Essential Domain-Driven Design

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virtualgenius
leading by design

“**Questions about whether design is necessary or affordable are quite beside the point…**The alternative to good design is bad design, not no design at all.”

— Douglas Martin

"A good design is not the one that correctly predicts the future, *it's one that makes* ***adapting to the future affordable***."

—Venkat Subramaniam

"…the *most significant complexity* of many applications is *not* technical. It is in the

domain *itself*,

the activity or business of the user."

“A **successful design**

must systematically deal with this business domain complexity

as the

central aspect of the software.”

- Eric Evans

Extended Warranties

Technical staff learn to *speak the business (i.e. domain) language…*

John,

In the system for Client A, please tell me the source for populating the field Retail Price?

Pam
Accountant

Pam,

Retail Price = **ARRAMT** in **ARRTRXPF** ...
It comes out of the **BARCSTPF** ... either directly or as calculated percentage from **BARCSTPF**.

John
Developer

Claire <Business Analyst>,

Can you please tell me what the @*&#^&^# field John is referring to?

I haven't memorized all of the column headers in the tables in the system that I never see . . . :-)

I'm guessing he means the product maintenance menu, and the screens 1 - 3 and the field marked "sale price" . . .

Pam
Accountant

SHARED LANGUAGE?


WELCOME
TO
99¢ PLAZA
EVERYTING
99¢
OR LESS
& UP


Days Inn
32IN HDTV
EGGS WAFFLES
BISCUITS AND
GRAVY HOT TUB

Ubiquitous Language

A language *structured around the domain model*,

used by *all team members*

to connect *all the activities of the team with the software*

Three Pillars of DDD

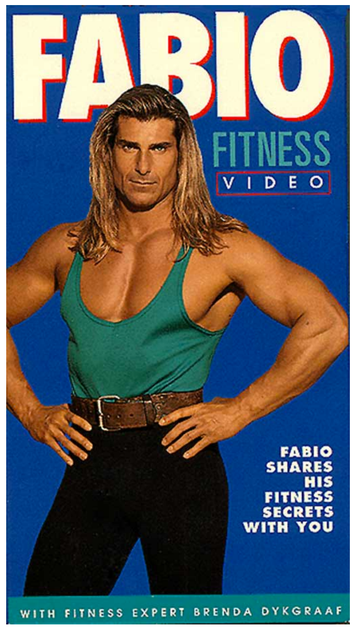
What exactly *is* domain-driven design?

How might I explain it to coworkers after this class?

Tell us a story...

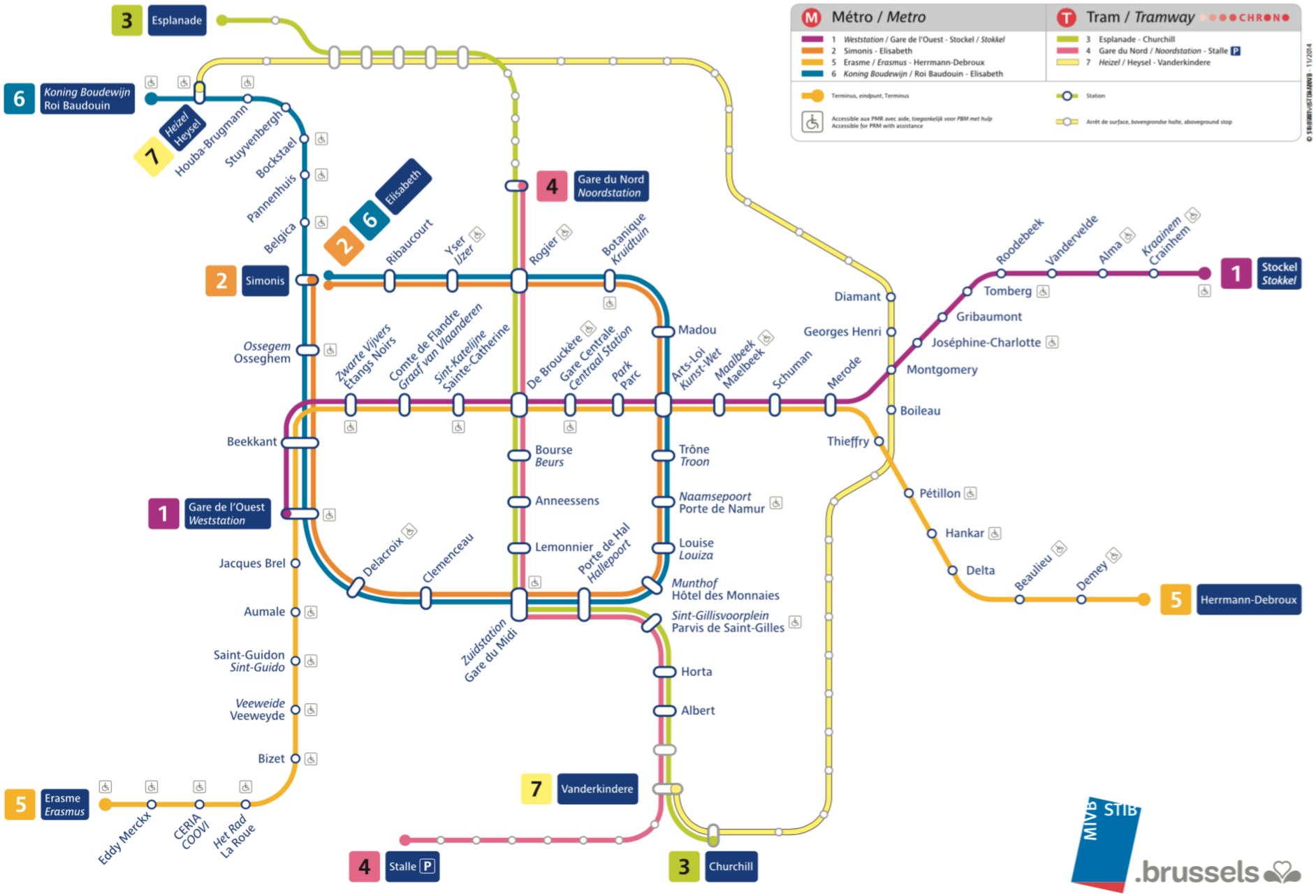
The Dishwasher

What is a Model?



UNIFIED MODELING LANGUAGE™

```
feature_query = RallyAPI::RallyQuery.new(
feature_query.type = "portfolioitem/featu
feature_query.fetch =
"Name,CreationDate,FormattedID,Milestones
anEstimate,InProgressDate,AcceptedDate,Ow
on,Description,Planned"
feature_query.limit      = 100          #
feature_query.page_size  = 200
feature_query.project_scope_up = false
feature_query.project_scope_down = true
feature_query.order = "FormattedID Desc"
```


Métro / Metro
1 Weststation / Gare de l'Ouest - Stockel / Stokkel
2 Simonis - Elisabeth
5 Erasme / Erasmus - Herrmann-Debroux
6 Koning Boudewijn / Roi Baudouin - Elisabeth
Tram / Tramway CHRONO
3 Esplanade - Churchill
4 Gare du Nord / Noordstation - Stalle P
7 Heizel / Heysel - Vanderkindere
Terminus, eindpunt, Terminus
Station
Accessible aux PMR avec aide, toegankelijk voor PBM met hulp
Accessible for PRM with assistance
Arrêt de surface, bovengrondse halte, aboveground stop
3 Esplanade
6 Koning Boudewijn
Roi Baudouin
1 Heizel
Heysel
Houba-Brugmann
Stuyvenbergh
Bockstael
Pannenhuis
Belgica
2 Simonis
2 6 Elisabeth
Ribaucourt
Yser
IJzer
4 Gare du Nord
Noordstation
Rogier
Botanique
Kruidtuin
Ossegem
Osseghem
Zwarte Vijvers
Etangs Noirs
Comte de Flandre
Graaf van Vlaanderen
Sint-Katelijne
Sainte-Catherine
De Brouckère
Gare Centrale
Centraal Station
Park
Parc
Madou
Arts-Loi
Kunst-Wet
Maalbeek
Maelbeek
Schuman
Merode
Diamant
Georges Henri
Roodebeek
Vandervelde
Alma
Kraainem
Crainhem
1 Stockel
Stokkel
Tomberg
Gribaumont
Joséphine-Charlotte
Montgomery
Boileau
Thieffry
Beekkant
Bourse
Beurs
Trône
Troon
1 Gare de l'Ouest
Weststation
Anneessens
Naamsepoort
Porte de Namur
Pétillon
Hankar
Delta
Beaulieu
Demey
5 Herrmann-Debroux
Jacques Brel
Delacroix
Clemenceau
Lemonnier
Porte de Hal
Hallepoort
Louise
Louiza
Munthof
Hôtel des Monnaies
Aumale
Zuidstation
Gare du Midi
Sint-Gillisvoorplein
Parvis de Saint-Gilles
Saint-Guidon
Sint-Guido
Horta
Veeweide
Veeweyde
Albert
Bizet
7 Vanderkindere
5 Erasme
Erasmus
Eddy Merckx
CERIA
COOVI
Het Rad
La Roue
4 Stalle P
3 Churchill
STIB
MIVB
.brussels

Domain Model

A set of concepts expressing distilled knowledge, rules, assumptions, concepts about a business domain

Domain Model

It's about **usefulness,**

not realism

…usefulness relative to a *particular set of scenarios*

Statements about this Model

- Passengers may only access transport at stations
- Passenger transport follows transit lines
- Transit line length does not convey relative distance or direction
- Transit lines terminate at last station

SANDEMANS
newBRUSSELS
START POINT
Meet your guide in front of the tower of City Hall on Grand Place/Grote Markt.
Grand Place - Grote Markt
City Hall
TOURS START HERE
FREE TOUR starts EVERY DAY at 11 AM & 2 PM
BEER TOUR START POINT
Meet your guide outside Scott's Bar on Rue Montagne aux Herbes Potagères.
SCOTT'S
BEER TOUR STARTS HERE
BEER TOUR starts EVERY DAY at 5:30 PM
Blvd Anspach Laan
Zuidstraat
Rue des Pierres - Steenstr
Rue du Midi
Lombard
Rue du Fossé au Loups
Rue d'Arenberg
Blvd Baudouin - Boudewijnlaan
Blvd D'Anvers - Antwerpselaan
Blvd du Roi Albert II Laan
Gare du Nord Noordstation
Rogier Tower
Blvd du Jardin Botanique - Kruidtuinlaan
Botanical Garden
Rue Royale - Koningsstr
Chaussée de Haecht - Haachtsesteenweg
Rue Rogier
Rue de l'Avenir - Toekomststr
Chaussée de Gand - Gentsesteenweg
Blvd du 9E Ligne Laan
KVS
Blvd Emile Jacqmain Laan
Beguinage Church
St Catherine's Church
Martyrs' Square
Comic Strip Center
Colonne du Congrès
Rue de Congrès Str
Blvd Pachéco Laan
Blvd Bischoffsheim Laan
Rue Scailquin Str
Rue Verbist Str
Chaussée de Louvain - Leuvensesteenweg
Blvd Clovis Laan
Ave de la Brabançonne Laan
Rue du Noyer - Notelaarstr
La Monnaie Opera
Galeries Royales St Hubert
Stock Exchange
Halles St Géry
Blvd de Berlaimont Laan
St Michel & St Gudula Cathedral
R Croix de Fer - Ijzerenkruisstr
Rue des Colonies - Koloniënstr
Federal Parliament
City Museum
Town Hall
Gare Centrale
R Lombard Str
Manneken Pis
Square Ambiorix
Rue de la Loi
Wetstraat
Rue Franklin Straat
Rue Archimède Straat
European Commission
Parc de Bruxelles Warandepark
Rue Royale - Koningsstr
Rue Ducale - Hertogsstr
Blvd de Régent - Regentlaan
Ave des Arts - Kunstlaan
Mont des Arts
Magritte Museum
Royal Palace
Blvd de l'Empereur
Blvd Maurice Lemonnier Laan
Blvd Poincaré - Poincarélaan
Ave du Stalingrad Laan
Rue Belliard Straat
Ave de la Renaissance Laan
Parc du Cinquantenaire Jubelpark
Arc de Triomphe
Ave des Nerviens - Nerviërslaan
Ave d'Auderghem - Oudergemlaan
European Parliament
Parc Léopold
Grand Sablon Grote Zavel
Notre Dame du Sablon
Petit Sablon Kleine Zavel
Rue de la Régence - Regentschapsstr
Ave Marnix Laan
Rue du Trône - Troonstraat
Porte de Namur Naamsepoort
Parc d'Egmont
Blvd Jamar Laan
Blvd du Midi - Zuidlaan
Ave de la Porte de Hal
Marolles Flea Market
Pl du Jeu de Balle
Palace of Justice
Gare du Midi
R Quatre Bras Str

EventStorming

Reference Scenario

A business example
that tells a story
about the business
need and what makes
the software worth
writing

Context

The conditions under which a particular model is defined and applicable.

Bounded Context

Ubiquitous Language

…within a **Bounded Countext**

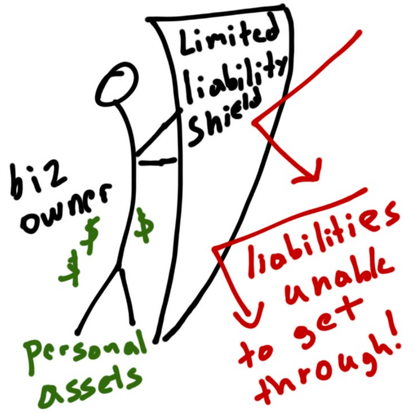
7. LIMIT OF LIABILITY:

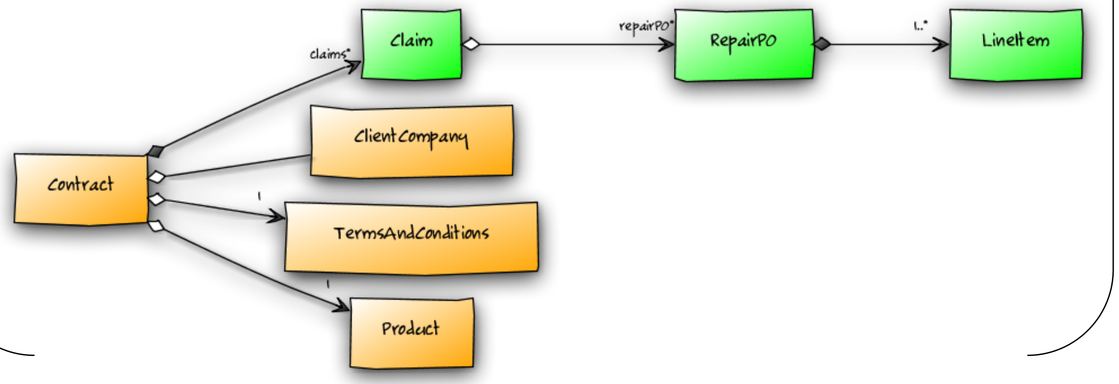
The total amount that We will pay for repairs or replacement made in connection with all claims that You make pursuant to this Protection Plan shall not exceed the

```
public double limitOfLiability()
{
  double claimTotal = 0;
  List<Claim> claims = new ArrayList<Claim>();
  claims.addAll(this.getClaims());

  for (Claim claim:claims)
  {
    claimTotal += claim.amount;
  }

  return (this.purchasePrice - claimTotal) * 0.8;
}
```





Clues to Identifying Bounded Contexts

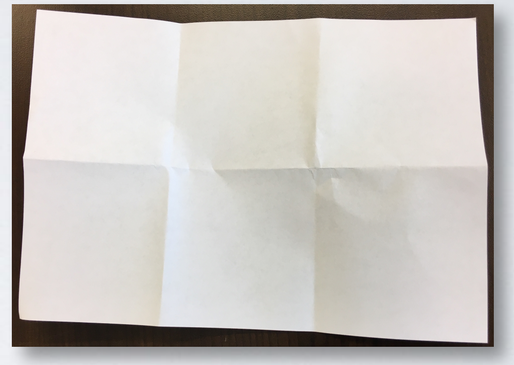
Look for:

- Different teams
- Differences in terminology
- Boundaries:
  - Subsystem
  - System
  - Component
  - Organizational

WELCOME TO DAY 2!

Sit with different people today.

Tear out the "Blackout Bingo!" page from your workbook and fold it into *6 equal-sized boxes*



Review yesterday's content and *write a word or phrase from yesterday's content in each box on the page*.

WELCOME TO DAY 3!

Sit with different people today.

With the person next to you, work through the review questions for aggregates and eventual consistency on pp. 34-35.

Baking Design into Agile

Review the front side of the *User Stories Reference Guide*. Then…

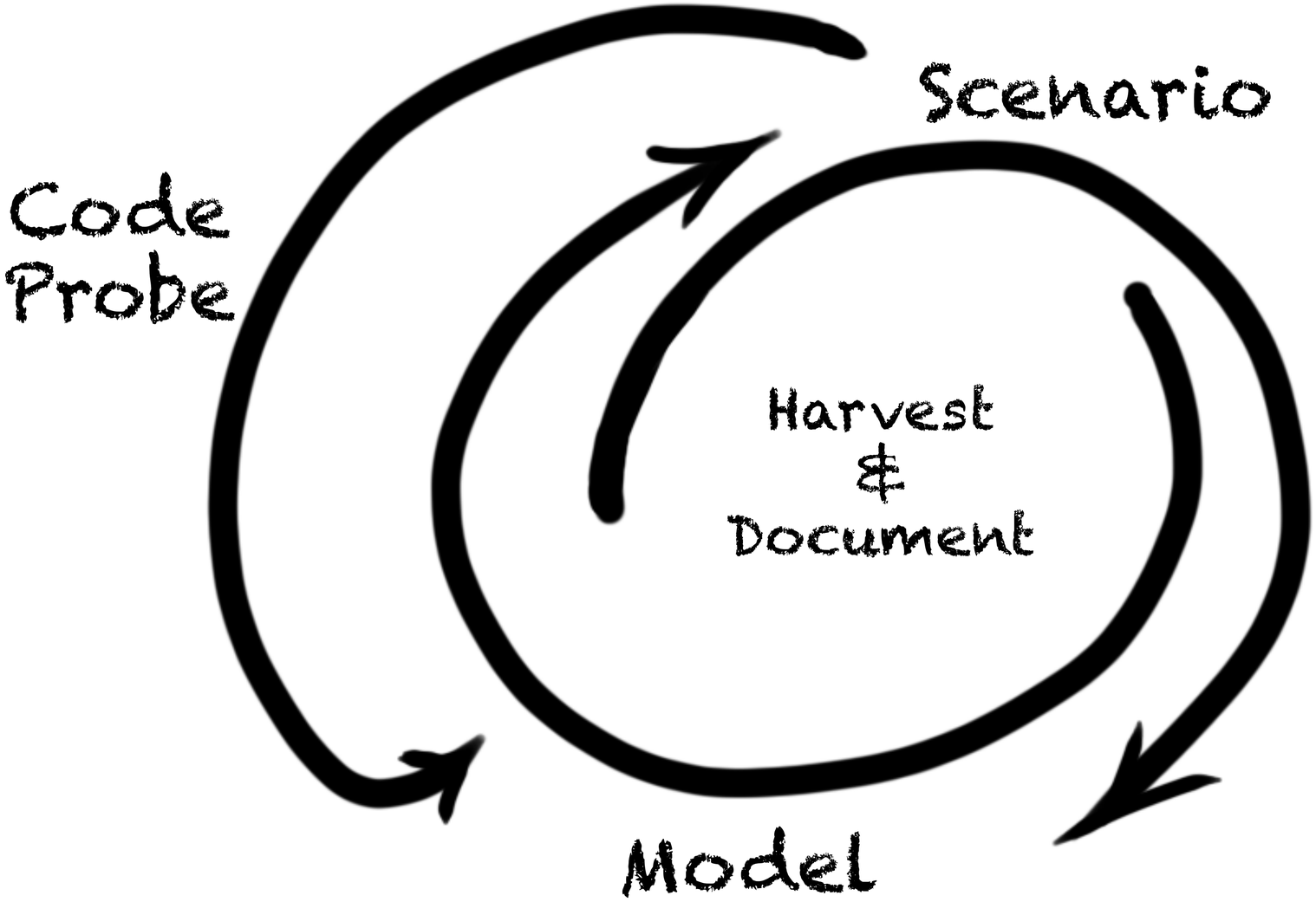
talk in your table group about:

- **what you find interesting**
- **ways to better integrate design into your team process.**

Model Exploration

Whirlpool

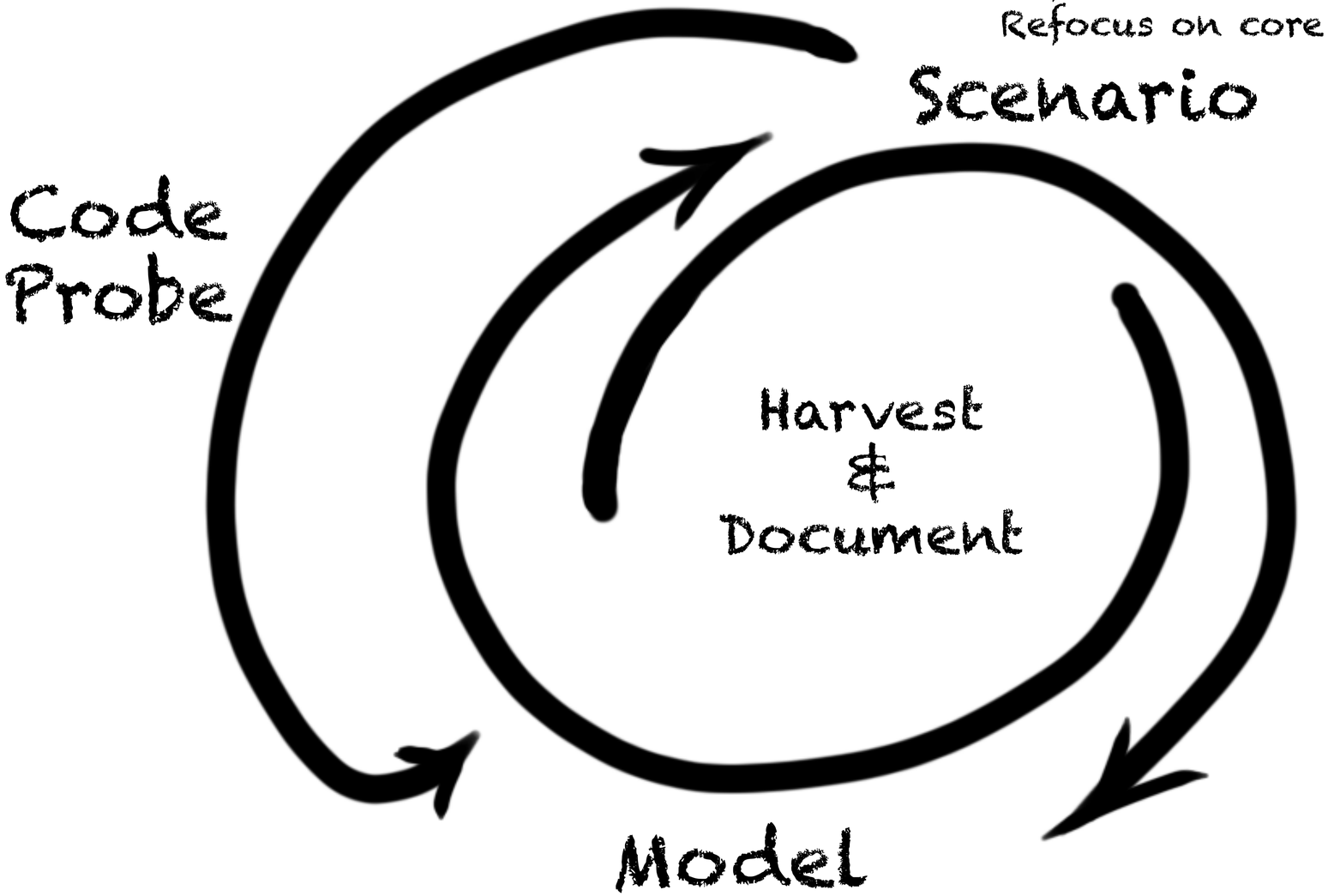
domainlanguage.com/ddd/whirlpool



Model Exploration

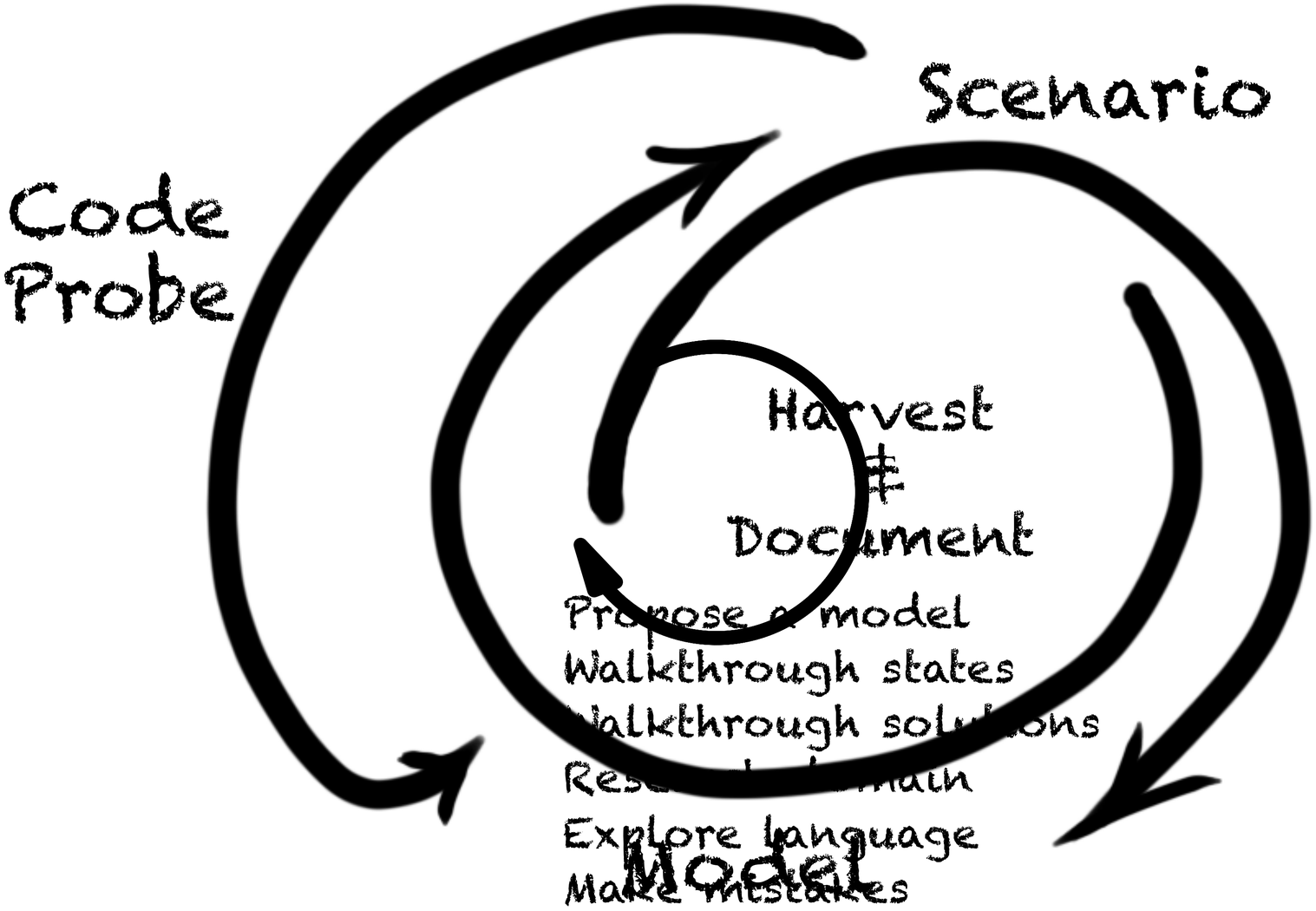
Whirlpool

Tell us a story
Flesh it out
Refocus on the hard part
Refocus on core domain



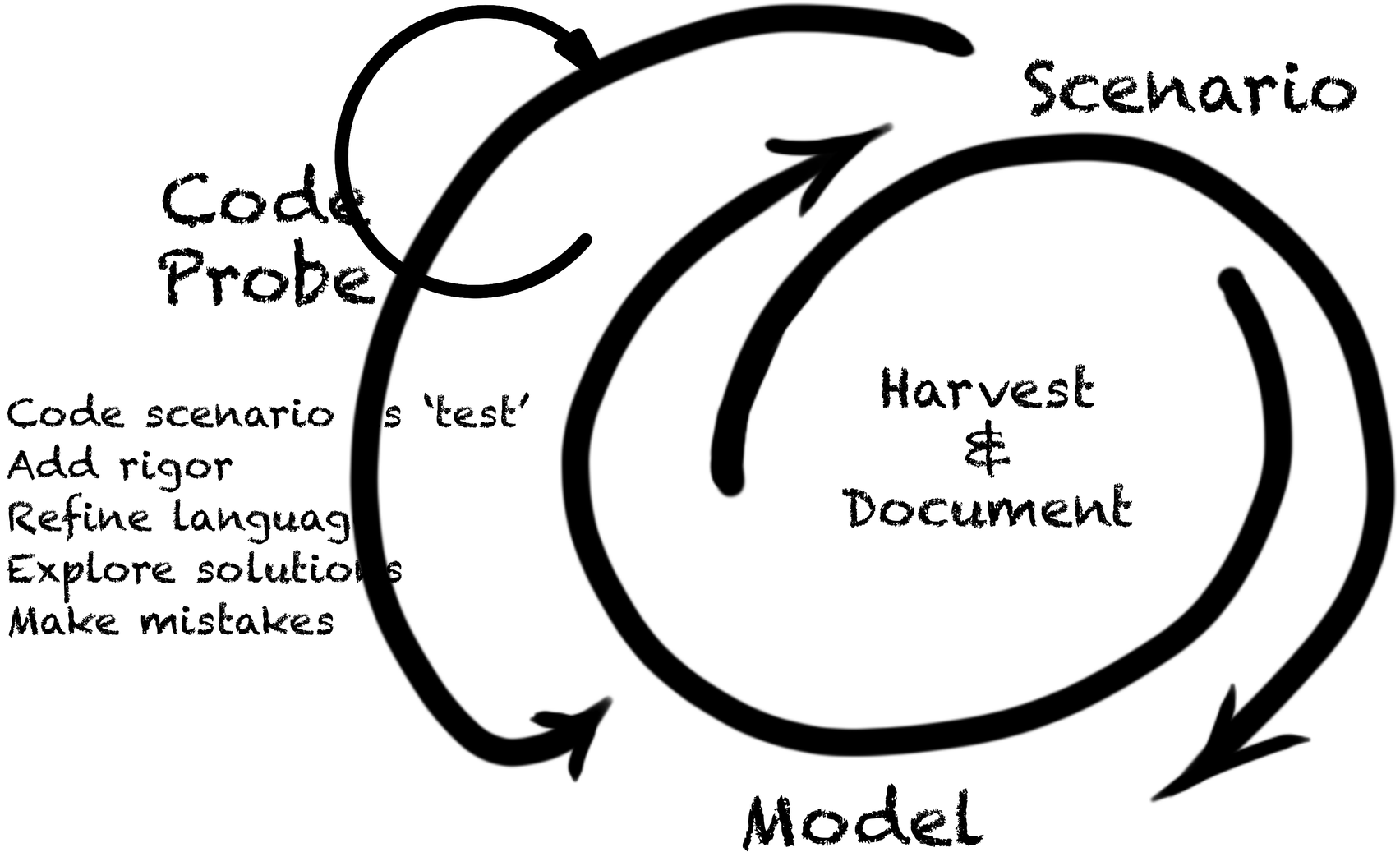
Model Exploration

Whirlpool



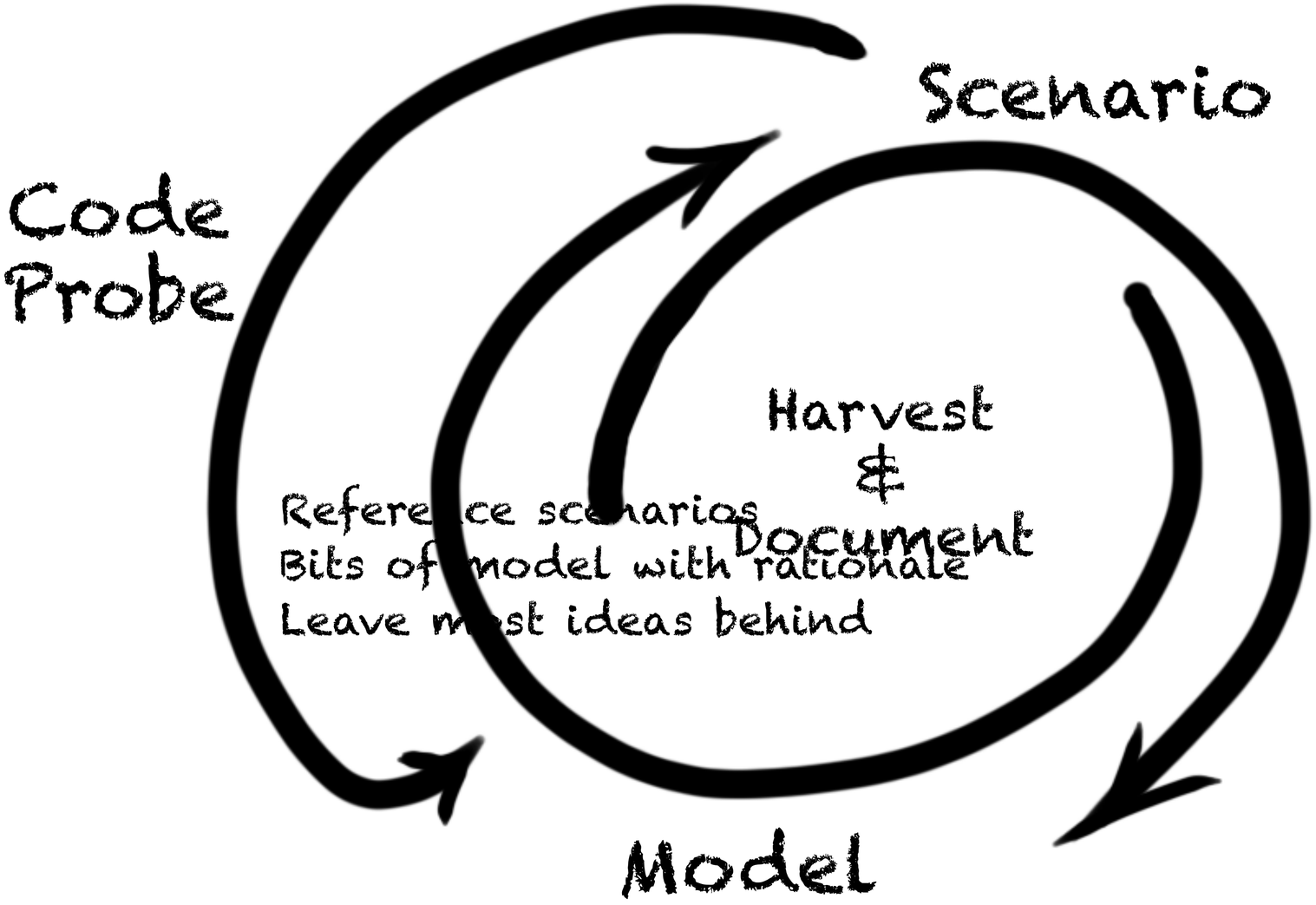
Model Exploration

Whirlpool



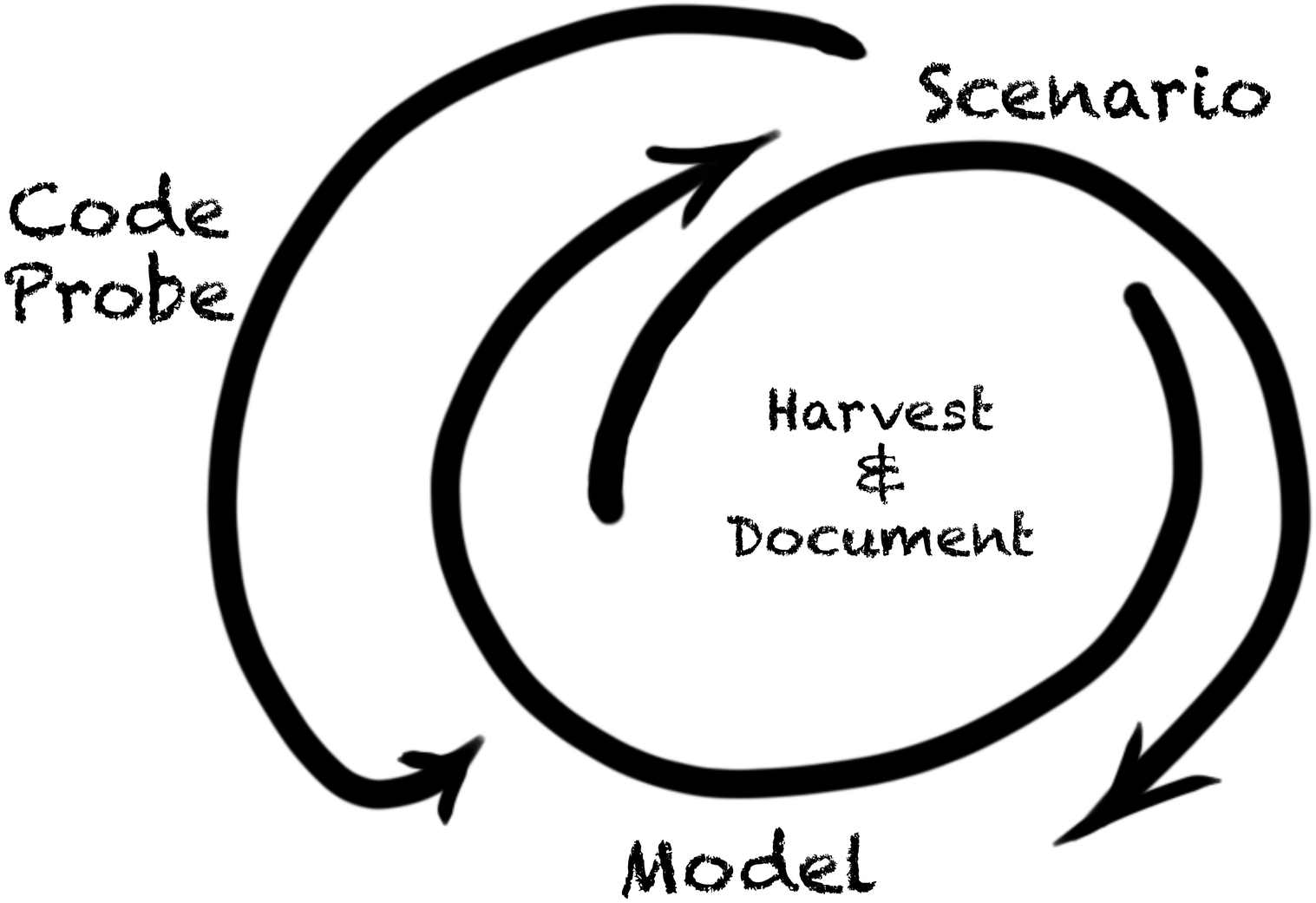
Model Exploration

Whirlpool



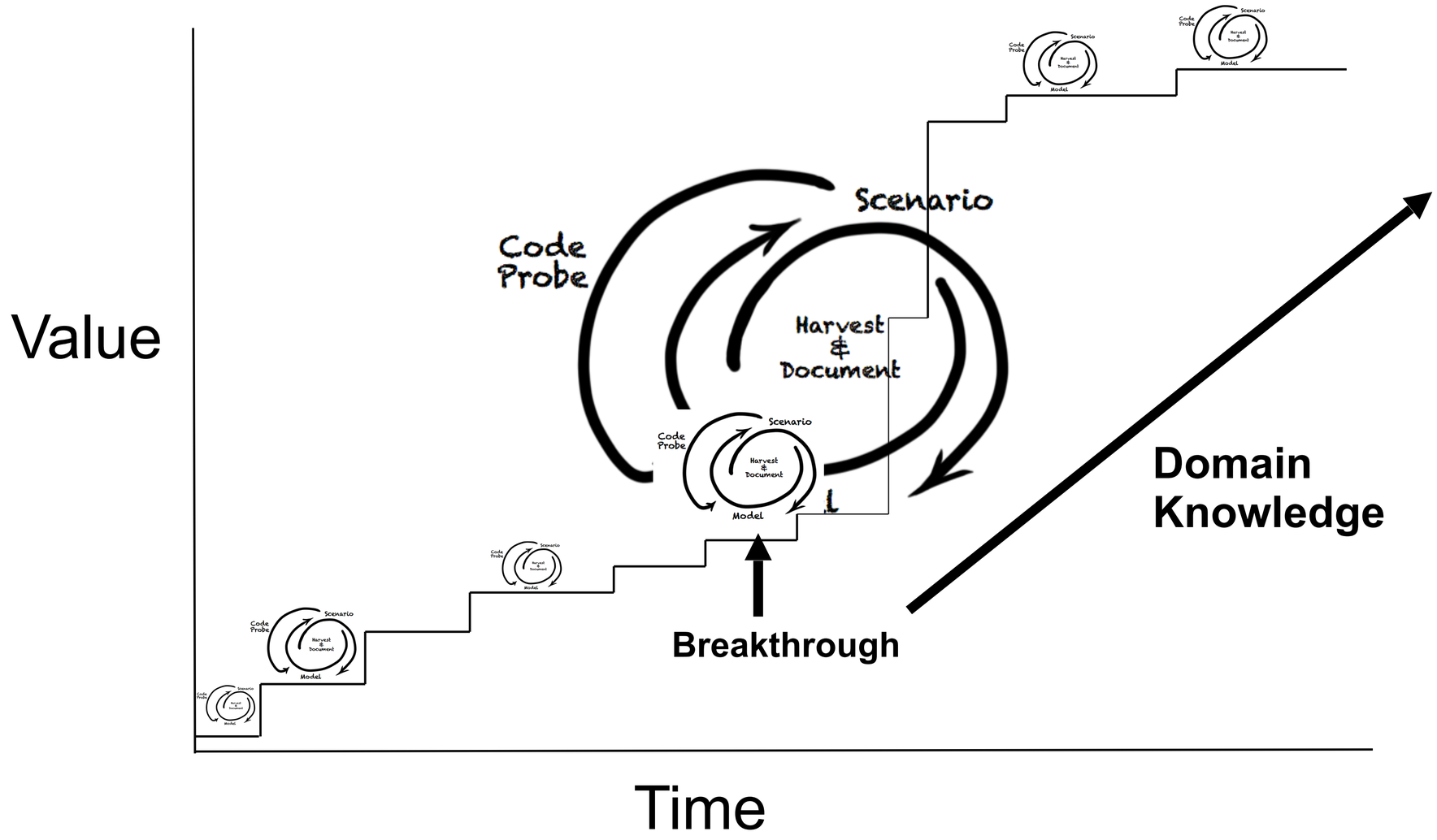
Model Exploration

Whirlpool

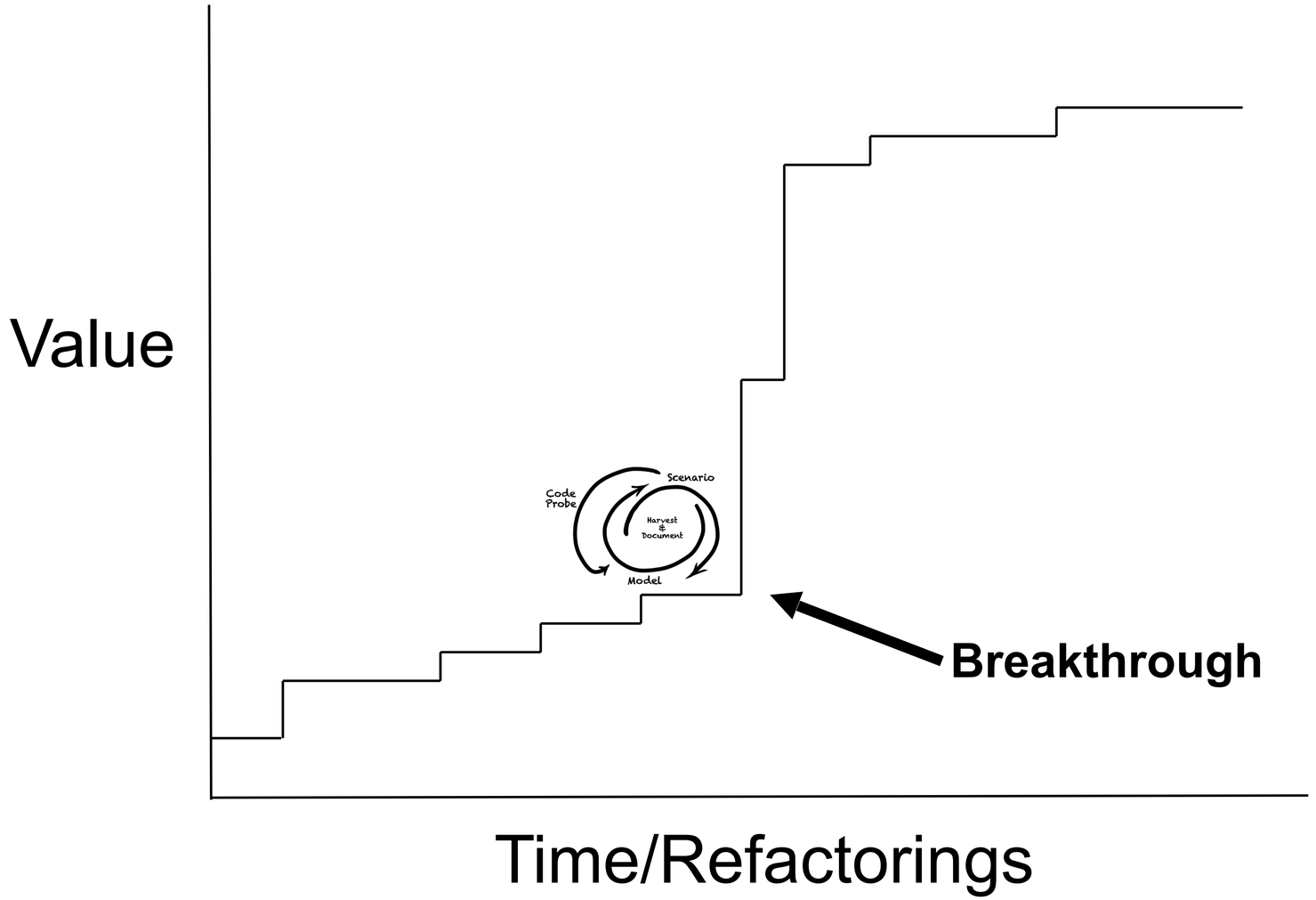


Iterative Design + Incremental Development =

Accelerated Product Delivery



Refactoring to a Deeper Model



Four strategies for getting started with DDD

…when you have a big commitment to legacy systems

Based on https://domainlanguage.com/ddd/surrounded-by-legacy-software/

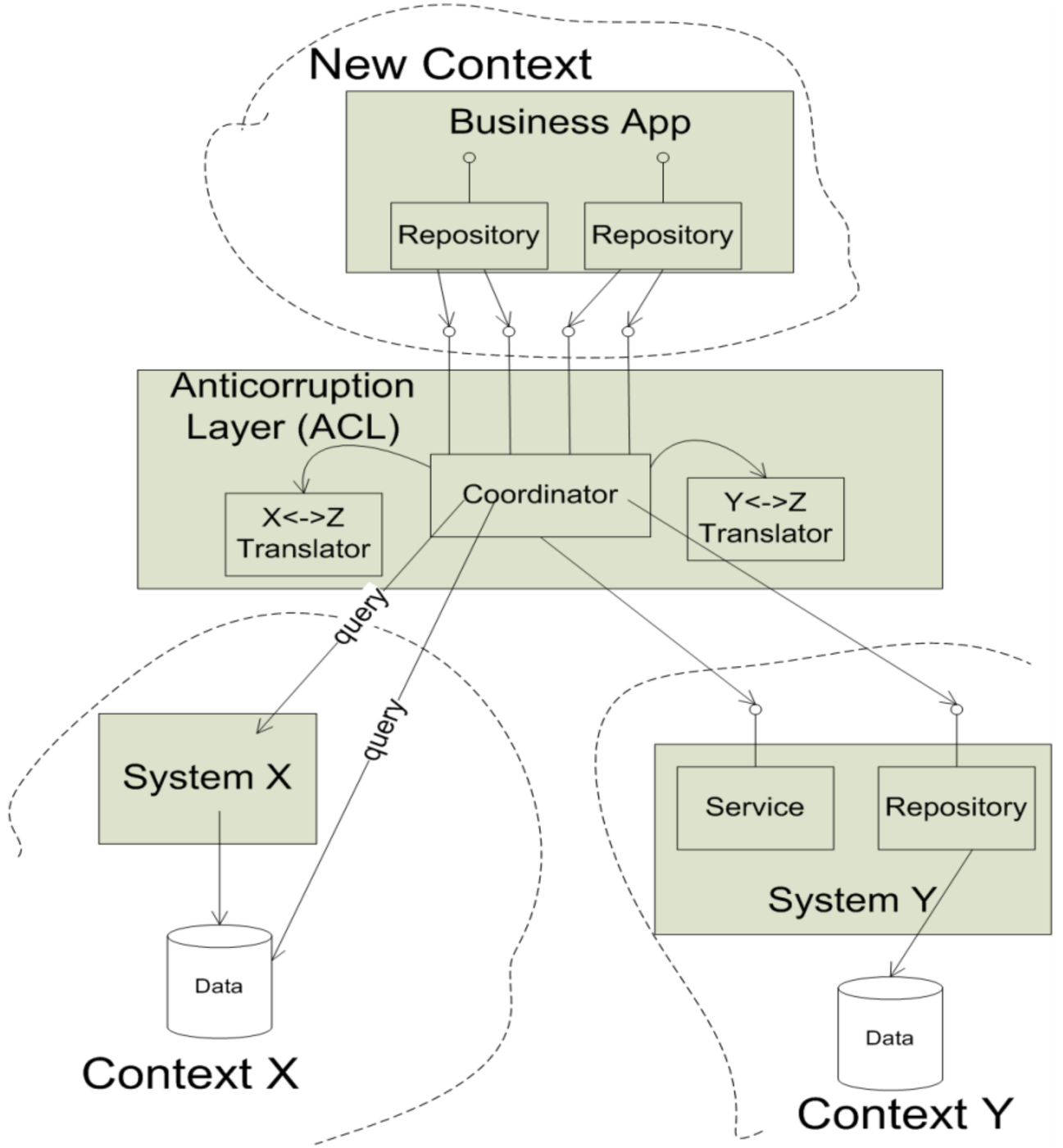
1. Bubble Context
2. Autonomous Bubble
3. Exposing Legacy Assets as Services
4. Expanding a Bubble

BUBBLE CONTEXT

How we form the Bubble:

- Choose an important, yet modest-sized, business-related problem with some intricacy.
- Small, self-disciplined team with control over its code.
- Establish context boundary for the bubble using an ACL to isolate from the legacy BBOM.

The bubble isolates the work so the team can evolve a model that addresses the chosen area, relatively unconstrained by the concepts of the legacy systems.


New Context
Business App
Repository
Repository
Anticorruption Layer (ACL)
X<->Z Translator
Coordinator
Y<->Z Translator
query
query
System X
Data
Context X
Service
Repository
System Y
Data
Context Y

Introducing a difficult new set of development principles and techniques is *best done incrementally, as in a pilot project.*

…In a way that allows members of the team to gain experience and allows the organization to assess the approach.

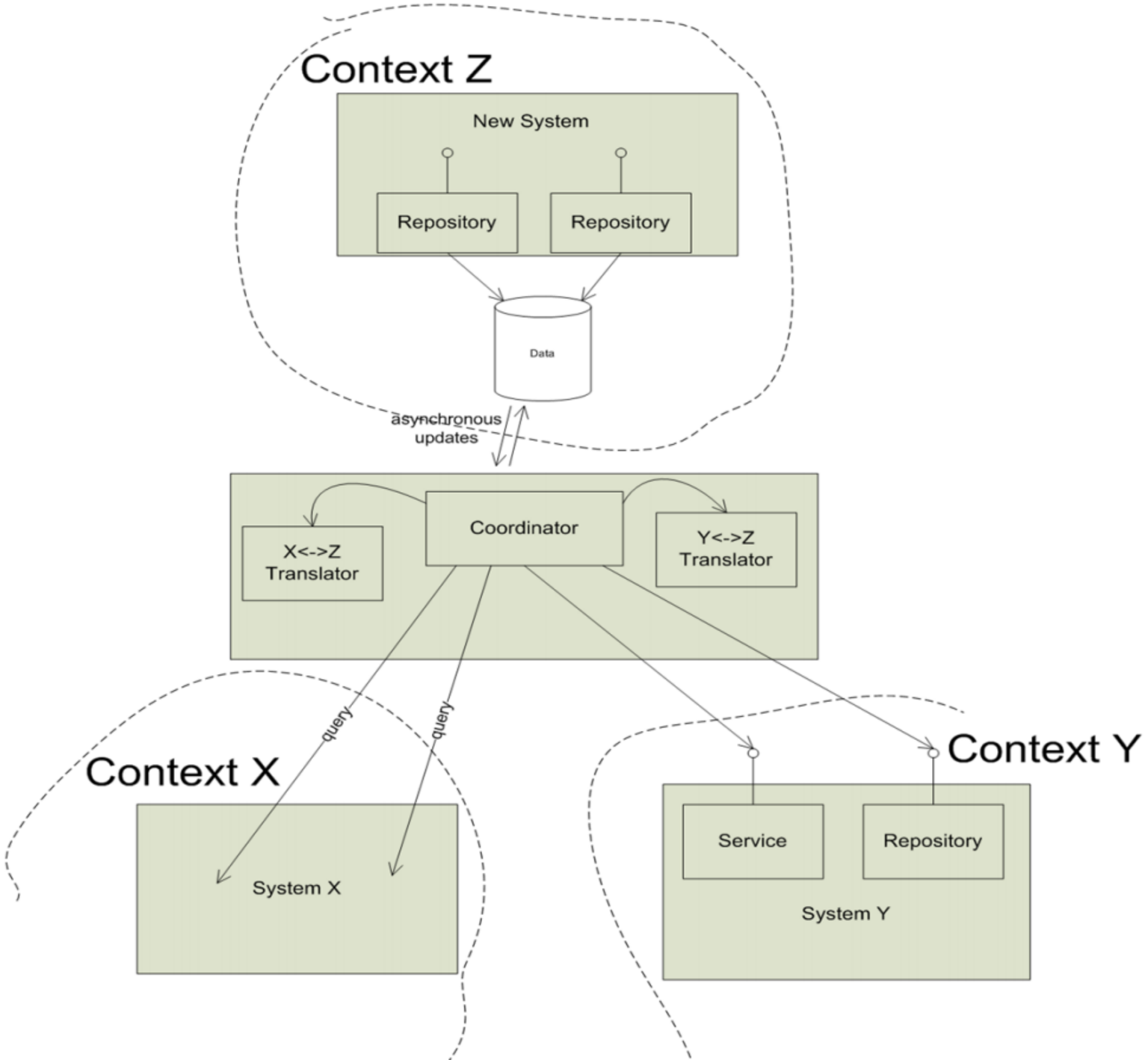
Bubble Context is a nice way to do this.

Main Characteristics of the Bubble Context Strategy:

- Modest commitment to DDD
- No synchronization risk (uses legacy database)
- Works when there is a limited range of data needed from legacy
- *At some later point the bubble may burst*

AUTONOMOUS BUBBLE

https://www.flickr.com/photos/tamuc/15974799741/


Context Z
New System
Repository
Repository
Data
asynchronous
updates
Coordinator
X<->Z
Translator
Y<->Z
Translator
query
query
Context X
System X
Context Y
Service
Repository
System Y

Synchronizing ACL

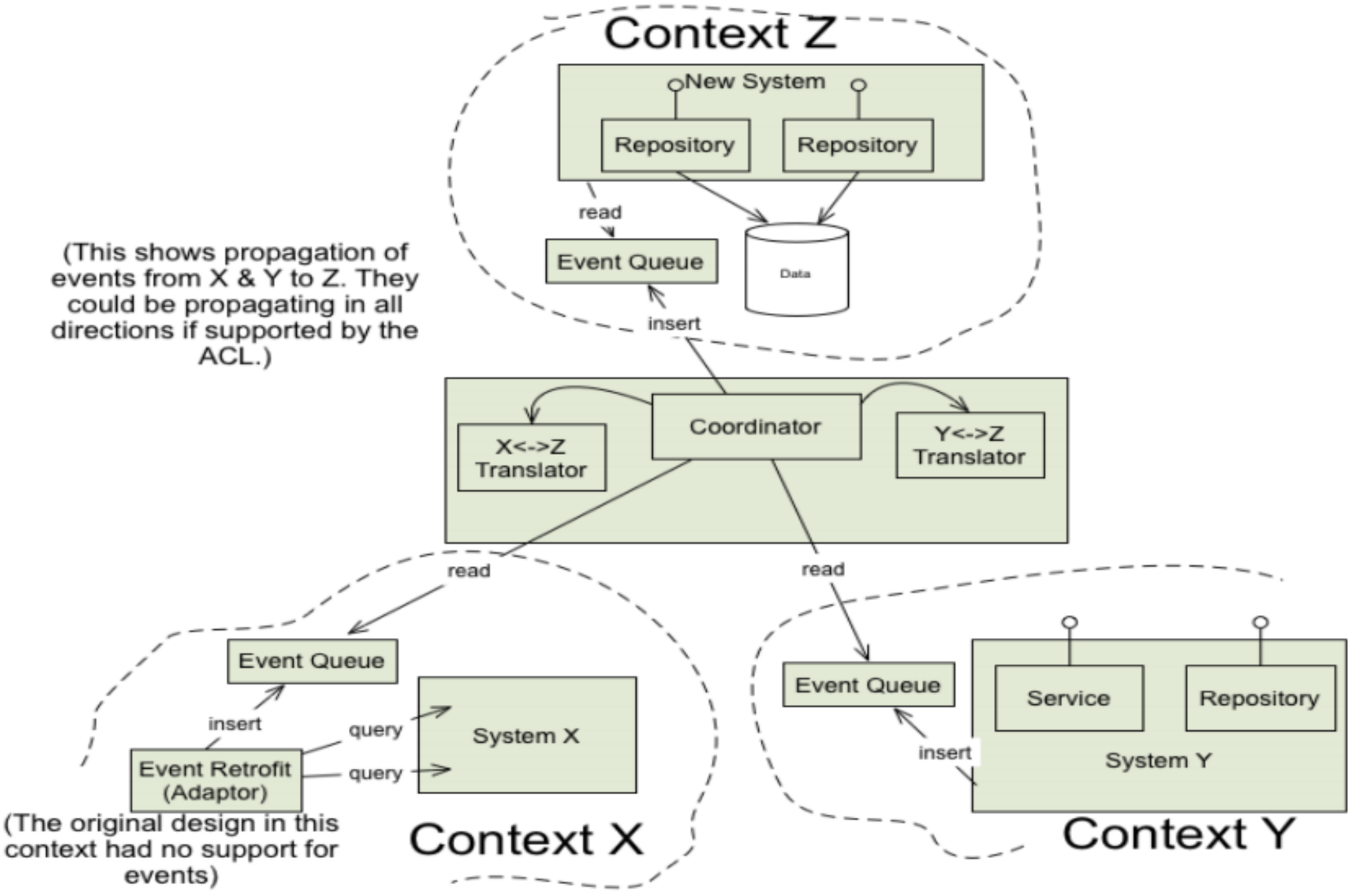
The ACL takes on the responsibility of synchronization between data stores in two contexts (which do not depend directly on each other).

This ACL activity is asynchronous with any activity in either context.

Define the service level agreement (SLA) regarding the freshness of the translated data.

Synchronizing ACL Approaches

- **Simple:** Nightly batch job
- **More Flexible:** Messages carrying domain events


Context Z
New System
Repository
Repository
read
Event Queue
Data
insert
(This shows propagation of events from X & Y to Z. They could be propagating in all directions if supported by the ACL.)
Coordinator
X<->Z Translator
Y<->Z Translator
read
read
Event Queue
insert
query
query
Event Retrofit (Adaptor)
System X
(The original design in this context had no support for events)
Context X
Event Queue
Service
Repository
insert
System Y
Context Y

- Needs organization committed to significant new development with new design approach.
- Allows new data to be collected and used without involving legacy.
- Allows decoupled "product" to evolve.
- May progress from Bubble Context as development is scaled up on a successful pilot project.

EXPOSING LEGACY ASSETS AS SERVICES

Don’t waste time *recreating capabilities that already exist*, especially in generic and supporting subdomains.

Use Open Host Services* to make legacy capabilities more accessible

*ACL-backed or synchronizing (with own data store)

EXPANDING A BUBBLE

1. *Coevolving* model and ACL
2. Only bring in data you use!
3. Adding data is a *modeling job*