7 YEARS OF DDD

or

Tackling Complexity in Large Scale Marketing Systems

vladikk

YAY!!!

@vladikk

vladikk.com

Internovus

PART 1

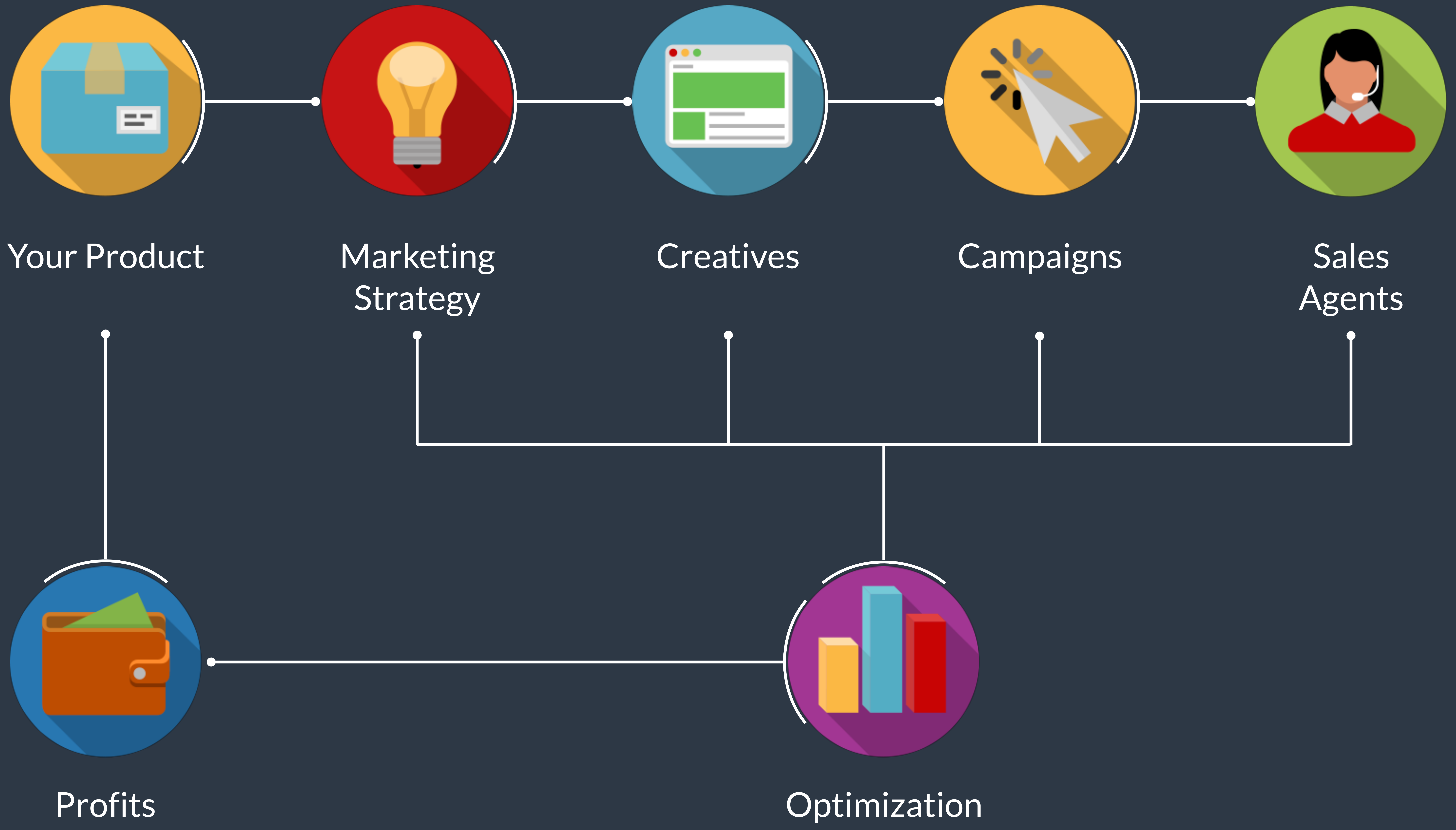
5 BOUNDED CONTEXTS

PART 2

5 PRACTICAL ADVICES

INTERNOVUS

The Ultimate Acquisition Solution


Your Product
Marketing Strategy
Creatives
Campaigns
Sales Agents
Profits
Optimization

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THE FIRST BOUNDED CONTEXT

01

VER 1.0

Media Buying

Creatives Catalog

Campaign Management

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n-Driven
DESIGN
Tackling Complexity in the Heart of Software
Eric E
Foreword by Ma

Very nice!!!1

Aggregates everywhere!!!

Aggregates everywhere!!!

Ad Type

Advertiser

Group

Creative

Agency

Target Market

Contract

Website

Funnel

Zone Type

Budget Unit

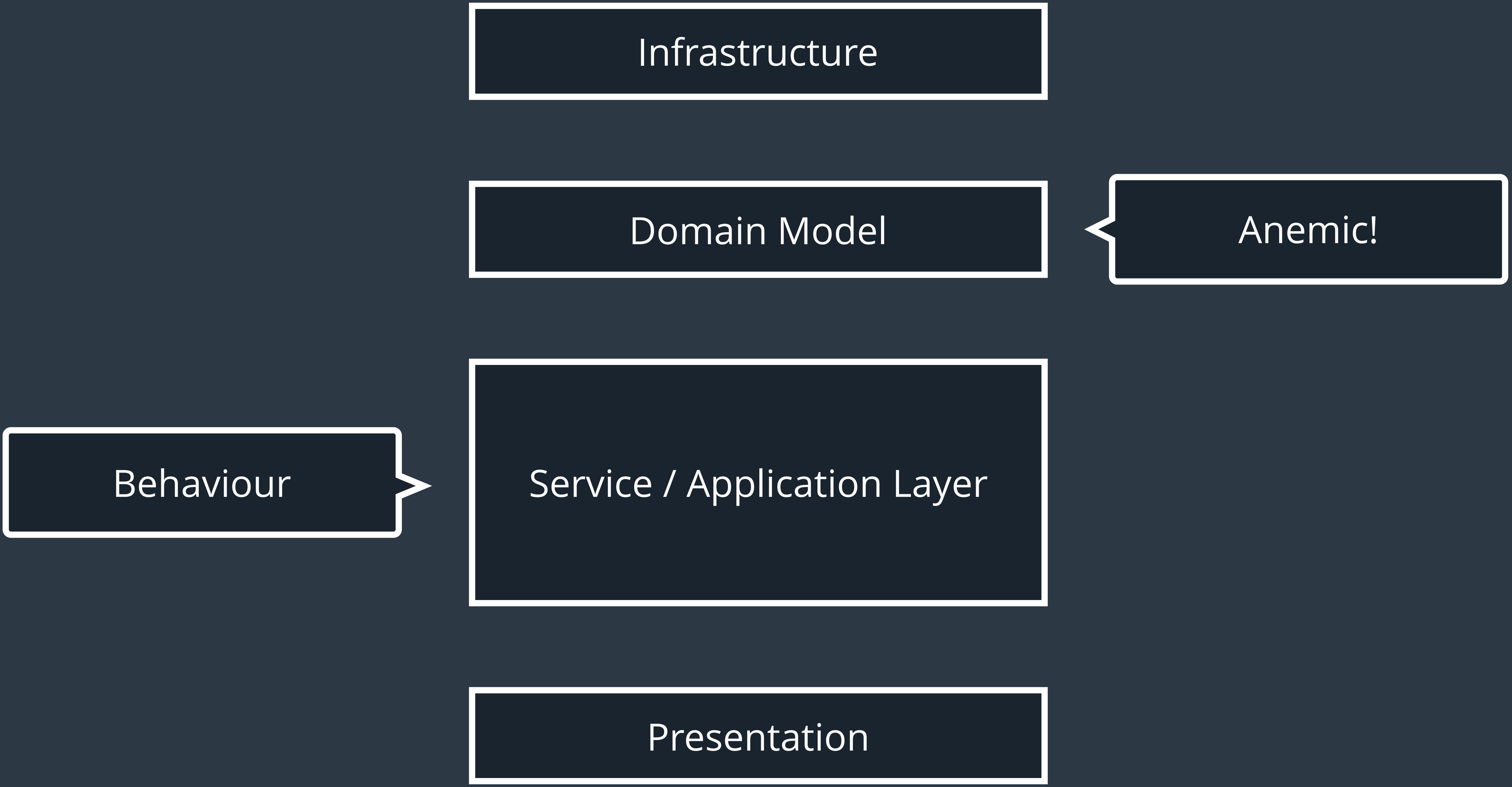
Placement

Campaign

Publisher

Ad Zone

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

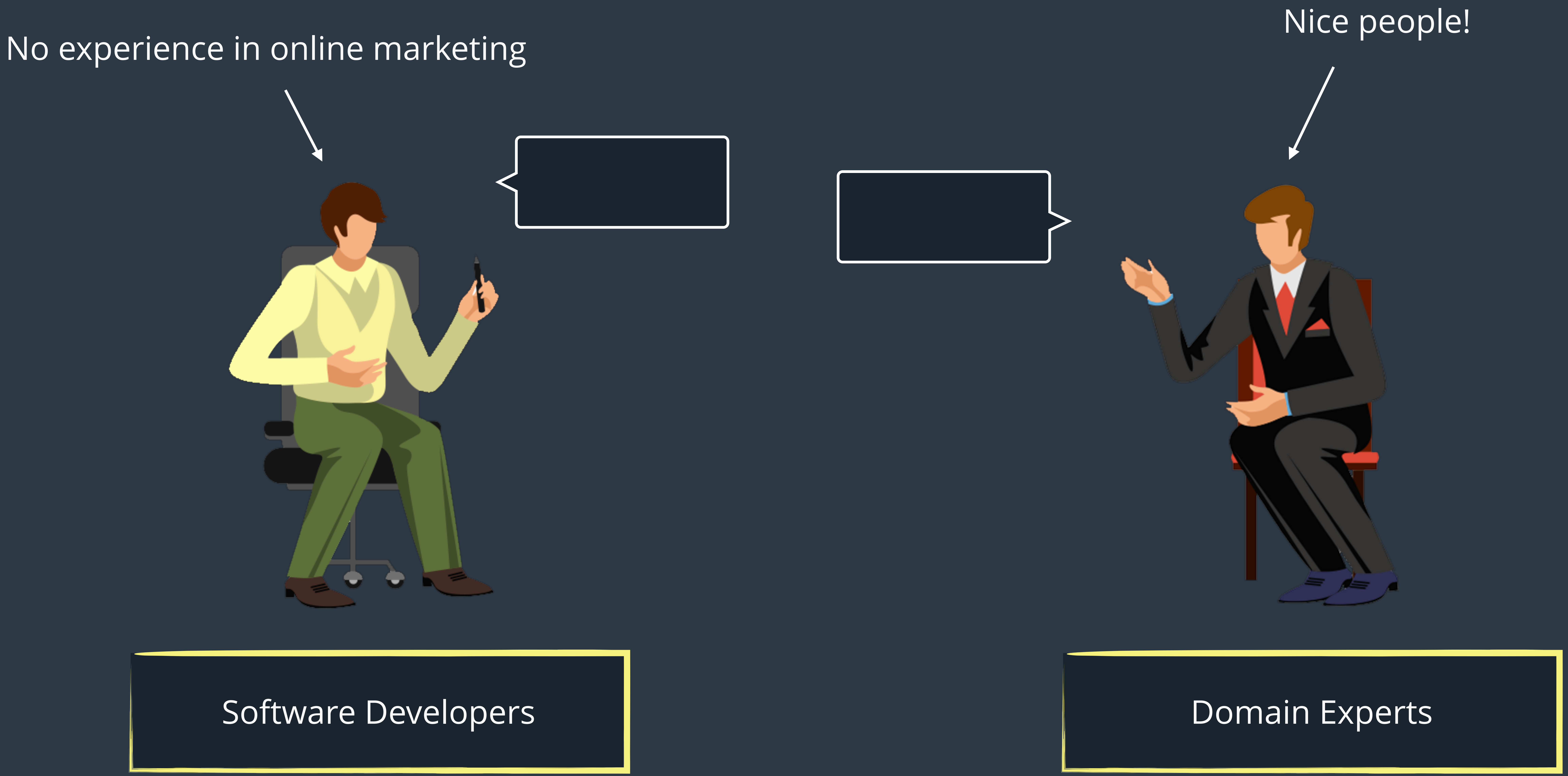

Infrastructure
Domain Model
Anemic!
Behaviour
Service / Application Layer
Presentation

Imperfect architecture

“QA is for cowards”

BUT IT WORKED!

UBIQUITOUS LANGUAGE

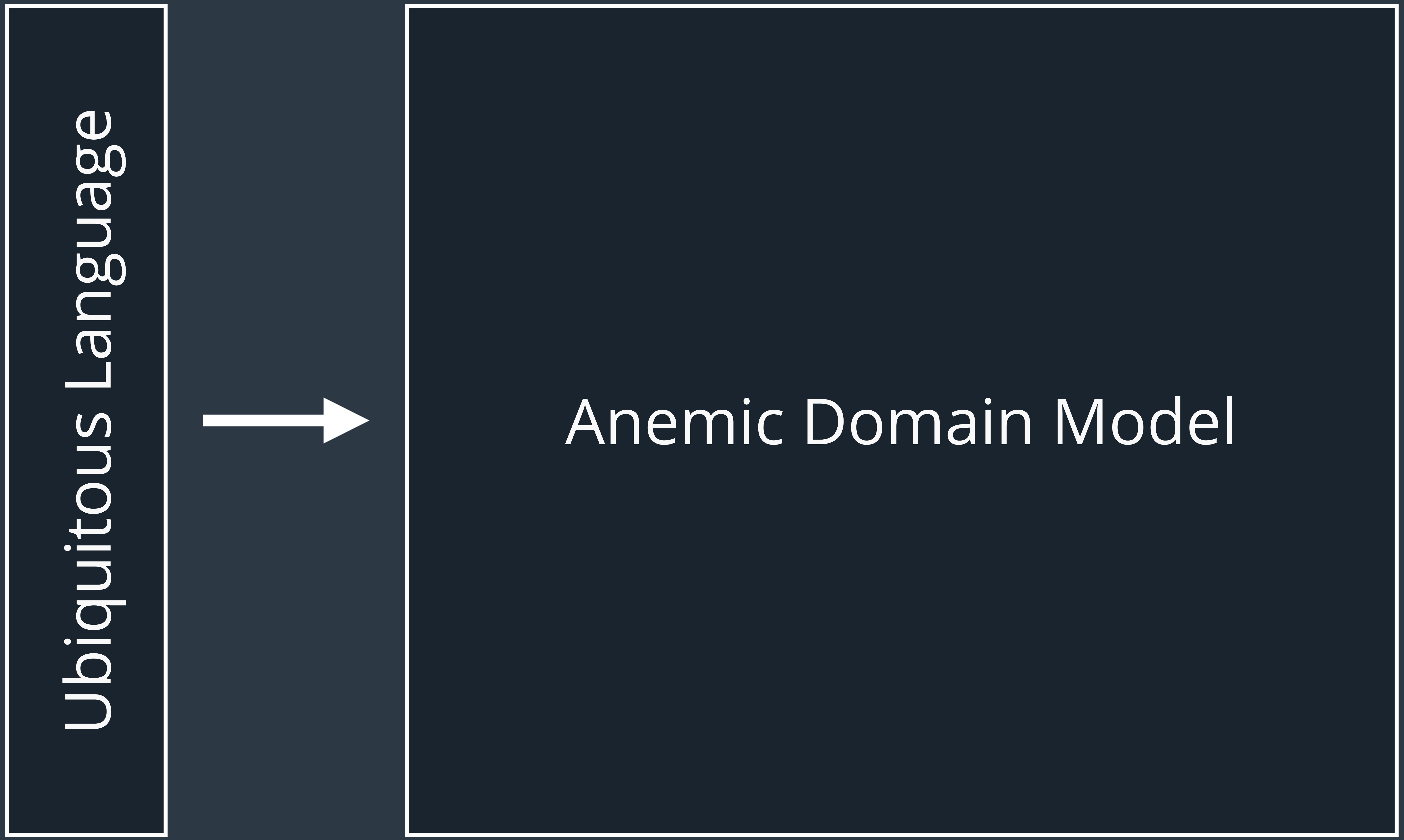

No experience in online marketing
Nice people!
Software Developers
Domain Experts

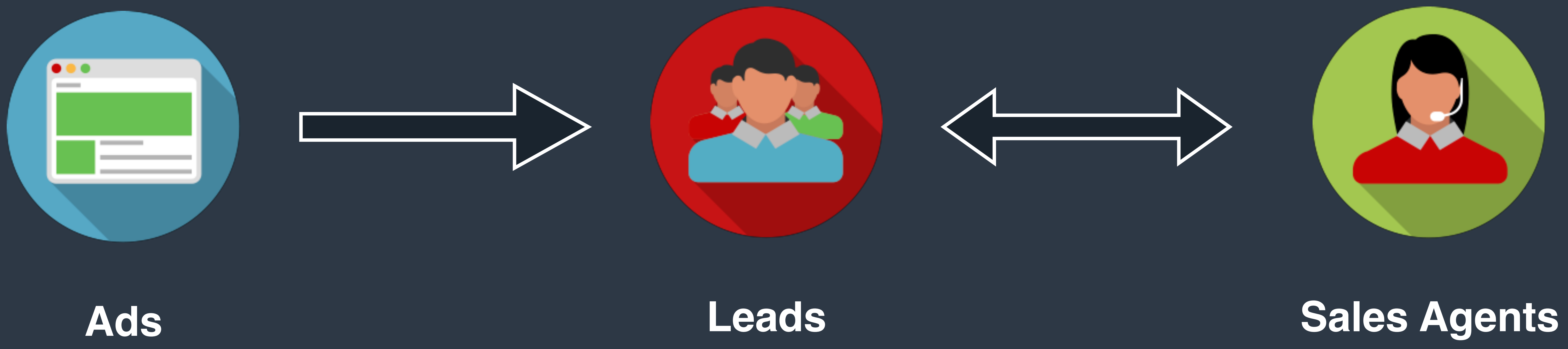
Smooth communication

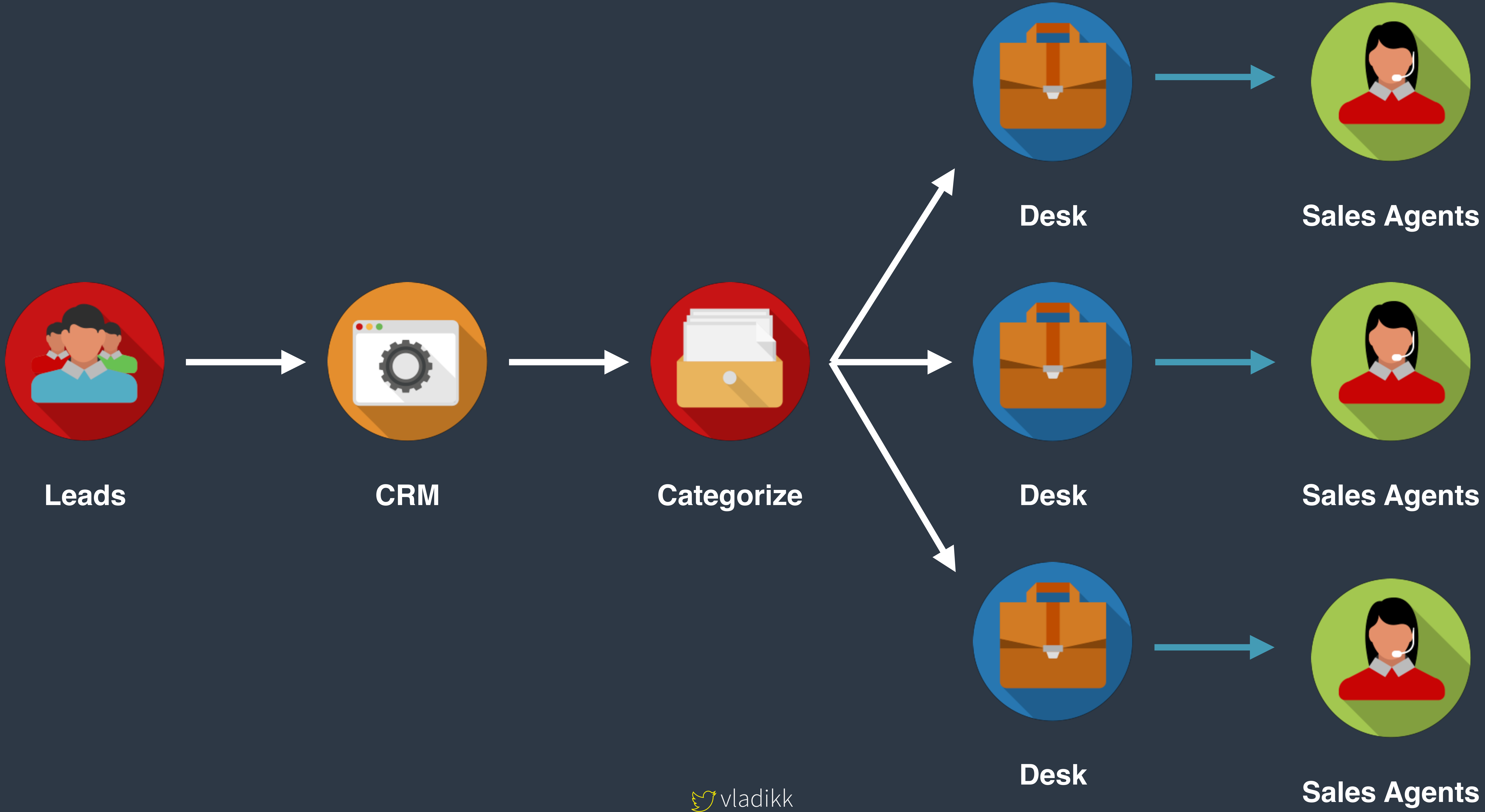
Strong grasp of the business domain

Working software

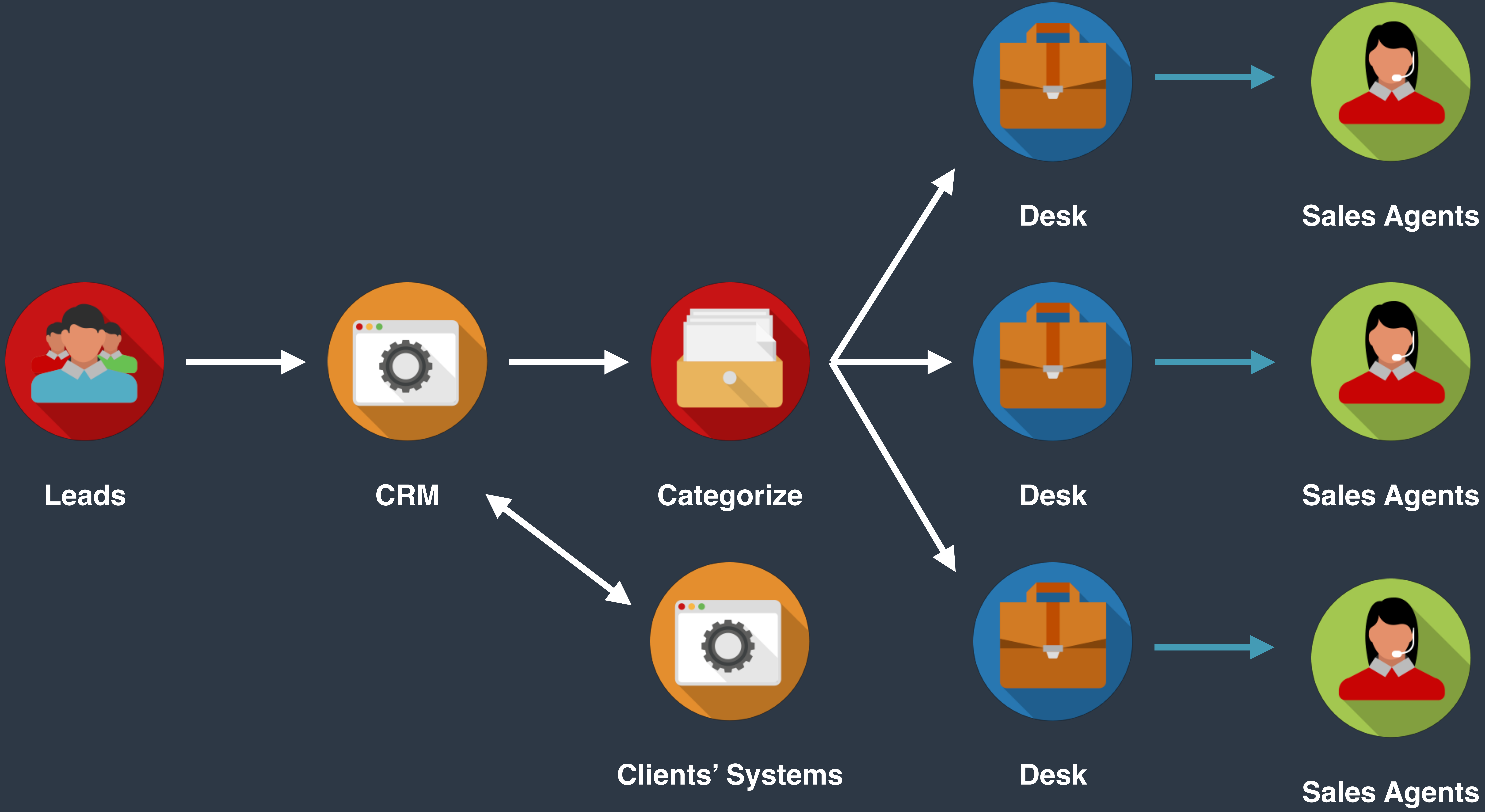
Aggressive time to market


Ubiquitous Language
Anemic Domain Model


Ads
Leads
Sales Agents


Leads
CRM
Categorize
Desk
Sales Agents
Desk
Sales Agents
Desk
Sales Agents

vladikk


Leads
CRM
Categorize
Clients' Systems
Desk
Desk
Desk
Sales Agents
Sales Agents
Sales Agents

OPTIMIZE
ALL THE THINGS
imgflip.com

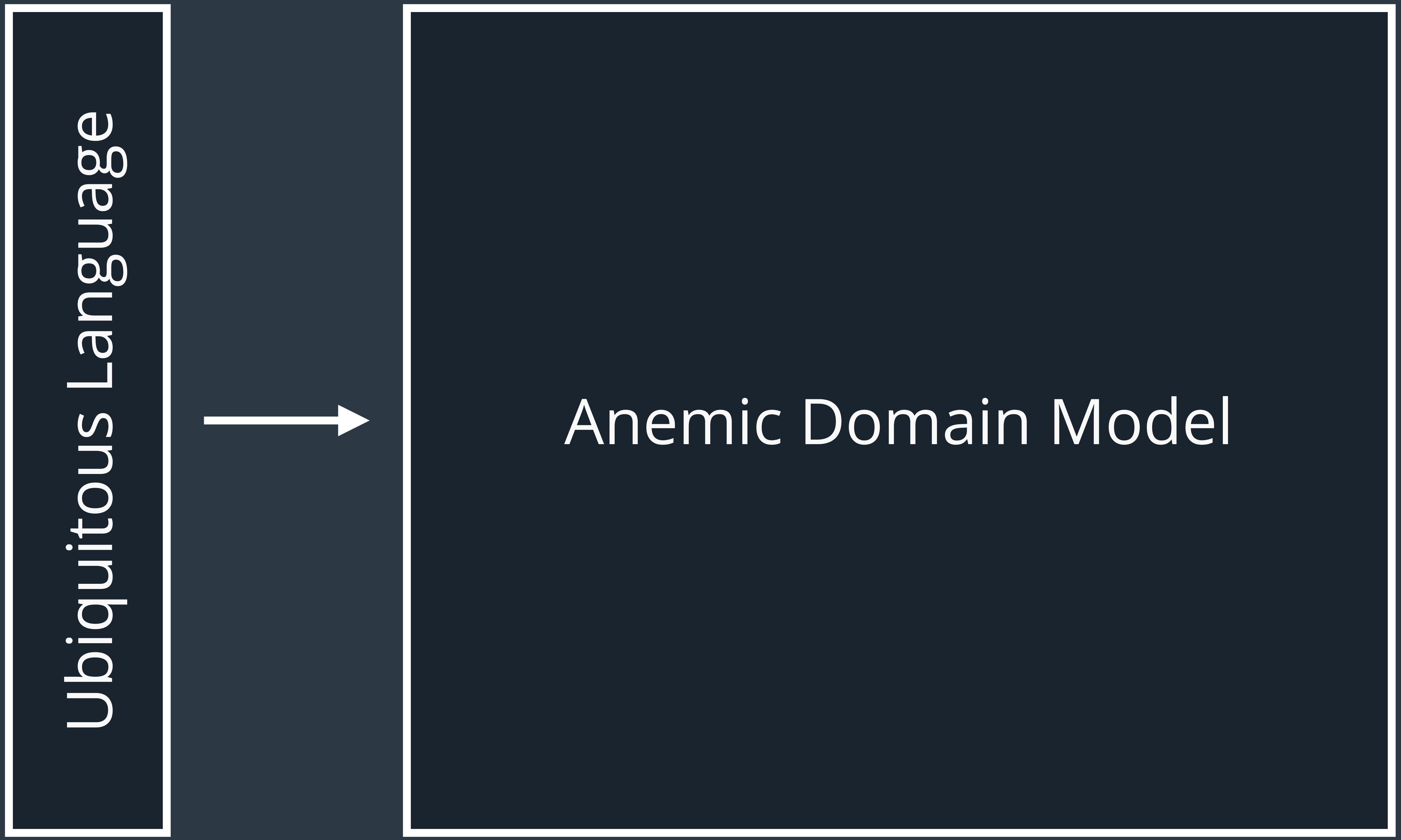
Lead qualification

Agent qualification

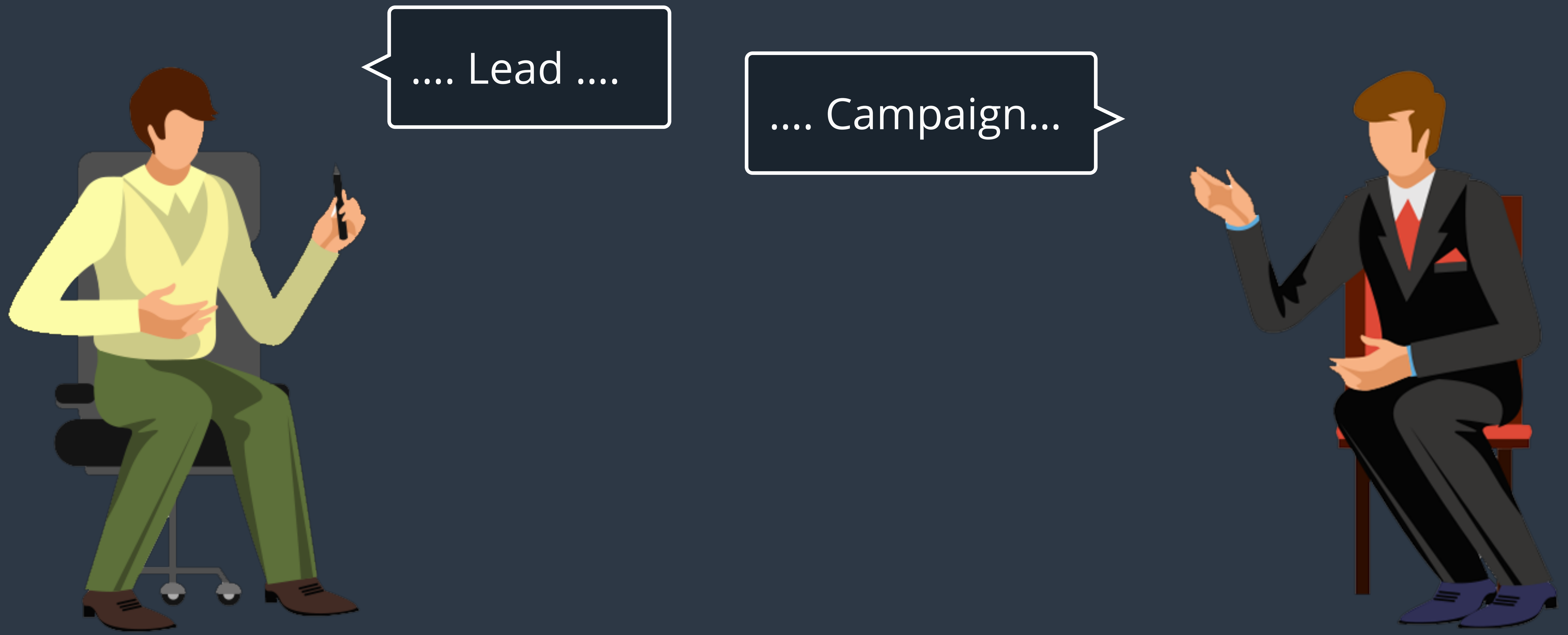
Agents’ commissions

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



Software Developers

Domain Experts

others. It all starts with mapping the current terrain of the project. A BOUNDED CONTEXT defines the range of applicability of each model, while a CONTEXT MAP gives a global overview of the project's contexts and the relationships between them. This reduction of ambiguity will, in and of itself, change the way things happen on the project, but it isn't necessarily enough. Once we have a CONTEXT BOUNDED, a process of CONTINUOUS INTEGRATION will keep the model unified.

Then, starting from this stable situation, we can start to migrate toward more effective strategies for BOUNDING CONTEXTS and relating them, ranging from closely allied contexts with SHARED KERNELS to loosely coupled models that go their SEPARATE WAYS.

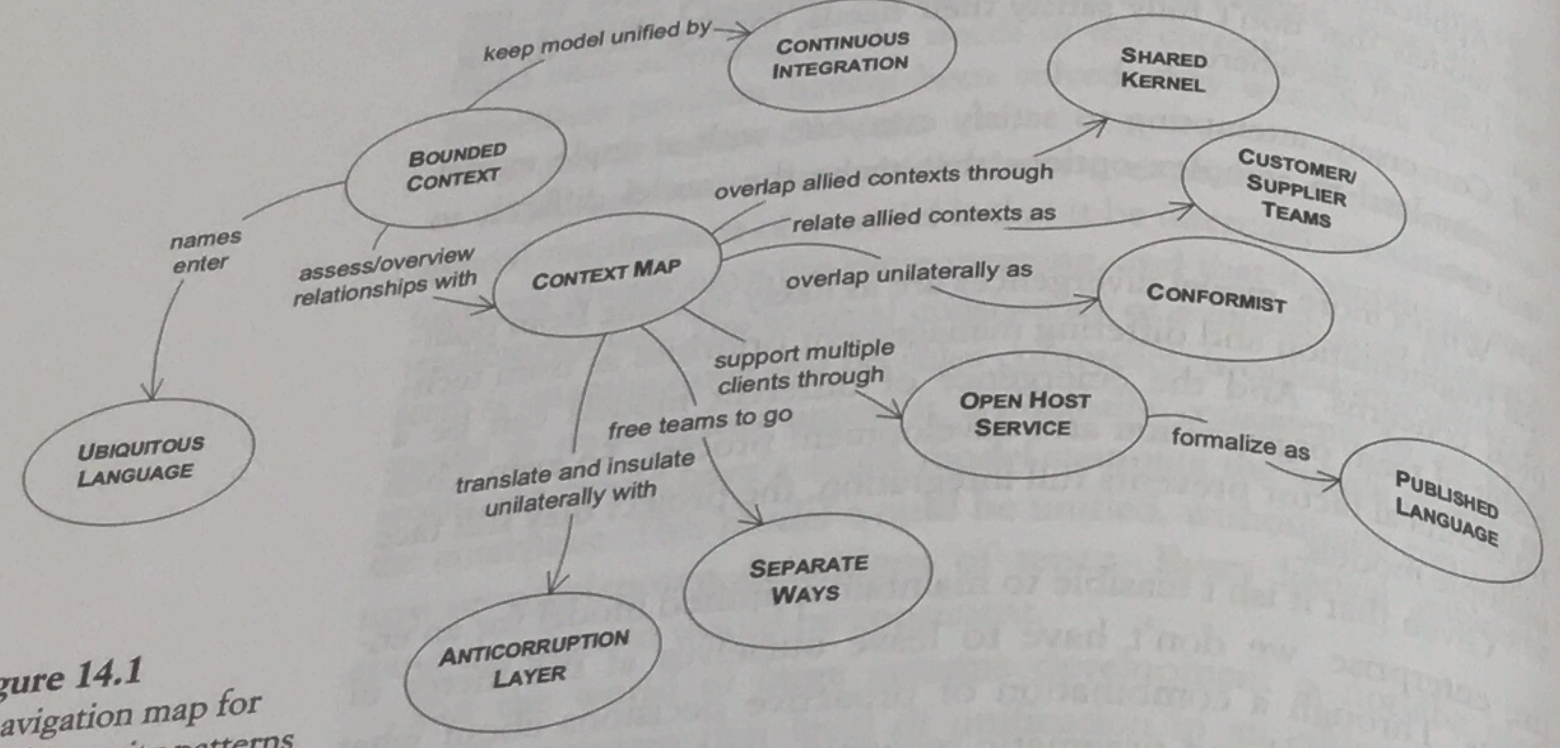
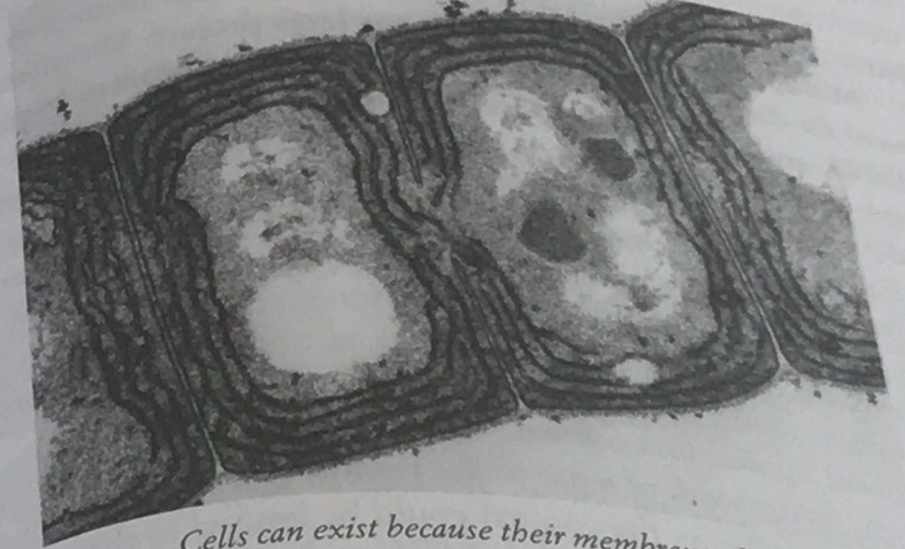


Figure 14.1
A navigation map for model integrity patterns

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 which your team has no control. A situation like this is probably clear 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

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

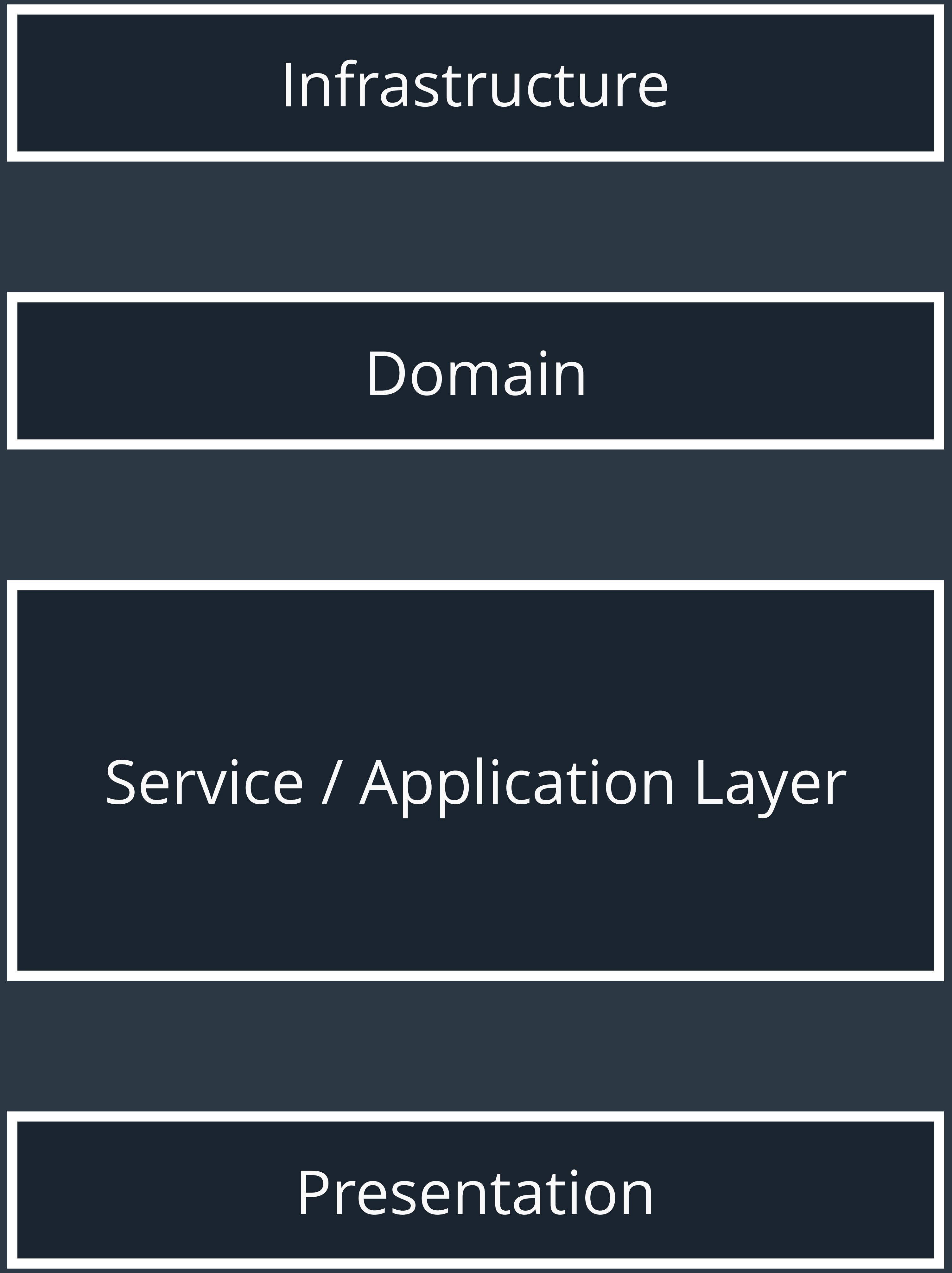
Creative	Ad Type	Advertiser
Agency	Target Market	Ad Zone
Lead	Group	Contract
Publisher	Zone Type	Budget Unit
Website	Funnel	Audience
Placement	Campaign	Visit

CRM

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

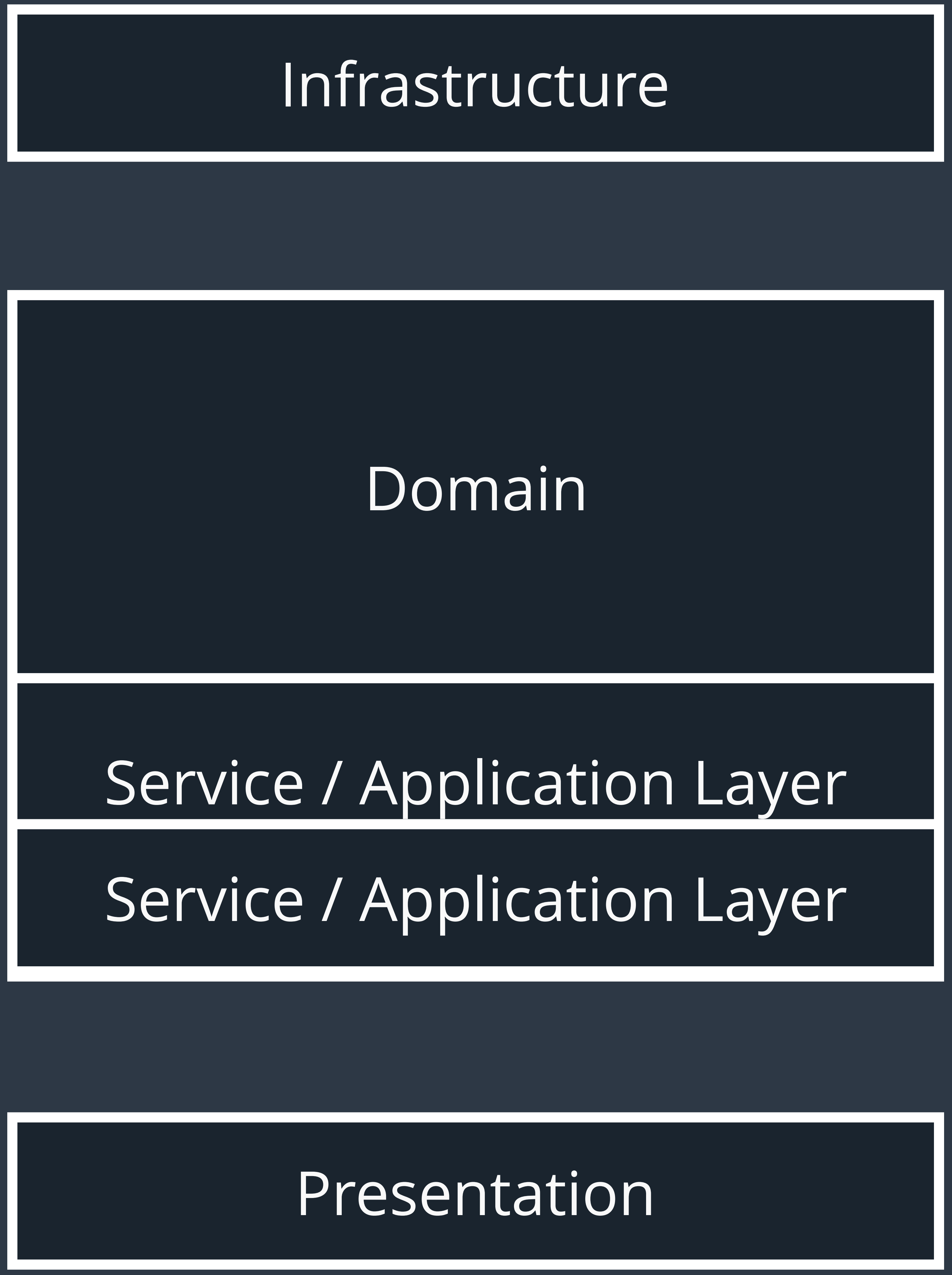
Aggregates will:

- Protect transactional boundaries
- Encompass business logic and invariants

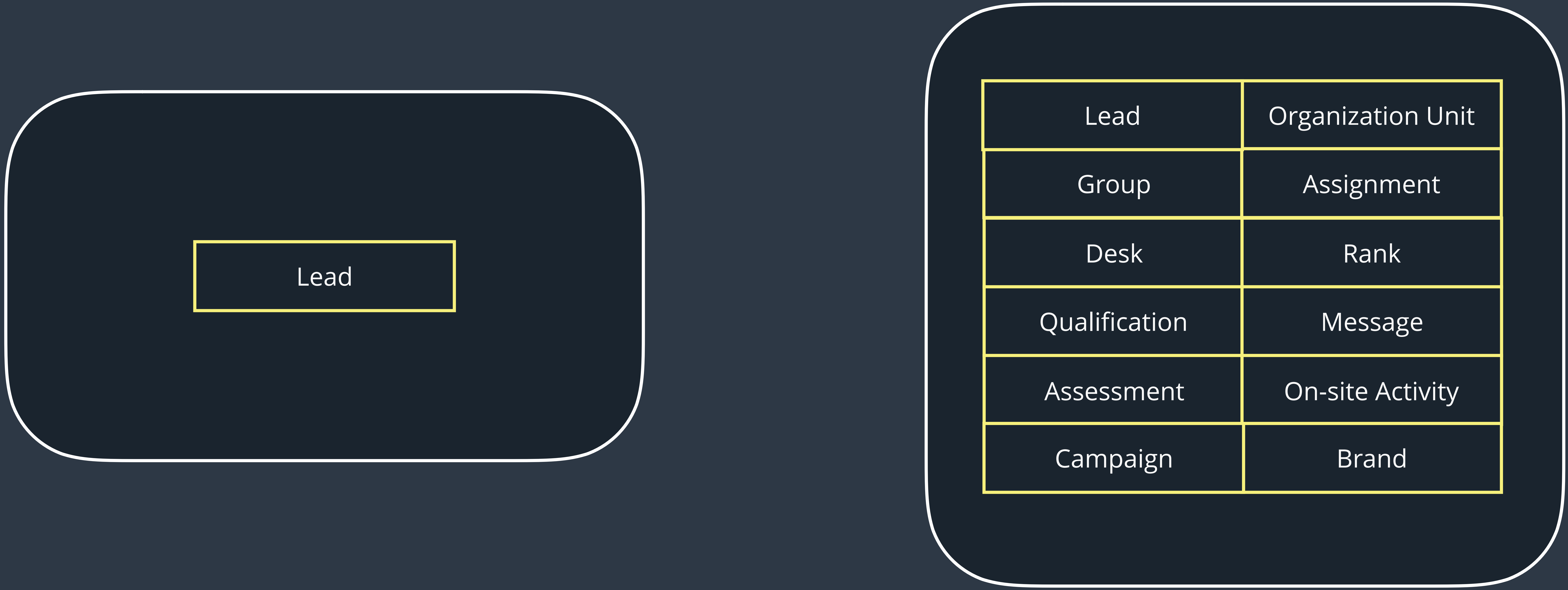


Aggregates will:

- Protect transactional boundaries
- Encompass business logic and invariants



Stored procedures???


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

CRM Team

L e a d

DBA Team

Achievement unlocked
Pwned by the Conway's Law

Inconsistent models

No shared understanding

Duplication of knowledge

Went out of sync quickly

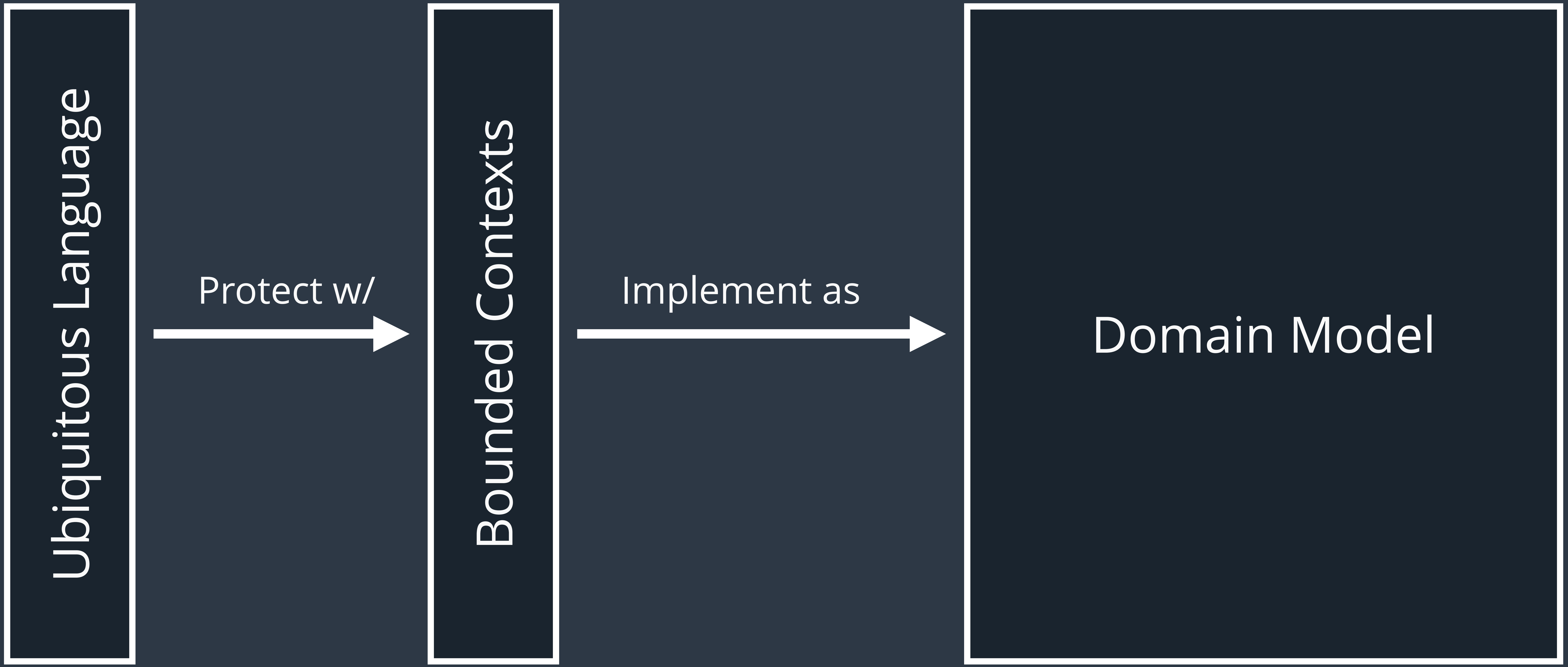
NIGHTMARE

Wasn’t delivered on time

Production issues

Data corruption

Thrown away and reimplemented


Ubiquitous Language
Protect w/
Bounded Contexts
Implement as
Domain Model

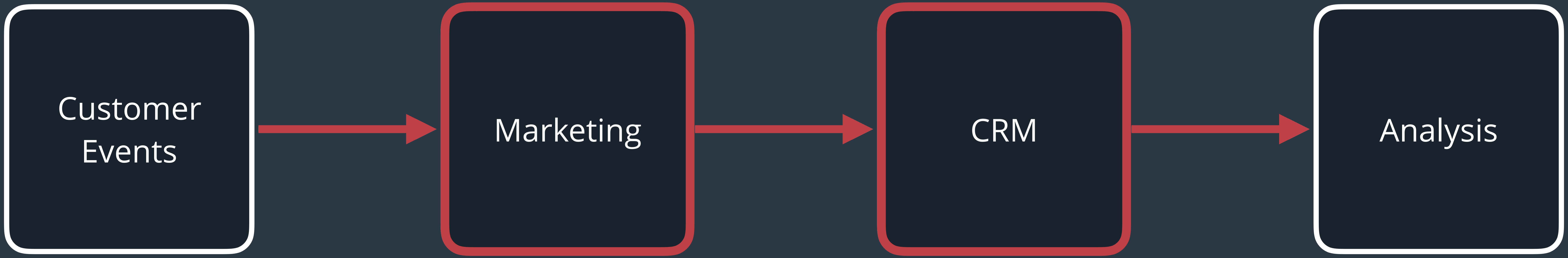
Not all of a large system will be well designed

“

Eric Evans

THE CRUNCHERS
BOUNDED CONTEXT

03



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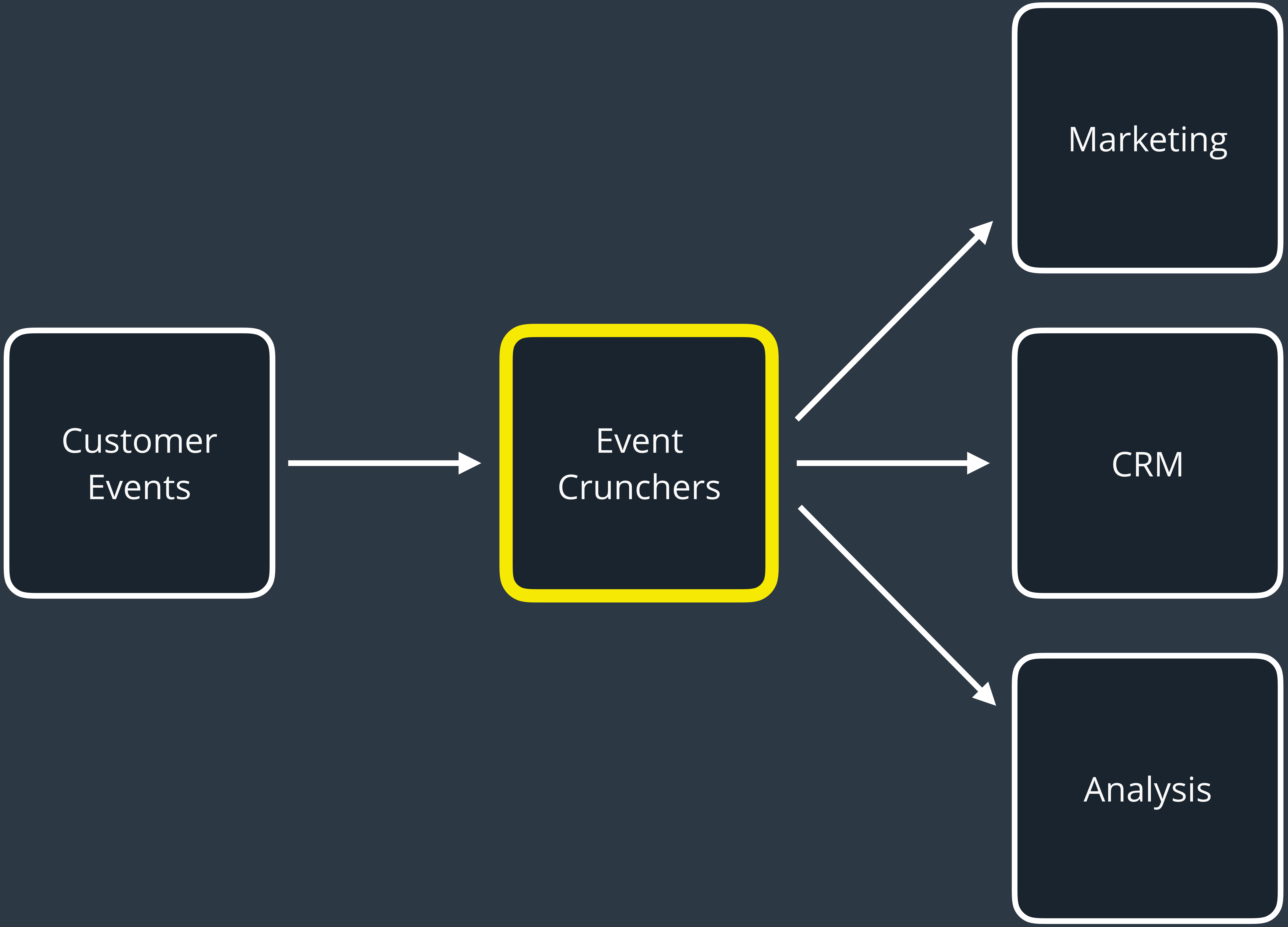

Customer Events
Event Crunchers
Marketing
CRM
Analysis

Competitive advantage? - No

Off-the-shelve solution? - No

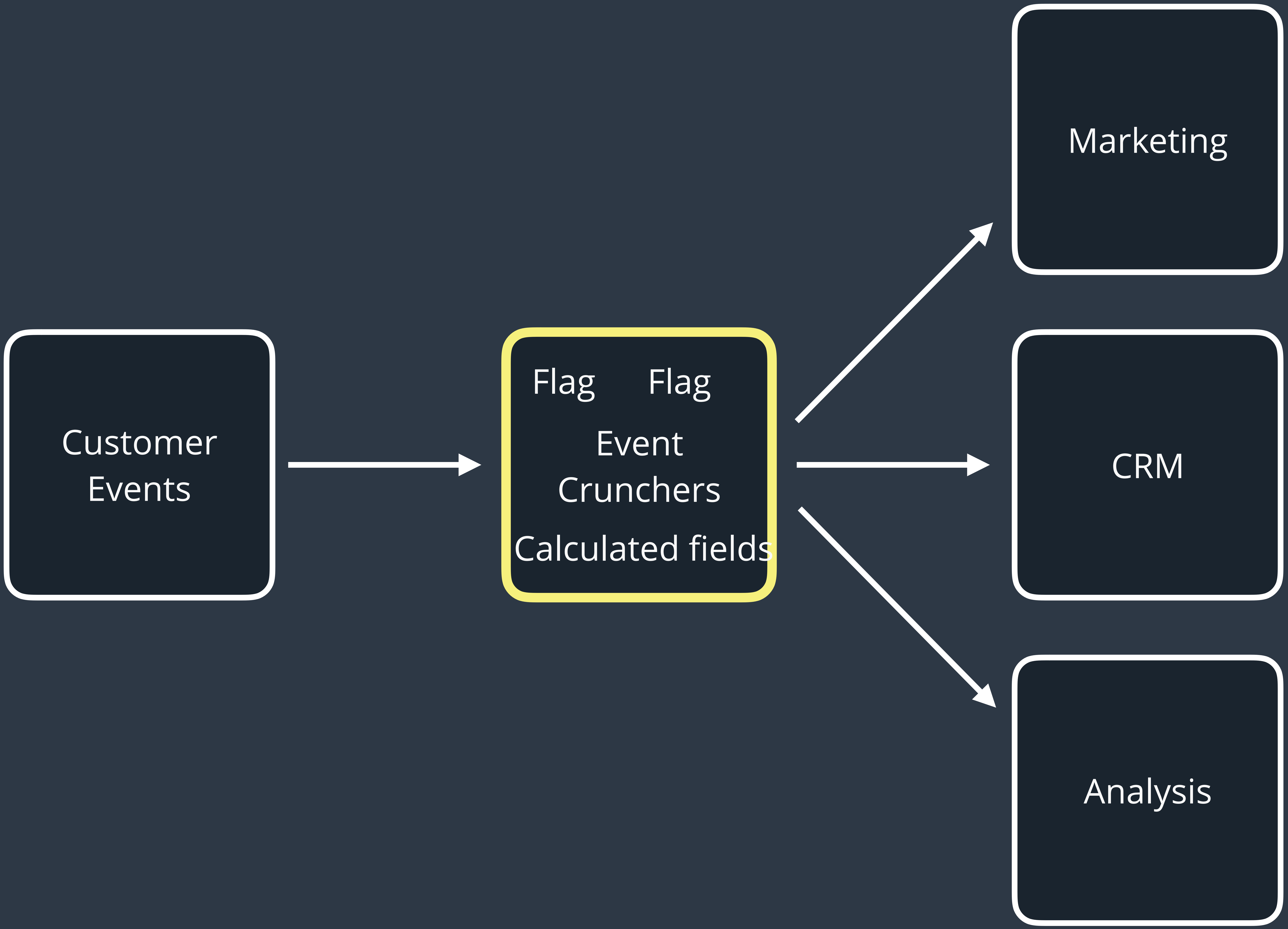
=> Supporting sub-domain

Layered Architecture

Transaction Script

Worked

.... for a while


Customer Events
Flag
Flag
Event Crunchers
Calculated fields
Marketing
CRM
Analysis

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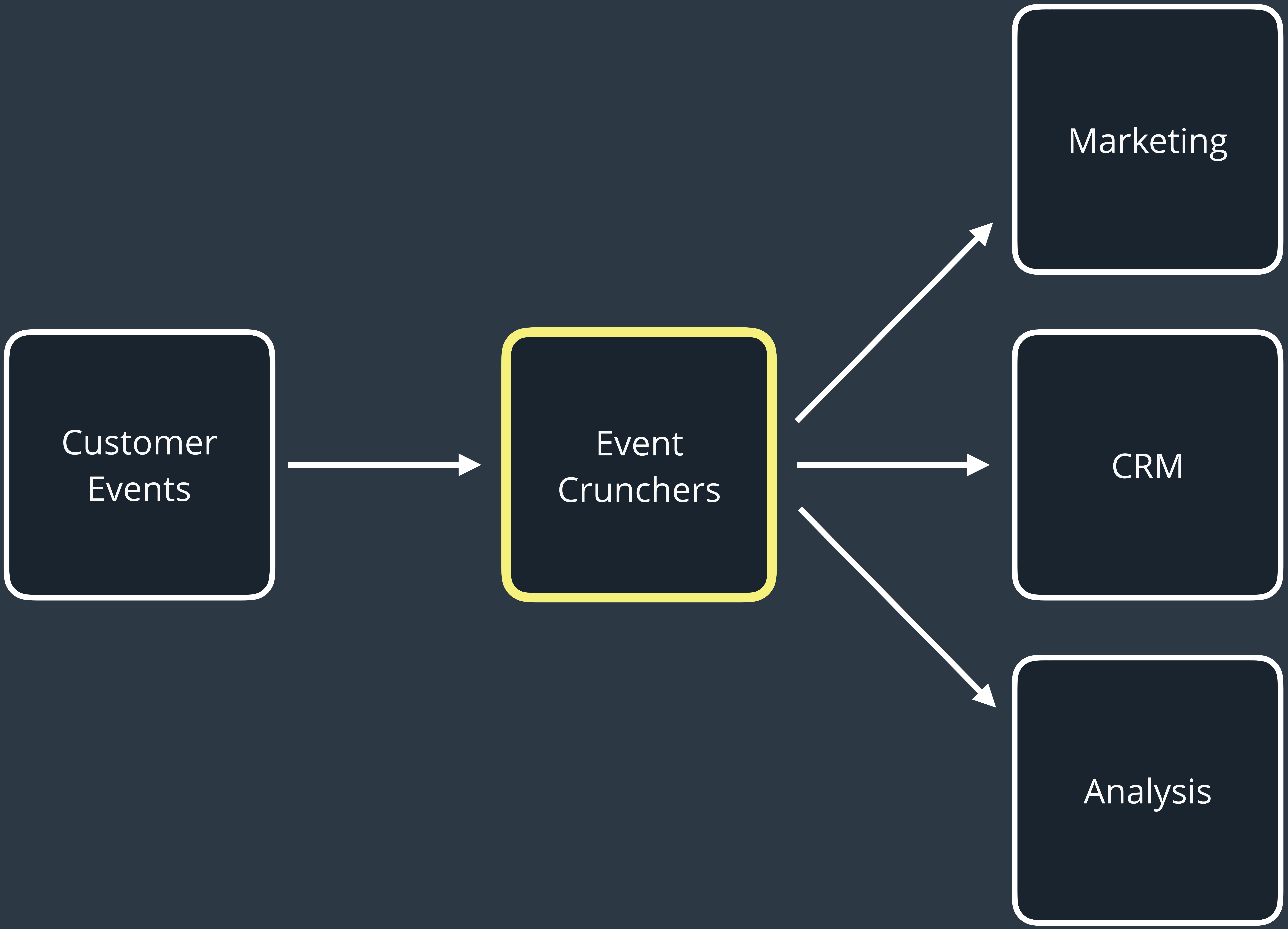
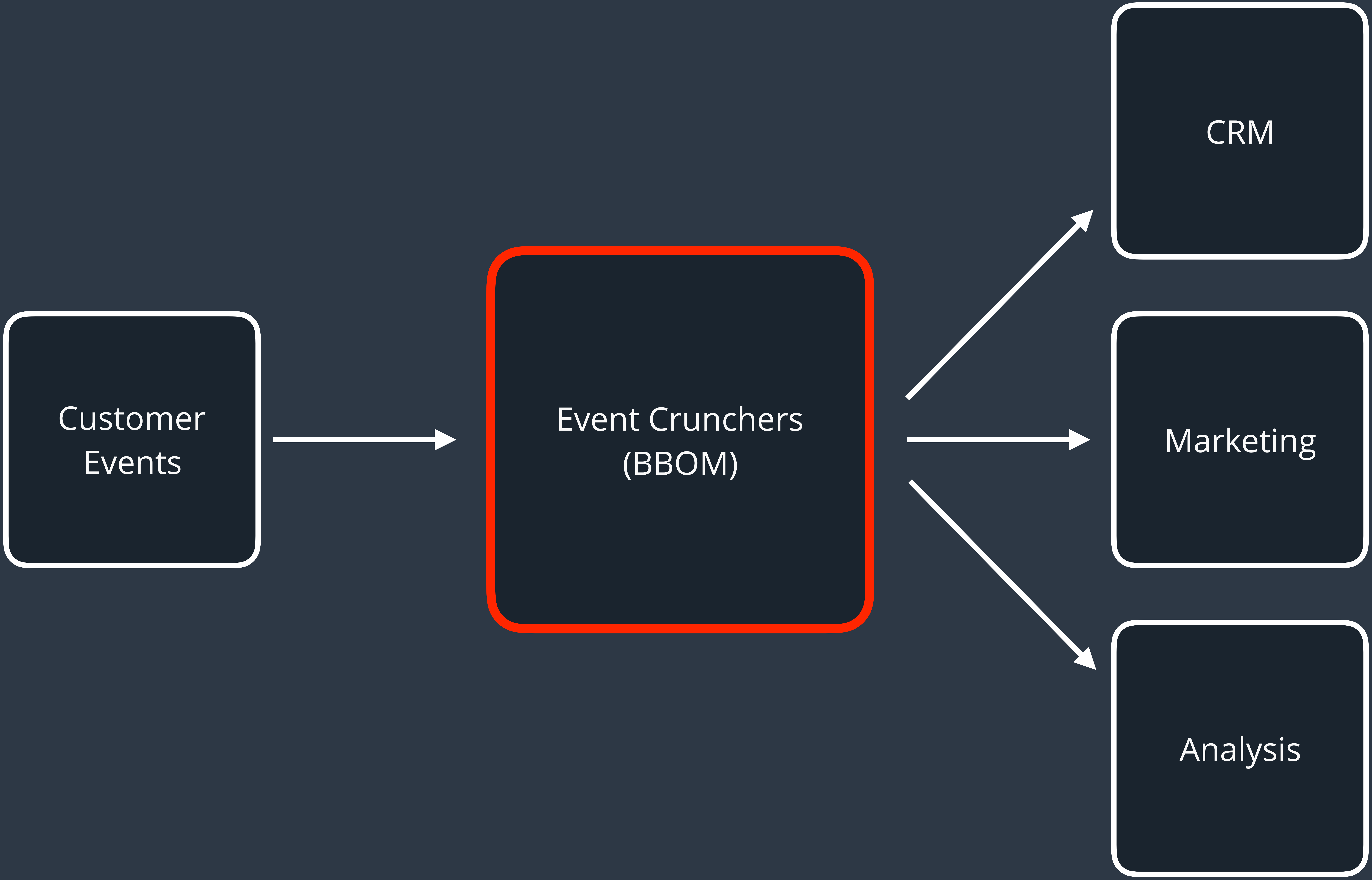
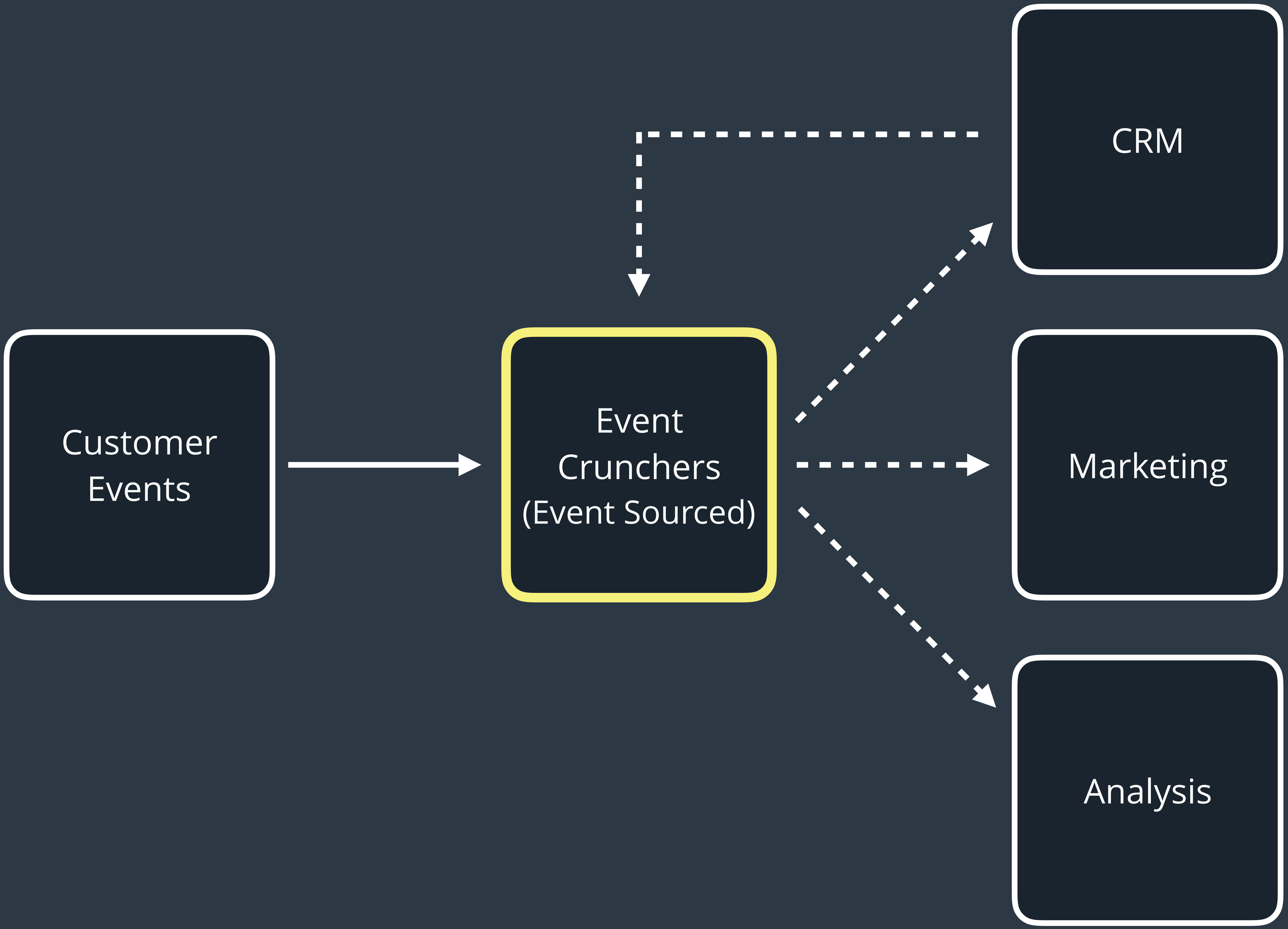
@kiszkiloszki

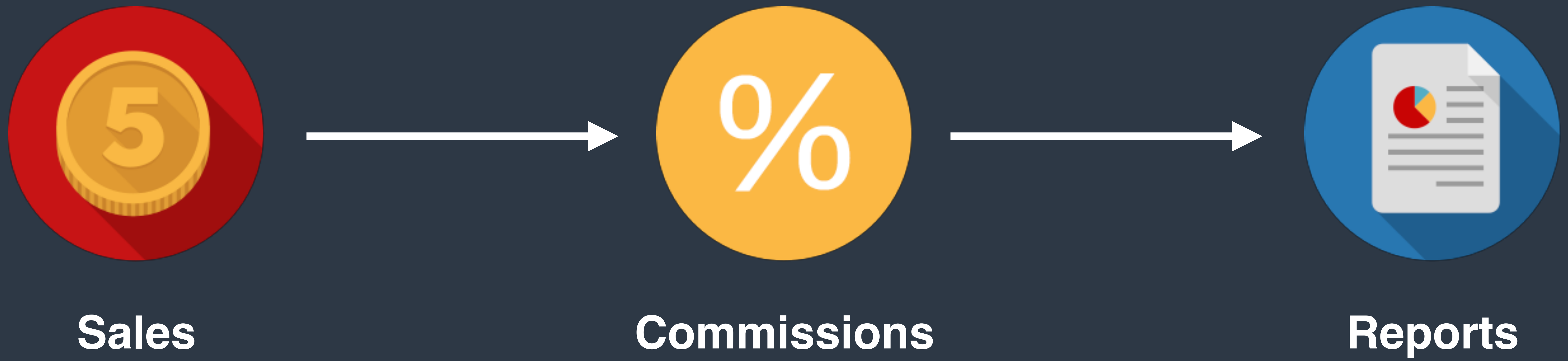

Customer Events
Event Crunchers
Marketing
CRM
Analysis


Customer Events
Event Crunchers (BBOM)
CRM
Marketing
Analysis


Customer Events
Event Crunchers (Event Sourced)
CRM
Marketing
Analysis

THE BONUSES
BOUNDED CONTEXT

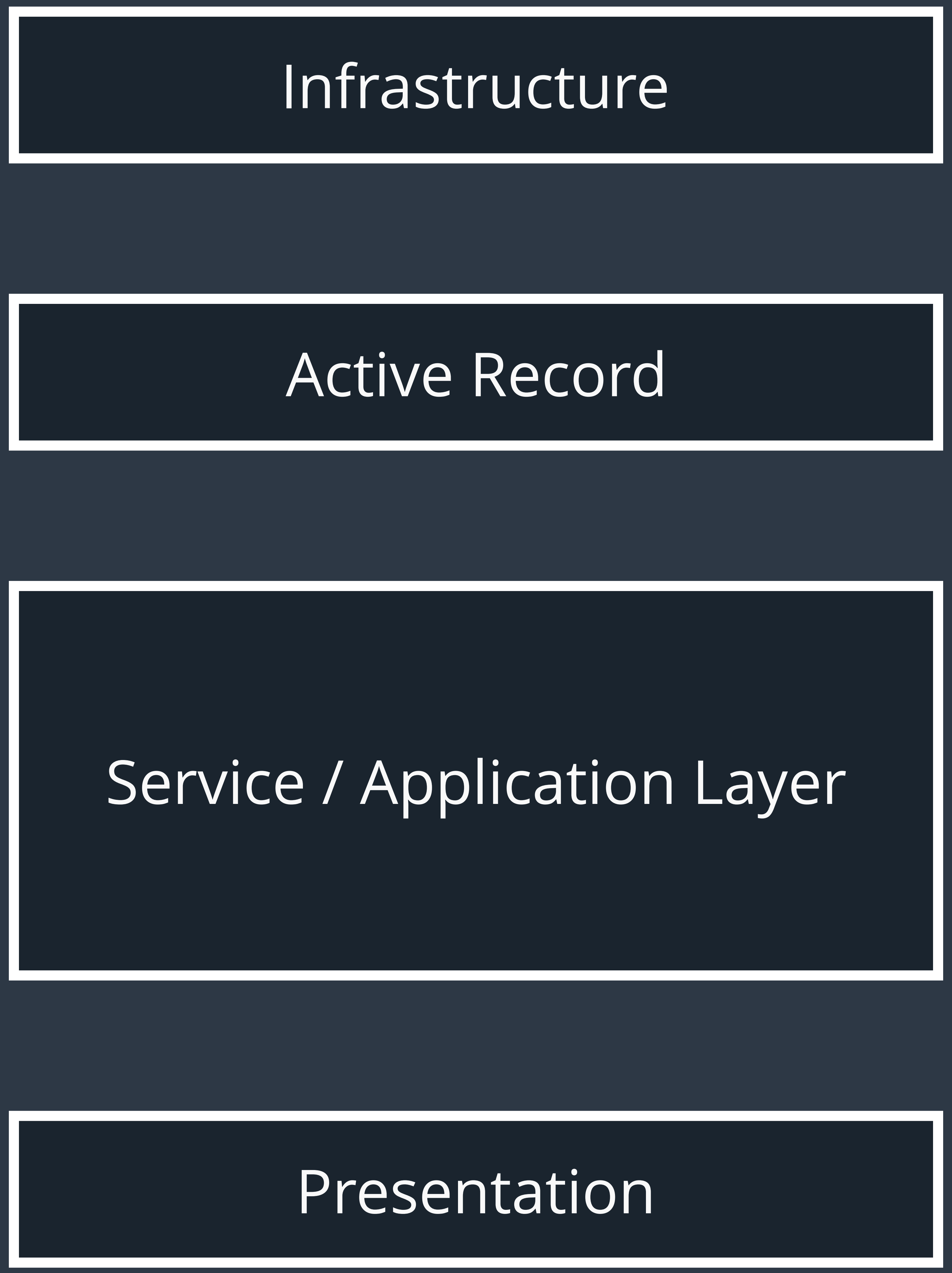
04


Sales
Commissions
Reports

Competitive advantage? - No

Off-the-shelve solution? - No

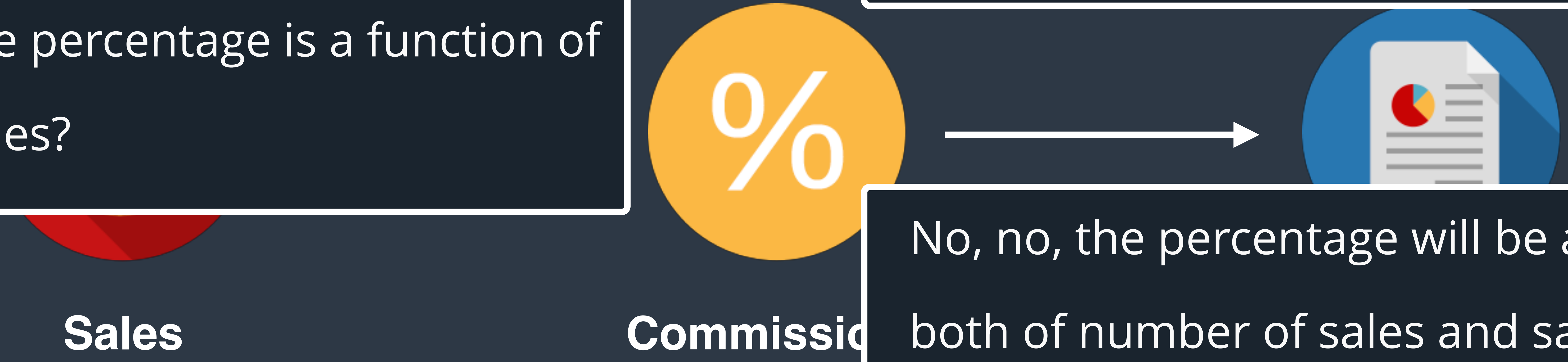
=> Supporting sub-domain


Infrastructure
Active Record
Service / Application Layer
Presentation

Let's try different percentages

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

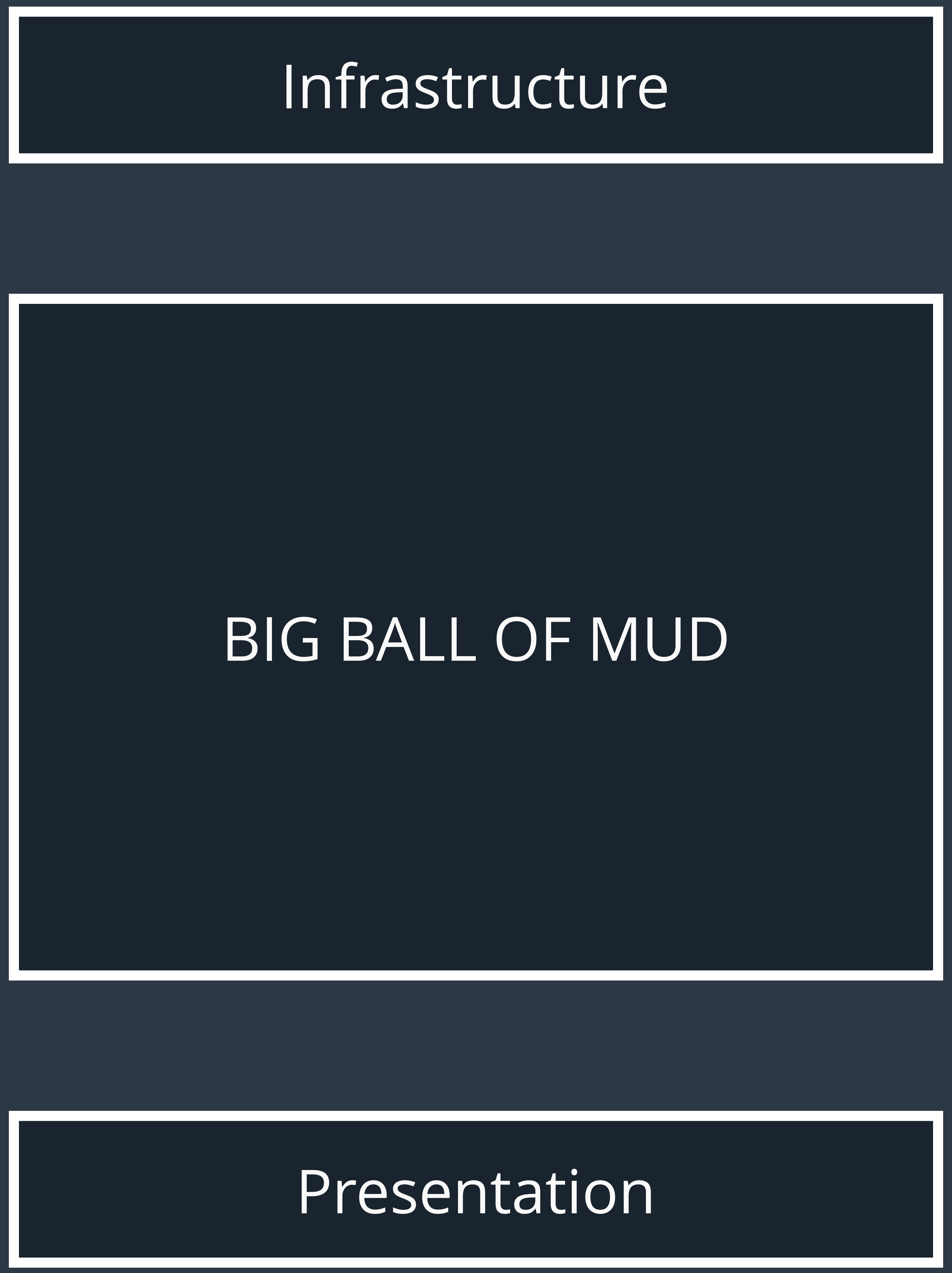
No, what if the percentage is a function of number of sales?

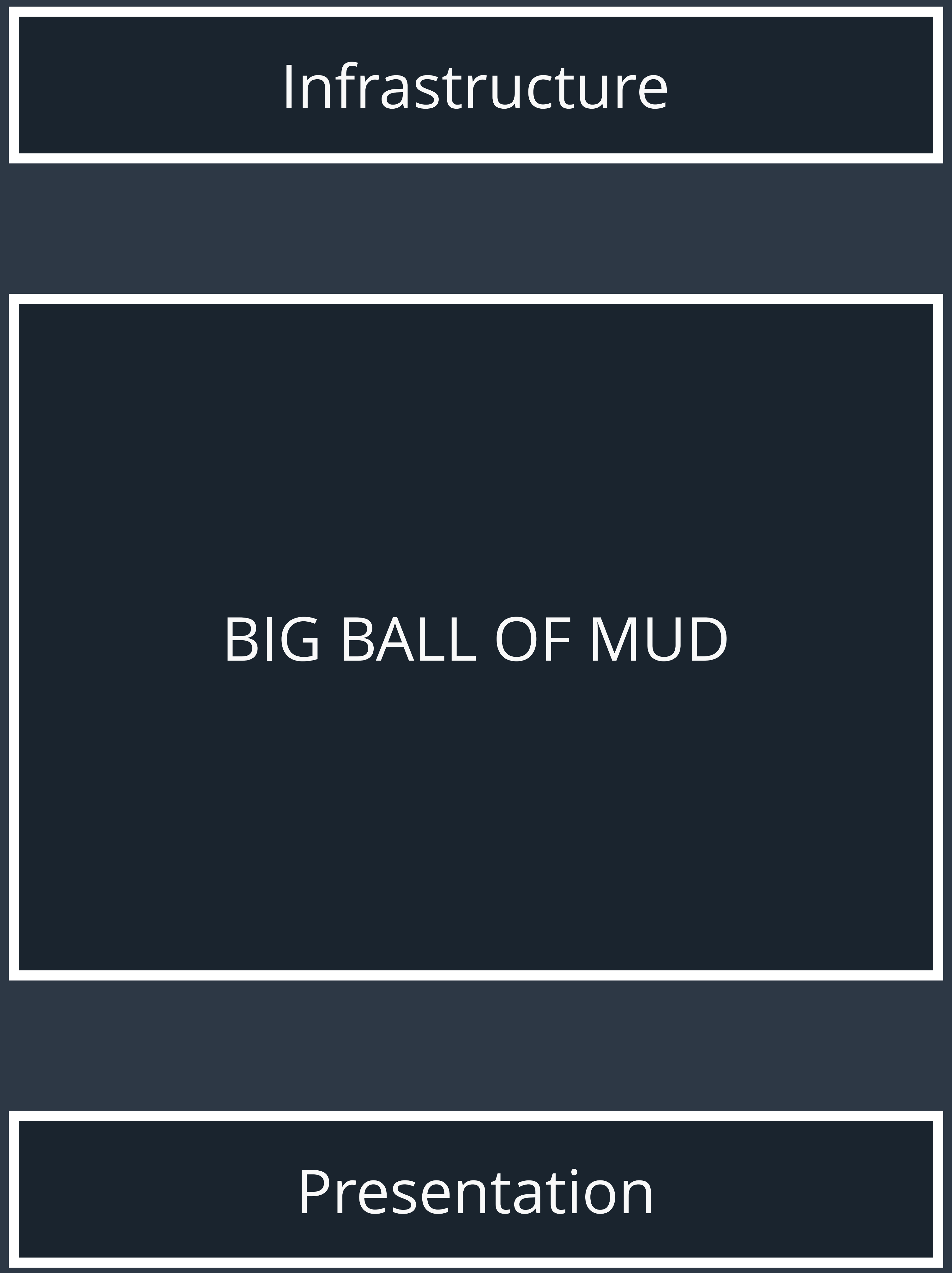


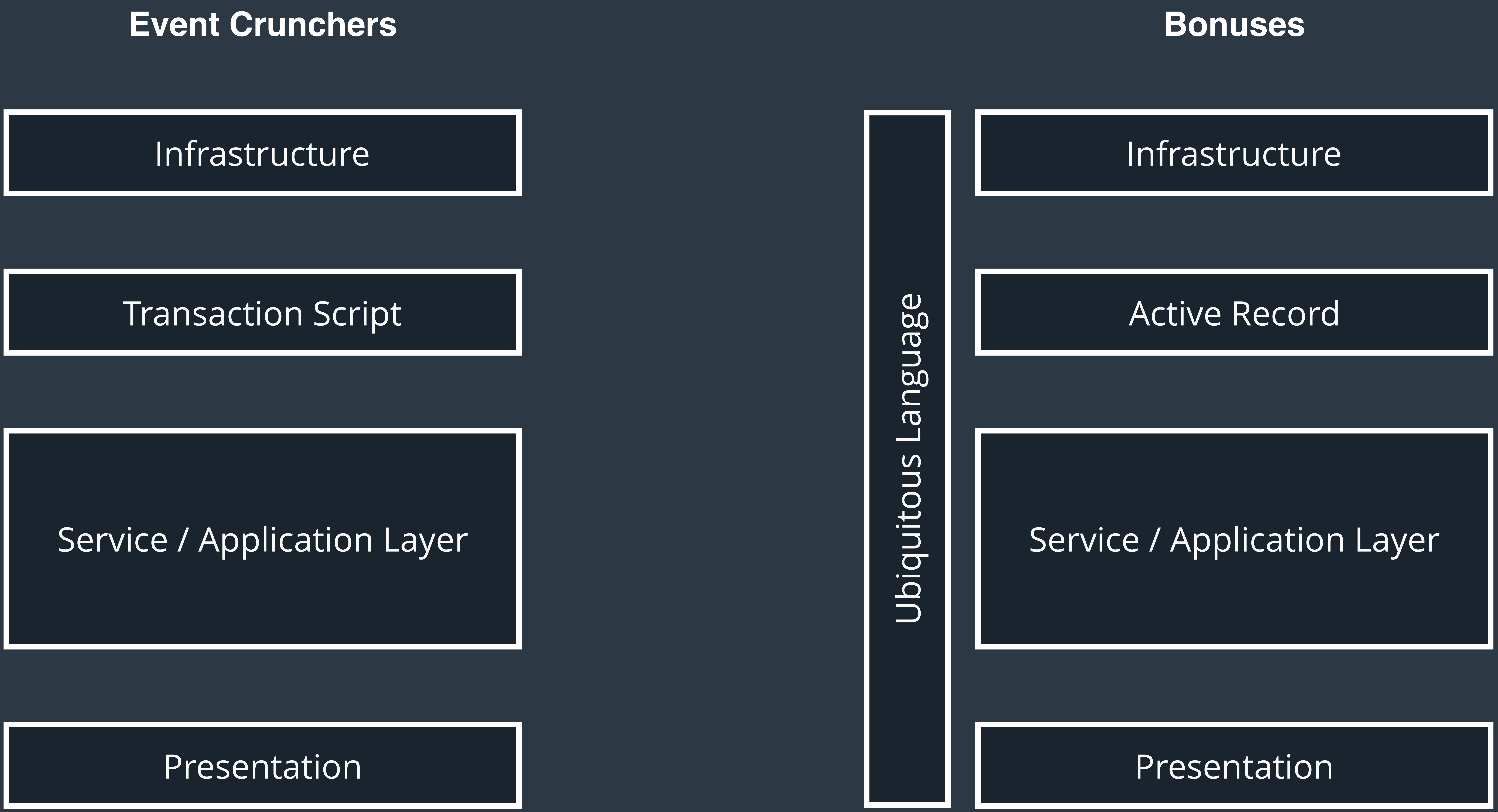
No, no, the percentage will be a function both of number of sales and sale amount

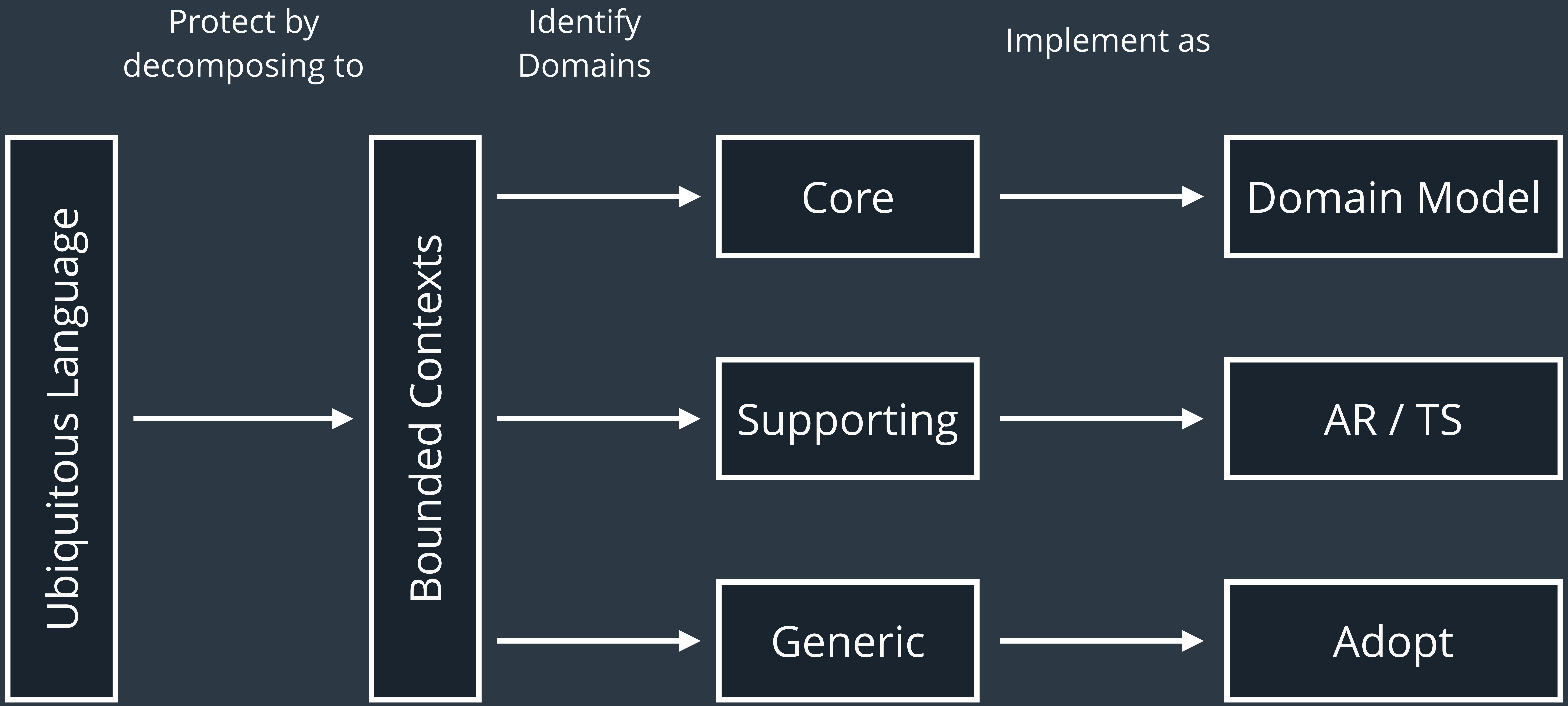
But we will upgrade the percentage if there are more than X sales per month!

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


Infrastructure
BIG BALL OF MUD
Presentation

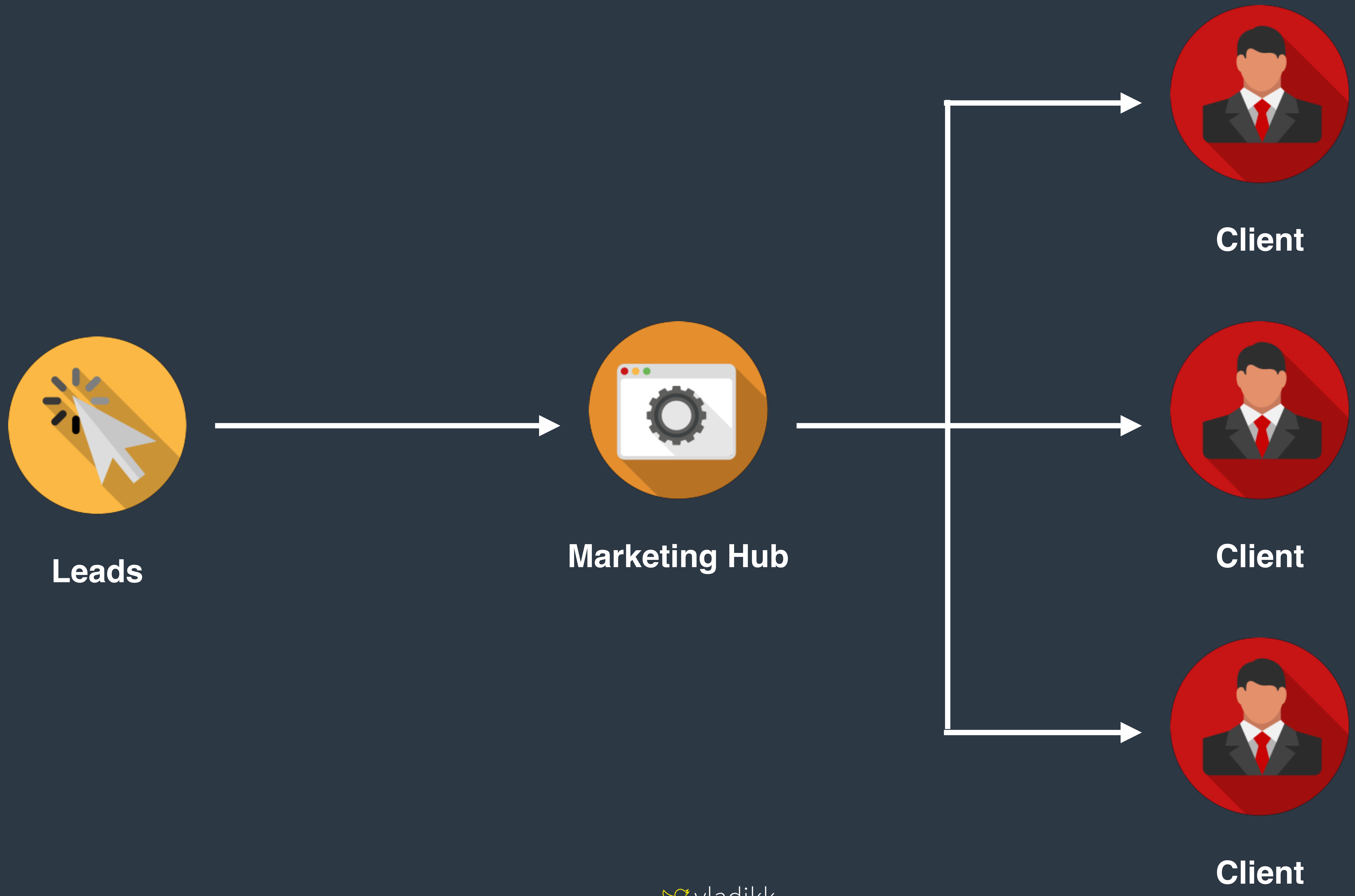

Infrastructure
BIG BALL OF MUD
Presentation


Event Crunchers
Infrastructure
Transaction Script
Service / Application Layer
Presentation
Bonuses
Ubiquitous Language
Infrastructure
Active Record
Service / Application Layer
Presentation


Protect by decomposing to
Identify Domains
Implement as
Ubiquitous Language
Bounded Contexts
Core
Supporting
Generic
Domain Model
AR / TS
Adopt

THE MARKETING HUB
BOUNDED CONTEXT

05



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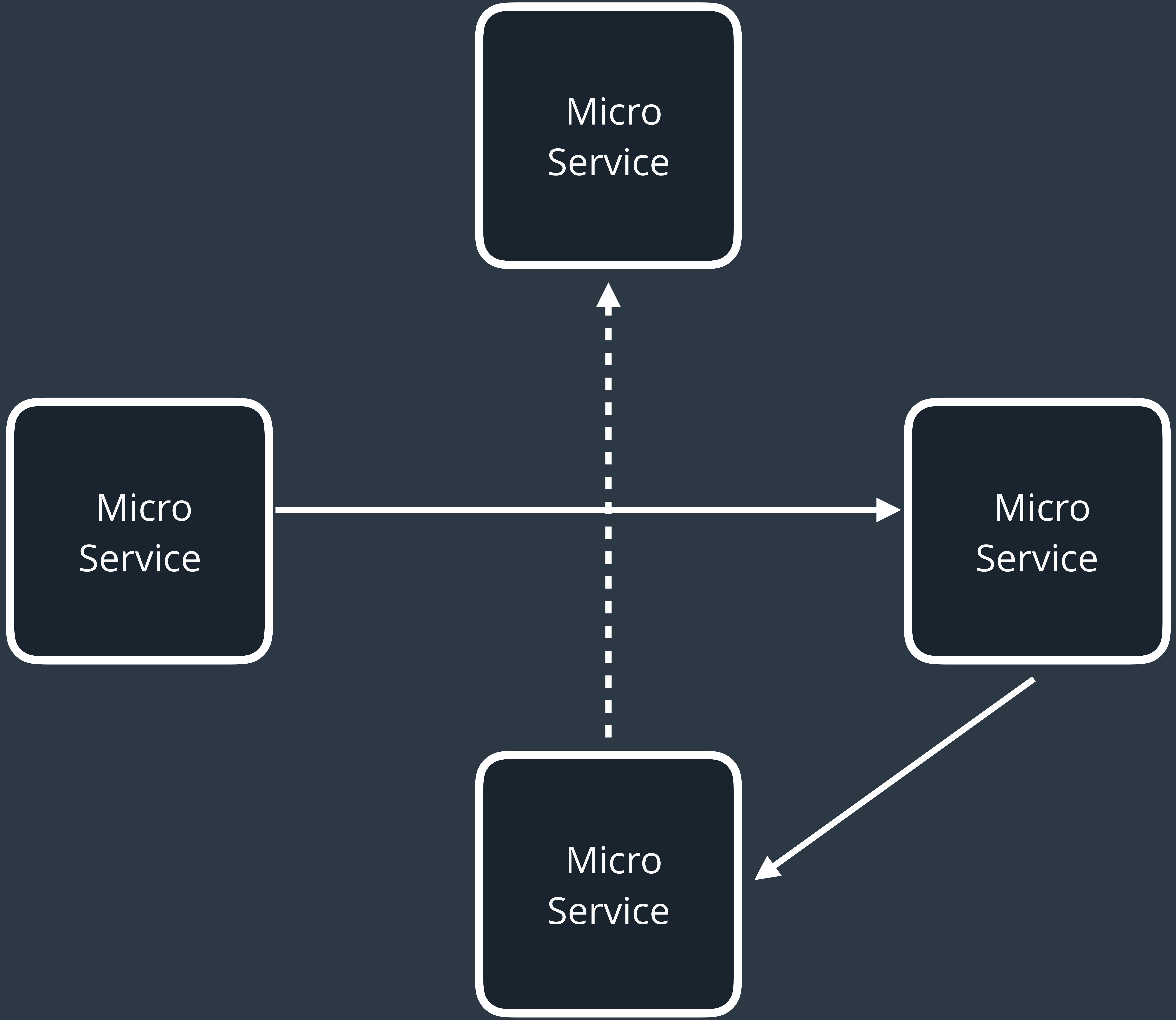
Competitive advantage? - Yes

=> Core Domain

Event Sourced Domain Model

CQRS

Microservices



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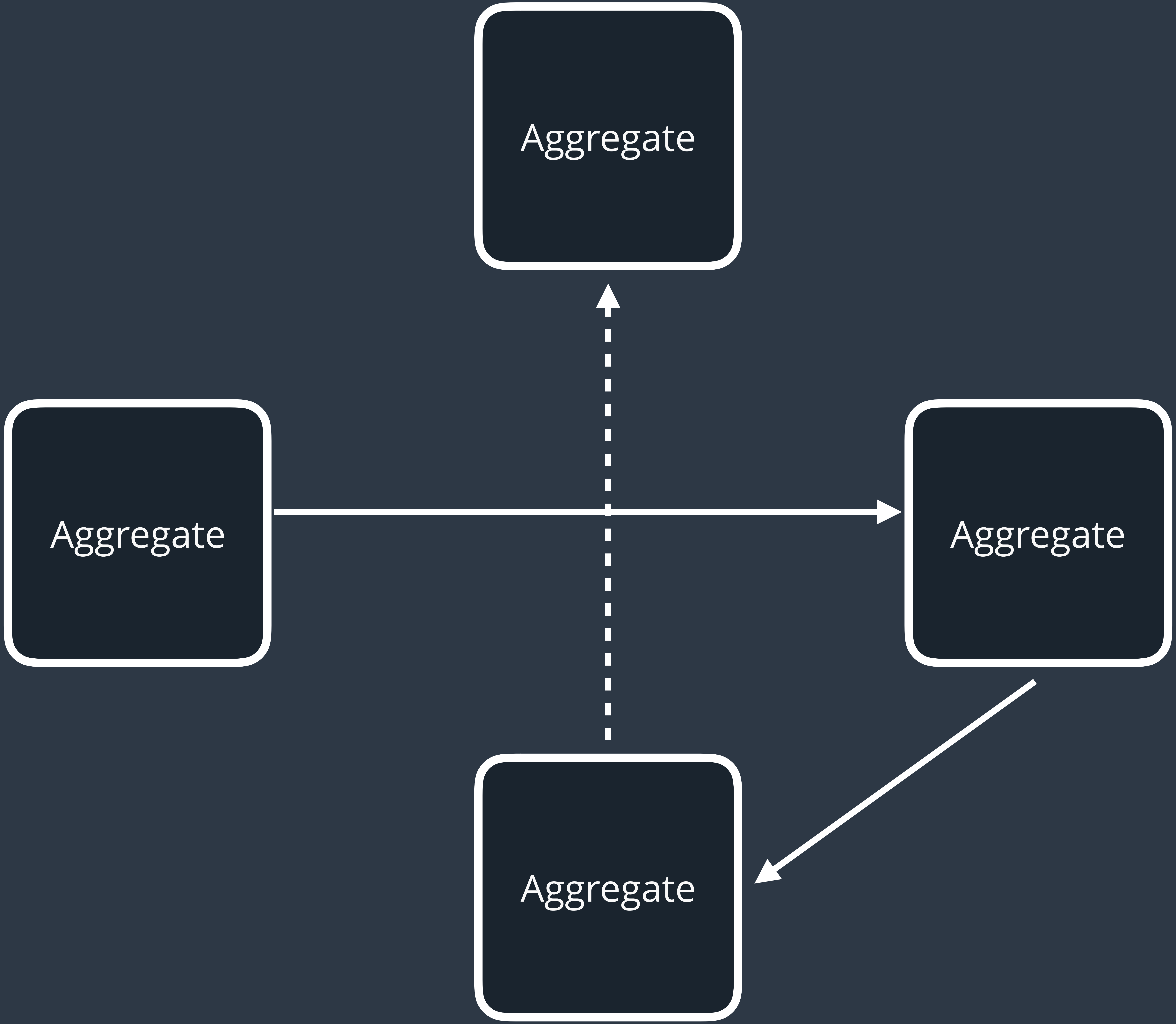

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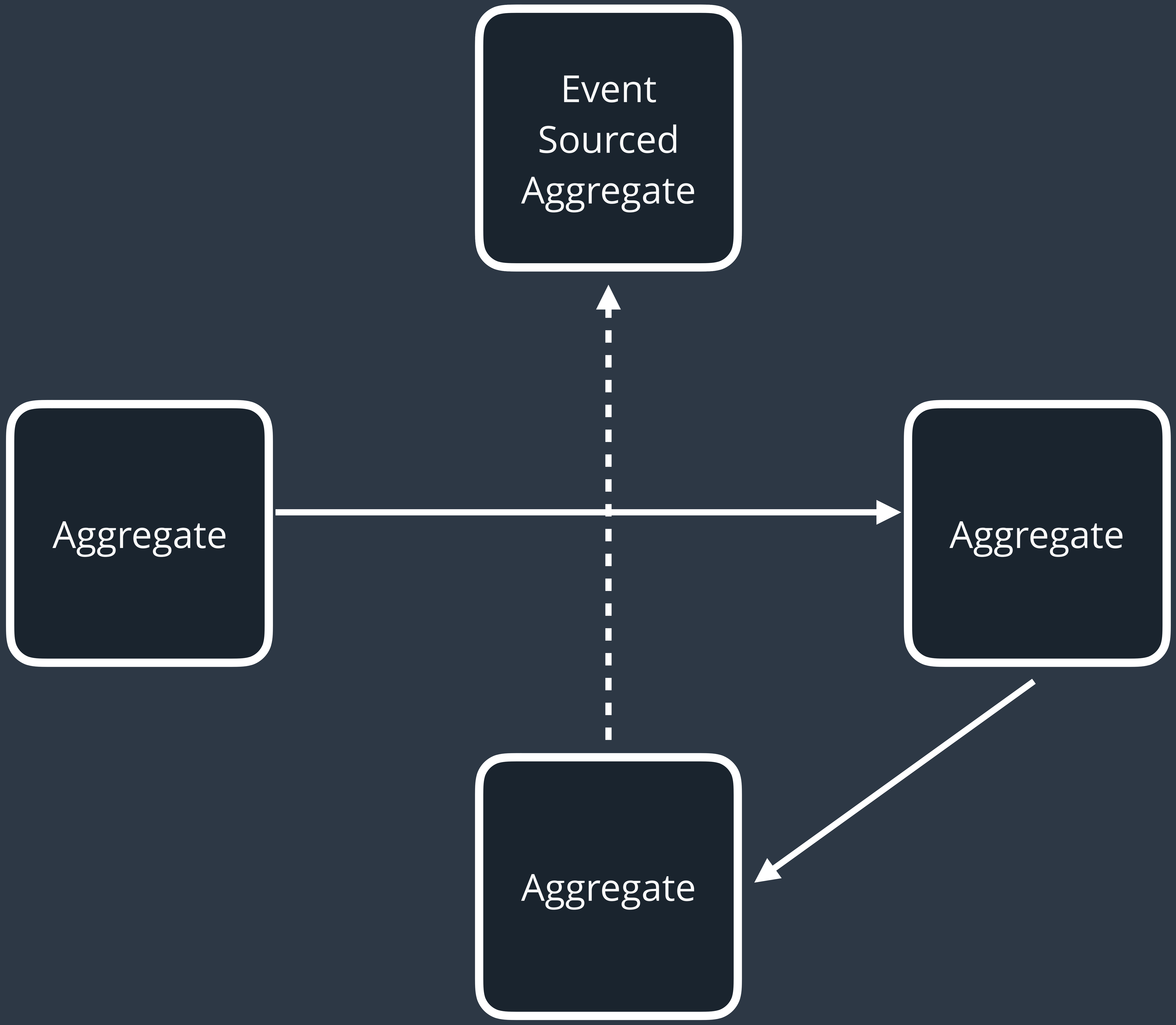

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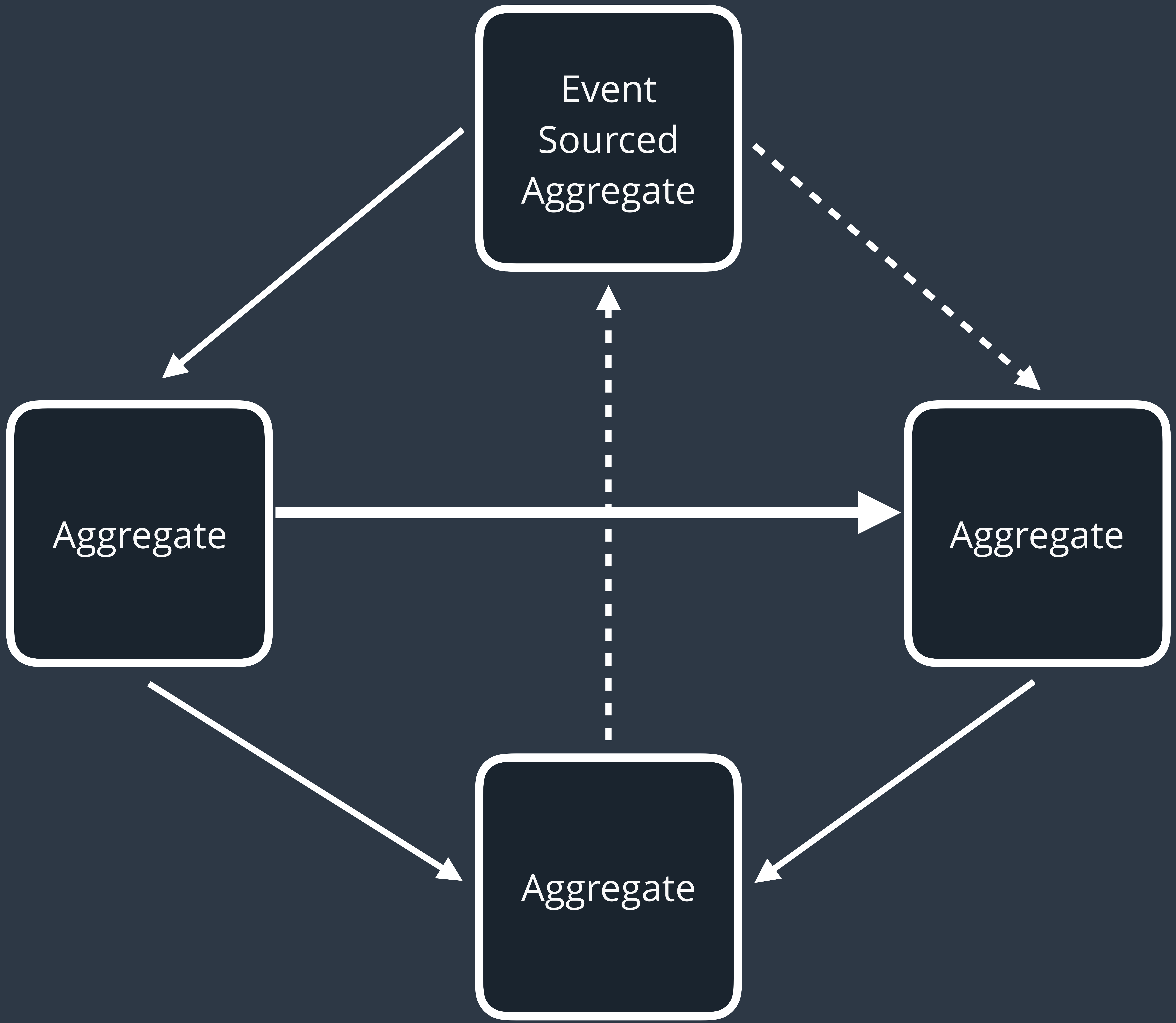

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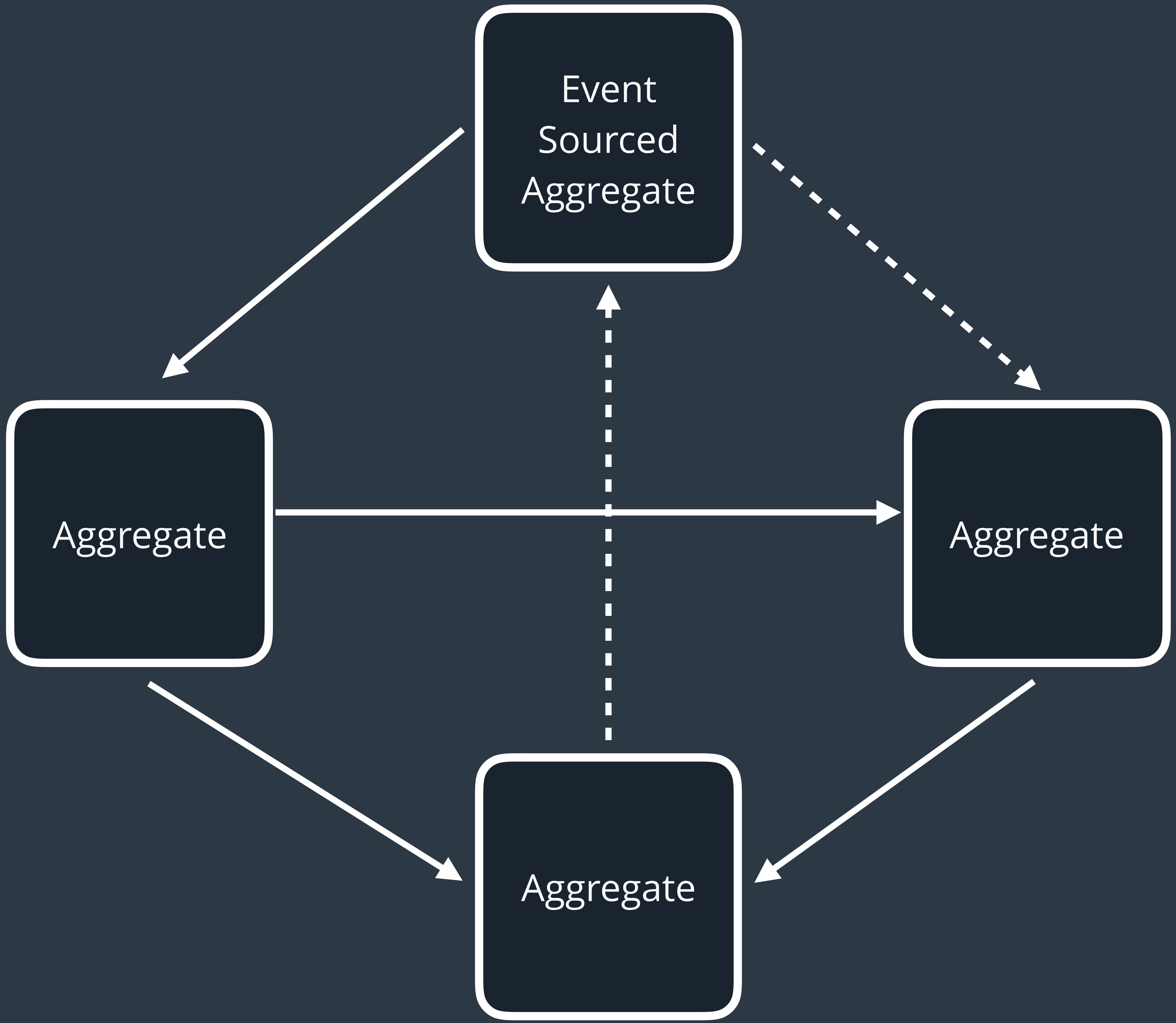
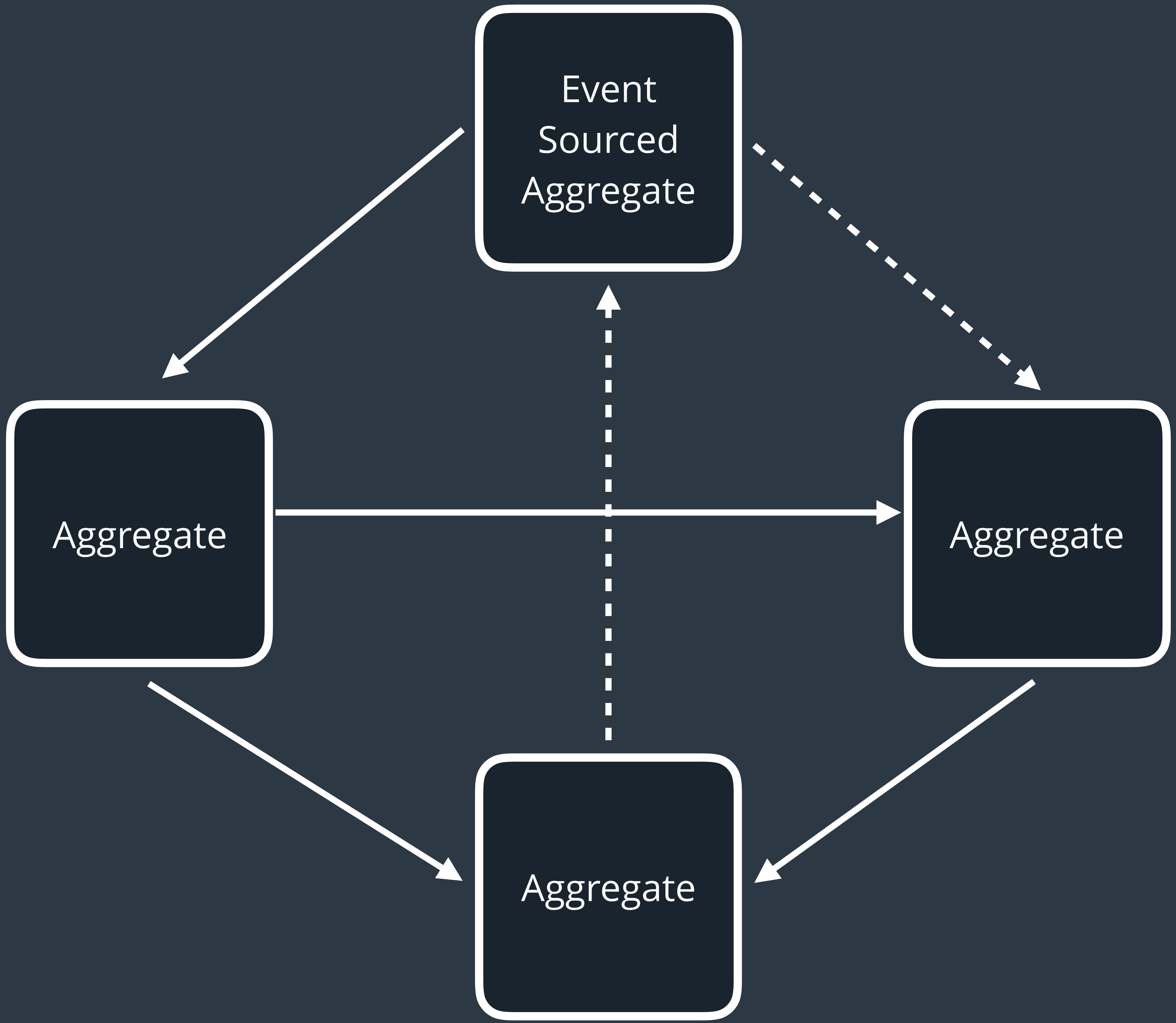
Event Sourced Domain Model

CQRS

Microservices


Event Sourced Aggregate
Aggregate
Aggregate
Aggregate

TECHNICAL COMPLEXITY > BUSINESS COMPLEXITY



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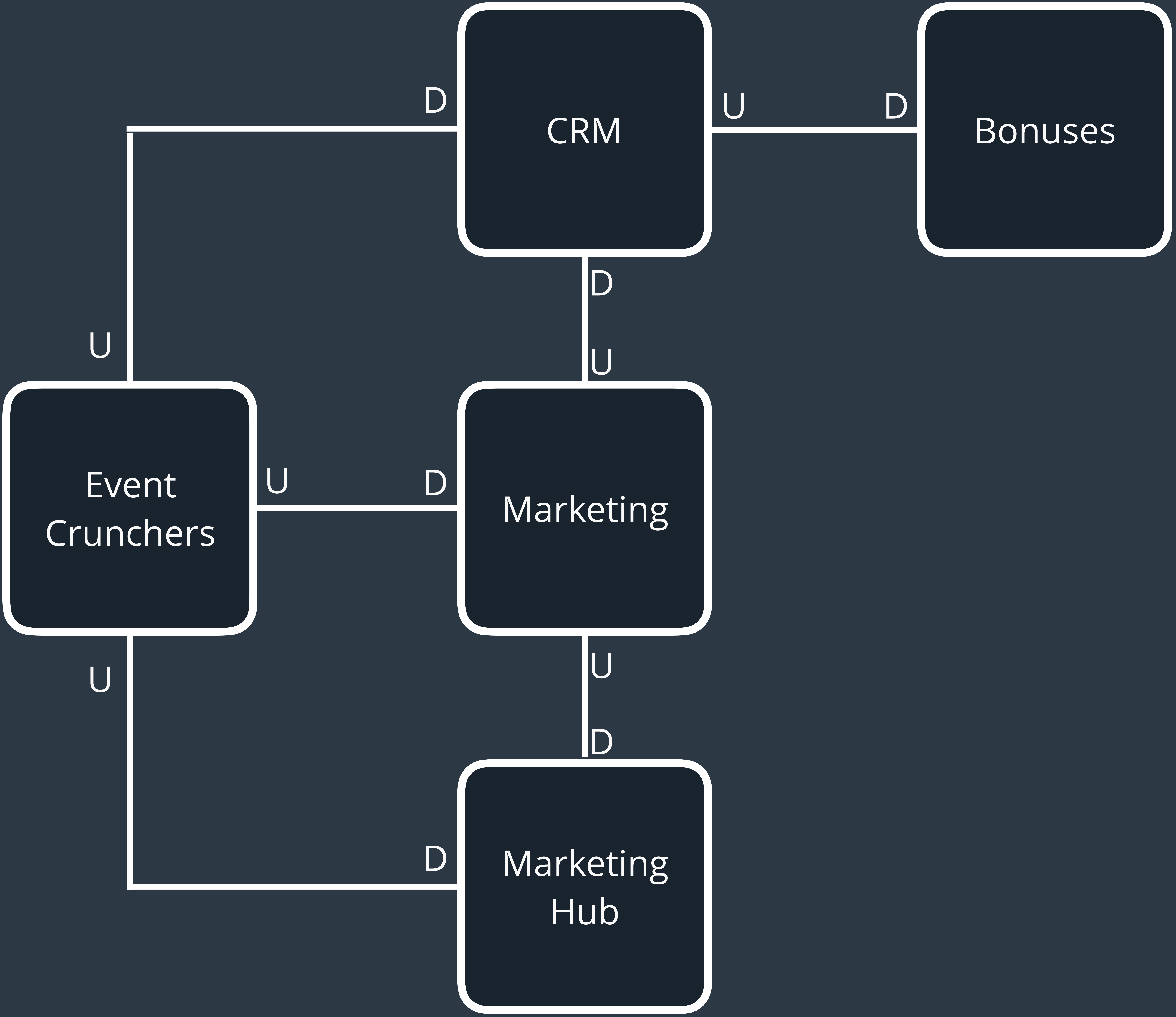

CRM
Bonuses
Event Crunchers
Marketing
Marketing Hub
D
U
D
U
D
U
U
D
U
D
U
D

WHAT WE HAVE LEARNED

UBIQUITOUS LANGUAGE

01

UBIQUITOUS LANGUAGE
THE CORE DOMAIN OF DOMAIN-DRIVEN DESIGN

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

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

Cheap!

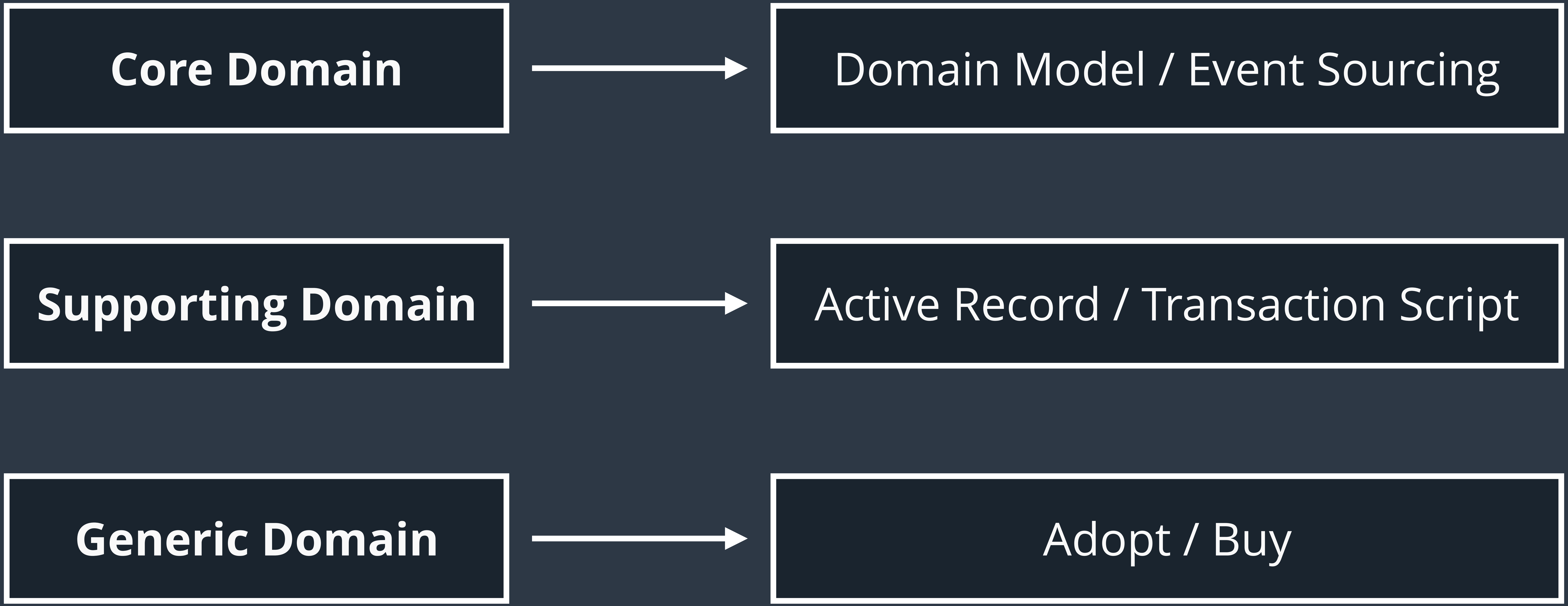
DOMAIN TYPES

02

Core

Supporting

Generic


Core Domain
Domain Model / Event Sourcing
Supporting Domain
Active Record / Transaction Script
Generic Domain
Adopt / Buy

COMPANIES CHANGE, EVOLVE, REINVENT THEMSELVES

DOMAINS' TYPES CHANGE ACCORDINGLY

SUPPORTING ➤ CORE

- Event Crunchers
- Bonuses

CORE ➤ SUPPORTING

- Marketing Hub

SUPPORTING ➤ GENERIC

- Creative Catalog

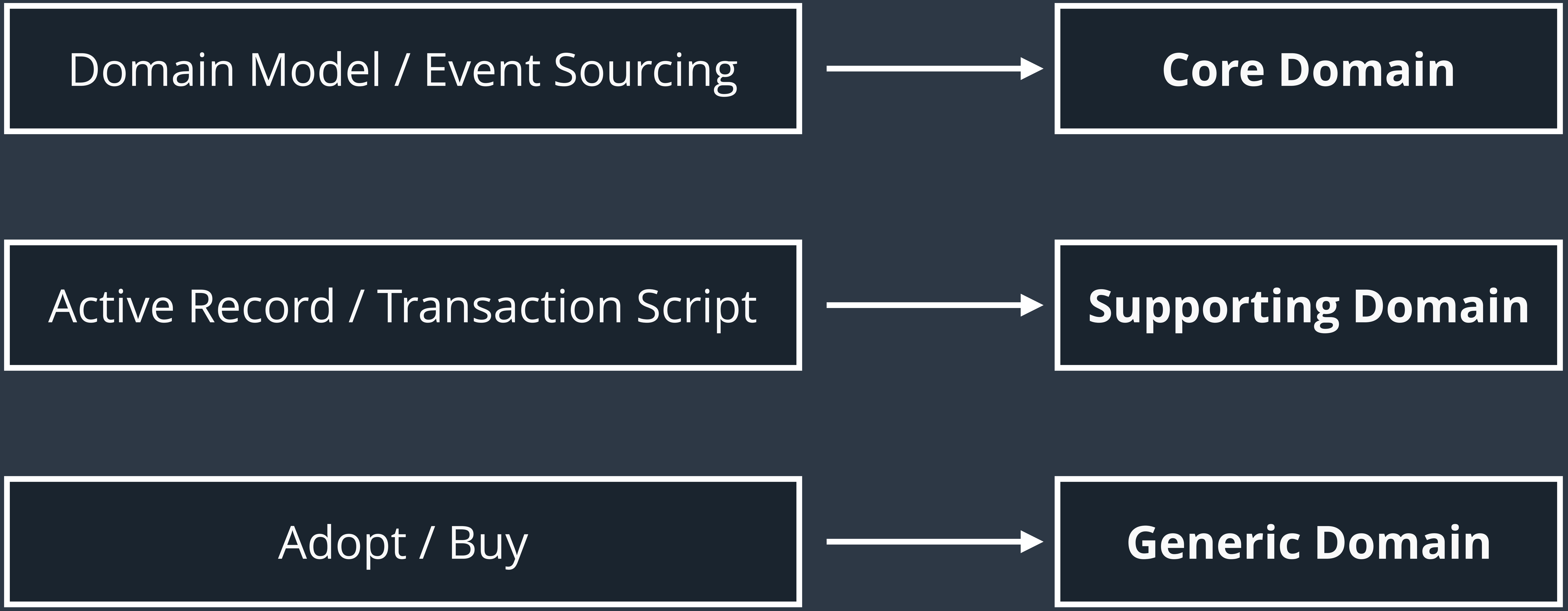
GENERIC ➤ CORE

- AWS

CORE ➤ GENERIC

- Lead Evaluation System

$$\begin{tikzcd}
\boxed{\textbf{Core Domain}} \arrow[r] & \boxed{\text{Domain Model / Event Sourcing}} \\
\boxed{\textbf{Supporting Domain}} \arrow[r] & \boxed{\text{Active Record / Transaction Script}} \\
\boxed{\textbf{Generic Domain}} \arrow[r] & \boxed{\text{Adopt / Buy}}
\end{tikzcd}$$


Domain Model / Event Sourcing
Core Domain
Active Record / Transaction Script
Supporting Domain
Adopt / Buy
Generic Domain

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

$$\begin{tikzcd}
\text{Domain Model / Event Sourcing} \arrow[r] & \textbf{Core Domain} \\
\text{Active Record / Transaction Script} \arrow[r] & \textbf{Supporting Domain} \\
\text{Adopt / Buy} \arrow[r] & \textbf{Generic Domain}
\end{tikzcd}$$

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IMPLEMENTATION STRATEGIES

03

How to Model the Business Logic?

How to Model the Business Logic?

Transaction Script (PoEAA)

Active Record (PoEAA)

Domain Model (PoEAA + DDD)

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

BUSINESS DOMAIN MODELING PATTERN

CQRS

ARCHITECTURAL PATTERN FOR REPRESENTING DATA IN *DIFFERENT* PERSISTENT MODELS

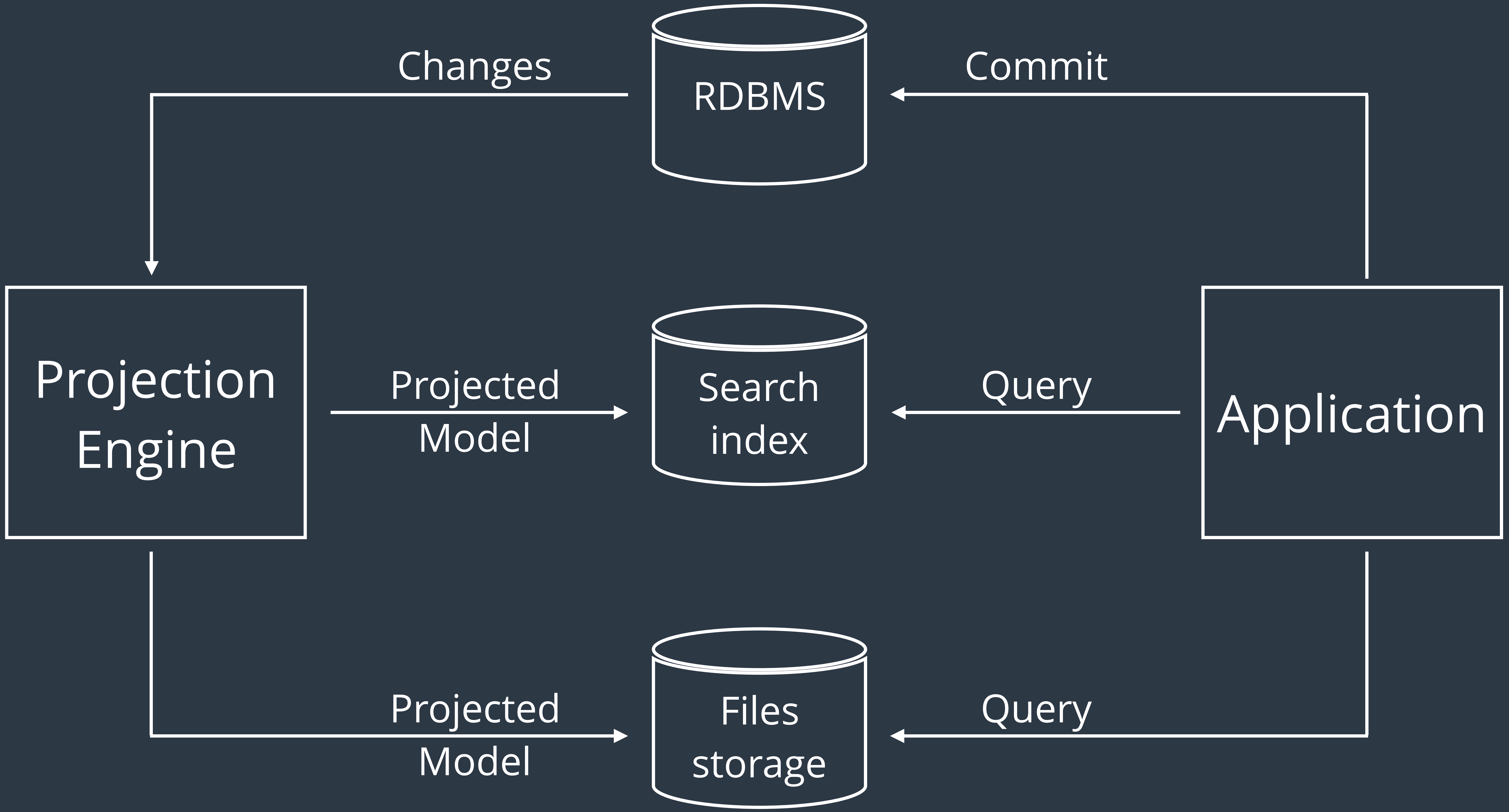
Transaction Script

Active Record

Domain Model

}

Can benefit from CQRS
and
State-Based Projections


Changes
RDBMS
Commit
Projection Engine
Projected Model
Search index
Query
Application
Projected Model
Files storage
Query

COMMAND QUERY RESPONSIBILITY SEGREGATION?

Did command succeed or fail?

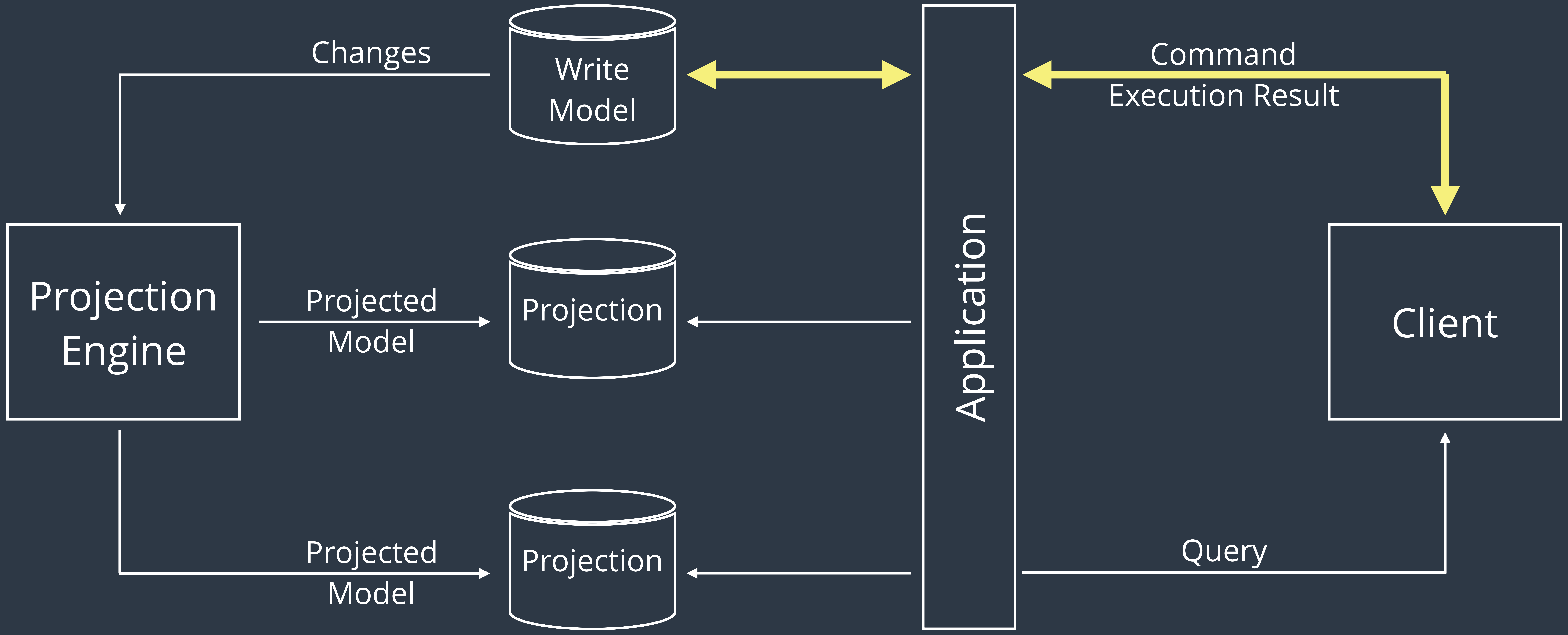
If failed - why?

What are the outcomes?

}

Can be delivered asynchronously through queries

… but why?


Changes
Write Model
Command
Execution Result
Projection Engine
Projected Model
Projection
Application
Client
Projected Model
Projection
Query

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BOUNDED CONTEXTS

05

LINGUISTIC BOUNDARIES

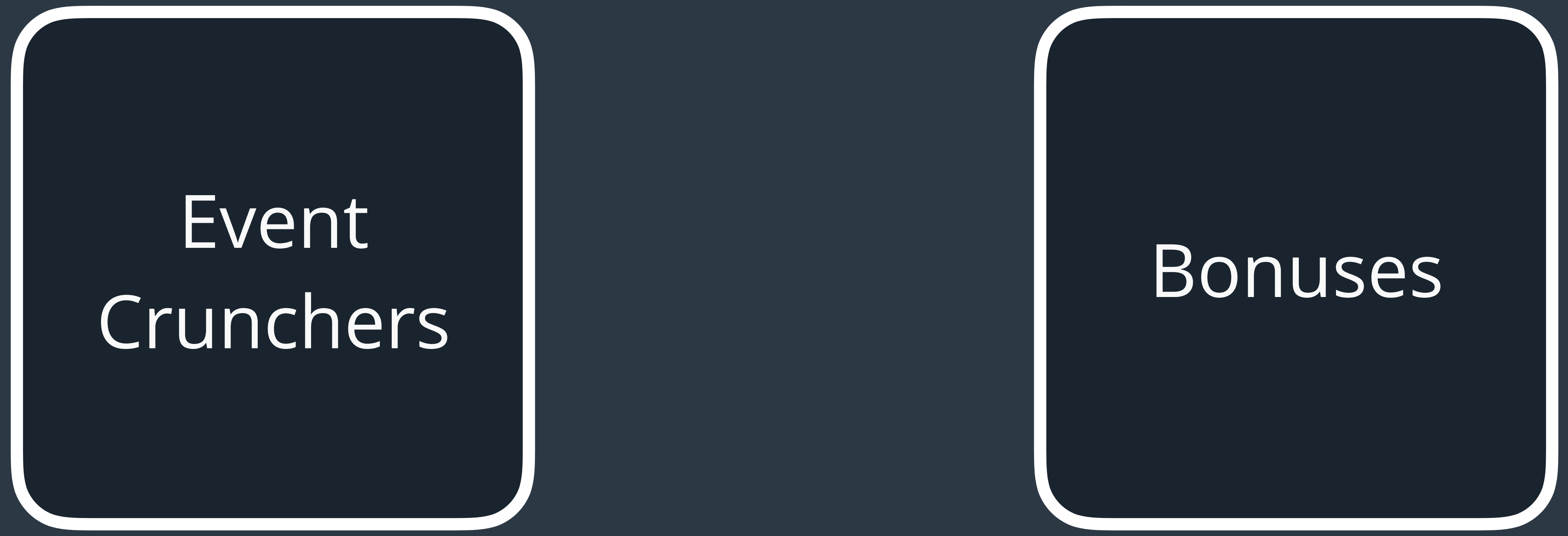
Creative	Ad Type	Advertiser
Agency	Target Market	Ad Zone
Lead	Group	Contract
Publisher	Zone Type	Budget Unit
Website	Funnel	Audience
Placement	Campaign	Visit

Marketing

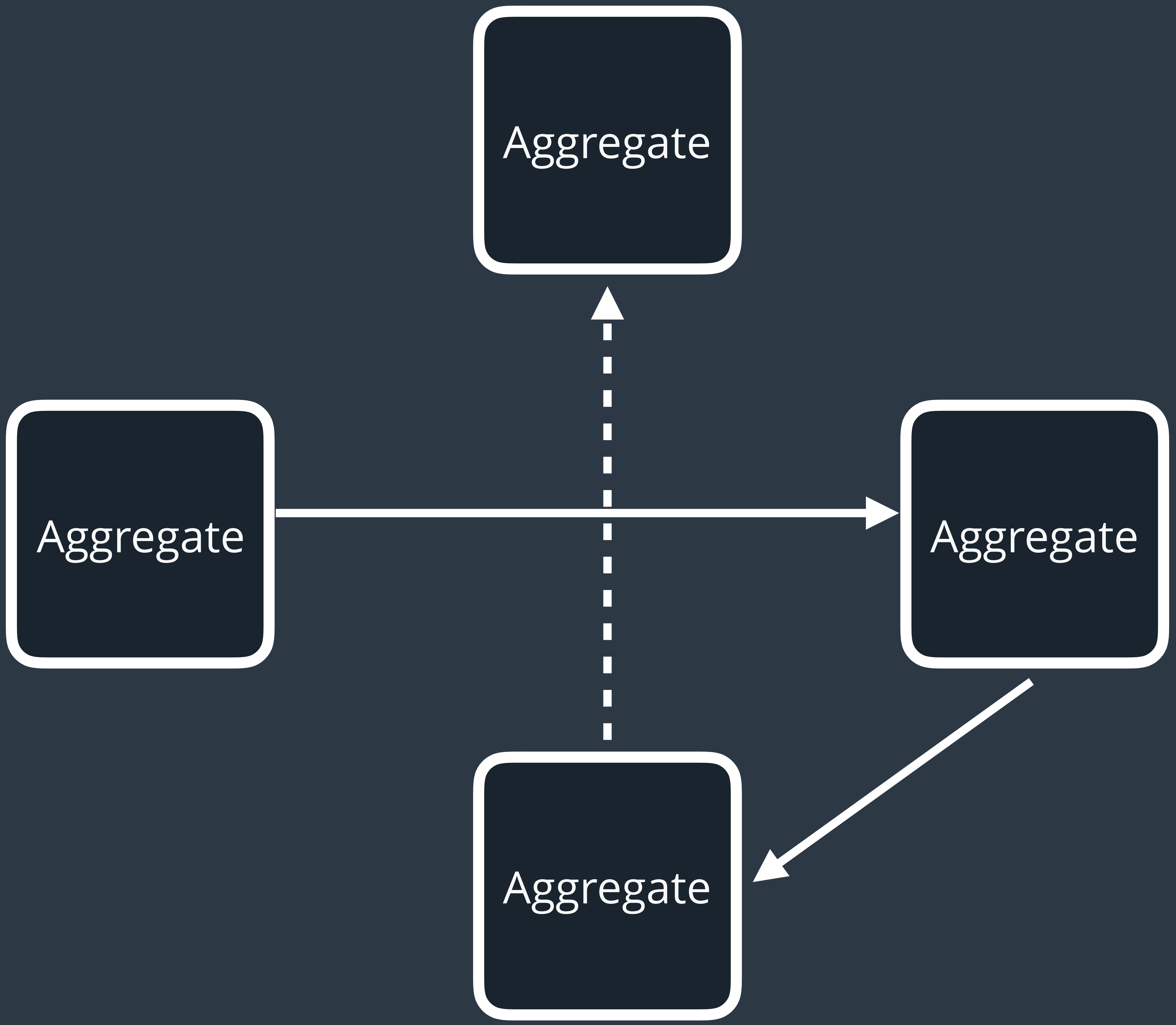
Lead	Organization Unit
Group	Assignment
Desk	Rank
Qualification	Message
Assessment	On-site Activity
Campaign	Brand

CRM

DOMAIN-BASED BOUNDARIES



AGGREGATE-BASED BOUNDARIES



SUICIDAL BOUNDARIES

L e a d

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PLOS ONE

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

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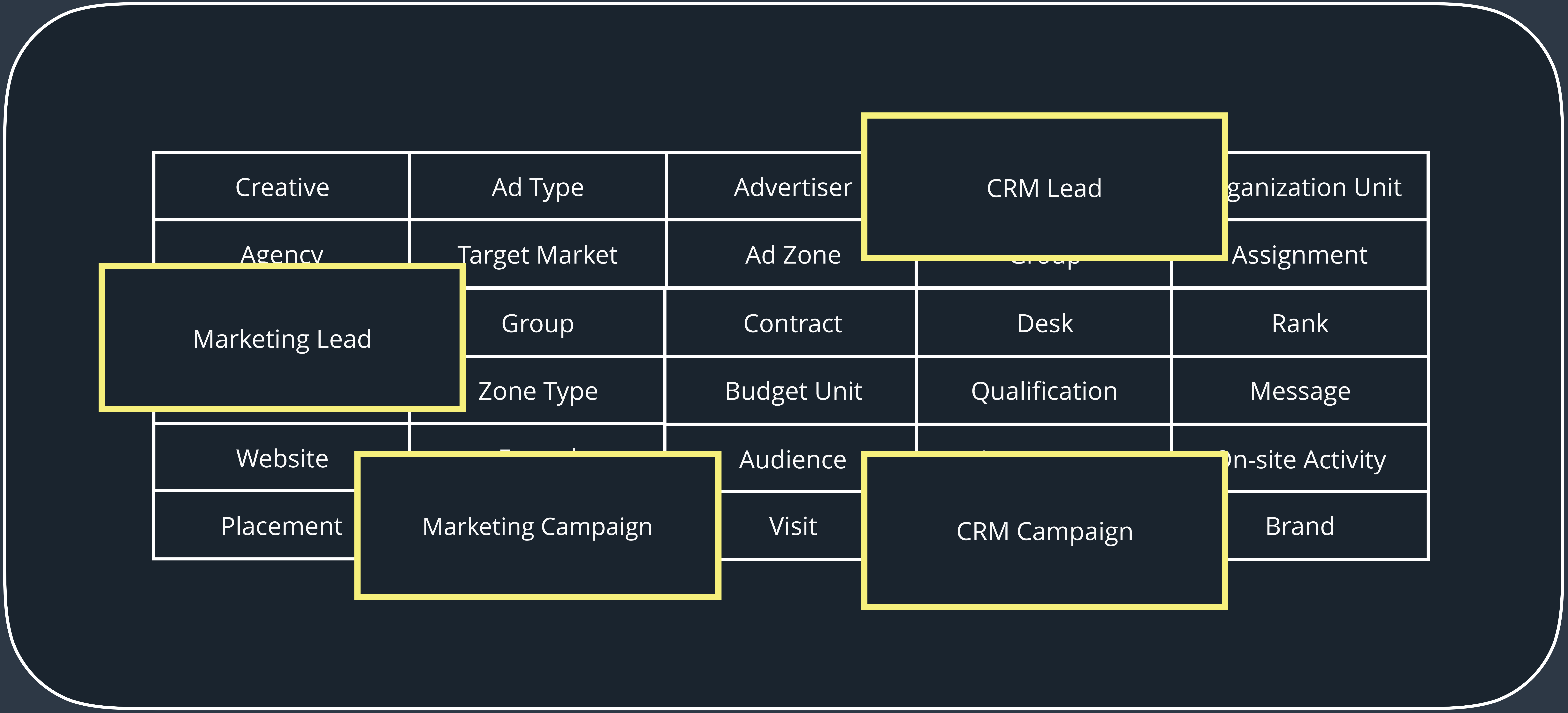
BOUNDED CONTEXTS ARE NOT MICROSERVICES

BOUNDED CONTEXTS

PROTECT INTEGRITY OF A UBIQUITOUS LANGUAGE


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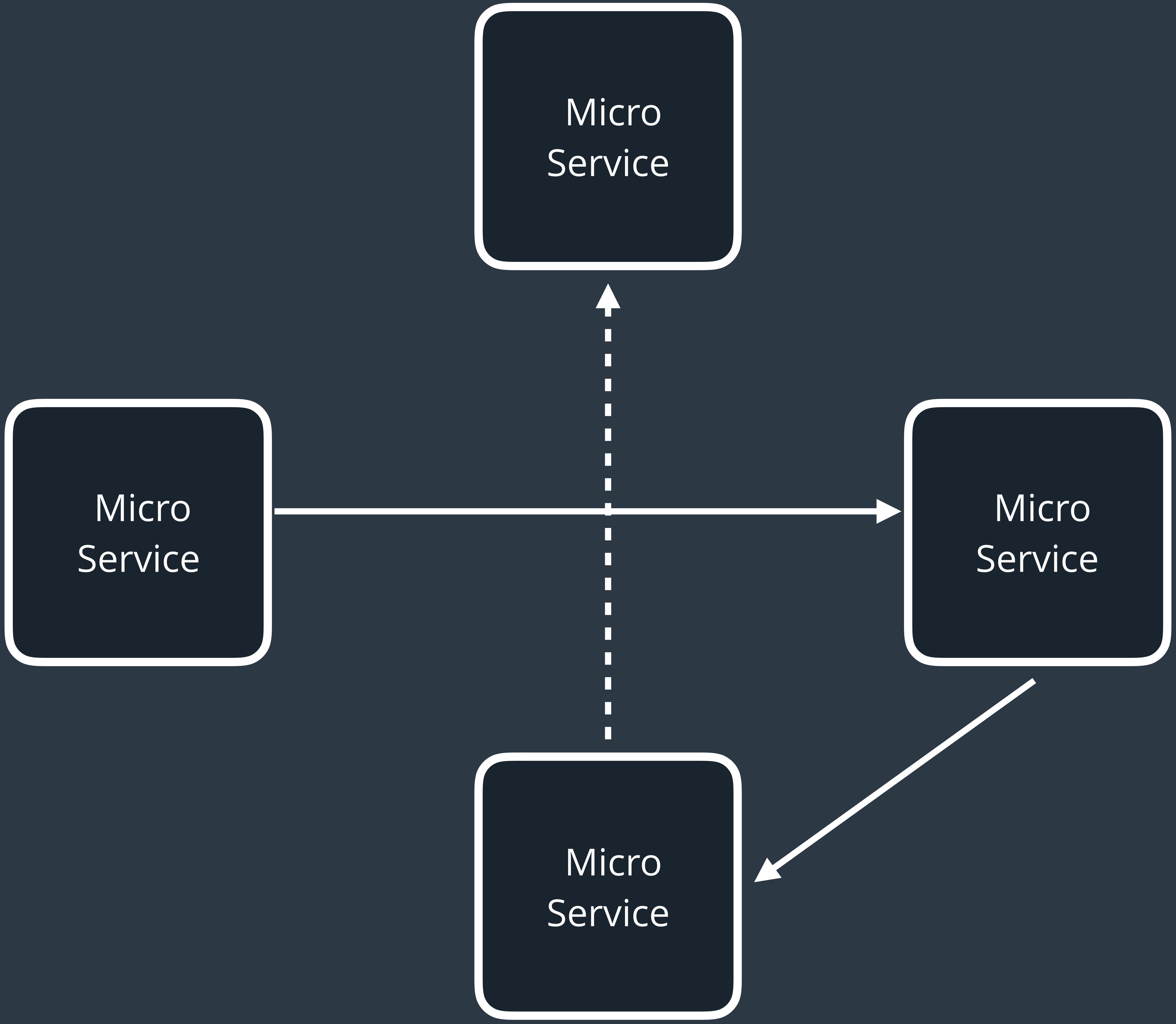
Agency
Target Market
Ad Zone
Assignment
Marketing Lead
Group
Contract
Desk
Rank
Zone Type
Budget Unit
Qualification
Message
Website
Audience
On-site Activity
Placement
Marketing Campaign
Visit
CRM Campaign
Brand

BOUNDED CONTEXTS

PROTECT INTEGRITY OF A UBIQUITOUS LANGUAGE

MICROSERVICES

DECOMPOSITION OF A SYSTEM INTO LOOSELY COUPLED COMPONENTS



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Finding service boundaries is really damn hard… There is no flowchart!

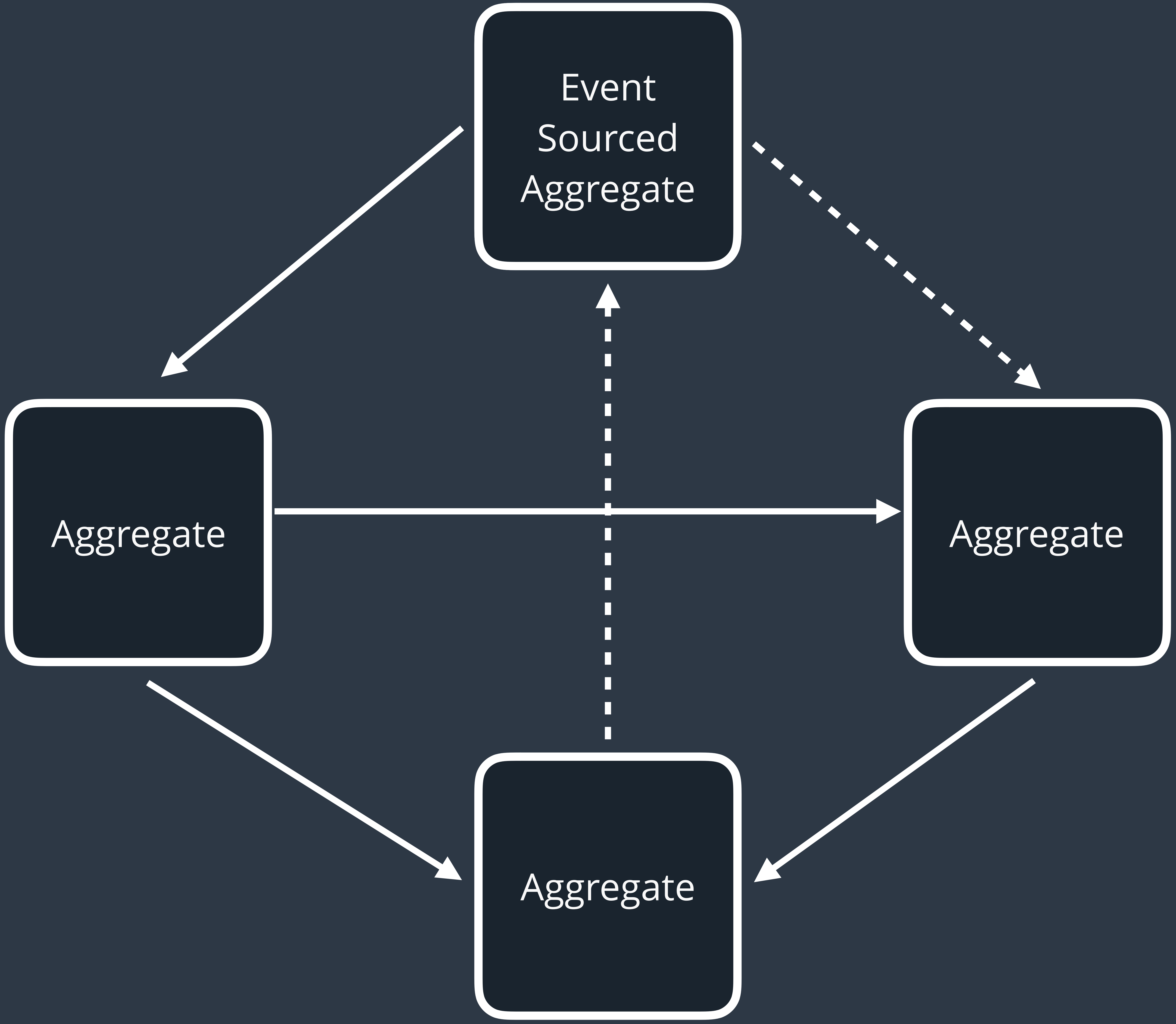
“

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



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Marketing

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

Campaigns

Campaign	Audience
Placement	Advertiser
Funnel	Target Market

Publishers

Agency	Website
Publisher	Zone Type
Budget Unit	Contract

Creative Catalog

Creative
Ad Type

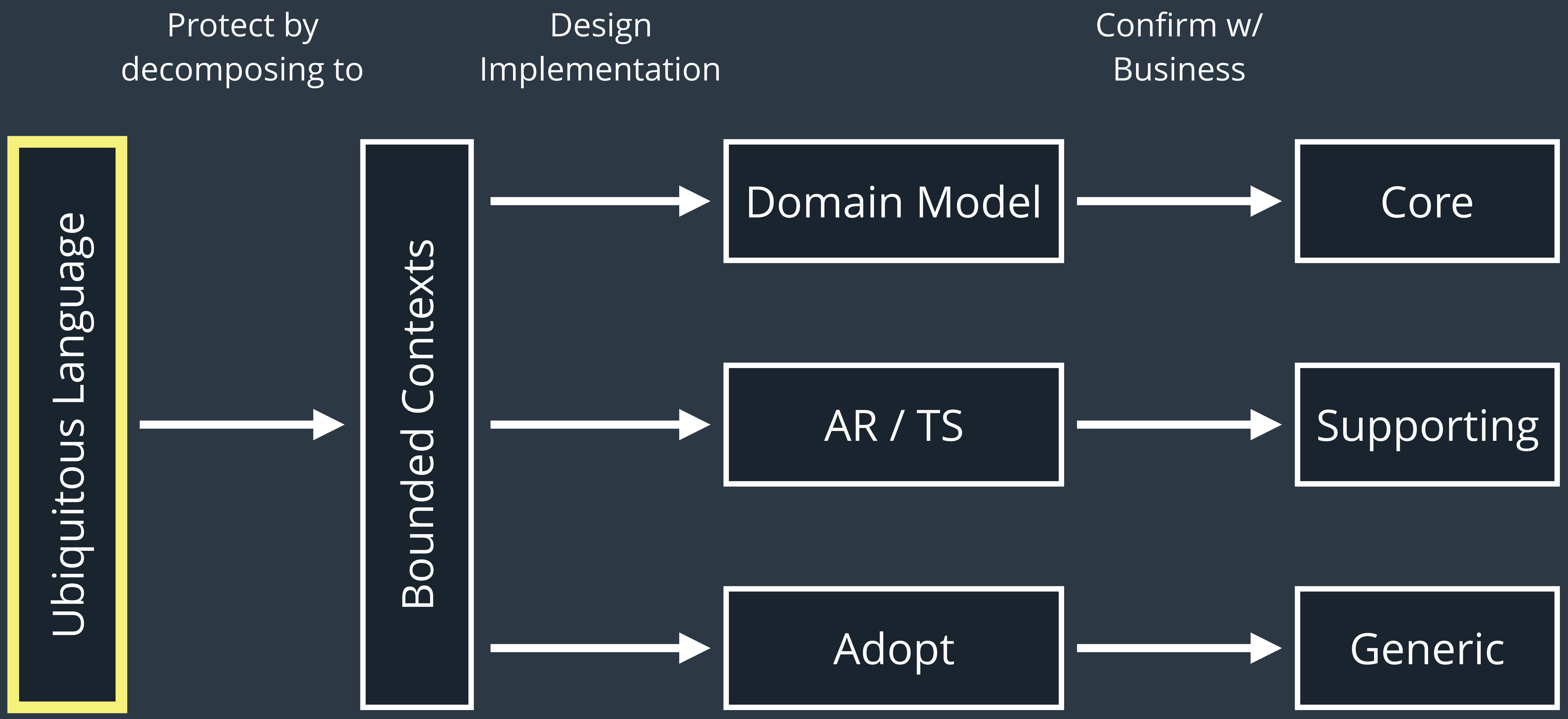
Events

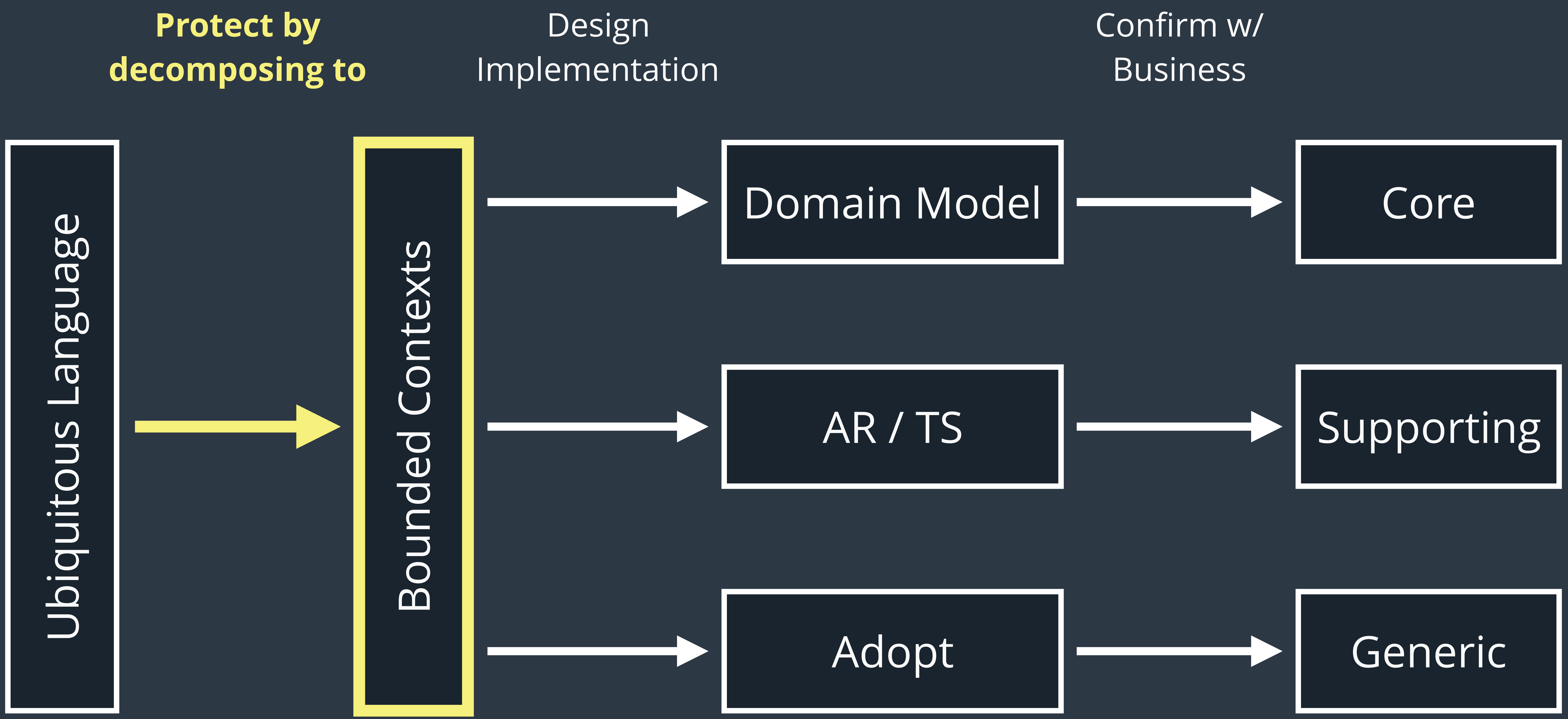
Lead
Impression
Visit

START WITH BIGGER BOUNDARIES
DECOMPOSE AS YOU GAIN DOMAIN KNOWLEDGE

1. Ubiquitous Language is not optional
2. Domain Types change. Embrace these changes to achieve resilient design
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. Bounded Contexts are not Microservices. Always start with bigger boundaries, but decompose further as you gain domain knowledge

SUMMARY


Protect by decomposing to
Design Implementation
Confirm w/ Business
Ubiquitous Language
Bounded Contexts
Domain Model
AR / TS
Adopt
Core
Supporting
Generic



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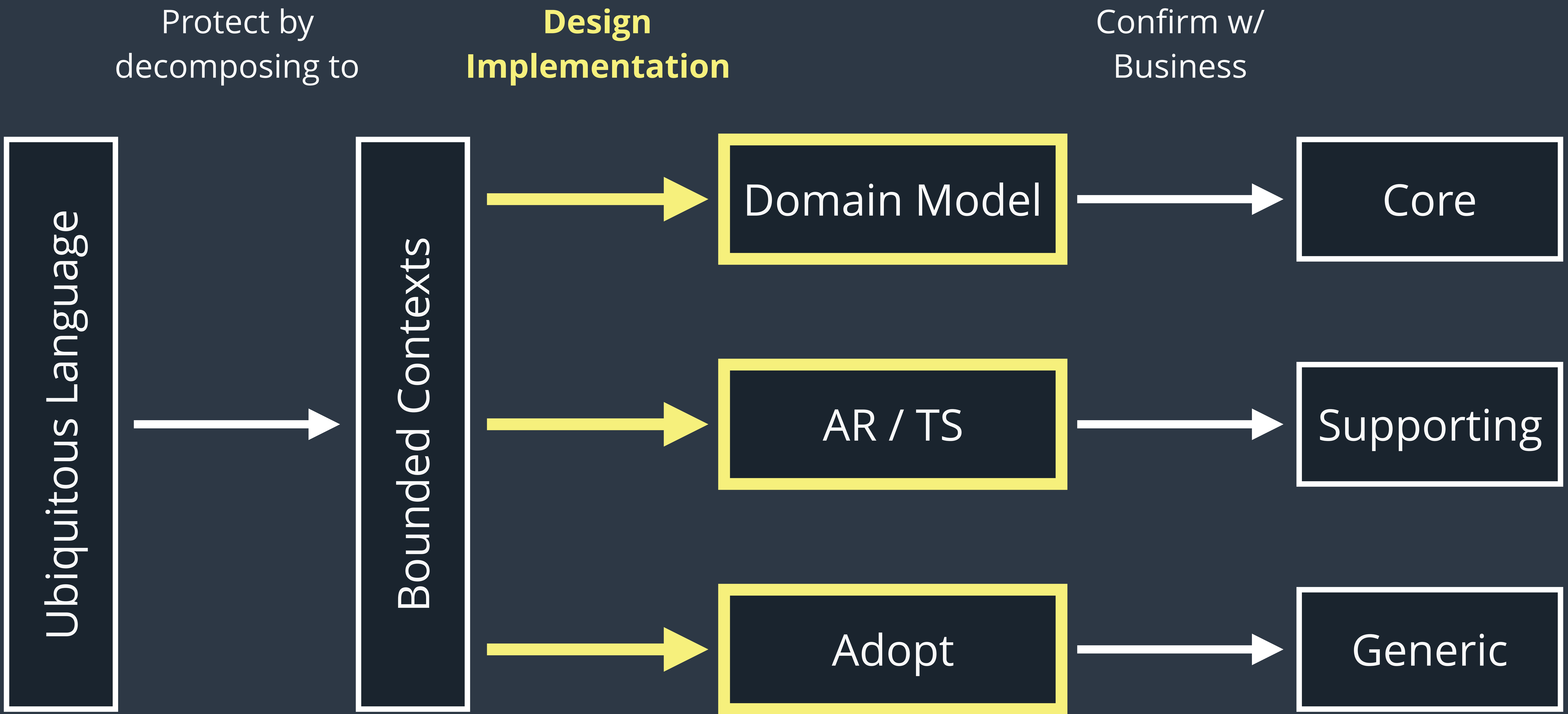
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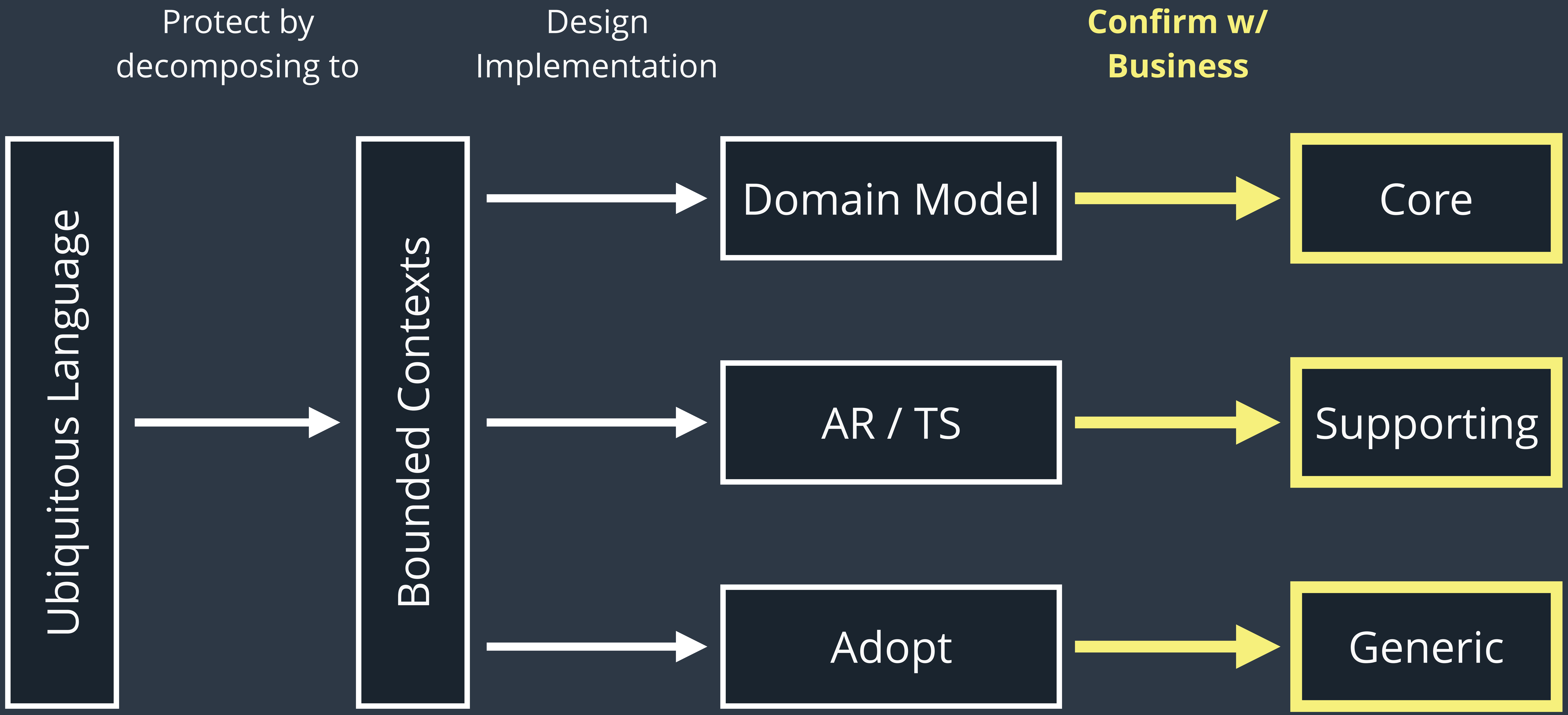
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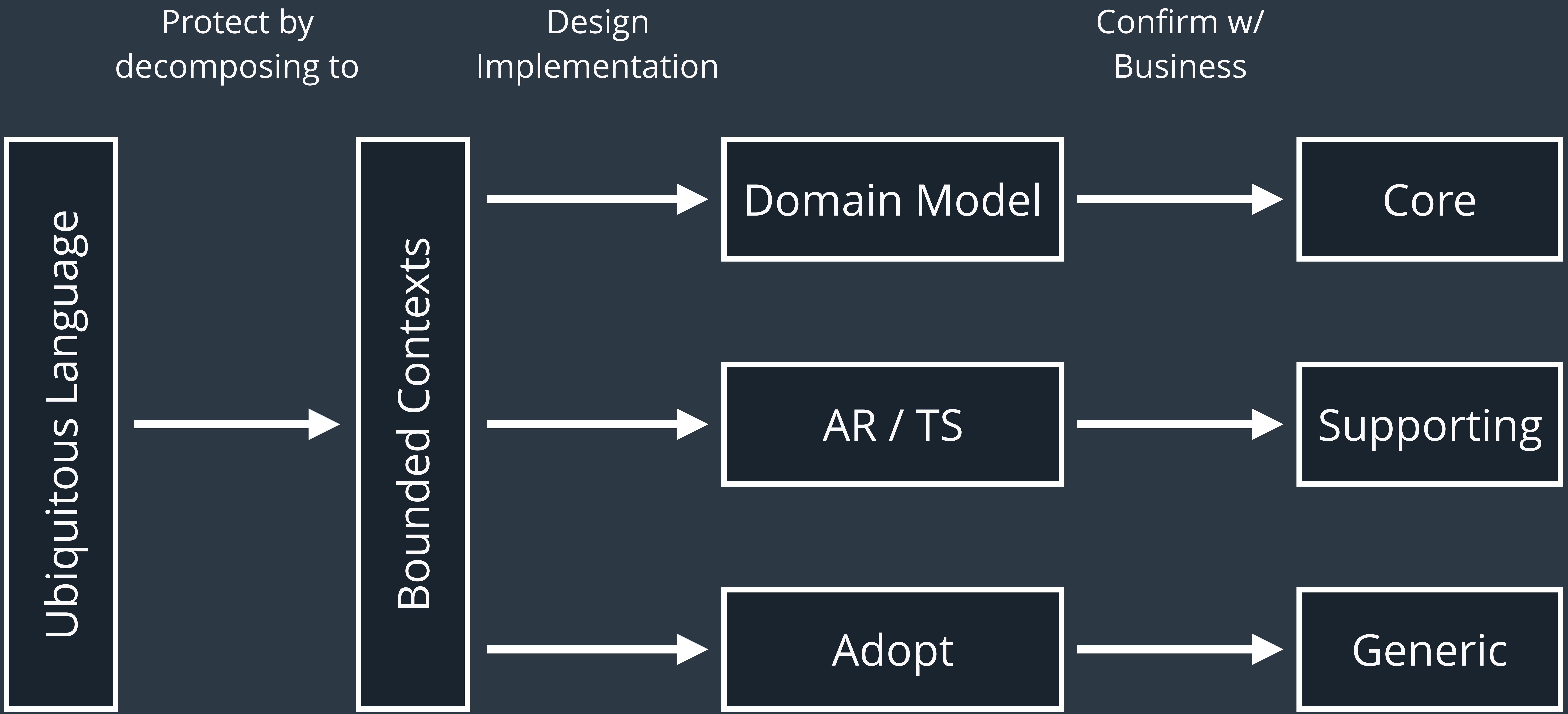
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Ad Type

Advertiser

Group

Creative

Agency

Target Market

Contract

Aggregates everywhere!!!

Website

Funnel

Zone Type

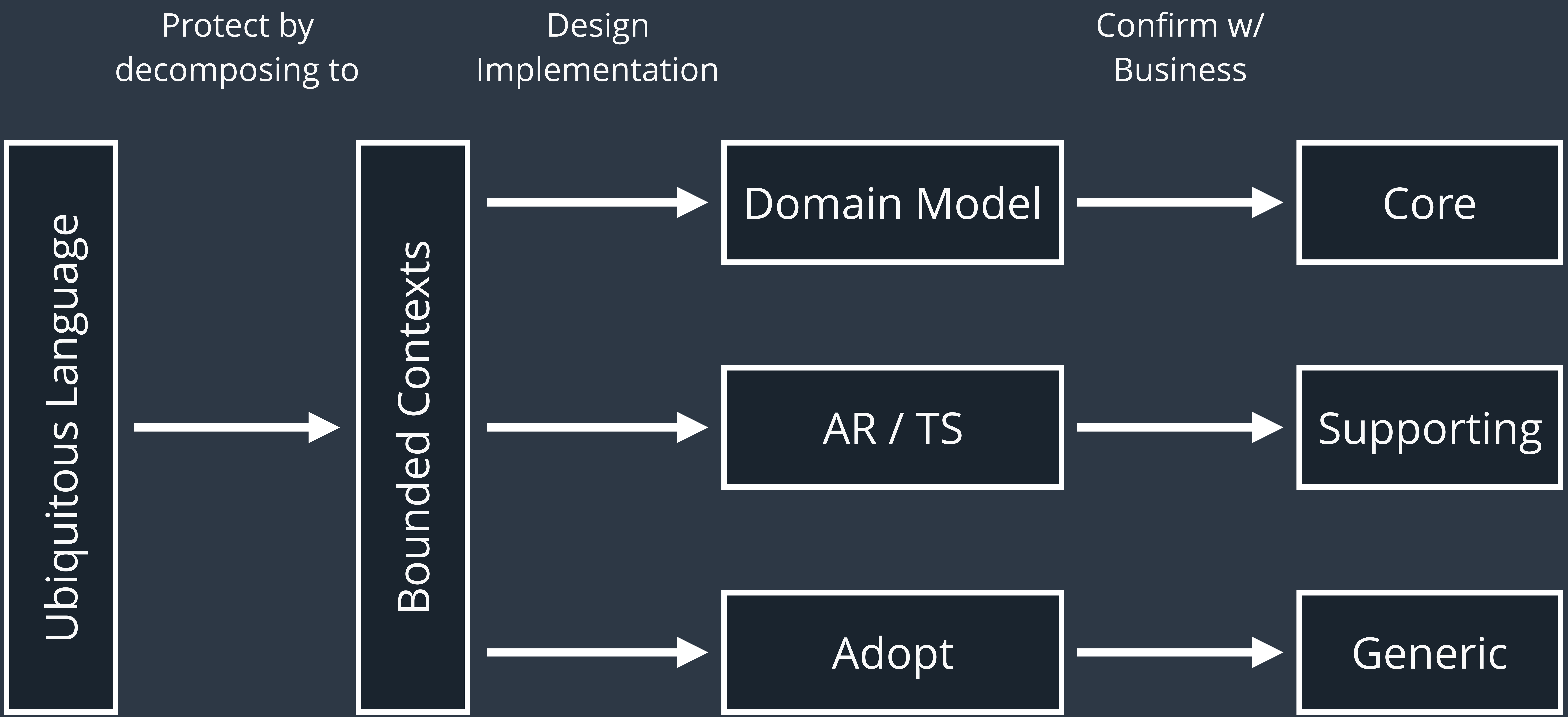
Budget Unit

Placement

Campaign

Publisher

Ad Zone



Ubiquitous Language Everywhere!!!

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P.S.

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THANK YOU!

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