STRATEGIC
DOMAIN-DRIVEN DESIGN

Nick Tune - @ntcoding

Hey Nick, I just stumbled across one of your videos and must say I'm impressed. You are like a combination of Martin Fowler and Eminem :)

— Anon

THE 3 VIRTUES OF MODULARITY

1. ☔ Isolation
2. ???
3. ???

MILLER'S LAW

The number of objects an average human can hold in working memory is 7 ± 2

https://en.wikipedia.org/wiki/The_Magical_Number_Seven,_Plus_or_Minus_Two

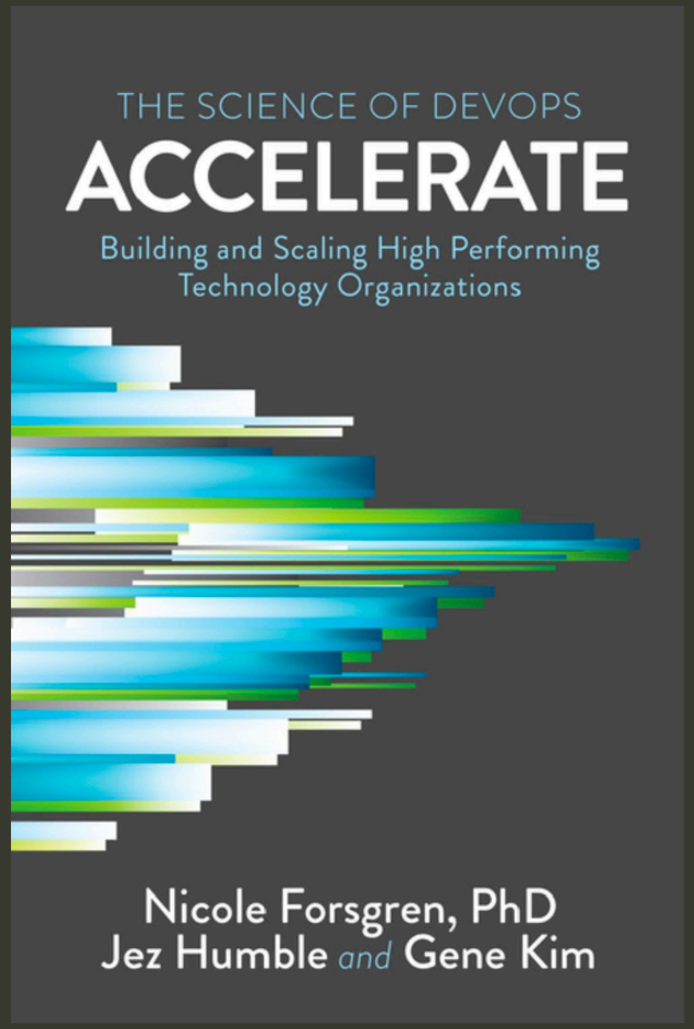
THE 3 VIRTUES OF MODULARITY

1. ☔ Isolation
2. 🧠 Comprehensibility
3. ???

THE 3 VIRTUES OF MODULARITY

1. ☔ Isolation
2. 🧠 Comprehensibility
3. ✈️ Parallelisation / Autonomy

ARCHITECTURE ACCELERATES ORGS



"If we a achieve a loosely-coupled, well-encapsulated architecture with an organizational structure to match we can achieve better delivery performance… and substantially grow the size of the engineering organization and increase productivity linearly."

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[In our study at Thoughtworks we found] work takes an order of magnitude longer when it leaves a team.

— **James Lewis** (@boicy)

Finding service boundaries is really damn hard... there is no flowchart

— **Udi Dahan** (@UdiDahan)

← Back to Segment Blog

Segment

Share on Twitter

ENGINEERING

Goodbye Microservices: From 100s of problem children to 1 superstar

Alexandra Noonan on July 10th 2018

https://segment.com/blog/goodbye-microservices/

STRATEGIC CHALLENGES

- Local vs global complexity
- Coupling & bottlenecks between teams
- Political disputes
- Inconsistent UX
- Fragile technical integrations

Strategic DDD: designing sociotechnical systems according to the 3 virtues of modularity.

** This is my interpretation not an official definition


#2
DOMAIN-DRIVEN DESIGN:
THE ELEVATOR PITCH

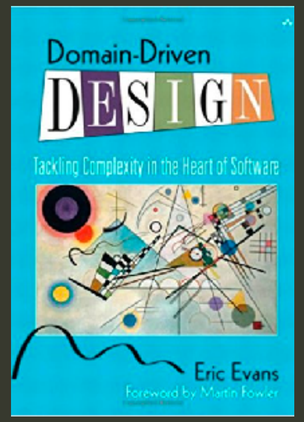
Businesses need to sustainably deliver value, but software grows less maintainable over time.

To create evolvable software we must be committed to continually reducing complexity.

To minimise complexity, we need to understand what complexity is truly essential in order to model our domain.

initial models usually are naive and superficial, based on shallow knowledge.

— **Eric Evans** (@ericevans0)



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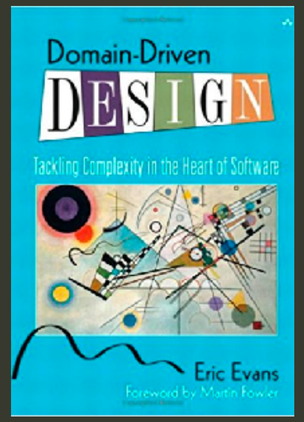
The refactorings that have the greatest impact on the viability of the system are those motivated by new insights into the domain

— **Eric Evans** (@ericevans0)



KEY DDD PRINCIPLES

- Everyone speaks the business language
- Whole team constantly strives to improve domain knowledge
- Optimise for core business domains (where competitive advantage can be gained)
- Make implicit business concepts explicit in code model

MAKE THE IMPLICIT EXPLICIT

Implicit domain concepts

```
public boolean isApplicable(Customer customer) {
    return customer.loyaltyPoints() > 5000;
}
```

Explicit domain concepts

```
public boolean isApplicable(Customer customer) {
    return isGoldCustomer(customer) ||
           isPlatinumCustomer(customer);
}
```

4 ELEMENTS OF DDD

#3

DOMAIN DISCOVERY

Strategic DDD is not ivory tower architecture. It requires continuous domain discovery.


He tried **UML** with domain experts!

EventStorming

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MODEL DOMAIN AS TIMELINE

CFP Opened

Talk proposal submitted

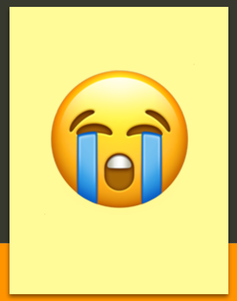
CFP Closed

Talk Accepted

EXTERNAL SYSTEMS, MONEY, UX

Ticket sold

Tickets downloaded



Speaker dropped out

Event booking service

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COMMANDS, USERS, POLICIES

Submit Proposal

Talk proposal submitted

Proposal Limit Policy

Talk Proposal Rejected

PERSONAL ES TRIUMPHS

- Uniting my teams and ‘the business’
- Modelling entire domains
- Engaging many domain experts for hours
- Gaining deeper understanding of domains

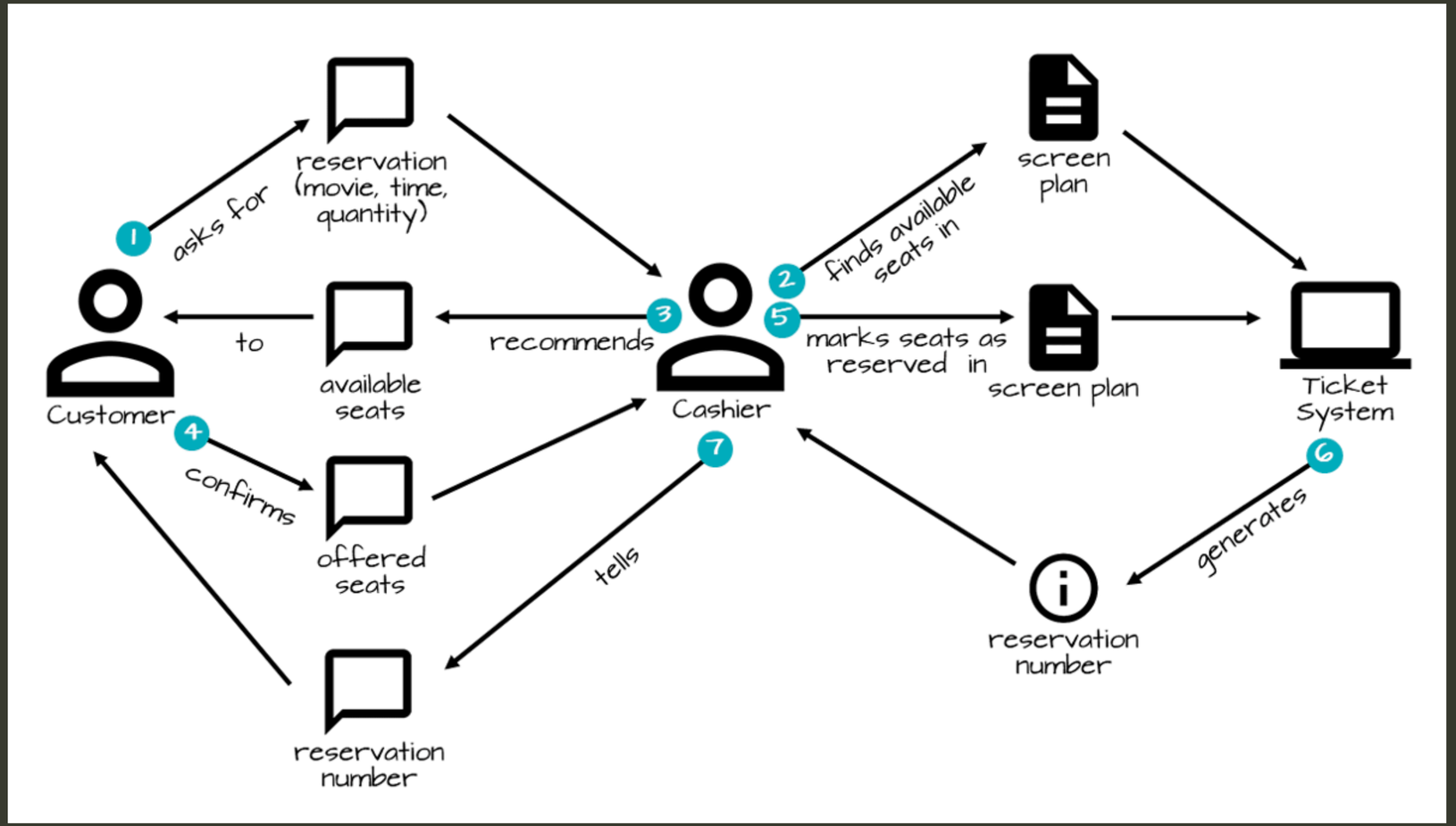
LEARN EVENTSTORMING

leanpub.com/introducing_eventstorming

eventstorming.com

github.com/mariuszgil/awesome-eventstorming

DOMAINSTORYTELLING.ORG



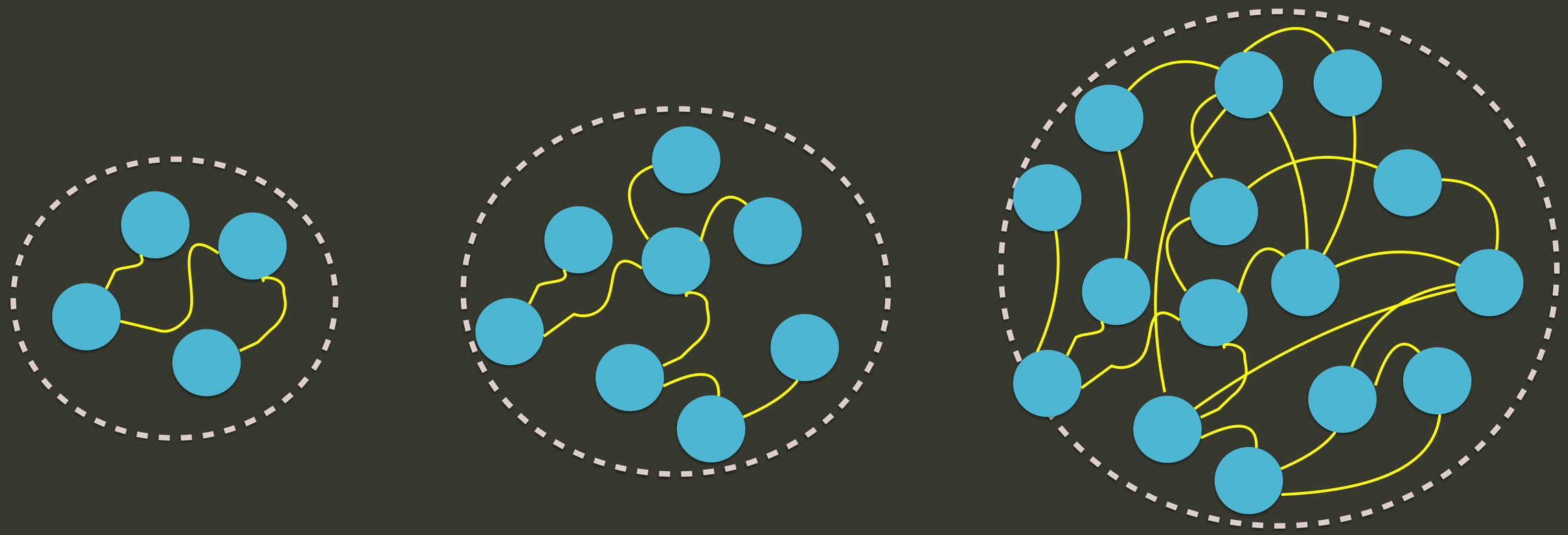
WHAT'S WRONG?

```
public class Product {
    public void allocate() {…}
    public Locations stock() {…}
    public Recommendations similar() {…}
    public Price priceFor(CustomerType..) {…}
    public PurchaseOrder buyFrom(Supplier..) {…}
    public Boolean canShipTo (Country..) {…}
}
```

#4

CONTEXT

DEPENDENCIES PROLIFERATE AS THE CODEBASE GROWS



Dependencies increase coupling making code unintelligible, fragile, and harder to change.

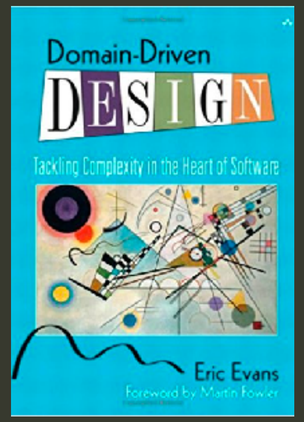
Large models are conducive to unnecessary coupling.

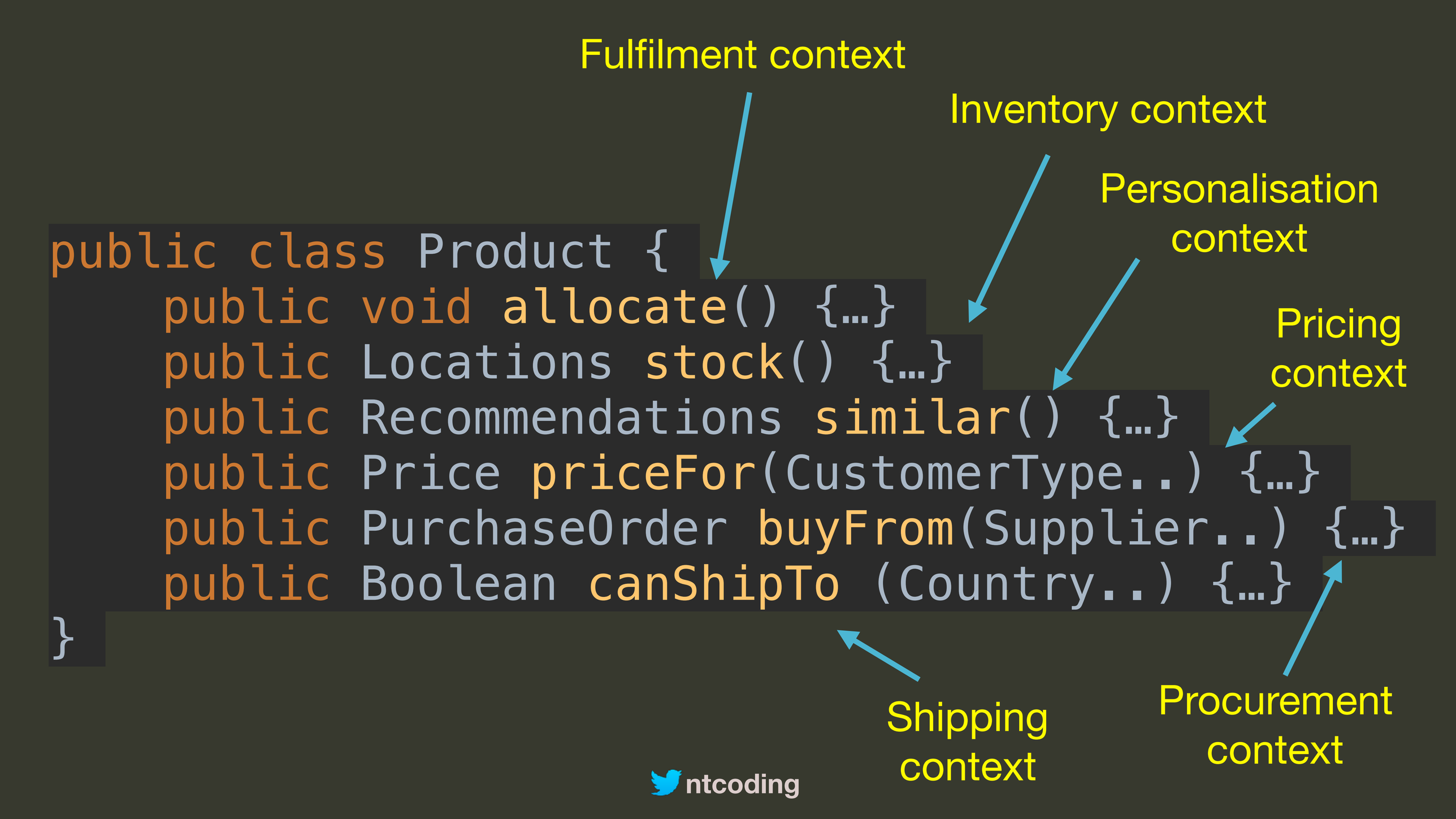
So much coupling is completely unnecessary!

How can we make it easy to add necessary coupling while making it harder to add unnecessary coupling?

Multiple models are in play on any large project... Explicitly define the context within which a model applies.

— **Eric Evans** (@ericevans0)




Fulfilment context
Inventory context
Personalisation context
Pricing context
public class Product {
public void allocate() {…}
public Locations stock() {…}
public Recommendations similar() {…}
public Price priceFor(CustomerType..) {…}
public PurchaseOrder buyFrom(Supplier..) {…}
public Boolean canShipTo (Country..) {…}
}
Shipping context
Procurement context
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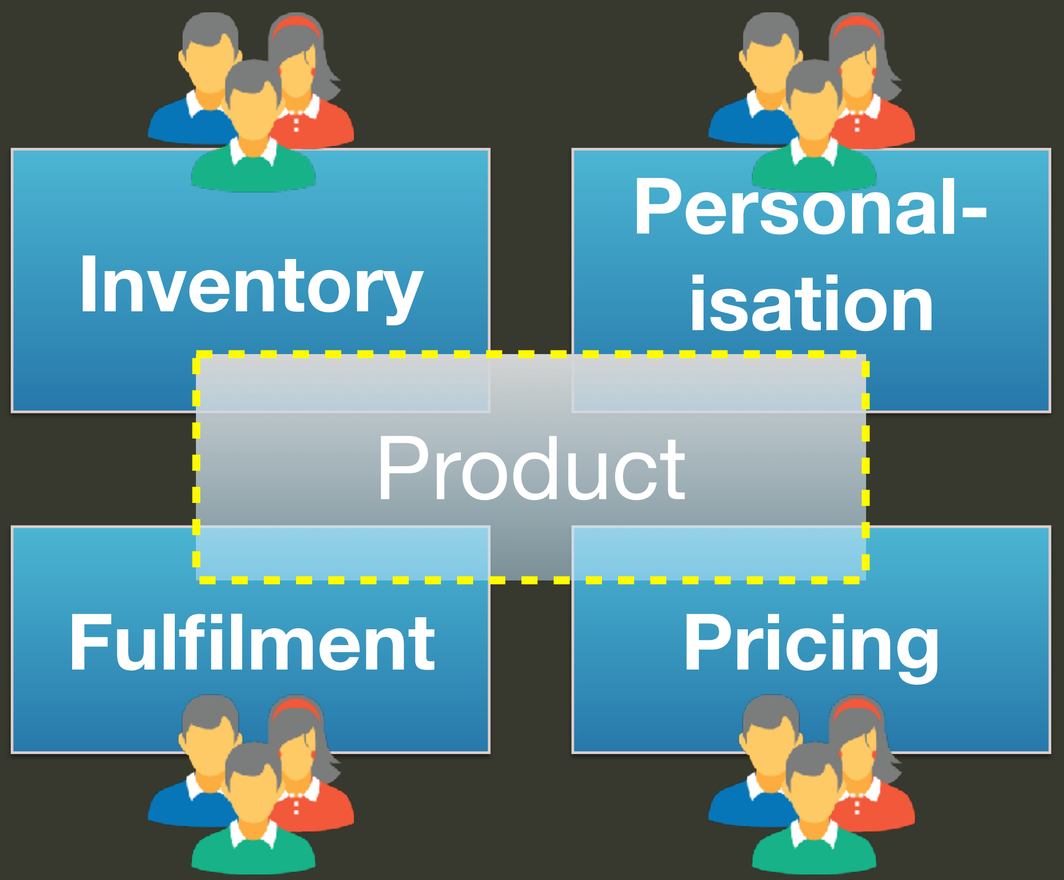
Just because a thing has a physical representation, it doesn't mean it needs a single representation in code.

COUPLING INCREASES COMPLEXITY

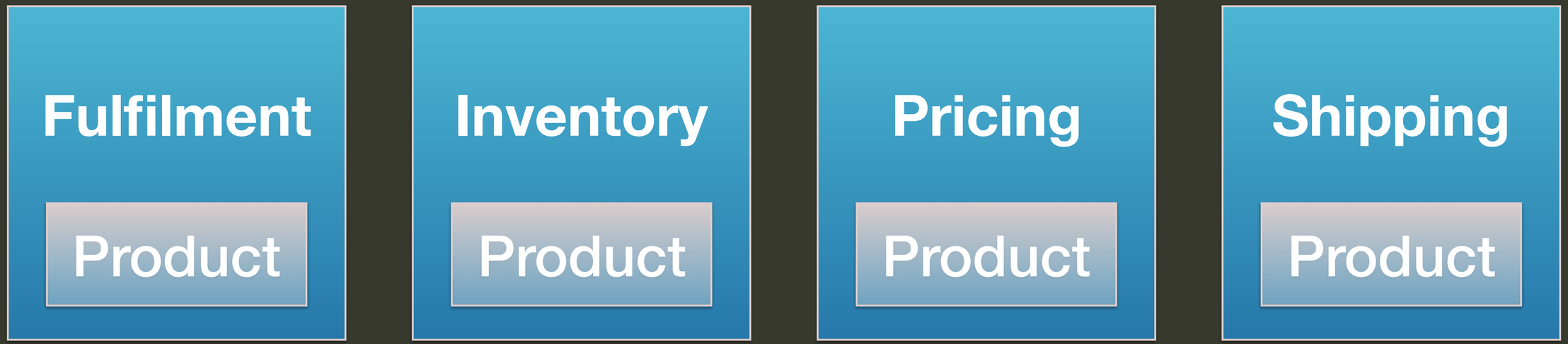


COUPLING DANGERS (page 1 of many)

- Changes rippling across the codebase
- One team ‘breaking’ another team’s code
- Frequent coordination & merge conflicts
- Generic model that loses domain focus
- Lack of ownership and accountability

DIFFERENT REPRESENTATIONS

Each product model applies within a separate context, facilitating isolation, comprehensibility and autonomy.



SAME WORD DIFFERENT MEANING

Sales

Ticket

- Number of seats
- Show length
- Cost
- Location

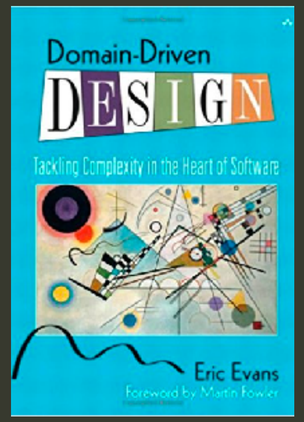
Customer Support

Ticket

- Severity
- Date raised
- Category

Generally speaking, there is a correspondence of one team per BOUNDED CONTEXT.

— **Eric Evans** (@ericevans0)



AUTONOMOUS TEAMS

Fulfilment

Product

Inventory

Product

Pricing

Product

Shipping

Product

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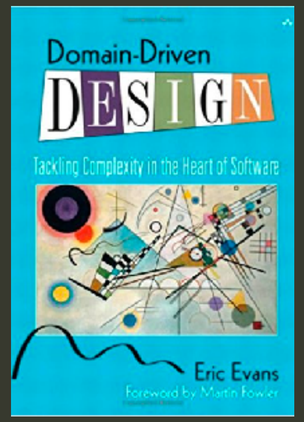
There are an unlimited variety of situations and an unlimited number of options for drawing the boundaries of BOUNDED CONTEXTS.

— **Eric Evans** (@ericevans0)




#5
STRATEGIC DESIGN
HEURISTICS & PATTERNS

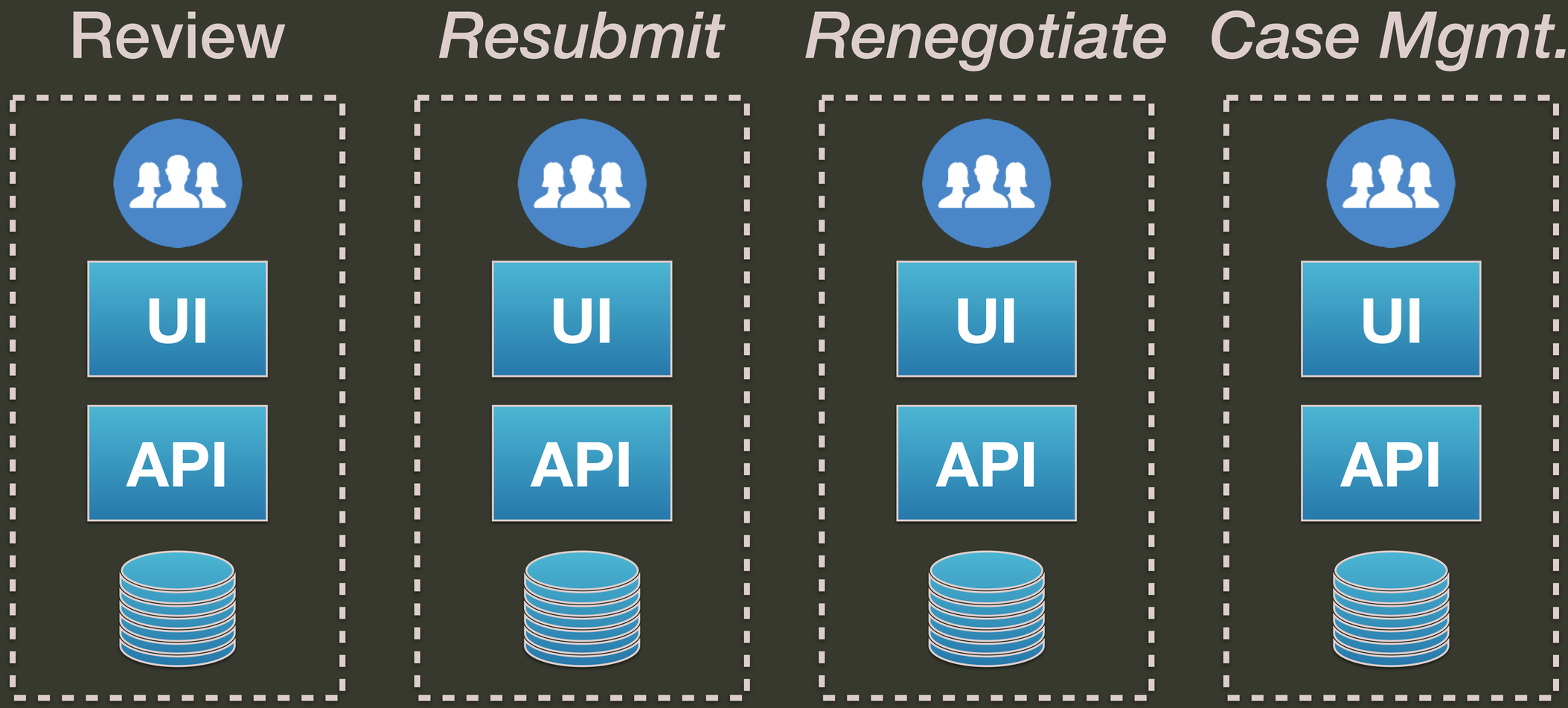
Look for heuristics that challenge your assumption or disprove your theory… that's when you learn something

— **Mathias Verraes** (@mathiasverraes)

MODELLING PROCESS

1. Explore contexts on EventStorm
2. Sketch out multiple models
3. Challenge models with design heuristics & use cases

CASE STUDY: GOVERNMENT TAX



DESIGN HEURISTIC

FIND CONTEXTUAL LANGUAGE

Segregate parts of the domain where specific words or phrases apply. This allows us to create explicit, comprehensible models.

DESIGN HEURISTIC

ALIGN BY DOMAIN EXPERT

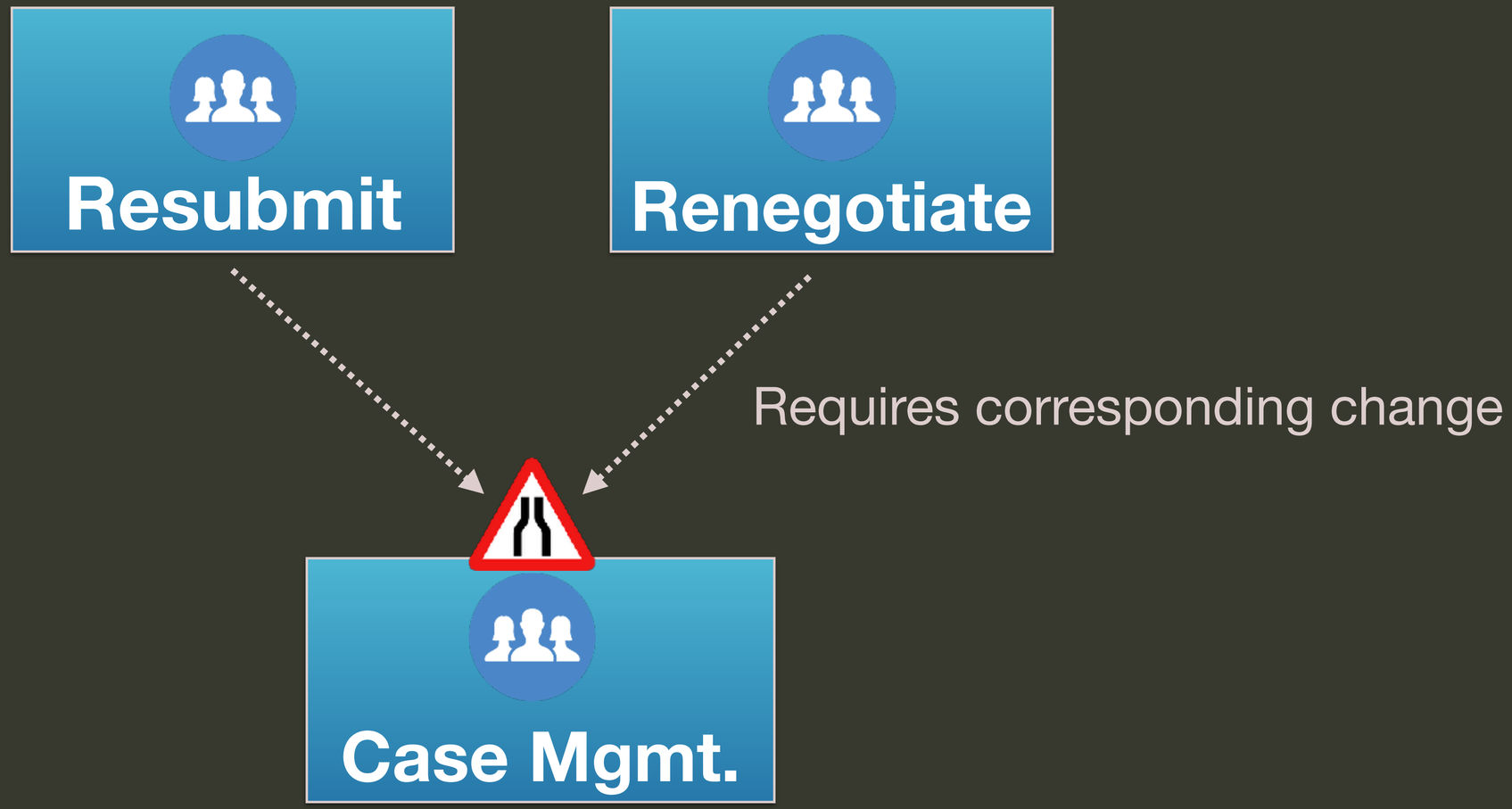
Different domain experts will care about different parts of the system indicating inherent domain cohesion.

DESIGN HEURISTIC

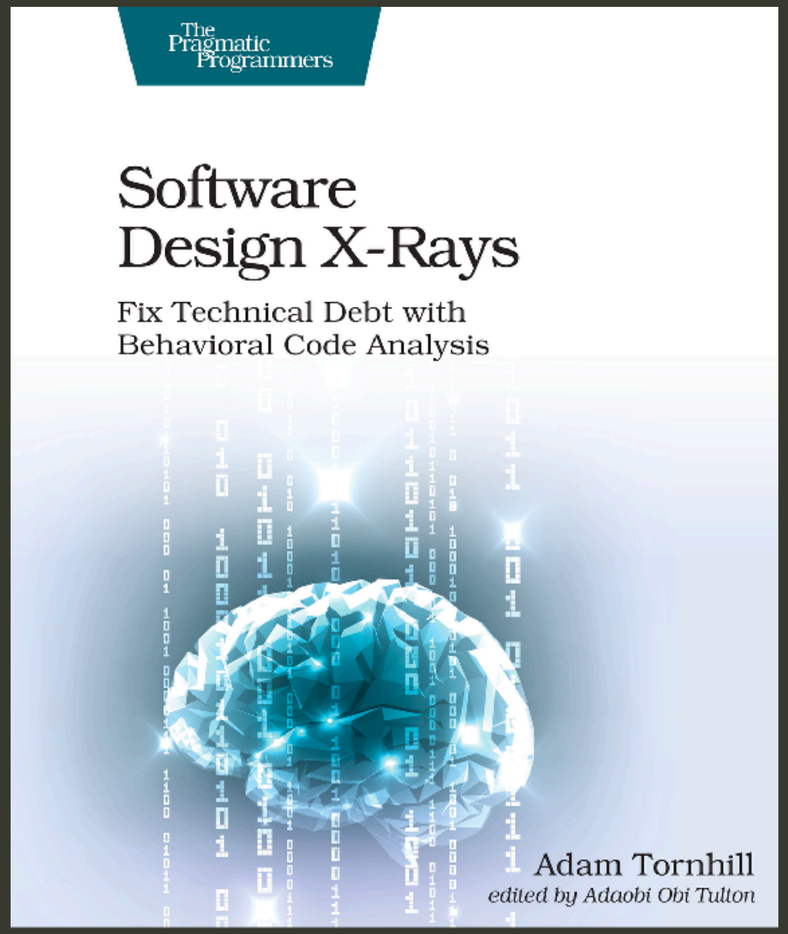
ALIGN WITH CO-CHANGE

Put boundaries around things that change together because it’s easier to make changes within a boundary than across boundaries. Aka minimise dependencies.

HIGH CO-CHANGE -> BOTTLENECK



FORENSIC ANALYSIS



Analyse source control history to identify dependencies in sociotechnical systems

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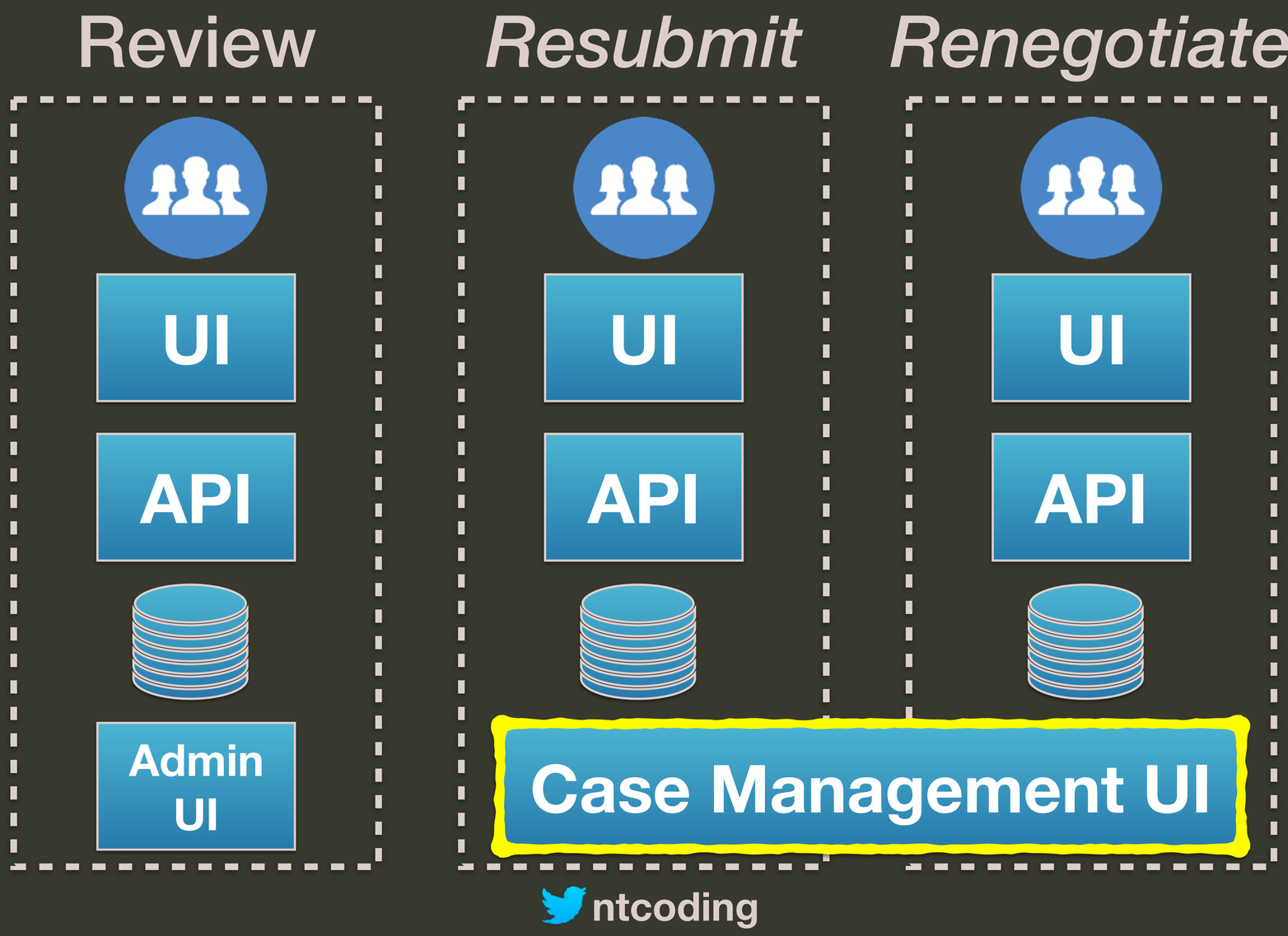
DESIGN HEURISTIC

ALIGN TO THE ORGANISATION

Create boundaries that reflect the structure of the organisation so that teams own everything they need to run their part of the business.

CONTEXTS VS EXPERIENCES



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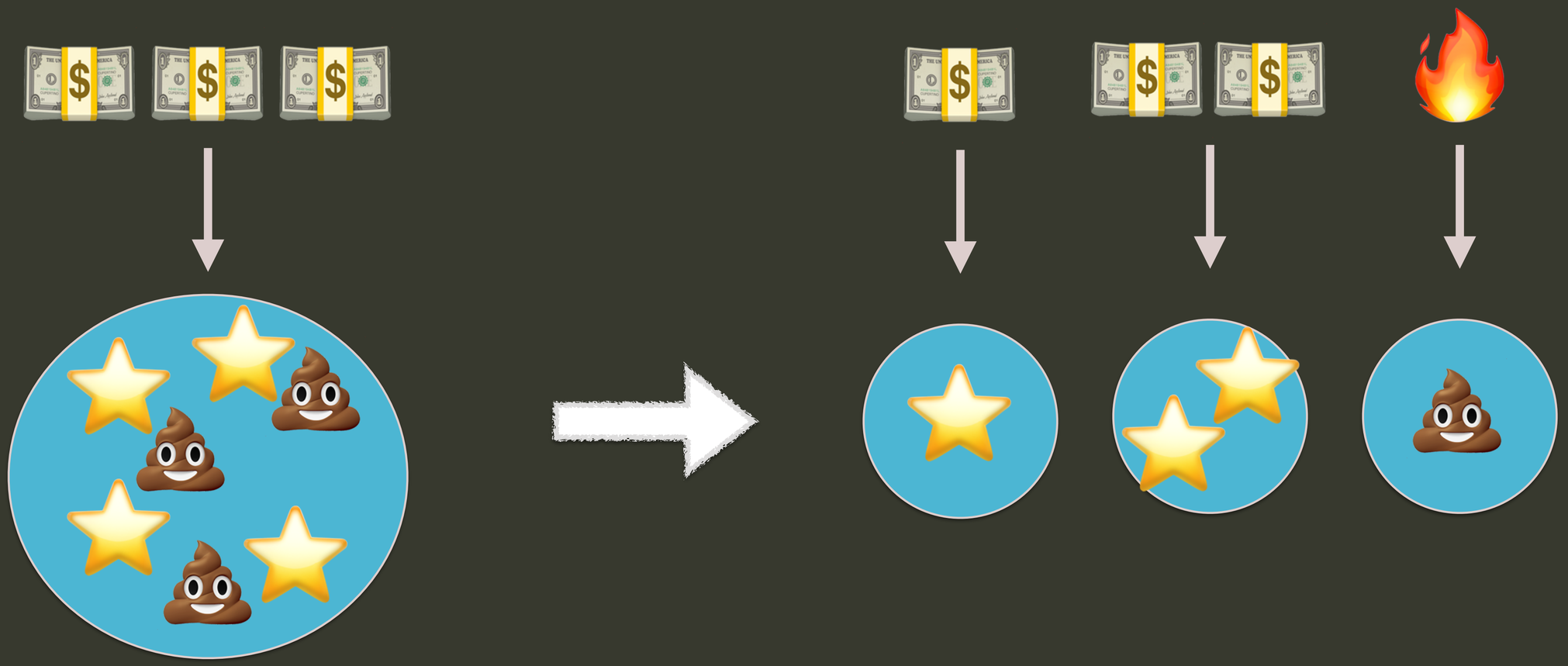
DESIGN HEURISTIC

ALIGN WITH BIZ VALUE

Isolate parts of a system based on their value to the business enabling a fine-grained investment strategy and optimal ROI.

INVESTMENT FLEXIBILITY



CASE STUDY: ADTECH CONTEXTS

95% of revenue is generated by customers running ad campaigns on Facebook.

Monolithic codebase and shared DB optimised for reuse

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DDD SUBDOMAIN JARGON

Core

A part of the domain where ROI and/or differentiation potential is high.

Supporting

Specific to current domain and needed in order to deliver core domains but little opportunity for differentiation.

Generic

A capability that is not unique to the current domain and holds little potential for differentiation. Consider buying.

WHAT IS CORE CAN CHANGE

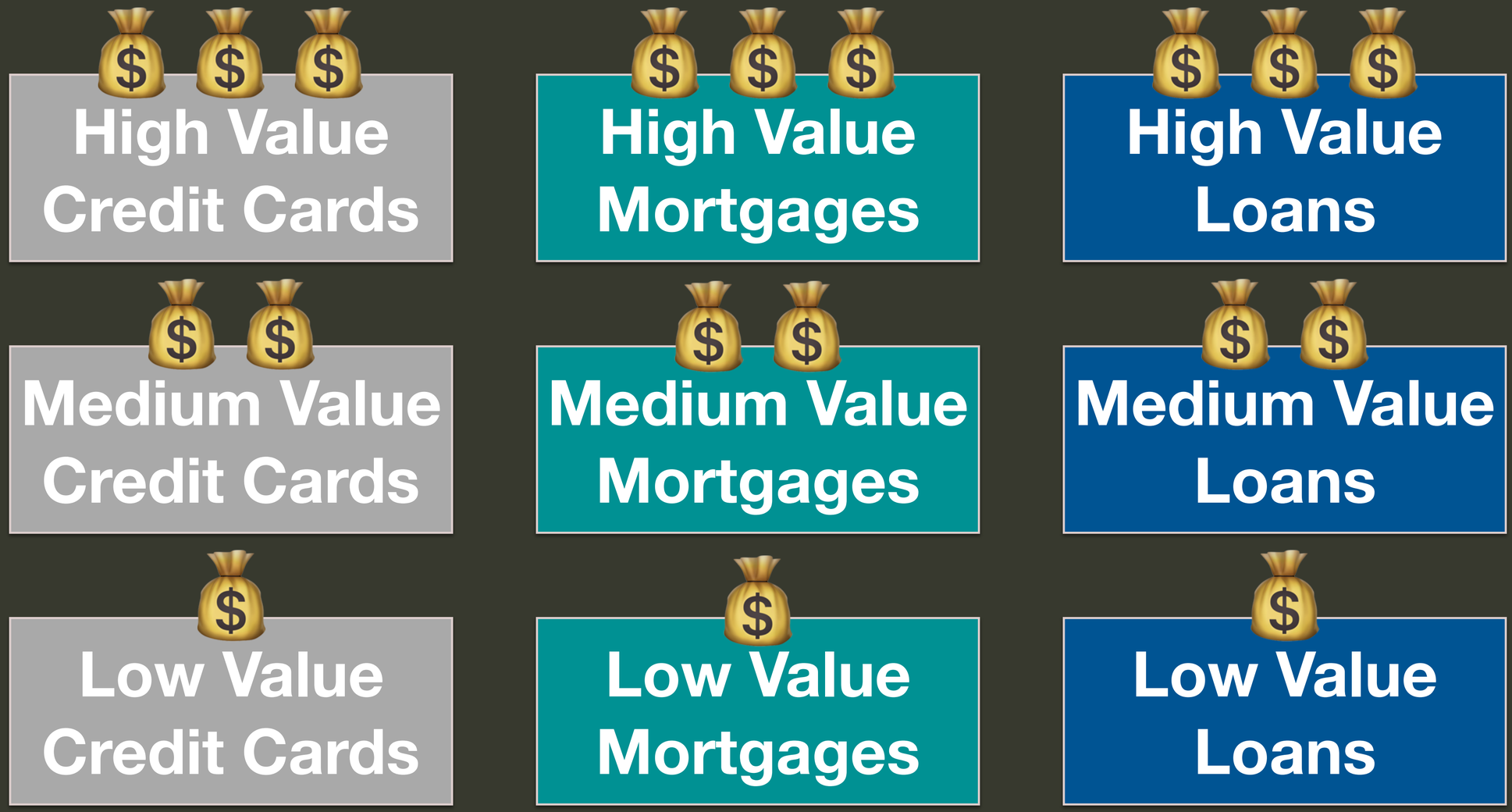
Slack started life as an internal chat system.

It is now the core domain worth $4bn.

Caveat: Aligning purely by value can result in a lot of dependencies.

Different parts of a system can relate to each other across multiple dimensions. It’s not a case of simply classifying related concepts.

CASE STUDY: FINANCIAL PRODUCTS



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DESIGN HEURISTIC

ALIGN BY PRODUCT TYPE

Put boundaries around each category of product/service your company sells because those concepts will be highly cohesive.

DESIGN HEURISTIC

ALIGN WITH USERS

Align contexts with users so each type of user has 1 team who are fully committed to giving that user the best possible experience.

Understand your business model to identify what is valuable to your company.

The Business Model Canvas

Designed for:	Designed by:	Date:	Version:

Key Partners

Who are our Key Partners?
Who are our key suppliers?
Which Key Resources are we acquiring from partners?
Which Key Activities do partners perform?

MOTIVATIONS FOR PARTNERSHIPS
Optimization and economy
Reduction of risk and uncertainty
Acquisition of particular resources and activities

Key Activities

What Key Activities do our Value Propositions require?
Our Distribution Channels?
Customer Relationships?
Revenue streams?

CATEGORIES
Production
Problem Solving
Platform/Network

Key Resources

What Key Resources do our Value Propositions require?
Our Distribution Channels? Customer Relationships?
Revenue Streams?

TYPES OF RESOURCES
Physical
Intellectual (brand patents, copyrights, data)
Human
Financial

Value Propositions

What value do we deliver to the customer?
Which one of our customer's problems are we helping to solve?
What bundles of products and services are we offering to each Customer Segment?
Which customer needs are we satisfying?

CHARACTERISTICS
Newness
Performance
Customization
"Getting the Job Done"
Design
Brand/Status
Price
Cost Reduction
Risk Reduction
Accessibility
Convenience/Usability

Customer Relationships

What type of relationship does each of our Customer Segments expect us to establish and maintain with them?
Which ones have we established?
How are they integrated with the rest of our business model?
How costly are they?

EXAMPLES
Personal assistance
Dedicated Personal Assistance
Self-Service
Automated Services
Communities
Co-creation

Channels

Through which Channels do our Customer Segments want to be reached?
How are we reaching them now?
How are our Channels integrated?
Which ones work best?
Which ones are most cost-efficient?
How are we integrating them with customer routines?

CHANNEL PHASES
1. *Awareness*
   How do we raise awareness about our company's products and services?
2. *Evaluation*
   How do we help customers evaluate our organization's Value Proposition?
3. *Purchase*
   How do we allow customers to purchase specific products and services?
4. *Delivery*
   How do we deliver a Value Proposition to customers?
5. *After sales*
   How do we provide post-purchase customer support?

Customer Segments

For whom are we creating value?
Who are our most important customers?

Mass Market
Niche Market
Segmented
Diversified
Multi-sided Platform

Cost Structure

What are the most important costs inherent in our business model?
Which Key Resources are most expensive?
Which Key Activities are most expensive?

IS YOUR BUSINESS MORE
Cost Driven (leanest cost structure, low price value proposition, maximum automation, extensive outsourcing)
Value Driven (focused on value creation, premium value proposition)

SAMPLE CHARACTERISTICS
Fixed Costs (salaries, rents, utilities)
Variable costs
Economies of scale
Economies of scope

Revenue Streams

For what value are our customers really willing to pay?
For what do they currently pay?
How are they currently paying?
How would they prefer to pay?
How much does each Revenue Stream contribute to overall revenues?

TYPES
Asset sale
Usage fee
Subscription Fees
Lending/Renting/Leasing
Licensing
Brokerage fees
Advertising

FIXED PRICING
List Price
Product feature dependent
Customer segment dependent
Volume dependent

DYNAMIC PRICING
Negotiation (bargaining)
Yield Management
Real-time-Market

Strategyzer
strategyzer.com

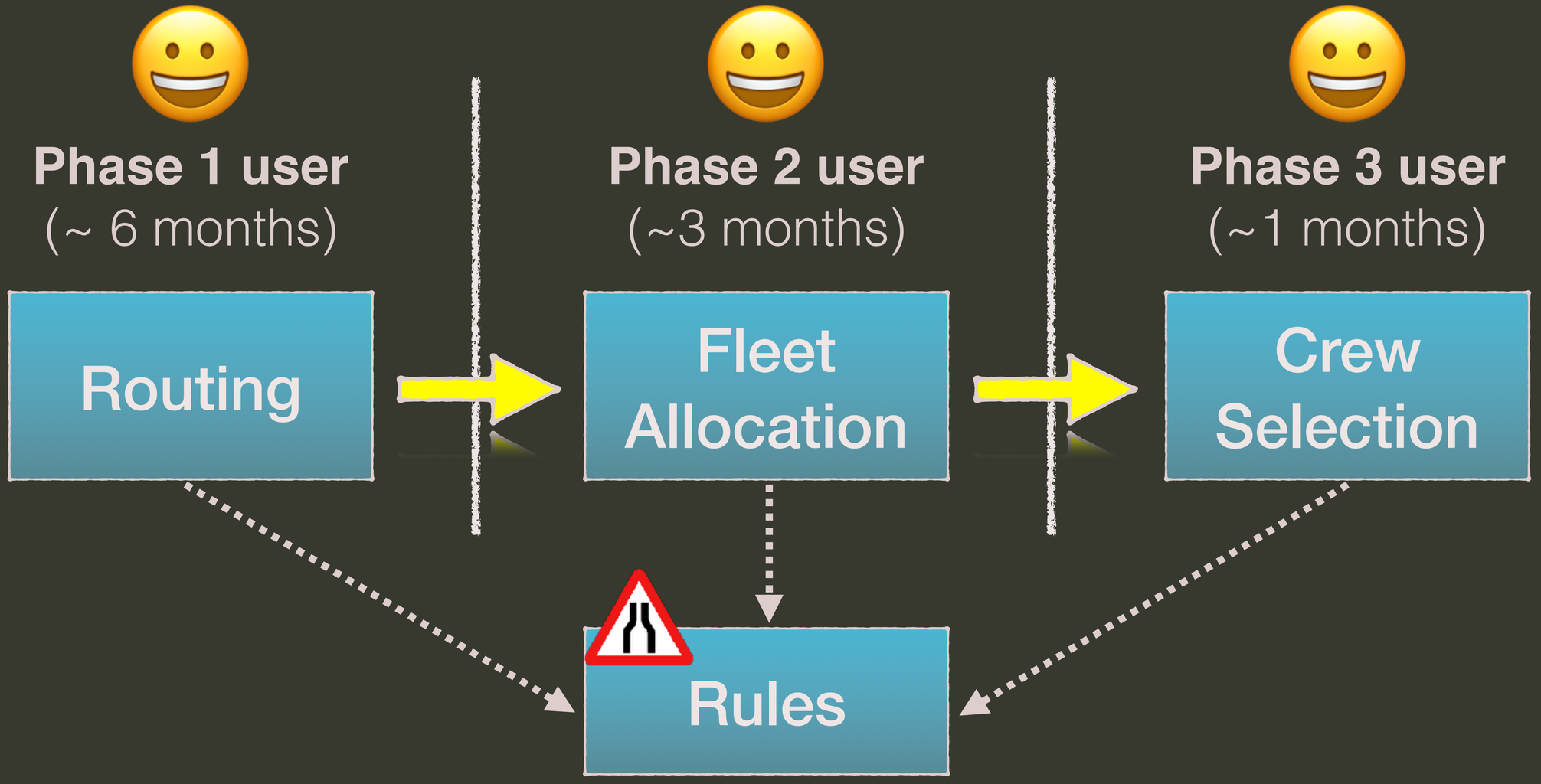
MODELLING PROCESS

1. **Understand the business model**
2. Explore contexts on EventStorm
3. Sketch out multiple models
4. Challenge models with design heuristics & use cases

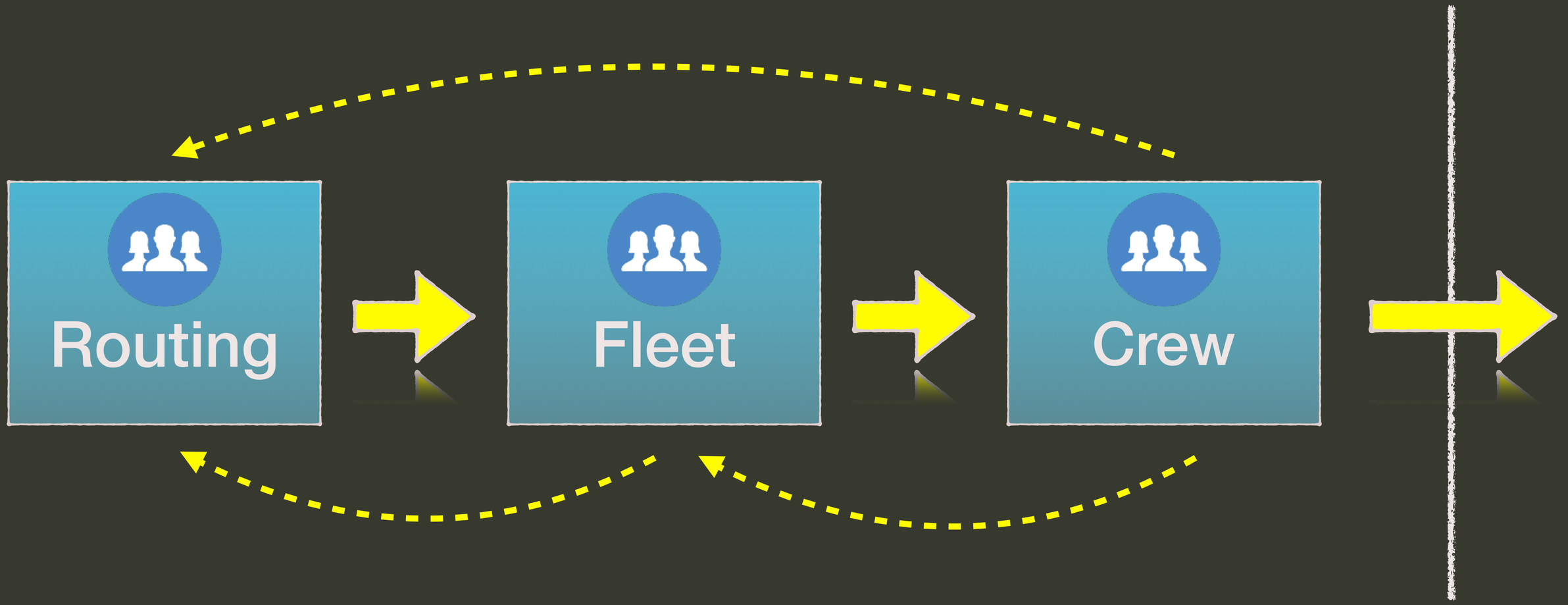
Understand the patterns in your domain to determine which heuristics you should trust.

ENTITY LIFECYCLE PIPELINE

CASE STUDY: AIR TRAVEL PLANNING



PROPOSAL PIPELINE



OCTOPUS CONTEXT

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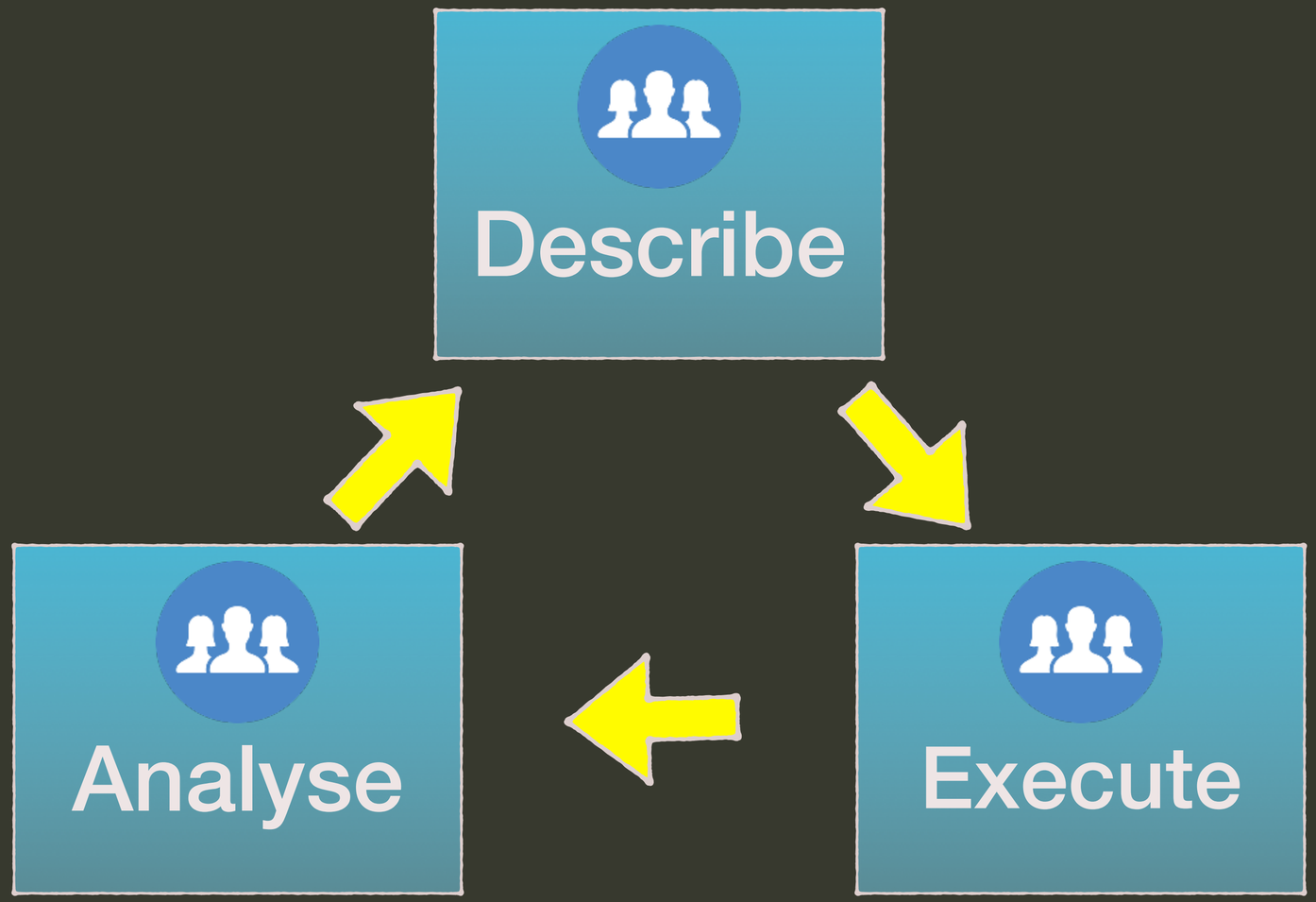
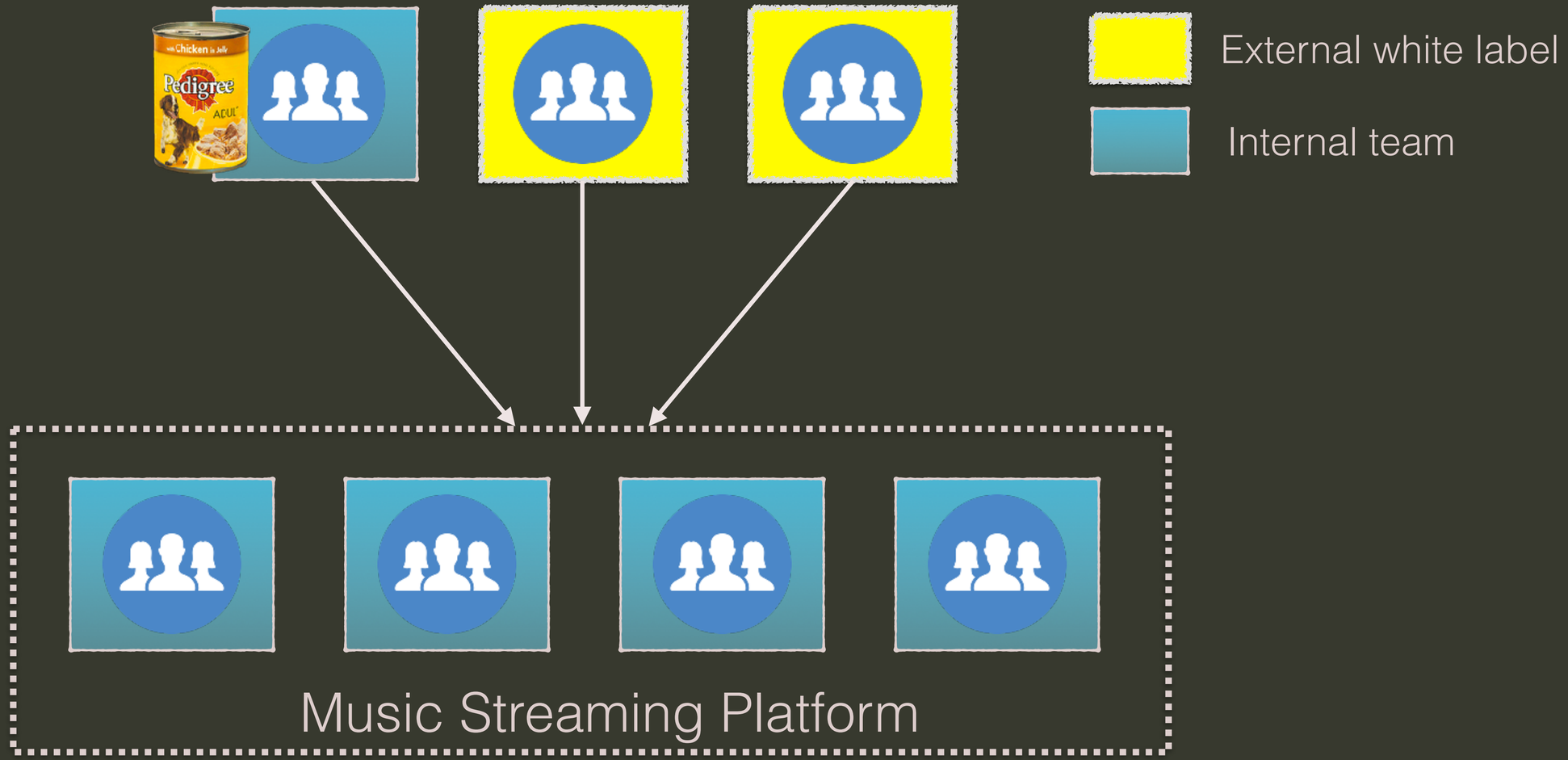
OCTOPUS CHALLENGES

- Try to centralise complexity in the Octopus
- Technology standardisation can help
- A bit of integration design up front can save a lot of politics in the future

DESCRIBE-EXECUTE-ANALYSE



DOG FOOD CONTEXT



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MORE HEURISTICS

- Align with consistency needs
- Minimise overall dependencies
- Who loves me the most?
- Respect operational capabilities
- Minimise social complexity

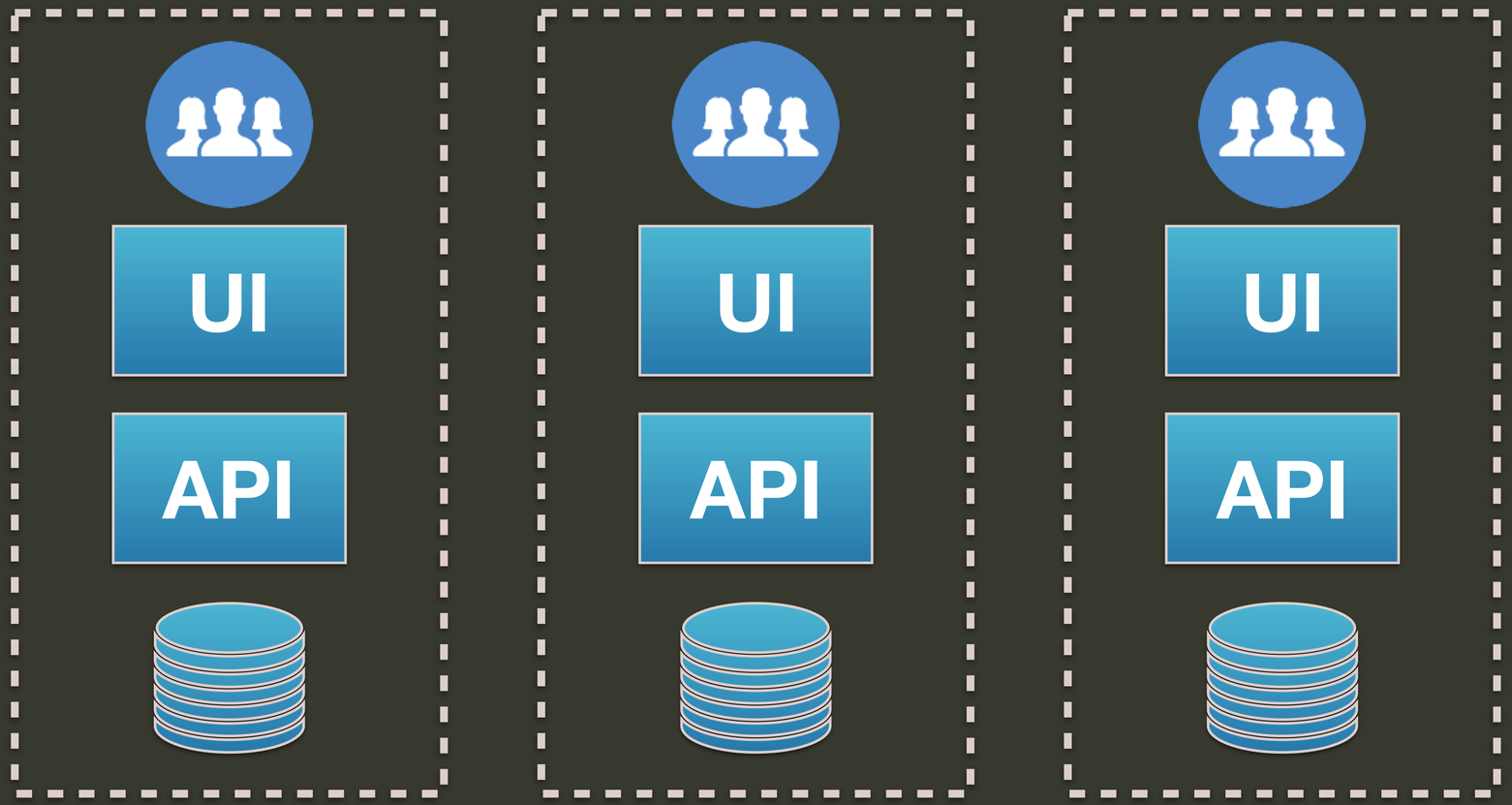
MORE PATTERNS AND HEURISTICS

- ntcoding.co.uk/org-design
- medium.com/nick-tune-tech-strategy-blog/

#6

IMPLEMENTING BOUNDED CONTEXTS

AVOID SHARING BETWEEN CONTEXTS

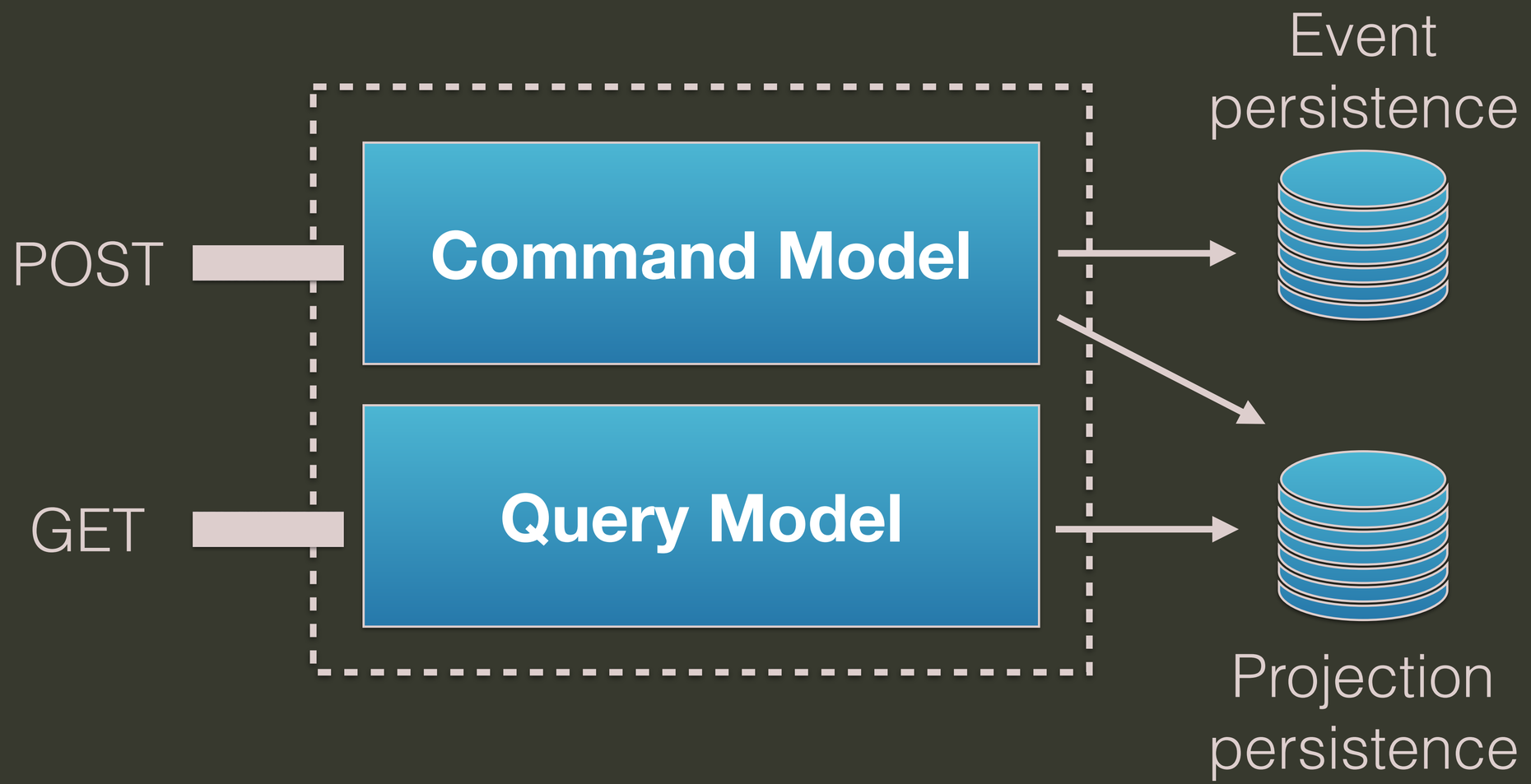


Each bounded context should be implemented according to it’s value and domain complexity.

IMPLEMENTATION PATTERNS

- CRUD
- Domain Model
- Transaction Script
- CQRS & Event Sourcing

CQRS & EVENT SOURCING



INTEGRATION TIP

COMMUNICATE WITH EVENTS

Communicate between bounded contexts using events to bind strategic model and domain (another reason to practice event storming).

COMMANDS VS EVENTS

Events are a notification to many subscribers that something has happened. Commands are an imposition to one recipient to perform some action.

Typically we prefer asynchronous integration but it’s not a hard and fast rule.

WHO OWNS THE UI?

- Page owned by 1 BC
- Micro-frontend / composite UI
- BFF / separate frontend team

LEGACY PATTERNS

- Anti-corruption Layer
- Bubble Context
- Autonomous Bubble
- Ice-pick

#7

ALIGNMENT & RESILIENCE:

PEOPLE PATTERNS

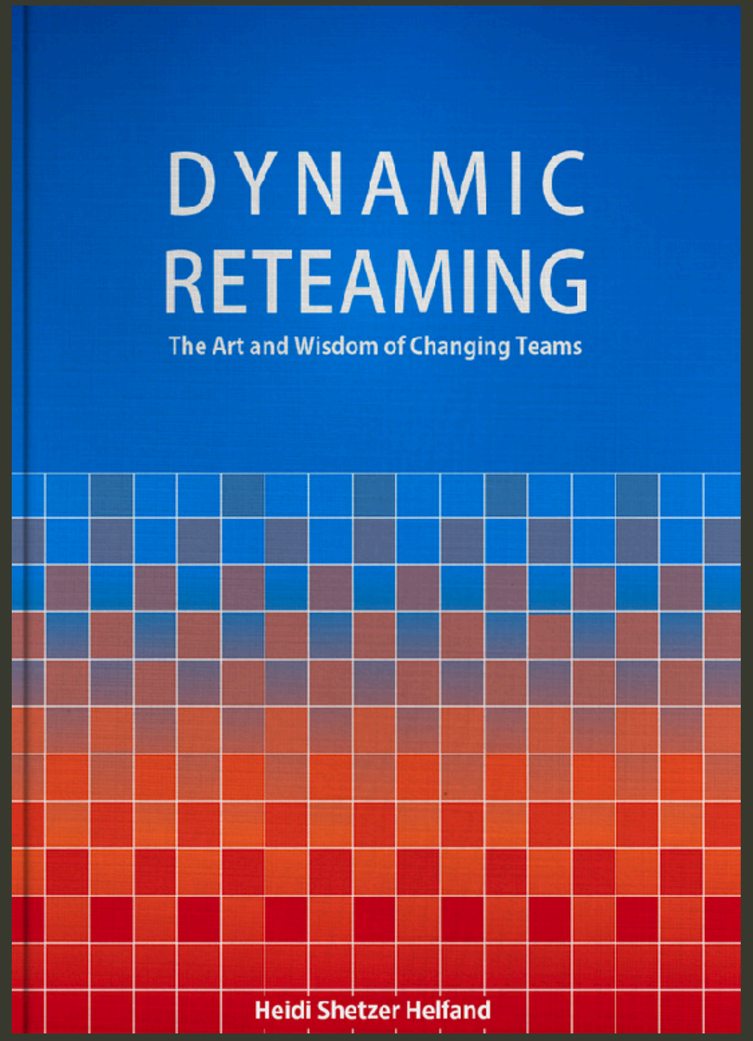
Perfect boundaries & 100% autonomous teams do not exist and you wouldn’t want them anyway.

RESILIENCE PATTERNS

- Use inner-sourcing to ‘take the people to the work’
- Cross-team pairing
- Rotate people regularly to build empathy and spread domain knowledge

THE NOMAD PATTERN

New people pair with many teams across the org before joining a team.



#8

BECOMING A SOCIOTECHNICAL THINKER

Software developers literally make million dollar decisions without even realising it.

Our challenge when designing software systems is continuously balancing economical, social, and technical factors.

THE 5 PRIMARY SOCIOTECHNICAL DESIGN HEURISTICS

1. 💰 Align with Business Value
2. 🔀 Align with Business Domain
3. ❤️ Optimise for Social Needs
4. 🖥️ Respect Technical Constraints
5. 😍 Optimise for UX & Brand Perception

LET'S KEEP IN TOUCH...

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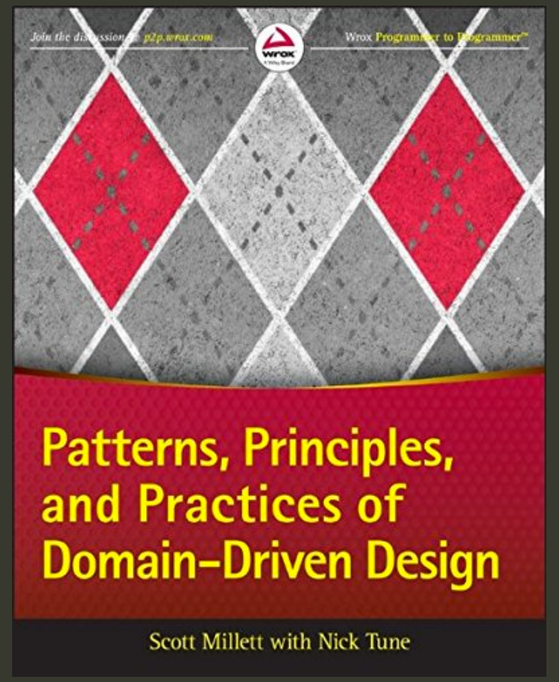
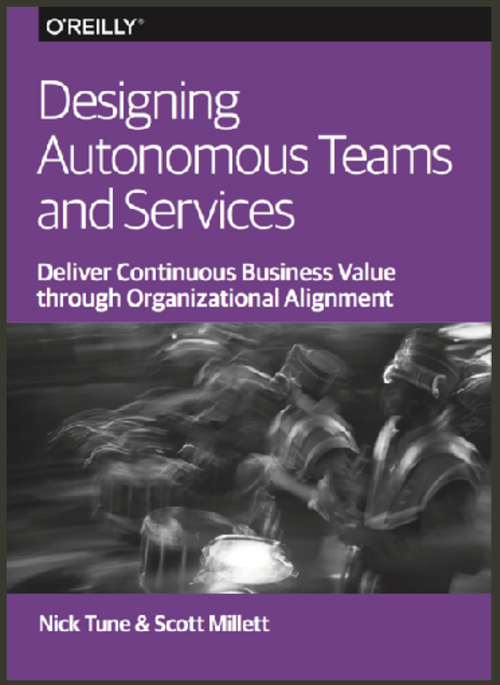
ntcoding.co.uk/speaking

@ntcoding

/in/ntcoding

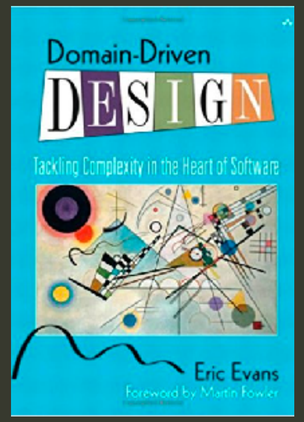





#BONUS CONTENT
EVOLUTIONARY DESIGN

An up-front imposition of a large-scale structure is likely to be costly. As development proceeds, you will almost certainly find a more suitable structure.

— **Eric Evans** (@ericevans0)



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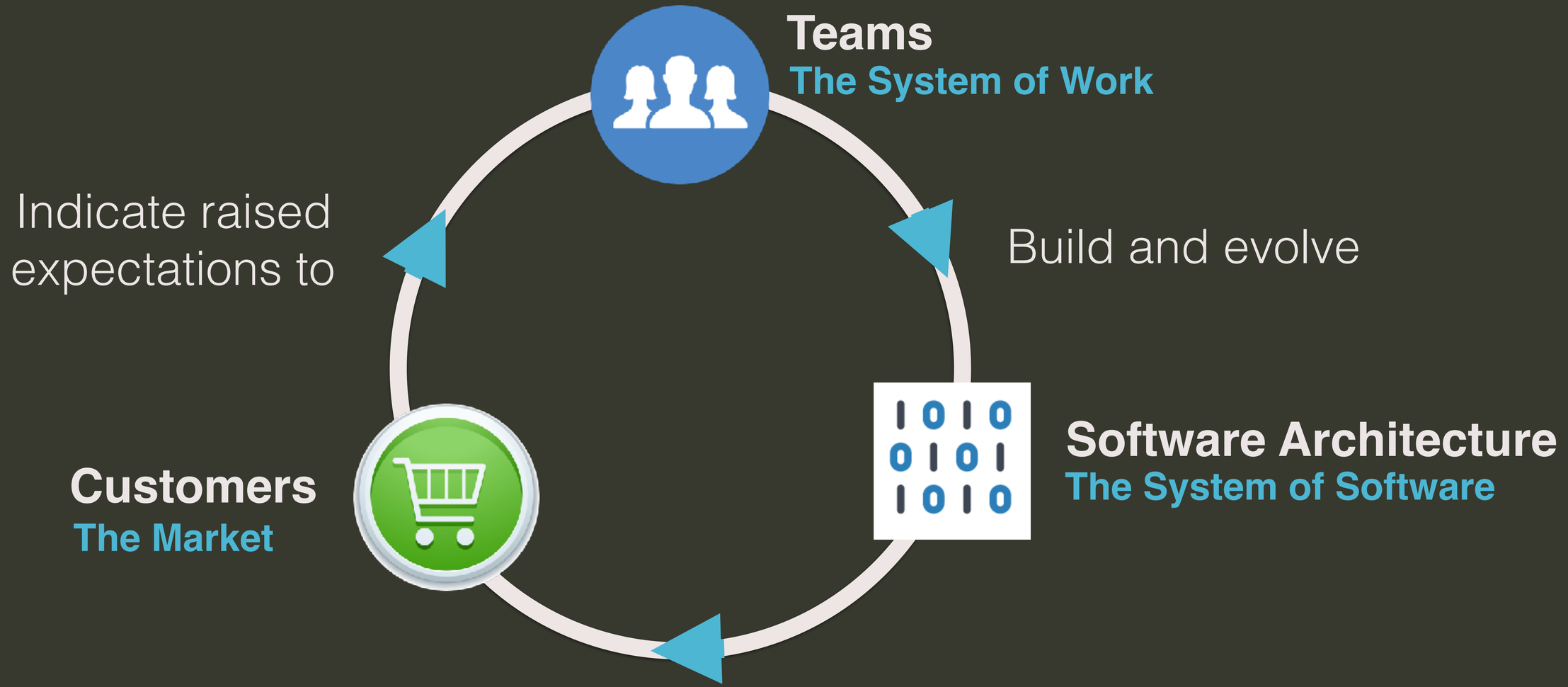
SOCIOTECHNICAL EVOLUTION



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DISTILLATION PATTERN
SEGREGATING THE CORE

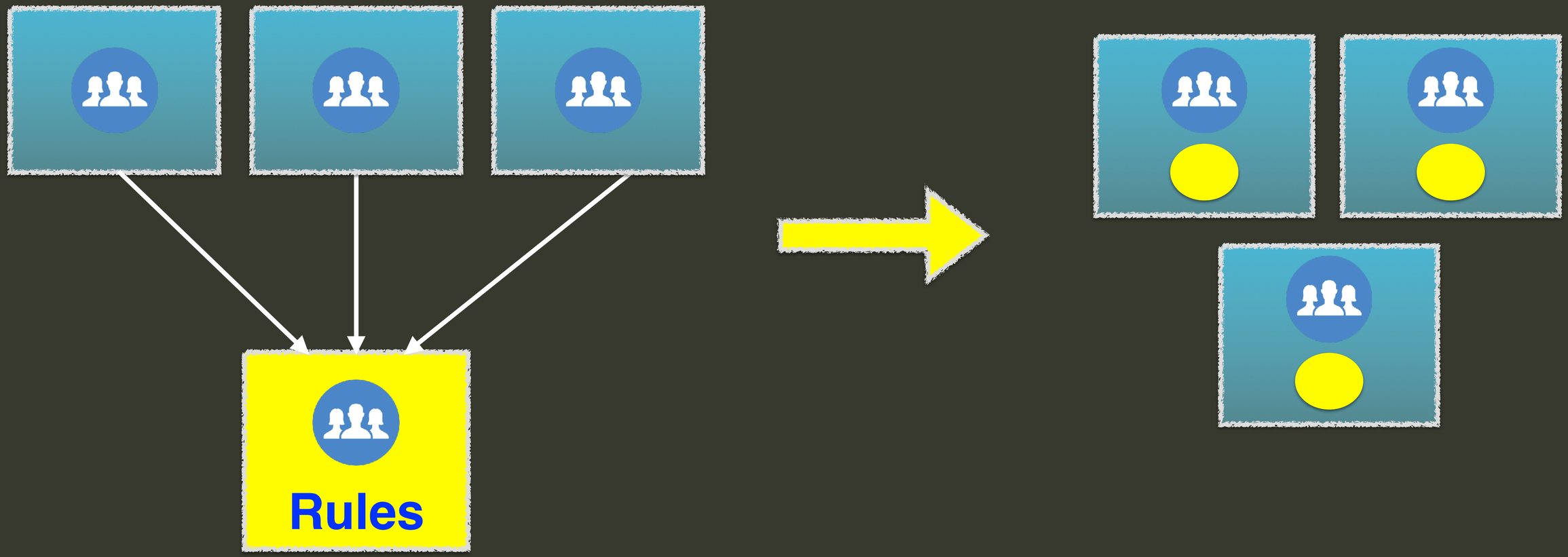
Extract part of an existing bounded context into a separate context based on identifying the part as a high value core domain.

SEGREGATING THE CORE

95% of revenue is generated by customers running ad campaigns on Facebook.

Core domain

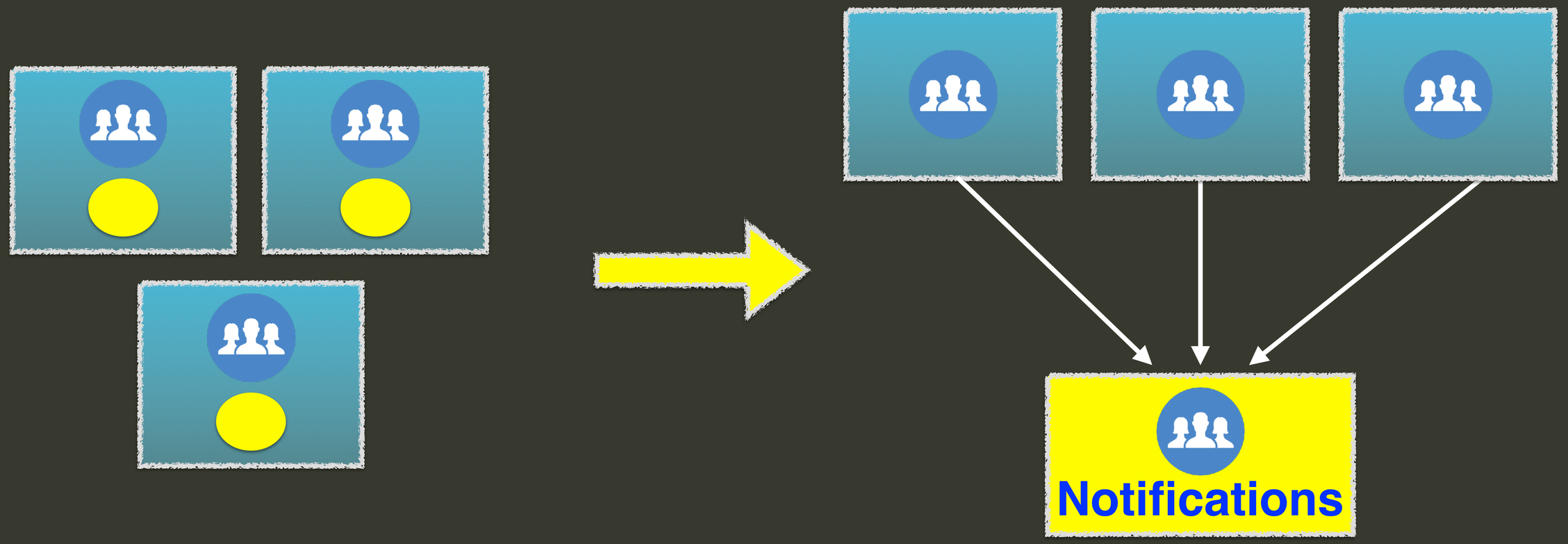
SLICE AND SCATTER



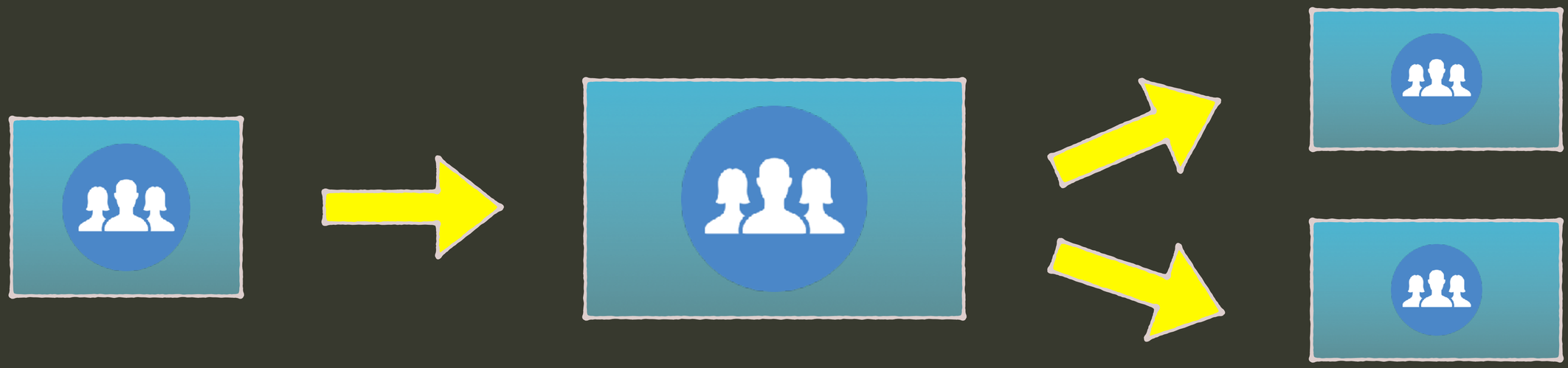
SLICE AND SCATTER CHALLENGES

- You may increase dependencies
- You have to break up a happy team
- Each team will now be bigger and have more code to maintain
- Possibly different tech in each context

EXTRACT GENERIC CAPABILITY



MITOSIS / GROW & SPLIT

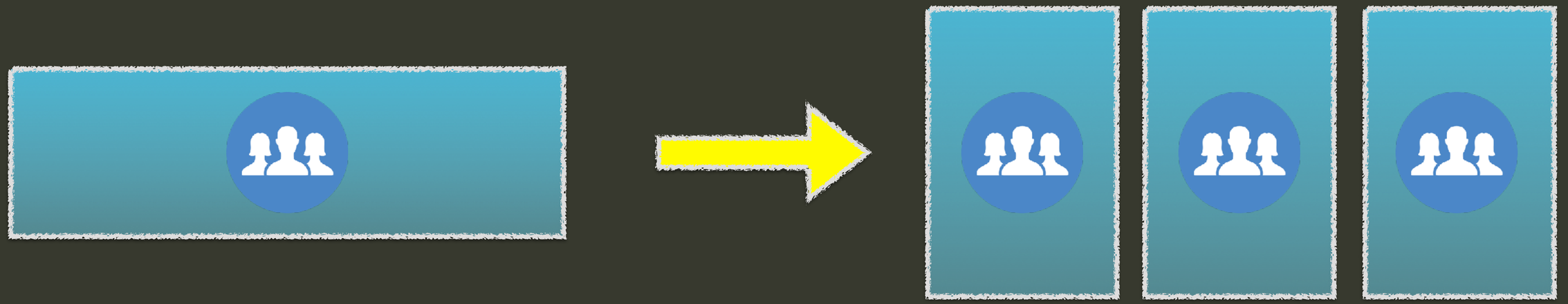


SPLIT BY REVENUE / ENGAGEMENT

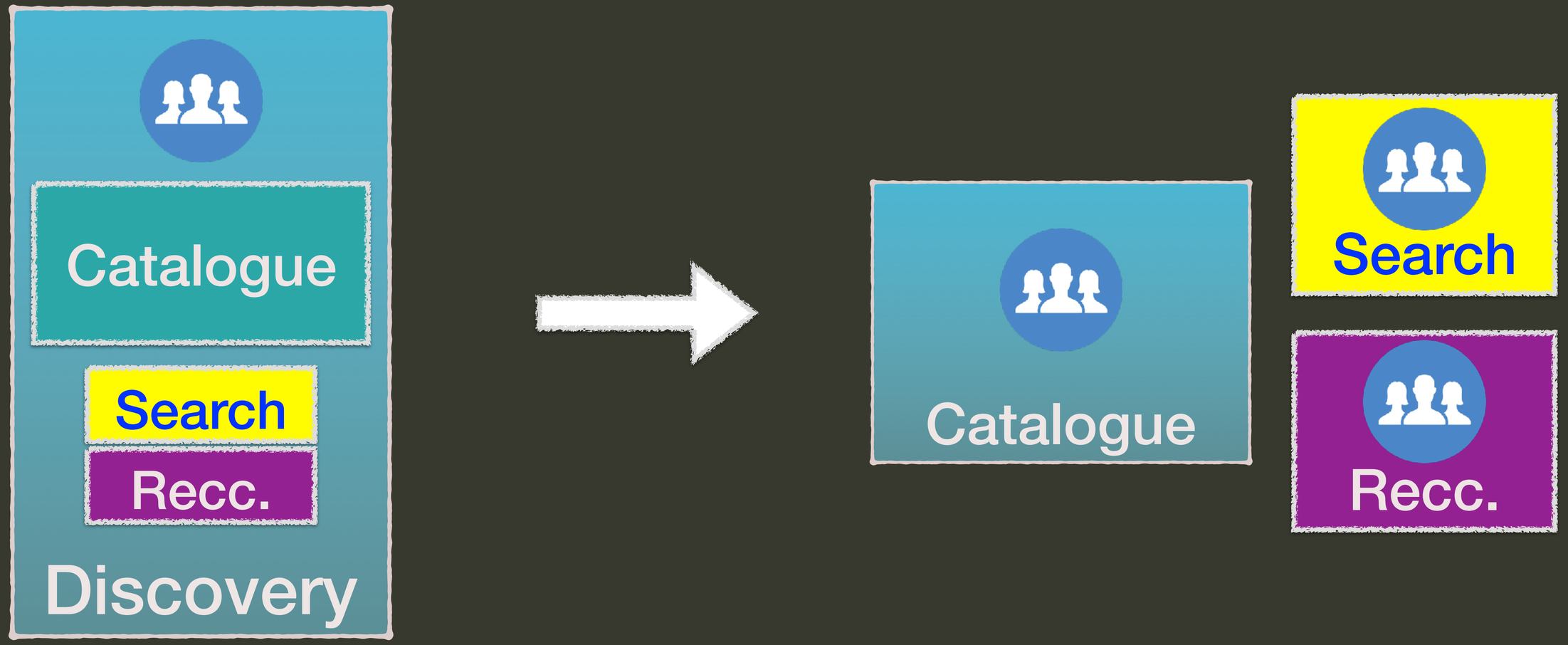
SPLIT BY...

- Team skills
- Backlog cohesion
- Domain cohesion
- Geographical location

SPREAD AND SLICE



SLICE AND SCALE



EVOLUTIONARY TRIGGERS

- Market demand changes
- Our knowledge of the domain improves
- The organisation evolves
- Technical constraints come and go