achieved

# Event Crunchers

- Ubiquitous Language
- Big ball of mud

# CRM

- Ubiquitous Language
- Production issues
- Long and painful refactoring

# Bonuses

- ✓ Ubiquitous Language
- ✓ Refactored in time

Invest in the Ubiquitous Language early on.

Cheap!

You don't need a budget for a Ubiquitous Language

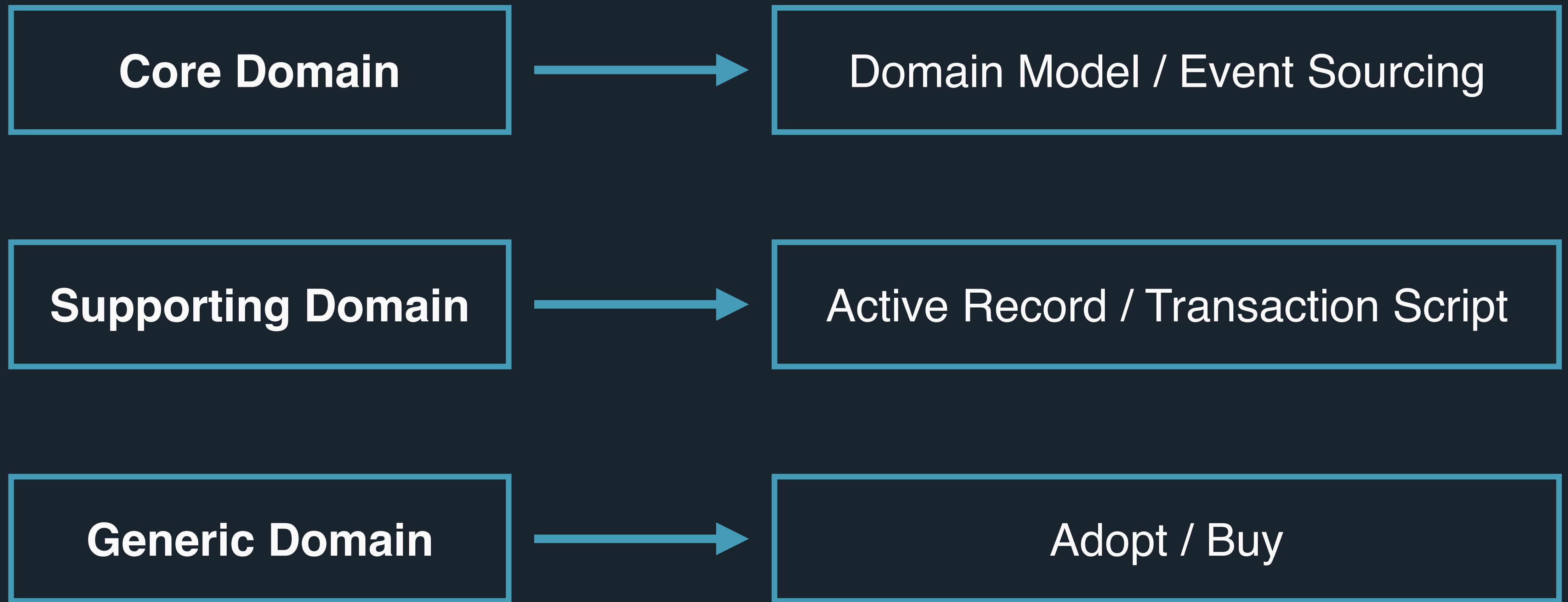
# DOMAIN TYPES

02

Core

Supporting

Generic



**COMPANIES CHANGE, EVOLVE, REINVENT THEMSELVES**

**DOMAINS' TYPES CAN CHANGE ACCORDINGLY**

## SUPPORTING ➤ CORE

- Event Crunchers
- Bonuses

## SUPPORTING ➤ GENERIC

- Creative Catalog

## CORE ➤ GENERIC

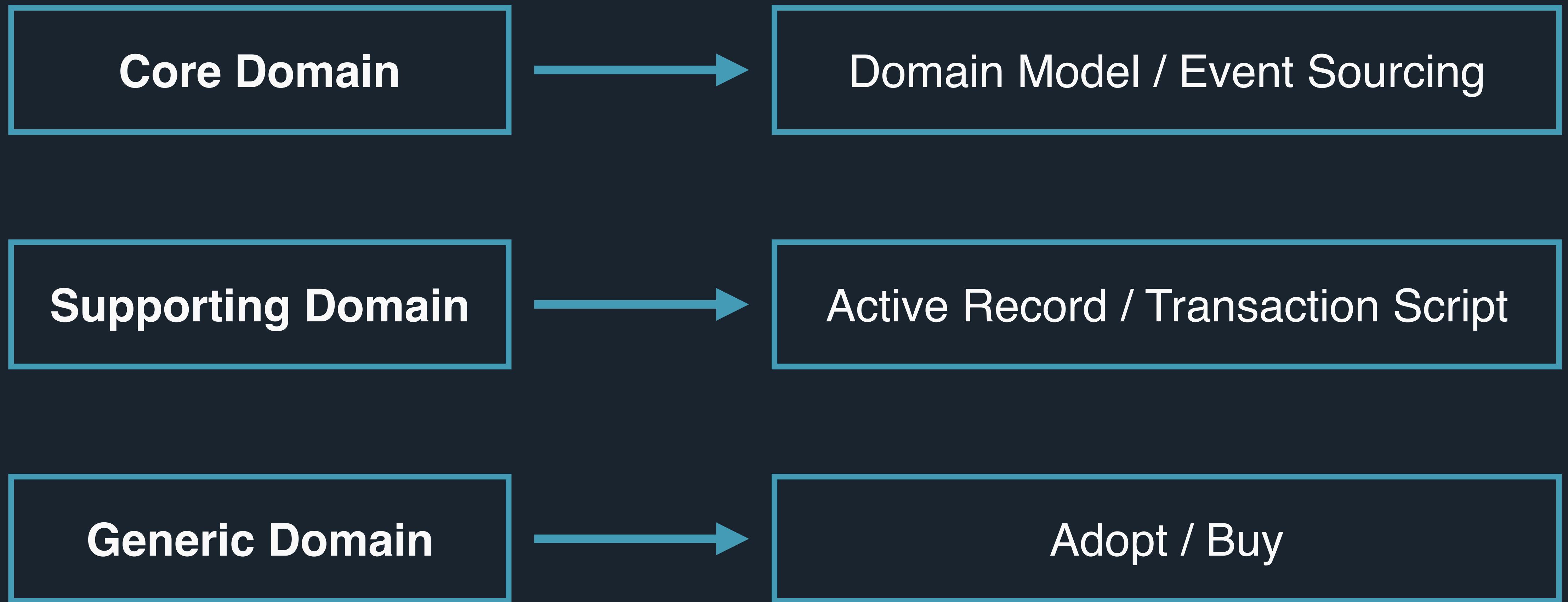
- Lead Evaluation System

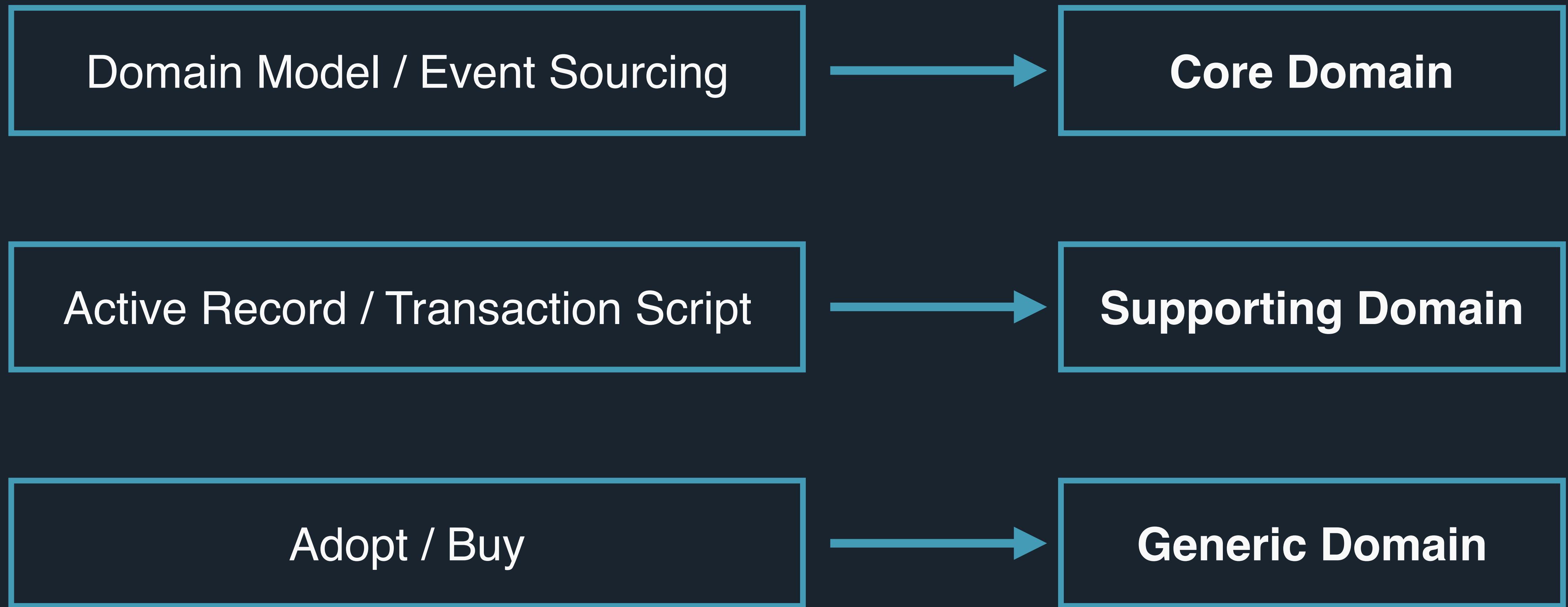
## CORE ➤ SUPPORTING

- Marketing Hub

## GENERIC ➤ CORE

- AWS





# IMPLEMENTATION DESIGN > DOMAIN TYPE

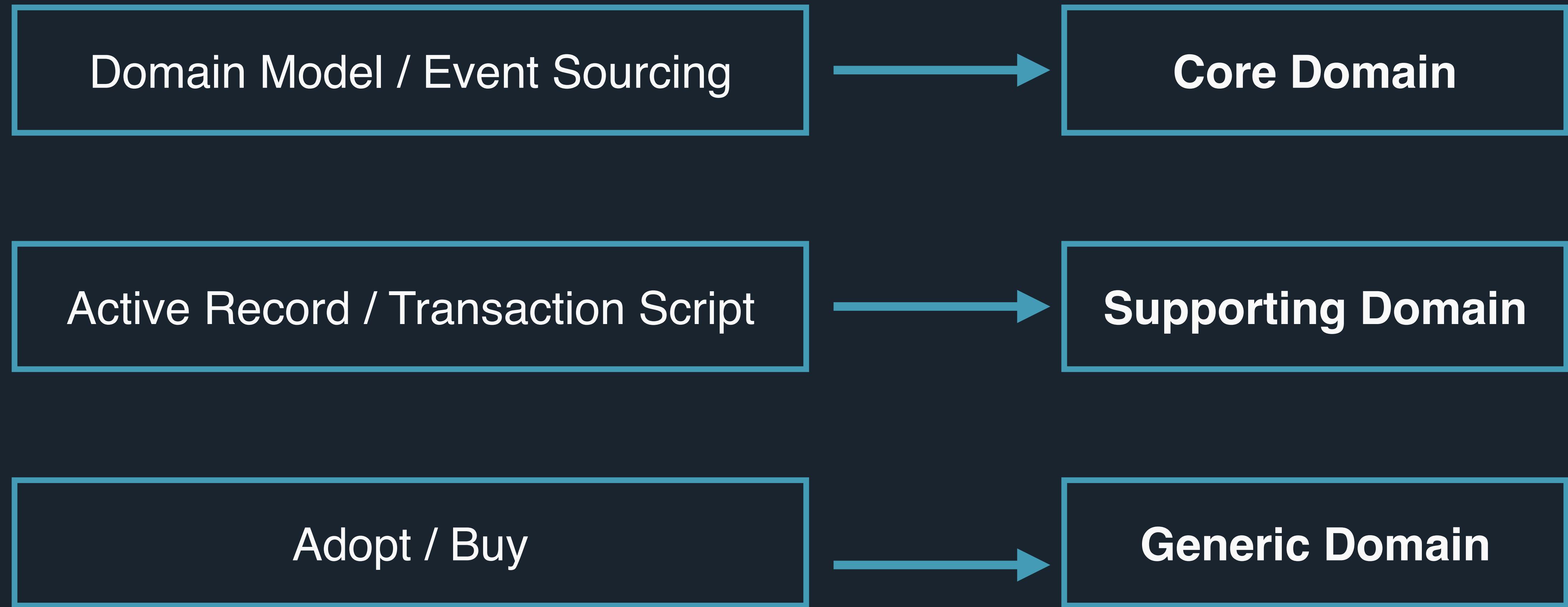
Less waste

Dialog with the business

# BUSINESS COMPLEXITY ≠ DOMAIN TYPE?

- Questionable competitive edge?
- Accidental “business” complexity?
- Unexpected competitive edge?

# IMPLEMENTATION DESIGN > DOMAIN TYPE



# IMPLEMENTATION STRATEGIES

03

# How to Model the Business Logic?

Transaction Script

Active Record

Domain Model

Event Sourced Domain Model

MONEY? DEEP ANALYTICS? AUDIT LOG?

Event Sourced Domain Model

COMPLEX BUSINESS LOGIC?

Domain Model

COMPLEX DATA STRUCTURES?

Active Record

SIMPLE LOGIC, SIMPLE DATA STRUCTURES?

Transaction Script

# MAPPING ARCHITECTURAL PATTERNS

Event Sourced Domain Model ➤ CQRS

Domain Model ➤ Hexagonal Architecture

Active Record ➤ Layered Architecture

Transaction Script ➤ “Keep it simple” Architecture

# MAPPING ARCHITECTURAL PATTERNS

**Event Sourced Domain Model** ➤ **CQRS**

**Domain Model** ➤ Hexagonal Architecture

**Active Record** ➤ Layered Architecture

**Transaction Script** ➤ “Keep it simple” Architecture

Transaction Script

Active Record

Domain Model

Event Sourced Domain Model

**PAIN? ➤**

**BUSINESS CHANGED?**

**DOMAIN TYPE CHANGED?**

**REVISE IMPLEMENTATION STRATEGY?**

Transaction Script

Active Record

Domain Model

Event Sourced Domain Model

# CQRS

04

Event Sourcing > CQRS

**EVENT SOURCING**  
**A WAY OF MODELING BUSINESS DOMAINS**

**CQRS**  
**ARCHITECTURAL PATTERN FOR REPRESENTING**  
**THE *SAME* DATA IN *DIFFERENT* MODELS**

**Transaction Script**

**Active Record**

**Domain Model**



**Can benefit from CQRS**

**and**

**State-Based Projections**

# BOUNDED CONTEXTS

05

# LINGUISTIC BOUNDARIES

Creative	Ad Type	Advertiser
Agency	Target Market	Ad Zone
Lead	Group	Contract
Publisher	Zone Type	Budget Unit
Website	Funnel	Audience
Placement	Campaign	Visit

Marketing

Lead	Organization Unit
Group	Assignment
Desk	Rank
Qualification	Message
Assessment	On-site Activity
Campaign	Brand

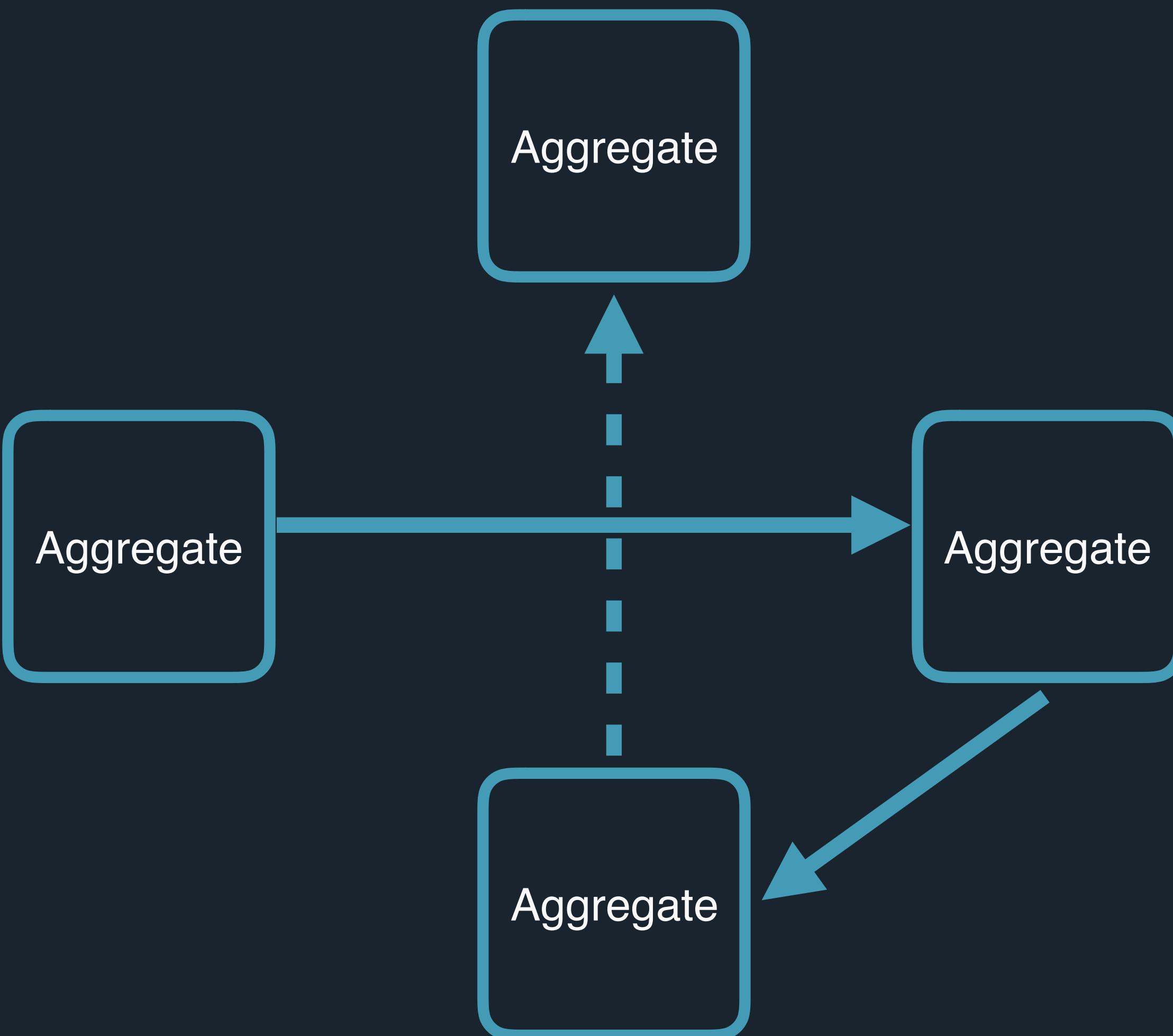
CRM

# DOMAIN-BASED BOUNDARIES

Event  
Crunchers

Bonuses

# AGGREGATE-BASED BOUNDARIES



# SUICIDAL BOUNDARIES

L e a d



# Good Fences: The Importance of Setting Boundaries for Peaceful Coexistence

**Alex Rutherford, Dion Harmon, Justin Werfel, Alexander S. Gard-Murray, Shlomiya Bar-Yam, Andreas Gros, Ramon Xulvi-Brunet, Yaneer Bar-Yam\***

New England Complex Systems Institute, Cambridge, Massachusetts, United States of America

## Abstract

We consider the conditions of peace and violence among ethnic groups, testing a theory designed to predict the locations of violence and interventions that can promote peace. Characterizing the model's success in predicting peace requires examples where peace prevails despite diversity. Switzerland is recognized as a country of peace, stability and prosperity. This is surprising because of its linguistic and religious diversity that in other parts of the world lead to conflict and violence. Here we analyze how peaceful stability is maintained. Our analysis shows that peace does not depend on integrated coexistence, but rather on well defined topographical and political boundaries separating groups, allowing for partial autonomy within a single country. In Switzerland, mountains and lakes are an important part of the boundaries between sharply defined linguistic areas. Political canton and circle (sub-canton) boundaries often separate religious groups. Where such boundaries do not appear to be sufficient, we find that specific aspects of the population distribution guarantee either



Finding service boundaries is really damn hard...

There is no flowchart!

“

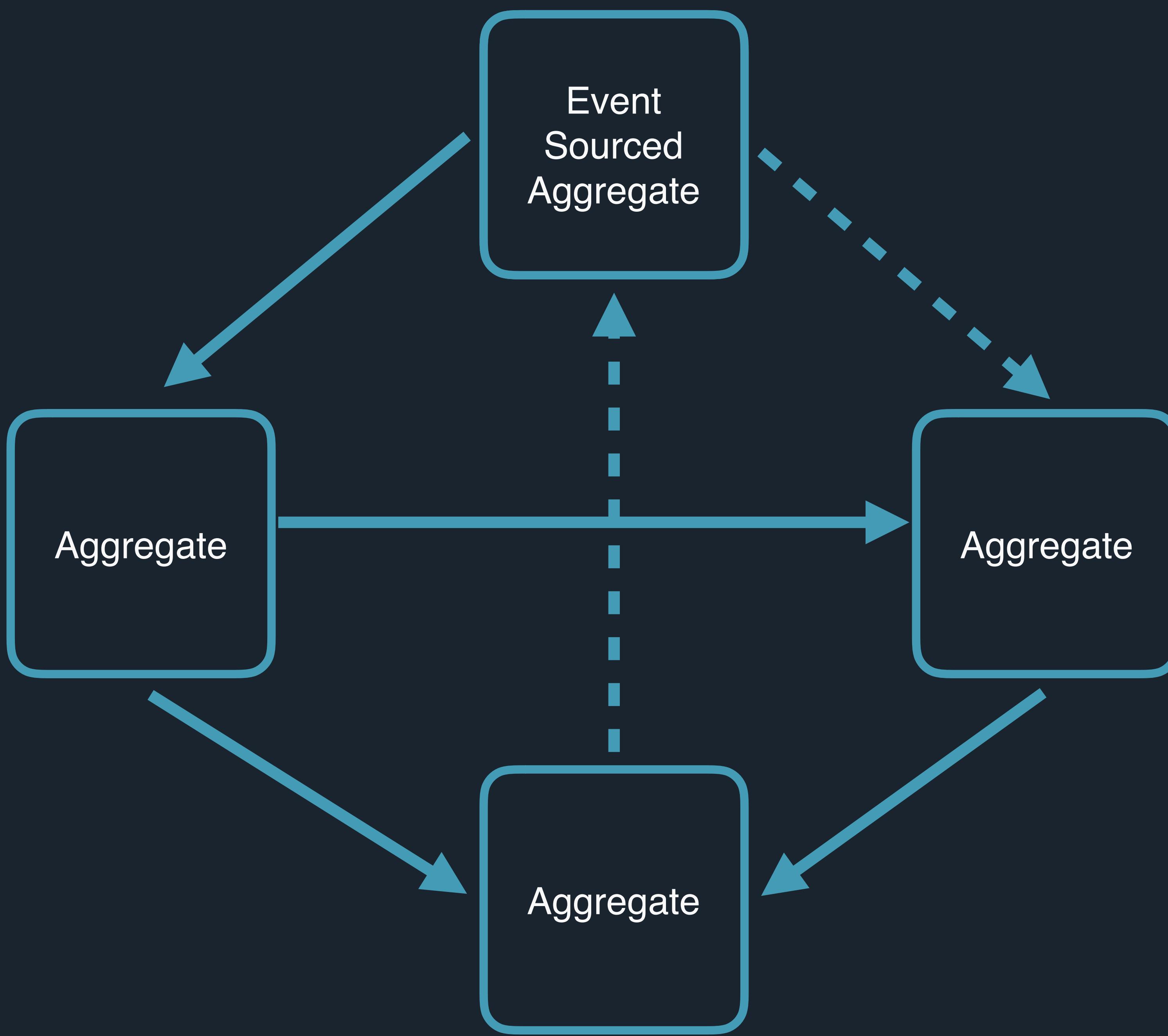
Udi Dahan

**THERE ARE GOING TO BE MISTAKES  
ACCEPT IT, AND DON'T MAKE FATAL ONES**

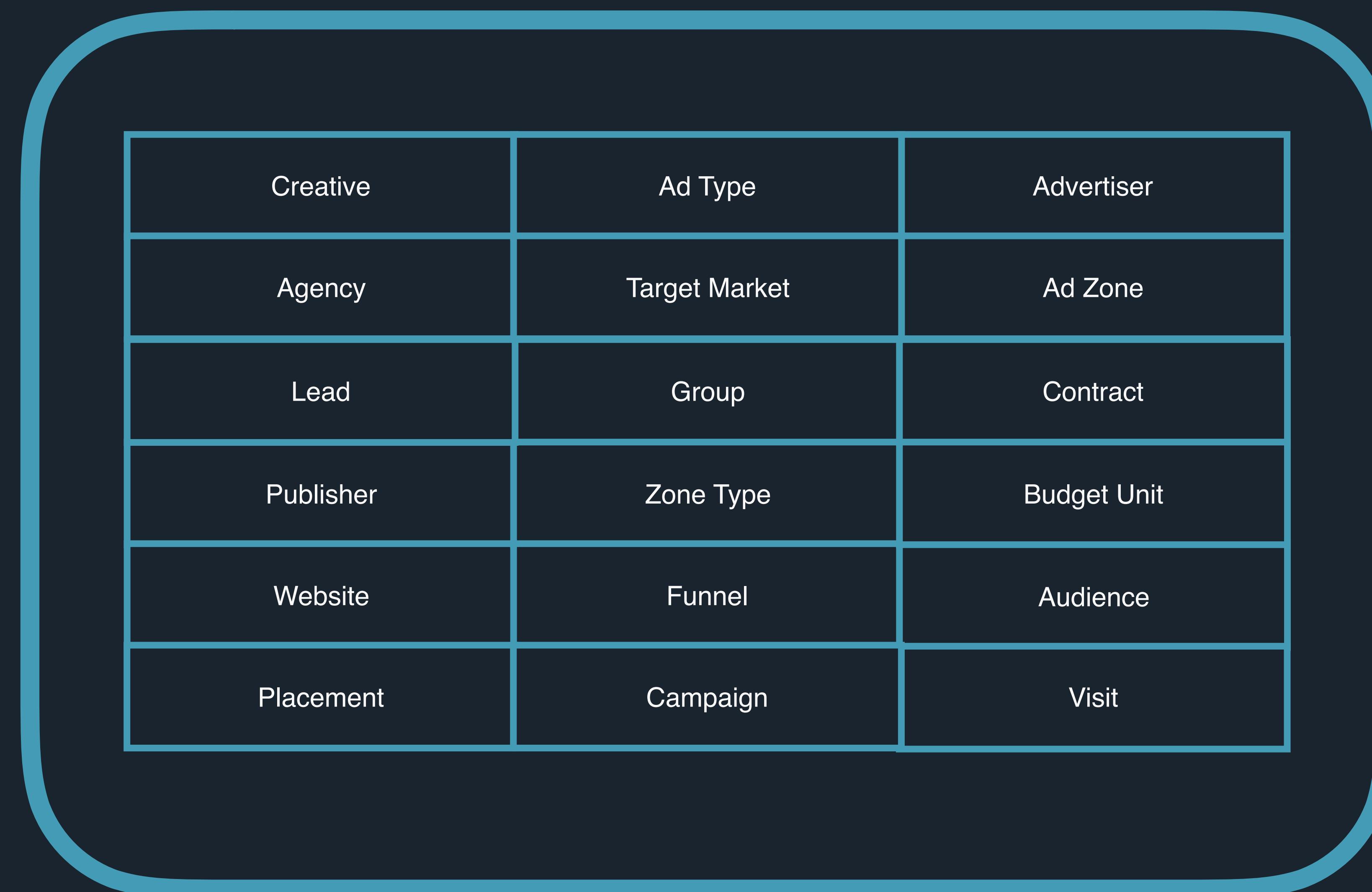
**START WITH BIGGER BOUNDARIES**

**DECOMPOSE LATER, AS YOU GAIN KNOWLEDGE**

**THE LESS YOU KNOW ABOUT THE DOMAIN -  
THE WIDER THE INITIAL BOUNDARIES ARE**



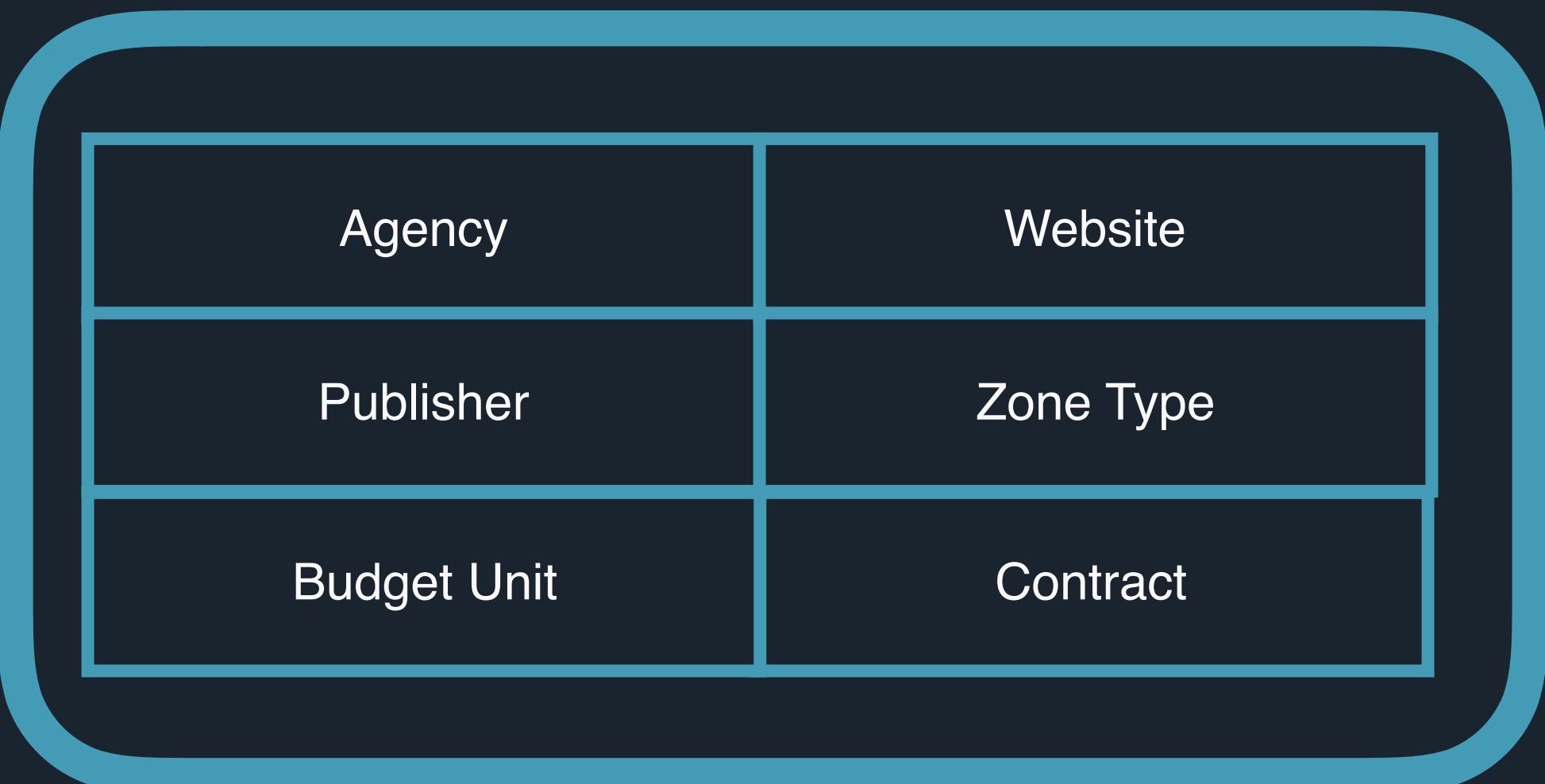
# Marketing



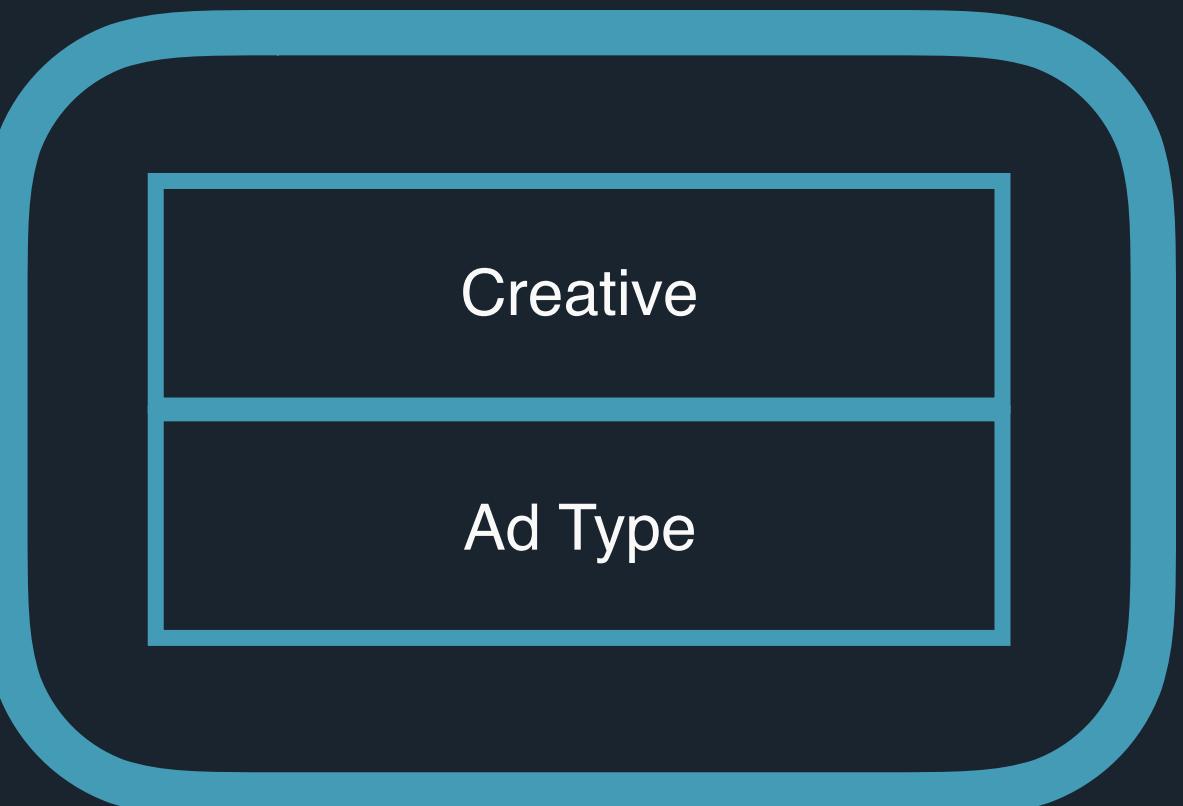
# Campaigns



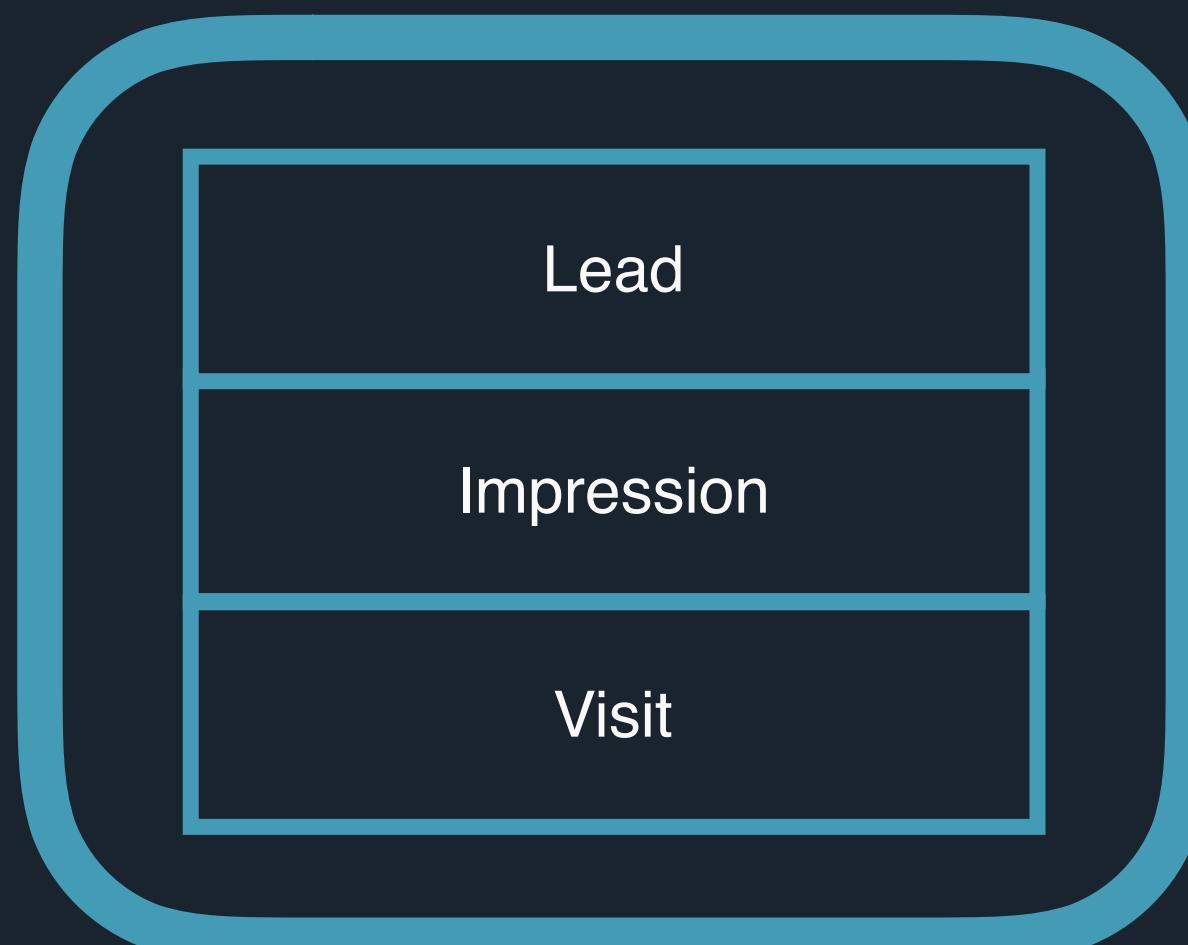
# Publishers



# Creative Catalog



# Events



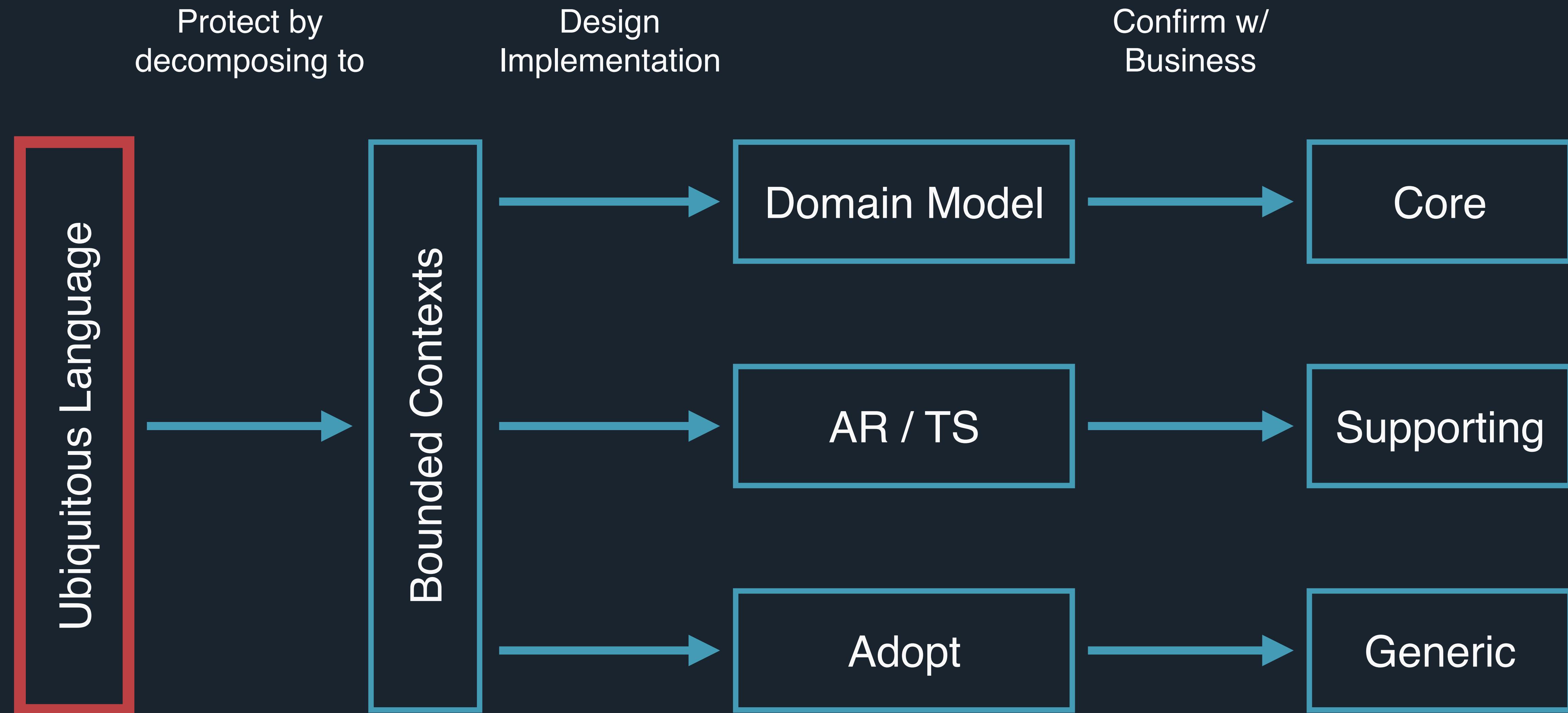
**START WITH BIGGER BOUNDARIES**

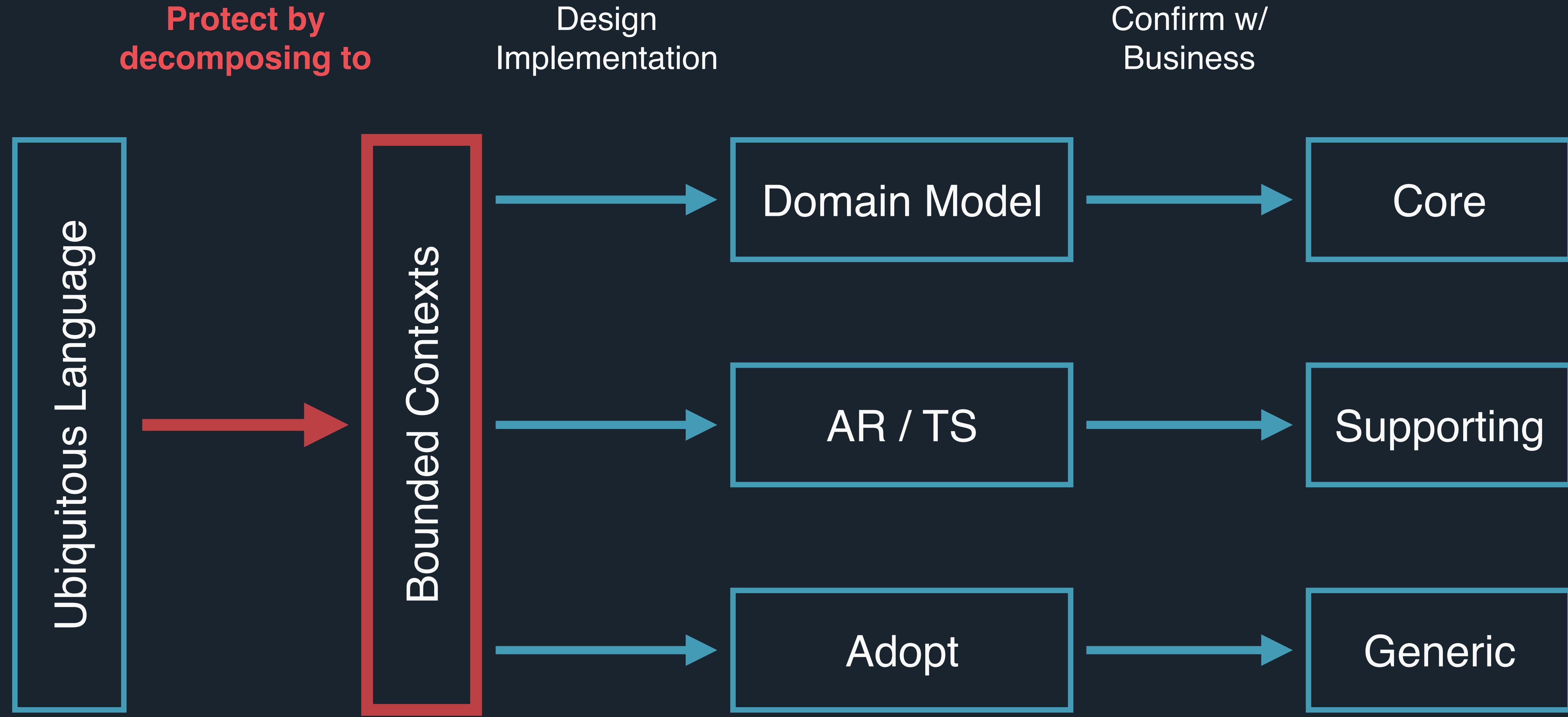
**DECOMPOSE AS YOU GAIN DOMAIN KNOWLEDGE**

1. Ubiquitous Language is not optional
2. Domain Types change. Embrace these changes
3. Learn the ins and outs of the four patterns of modeling business logic
4. Use CQRS to represent the same data in multiple models
5. Start with bigger boundaries, and divide as you gain domain knowledge

# SUMMARY

07

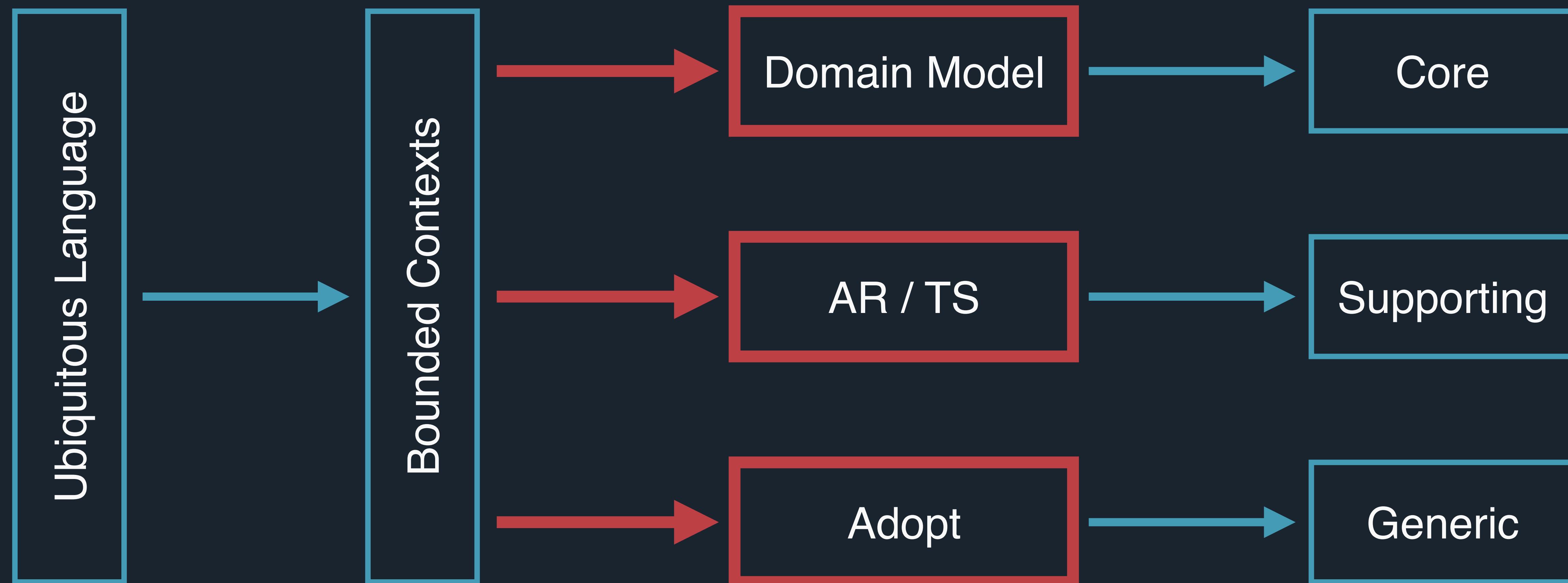


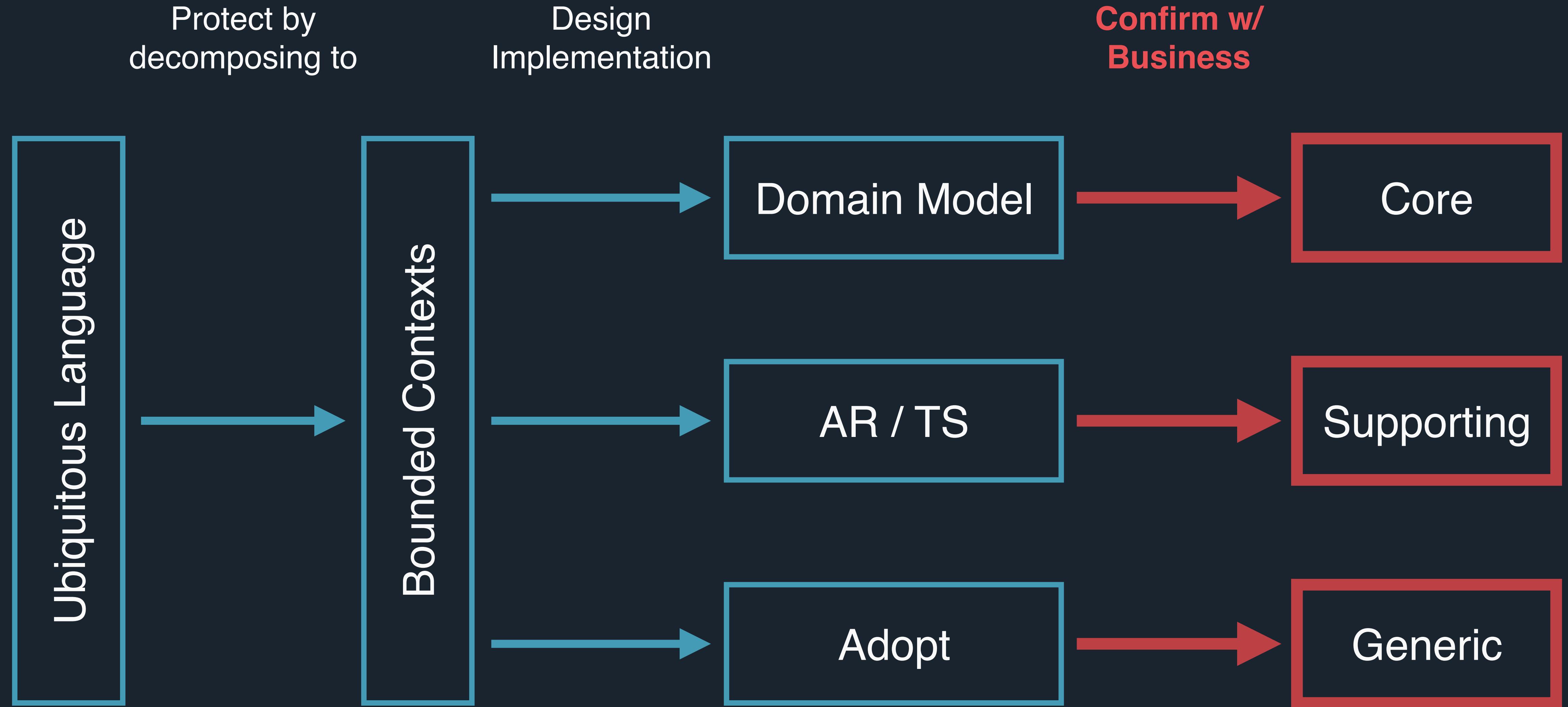


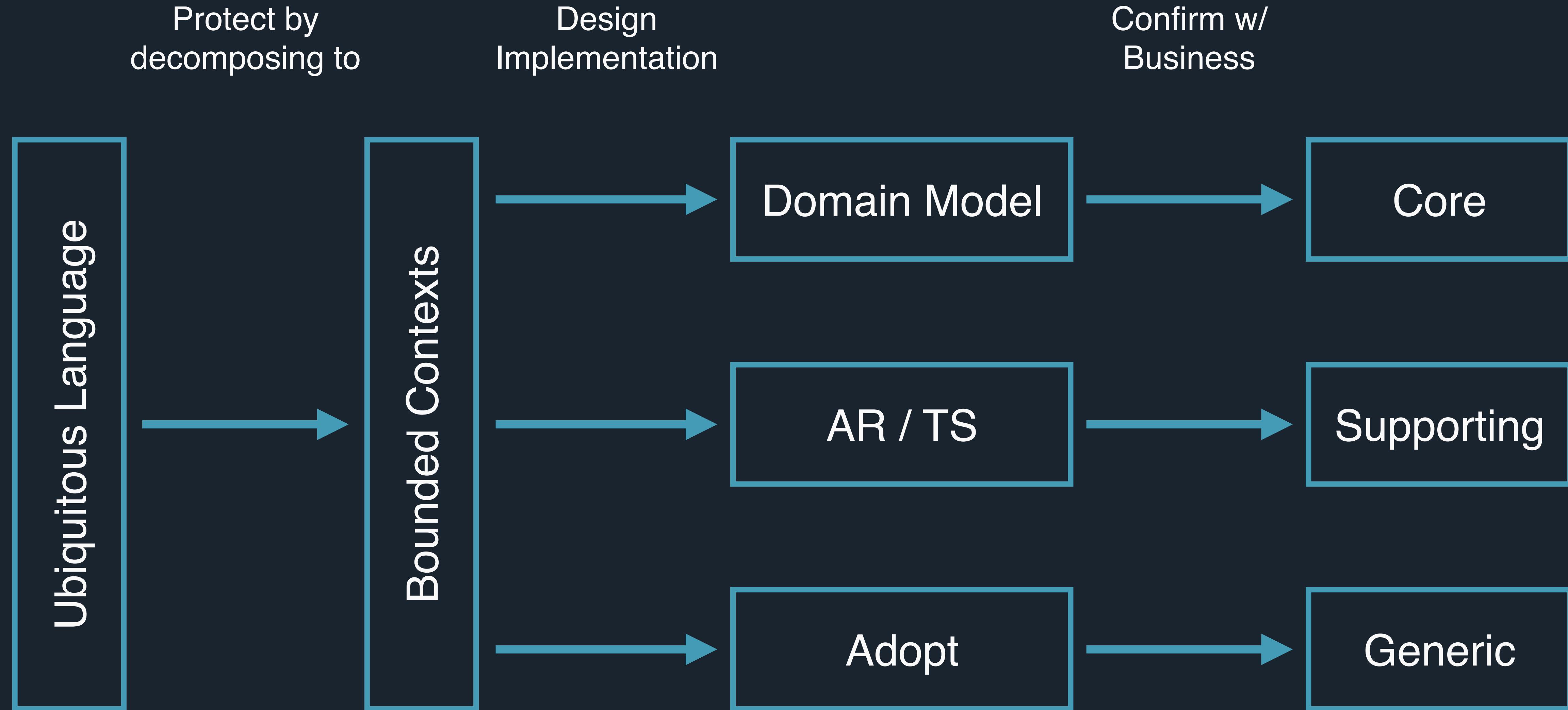
Protect by  
decomposing to

## Design Implementation

Confirm w/  
Business







Ad Type

Advertiser

Group

Agency

Target Market

Creative

Website

Funnel

Placement

Zone Type

Budget Unit

Ad Zone

Campaign

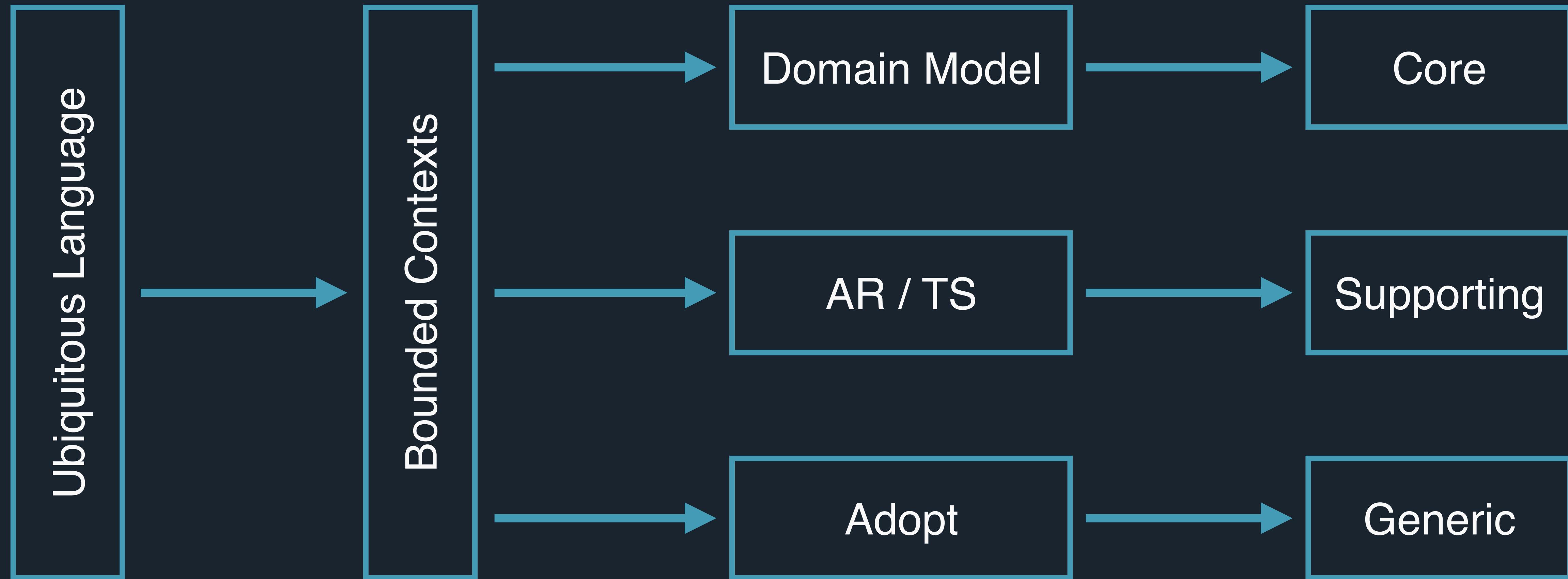
Publisher

# Aggregates everywhere!!!

Protect by  
decomposing to

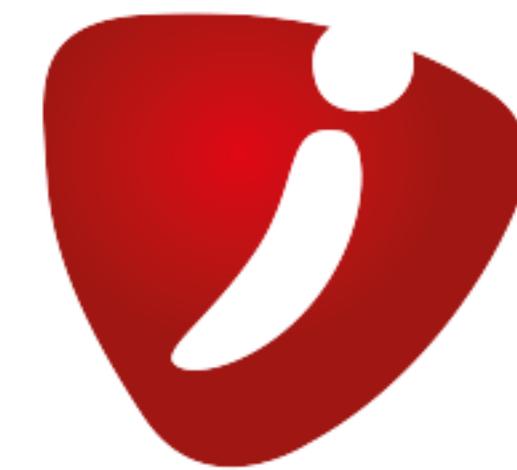
Design  
Implementation

Confirm w/  
Business



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P.S.



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# QUESTIONS?

# THANK YOU!

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