

Course: Domain Driven Design & Microservices for Architects

Section: Domain Driven Design

<http://acloudfan.com/>

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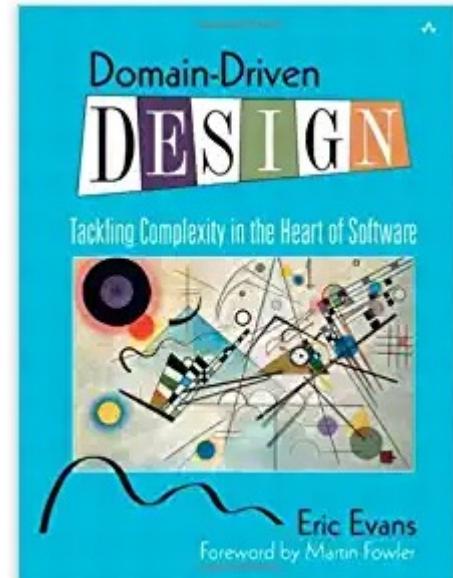
Discount Link to course:

<https://www.udemy.com/course/domain-driven-design-and-microservices/?referralCode=C5DCD3C4CC0F0298EC1A>

Domain Driven Design

“

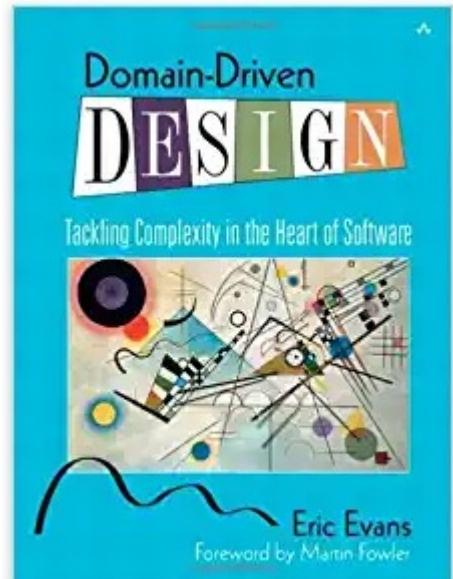
Domain Driven Design approach provides principles and patterns to address the challenges faced with developing complex domain models



Domain Driven Design

“

Domain Driven Design approach provides principles and patterns to address the challenges faced with developing complex domain models



Objectives

- IT project's primary focus is on the core domain and domain logic
- Break a unified model into smaller more manageable models
- Iterative improvements to the model to solve a domain problem

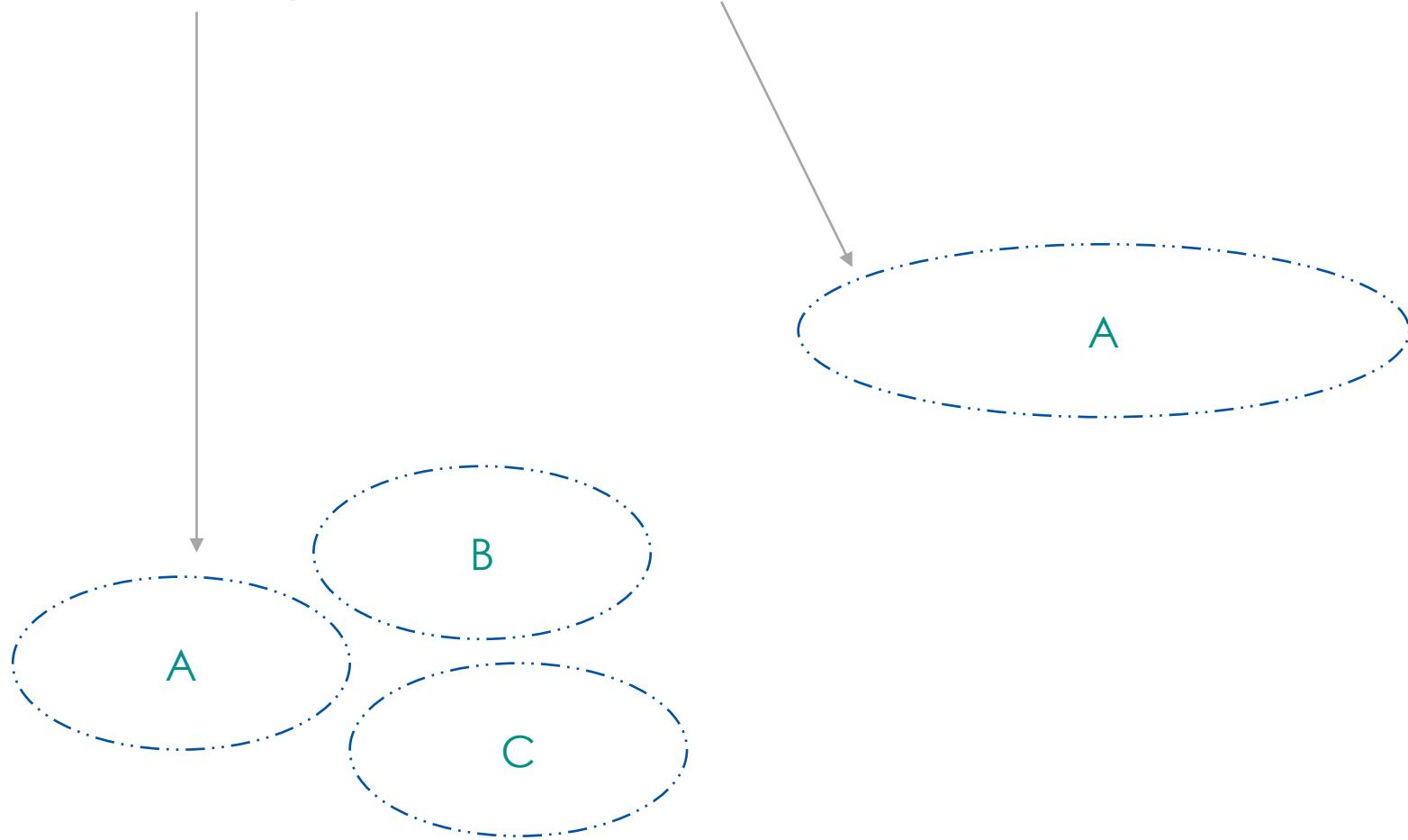
Strategic Vs. Tactical Patterns



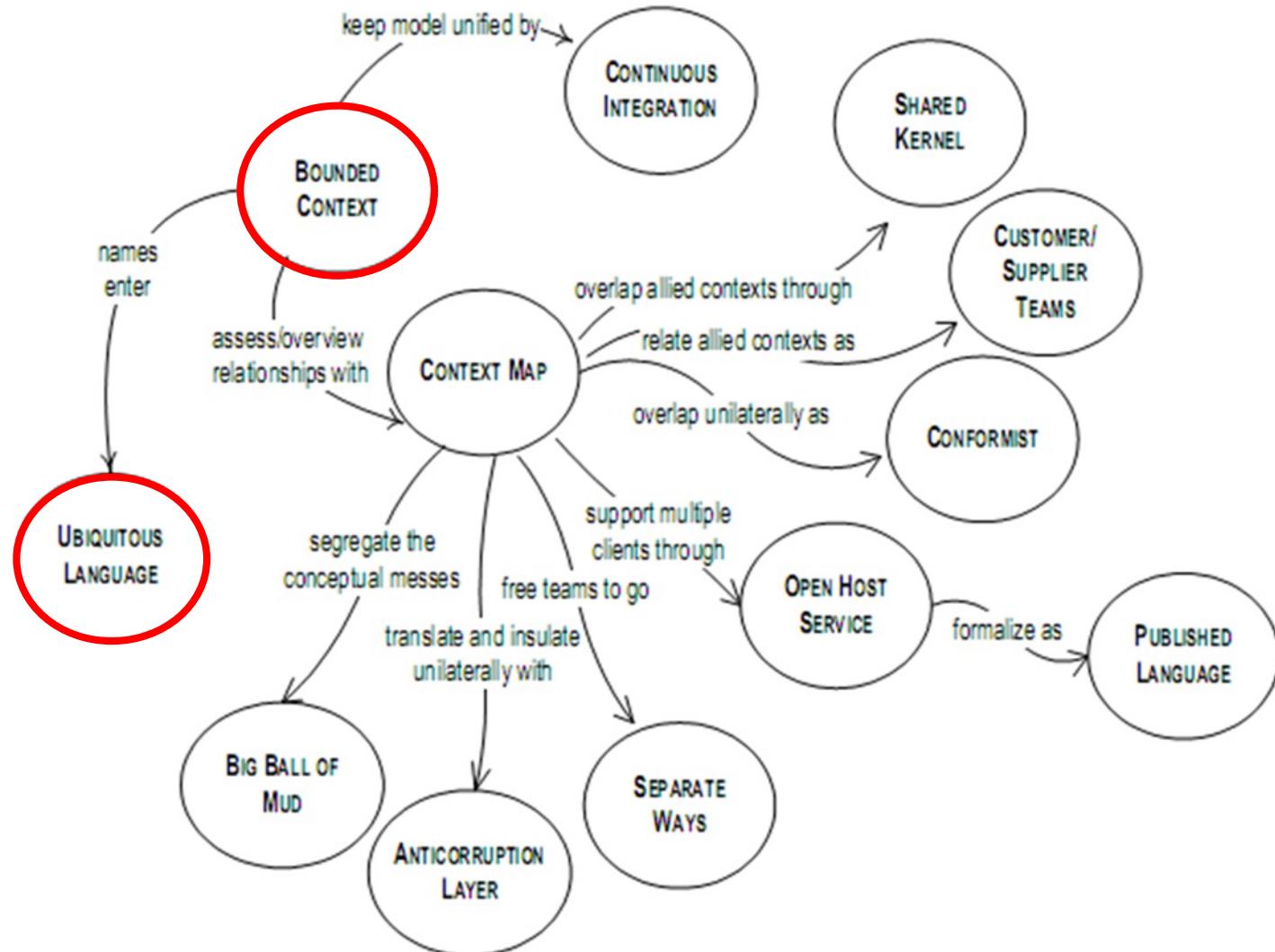
Translate of the conceptual models to software application | services design e.g., classes, modules

Divide a complex & large business problem into smaller chunks with well defined boundaries

Strategic Vs. Tactical Patterns



Strategic Patterns



Microservices

“

Domain Driven Design approach leads to smaller independent domain models that can then be built as highly decoupled, independent set of microservices

- 
- 1** Identify and categorize the Sub-domains
 - 2** Business context
 - 3** DDD Strategic Pattern : Ubiquitous Language
 - 4** DDD Strategic Pattern : Bounded Context
 - 5** Discovering the Bounded Contexts

Introduction to DDD

Terminology



- 1 How does DDD address the challenges of Modeling?
- 2 What is a sub-domain?
- 3 ...

Addressing the Challenges

“

Domain Driven Design approach provides principles and patterns to address the challenges faced with developing complex domain models



Quick Review

Domain = A sphere of knowledge, influence, or activity

- Made up of MULTIPLE Sub-domains
- Multiple Domain Experts needed to support business functions

Subdomains

Understanding the business requires breaking it into parts



- 1 Subdomain
- 2 Types of Subdomains
- 3 Build Vs. Buy decisions

Sub-Domains

A business domain is composed of multiple subdomains



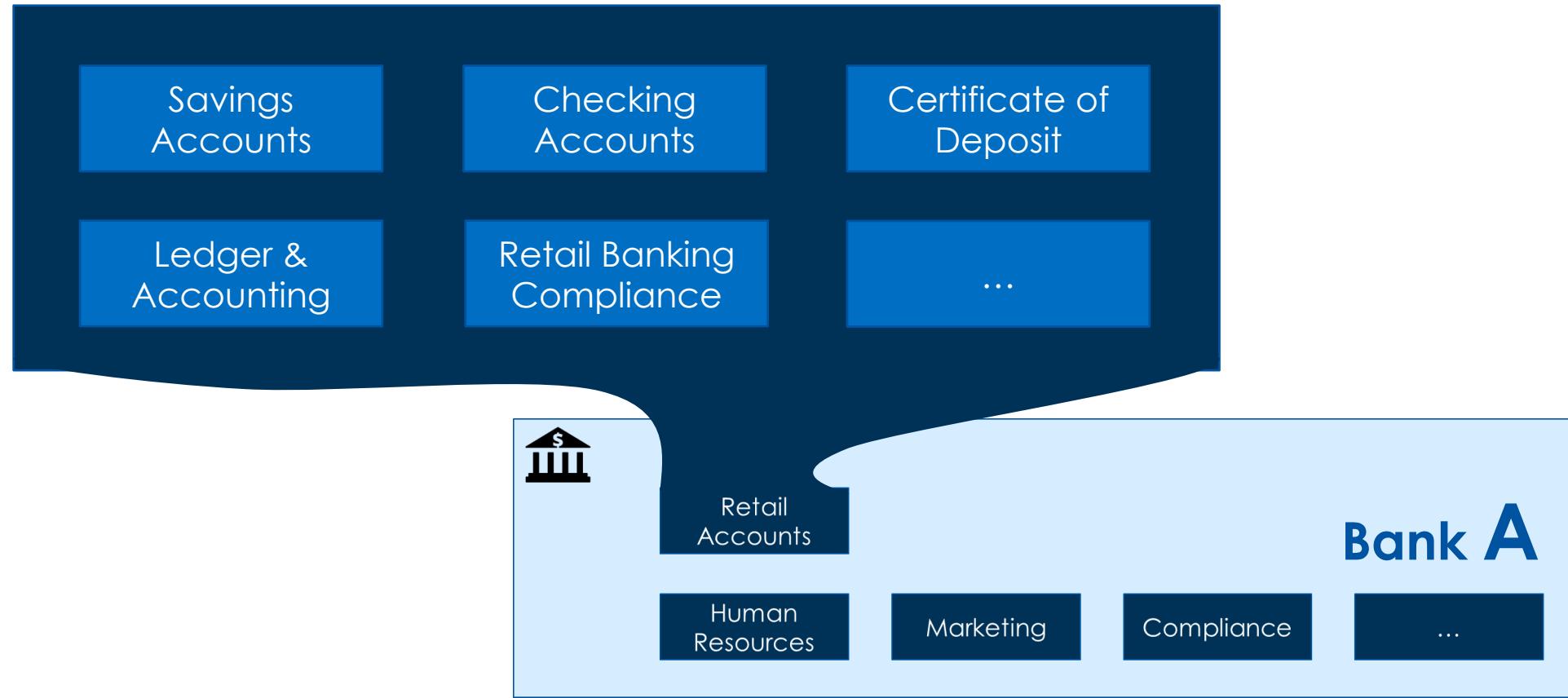
Sub-Domains are specific to the Enterprise

Business may not operate in all sub domains in that overarching domain (industry)



Sub-Domains Granularity

Depends on the focus of the business



Sub-Domain Complexity

Each Sub-Domain has a different level of complexity

Business Rules

Compliance

Complex
Calculations

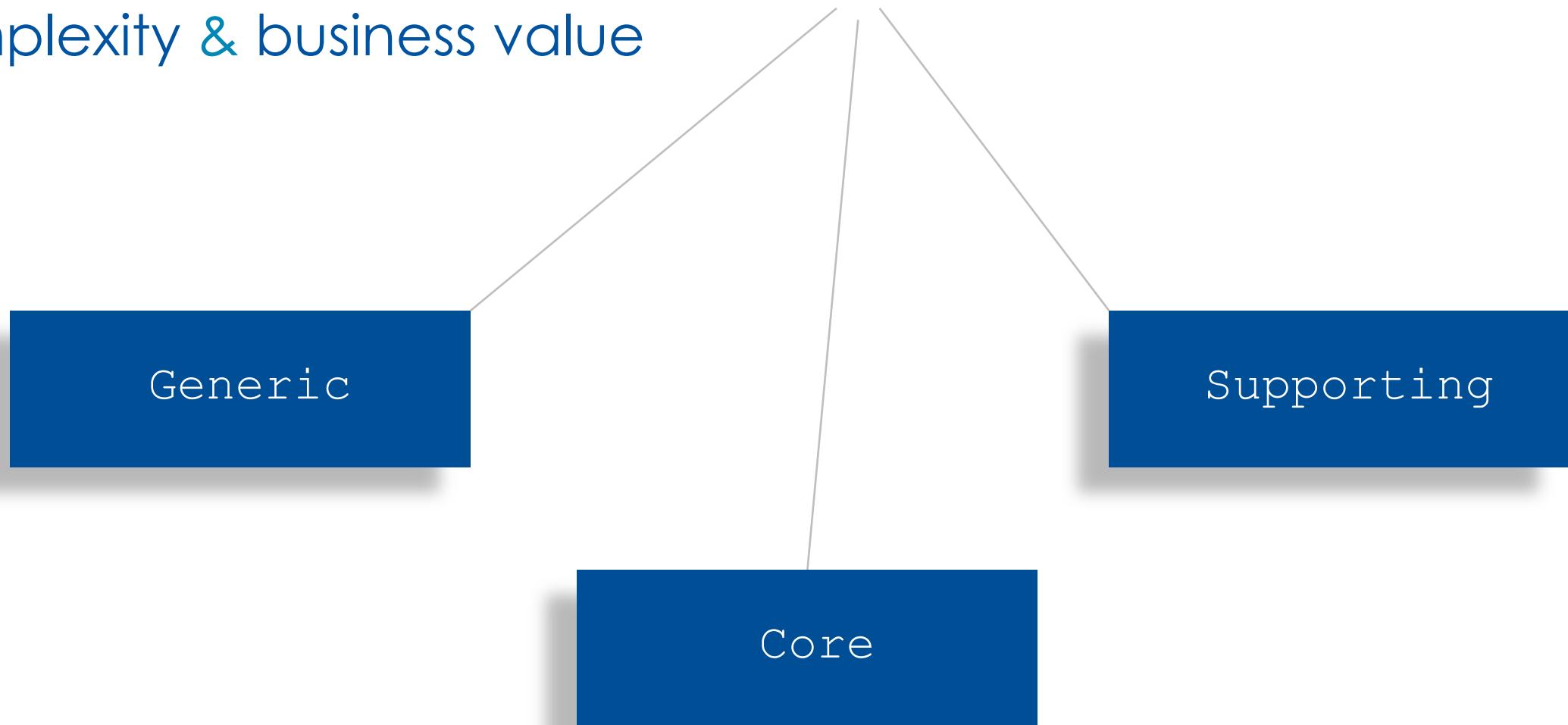
Process &
Handovers

Dynamicity

...

Sub-Domain Categories

Sub-domains are categorized into 3 types based on their complexity & business value



Generic Subdomain

Known solutions exist for such subdomains

Generic

- Nothing special about these subdomains
- Best practices are available
- NO business advantage in re inventing the wheel

Human
Resources

Facilities
Management

Core Subdomain

This is the Differentiator for the business

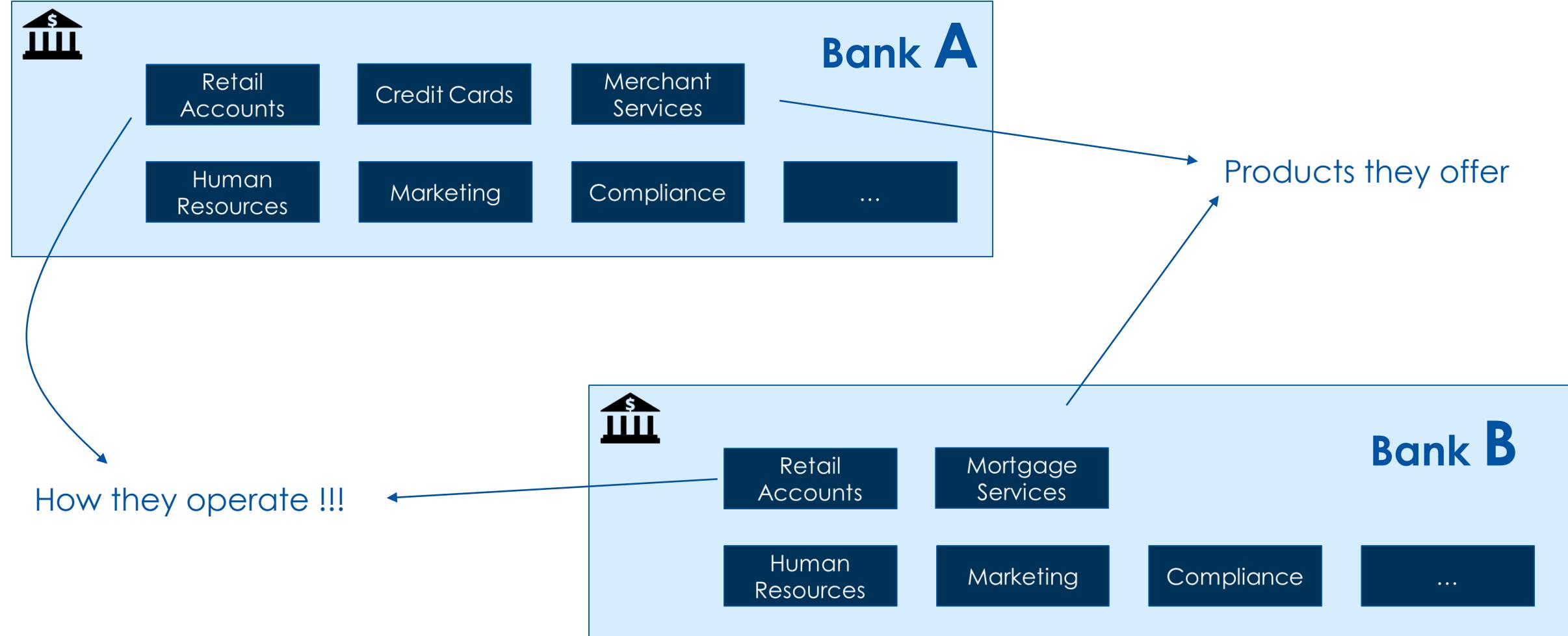
Core

- Secret sauce is in the core subdomain
- Business looks for ways to get competitive advantage
- Fast pace & ever evolving

Manufacturing

Credit Cards

Quick Exercise: What differentiates these banks?



Supporting Subdomain

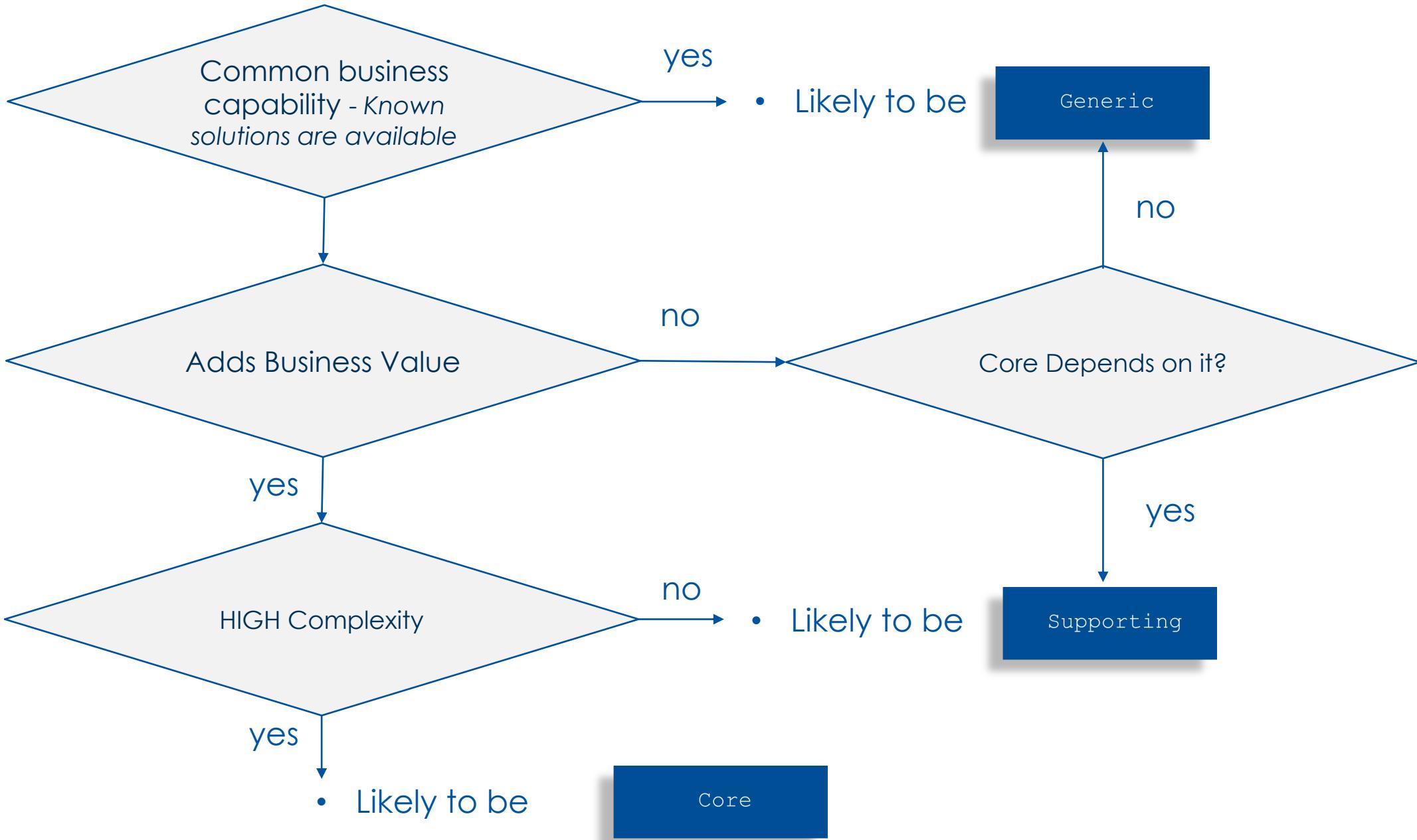
Does not provide business advantage but core depends on it

Supporting

- Well known practices but solutions not readily available
- Relatively simple to build as no complex business logic

Customer
Support

Compliance



Why do we categorize the sub-domains?

- Limited Resource; drives prioritization
- Return on Investments
- Build Vs. Buy decisions

IT Solutions : Buy Vs Build

Generic

- Buy



Supporting

- Outsource
- Customized



Core

- Built by 'A' teams



Quick Review

- 3 type of Subdomains
- Categorization helps with build vs. buy decisions
- Businesses gets the most ROI by investing

Generic

Core

Supporting

Core

Business Context

Understanding the meaning of the context



1

What is Context?

2

What is Business Context?

3

Why is it important for IT Teams to understand the context?



1. Should I prefer an account with **High** interest rates

2. Should I prefer an account with **Low** interest rates

What would you tell Jack to do?



1. Should I prefer an account with **High** interest rates
2. Should I prefer an account with **Low** interest rates

This is good if Jack is looking to open a "SAVINGS Account"



1. Should I prefer an account with **High** interest rates
2. Should I prefer an account with **Low** interest rates

This is good if Jack is looking to open a "CREDIT CARD Account"



1. Should I prefer an account with **High** interest rates
2. Should I prefer an account with **Low** interest rates

To make an objective decision you will need additional facts or information on the situation !!!

You need the *Context*

Context

“

The circumstances or facts that form the setting for a statement, event or idea

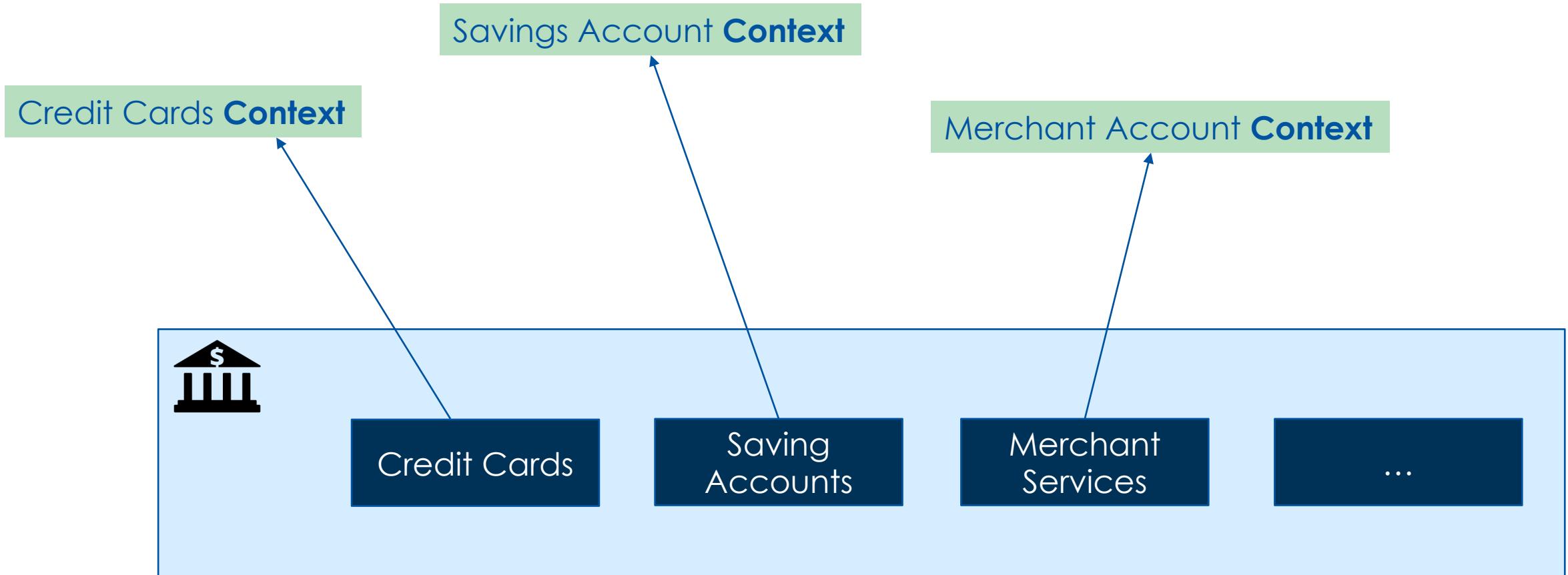


Context: Jack is looking borrow money from the bank.

1. Should I prefer an account with **High** interest rates
2. Should I prefer an account with **Low** interest rates

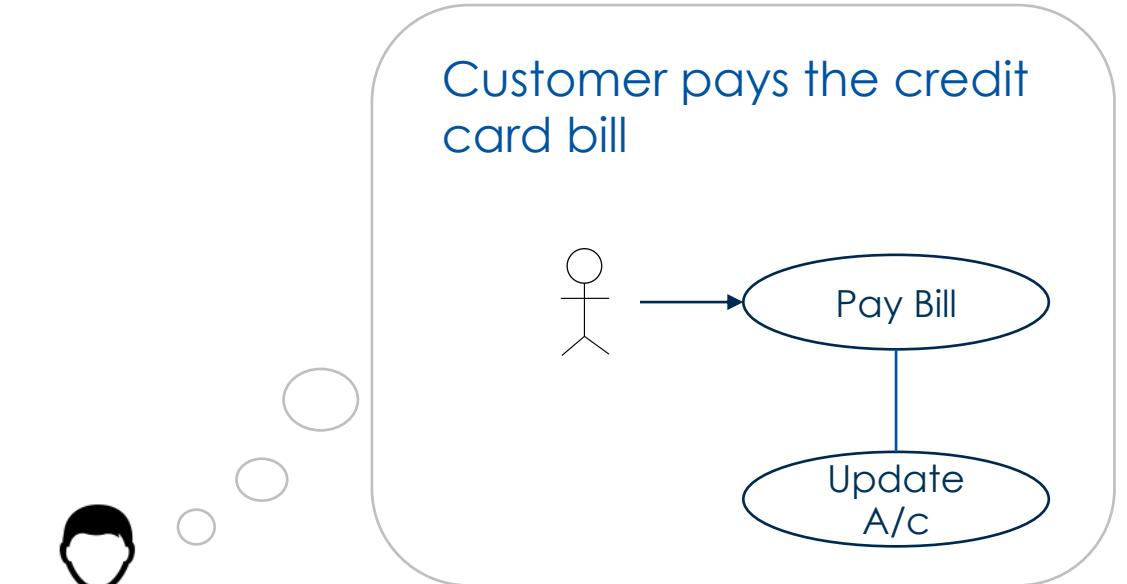
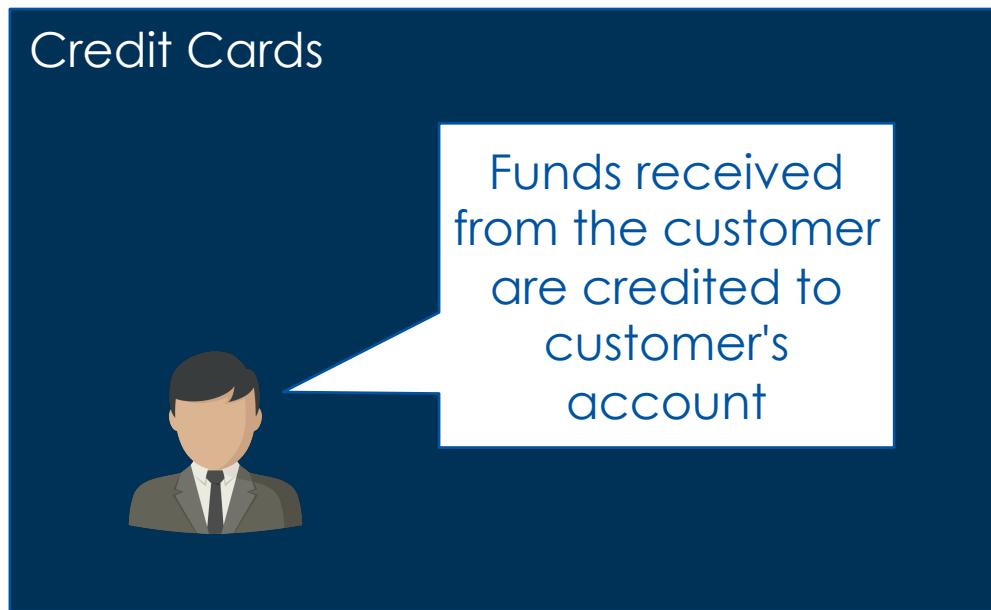
Business Context

Focus areas for knowledge crunching



Business Context

In order to understand the business domain one MUST understand the business context



Business Context

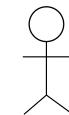
In order to understand the business domain one MUST understand the business context

Savings Account

Funds received from the customer are credited to customer's account

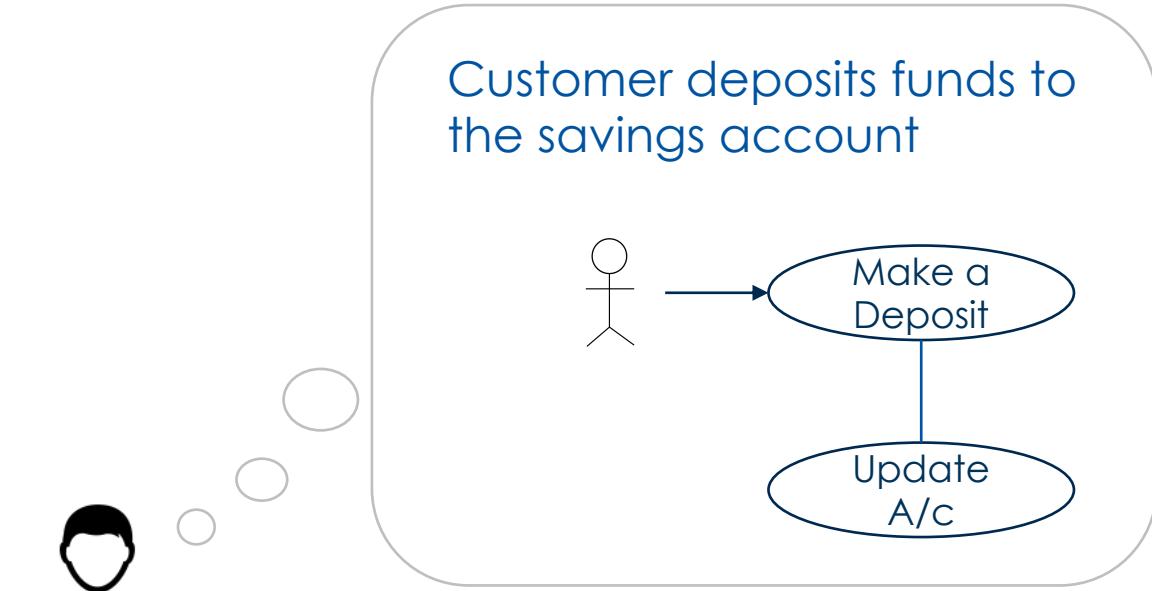


Customer deposits funds to the savings account



Make a Deposit

Update A/c



Why so much emphasis on business context?

- Confusion & Misinterpretation
- Leading to Misrepresentation of the domain model(s)



Quick Review

- Context is the circumstances or facts that form the setting for statement, event or an idea
- For understanding the Business Domain it is a MUST that IT teams understand the business context

Business Language

IT team MUST learn the language of business



- 1 Business Language
- 2 Linguistic Challenges
- 3 Introduction to Ubiquitous Language

Tuna

Japanese = Large Fish



Spanish = Cactus



Pasta

Italian = Noodle



Polish = Toothpaste



Kiss

Swedish = Pee ☺



Same terms used in different region may lead to confusion

Business Language

Each industry | profession has its own lingo



Business Language

There are specializations within an industry



Business Language

- Teams within enterprise have their own lingo
- Experts use the team's language in all their communication



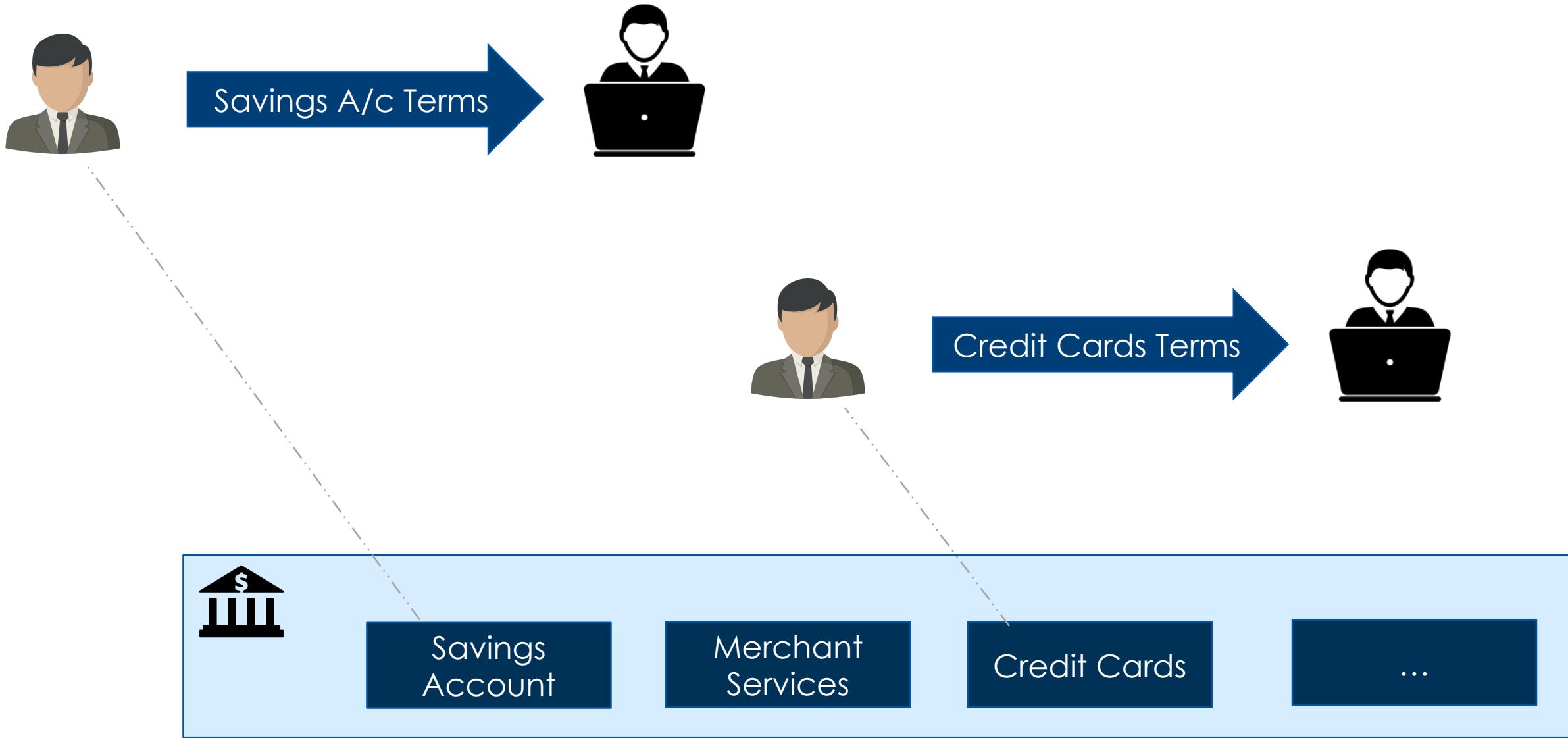
Savings
Account

Merchant
Services

Credit Cards

...

Business Language



Understanding the domain

“

To gain knowledge of the domain one
MUST understand the language used by
the domain experts

Linguistic Challenges

1

Multiple business languages across the enterprise



Savings
Account

...

Credit Cards

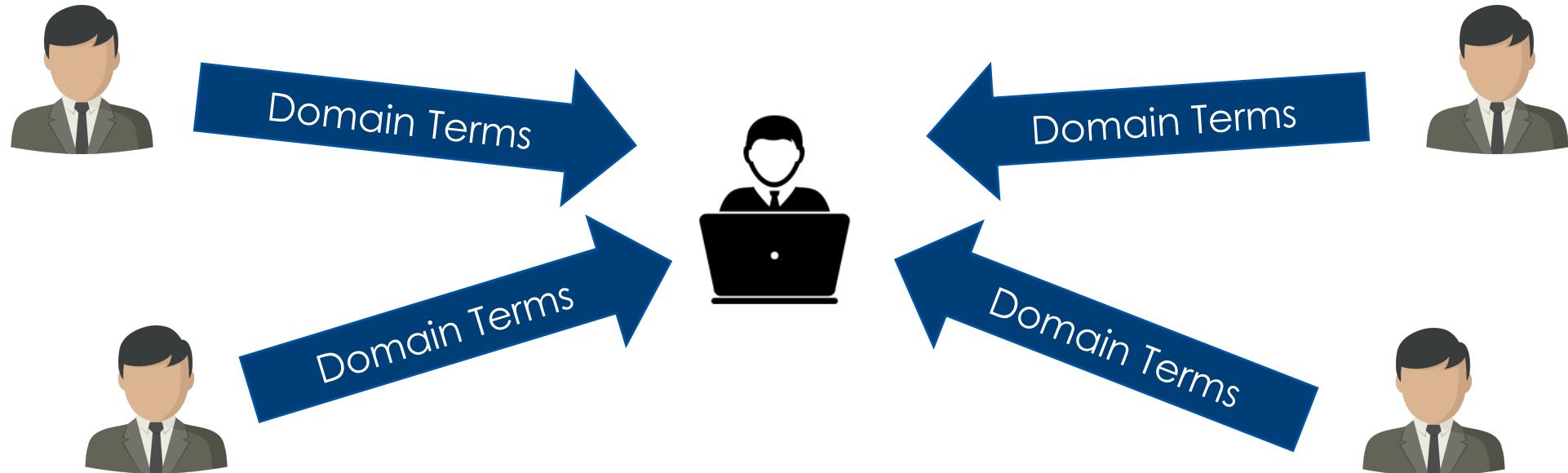
...

- Credit
- Deposit
- Withdraw
- Debit
- Credit
- Payment
- Merchant
- Cash advance

Linguistic Challenges

1

Multiple business languages across the enterprise



For building complex systems IT Teams MUST learn multiple Business languages used by the Experts in the context of different domains

Linguistic Challenges

2

Conflicting meaning of terms



Savings
Account

...

Credit Cards

...

- Credit

- Deposit

- Withdraw

- Debit

- Credit

- Payment

- Merchant

- Cash advance

Linguistic Challenges

2

Conflicting meaning of terms



• Credit

• Credit

'Credit' means deposit

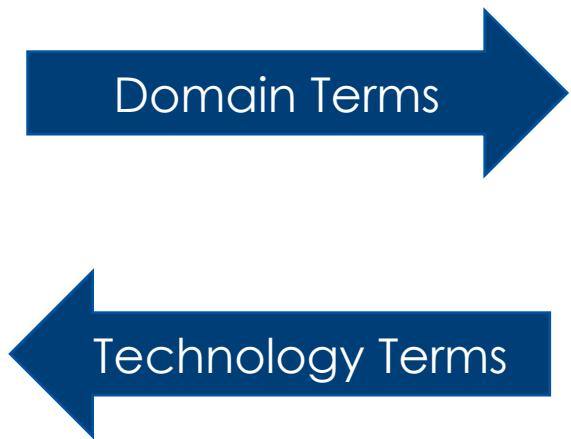
'Credit' means payment

Different meaning depending on the context is a cause of confusion!!

Linguistic Challenges

3

Technology teams tend to translate business terms to IT lingo



- getters / setters
- create / delete
- Object
- DB
- ...

Linguistic Challenges

3

Technology teams tend to translate business terms to IT lingo

We check customer's credit history
I open a Savings A/c for customer
Deposit the initial \$ to account



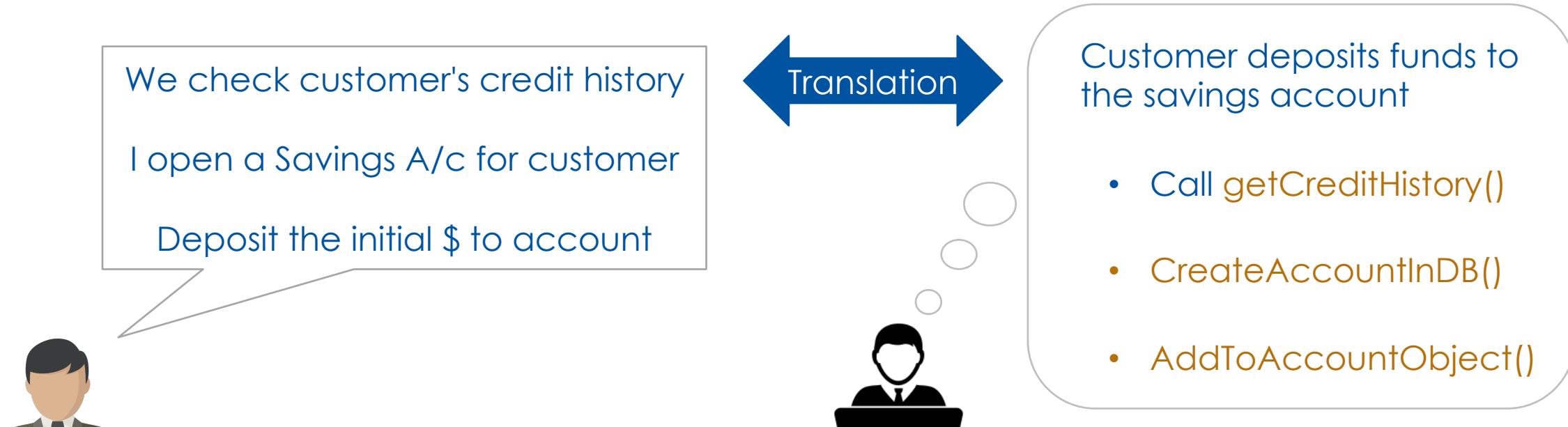
Customer deposits funds to the savings account

- Call `getCreditHistory()`
- `CreateAccountInDB()`
- `SetAmountAcObject()`

Linguistic Challenges

3

Technology teams tend to translate business terms to IT lingo



Software doesn't reflect domain's terms; loss of meaning & confusion due to back & forth translation between IT <> Domain

How are these linguistic challenges addressed?

“

Domain Driven Design suggests setting up a common language within each business context; this language is used by ALL stakeholders

Ubiquitous Language



Quick Review

- IT Teams MUST learn business language
- Confusion caused by translation between domain & IT
- DDD suggests creation of common language that MUST be used by all stakeholders

Ubiquitous Language

DDD Strategic pattern to address Linguistic Challenges



- 1 Characteristics of UL
- 2 Building & Managing the UL
- 3 Where to use UL

Strategic Pattern: Ubiquitous Language

“

DDD suggests setting up a common language
(set of terms) within each business context

Ubiquitous = Constantly encountered or seen

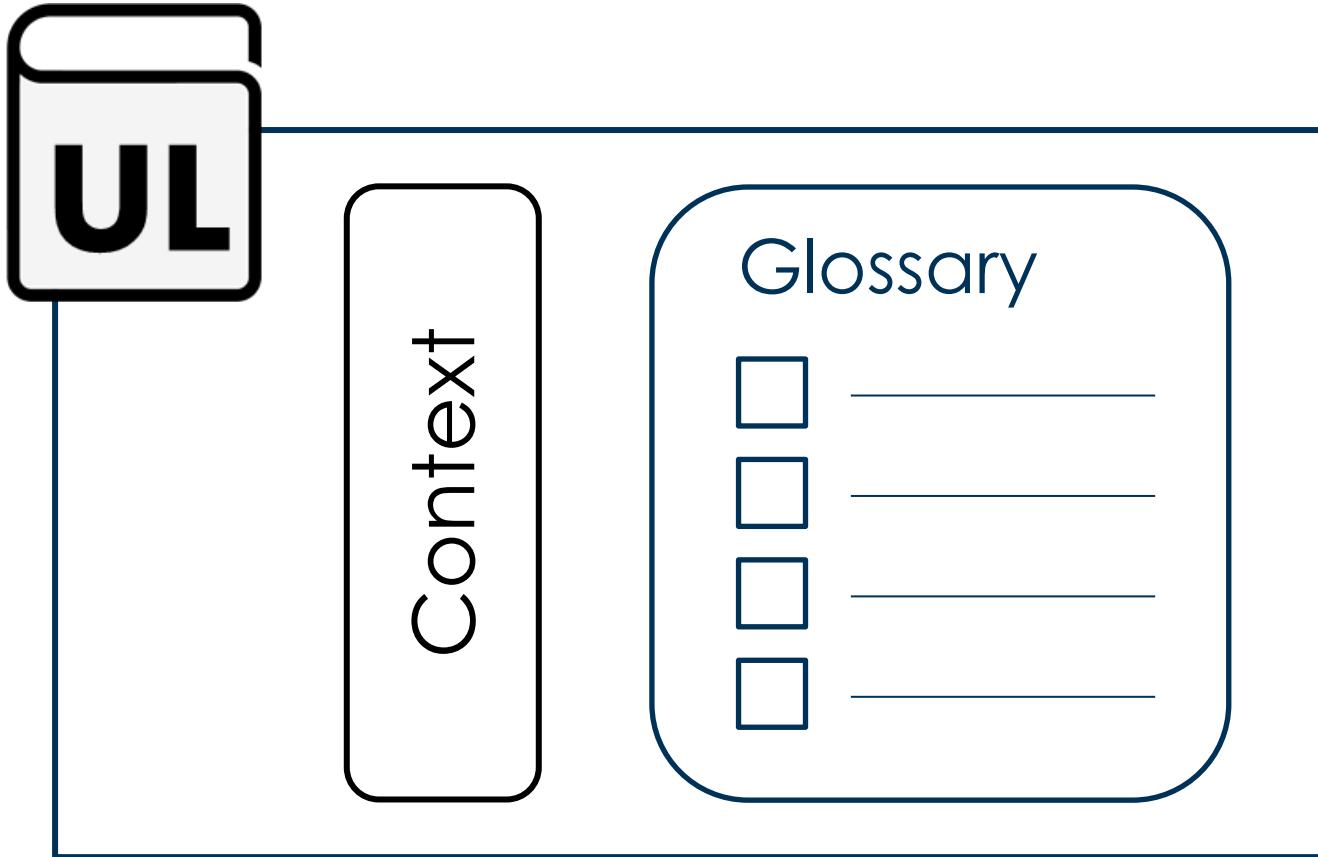


* Linguistic Challenges

Addressed by way of UL

Characteristics of UL

Dialect defined by the vocabulary

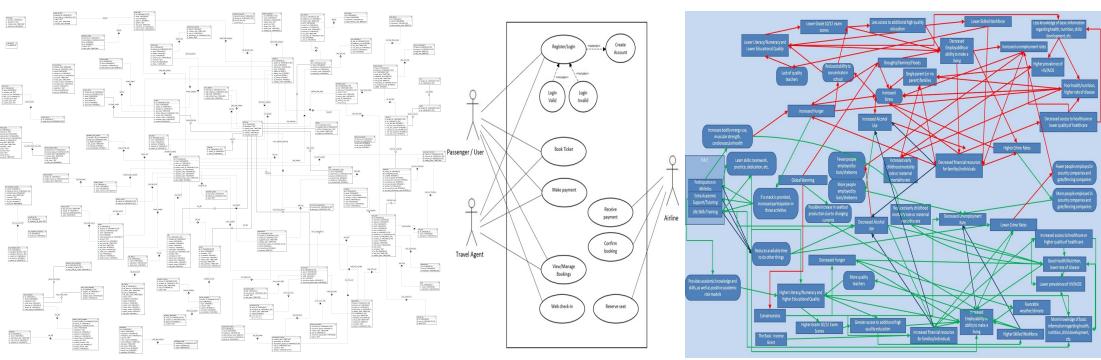


Terms & Acronyms

Examples

Links to relevant assets

Common Business Dictionary



Business Dictionary

<input type="checkbox"/>	_____

IF product='auto' THEN

It means ...

ELSE IF product='home' THEN

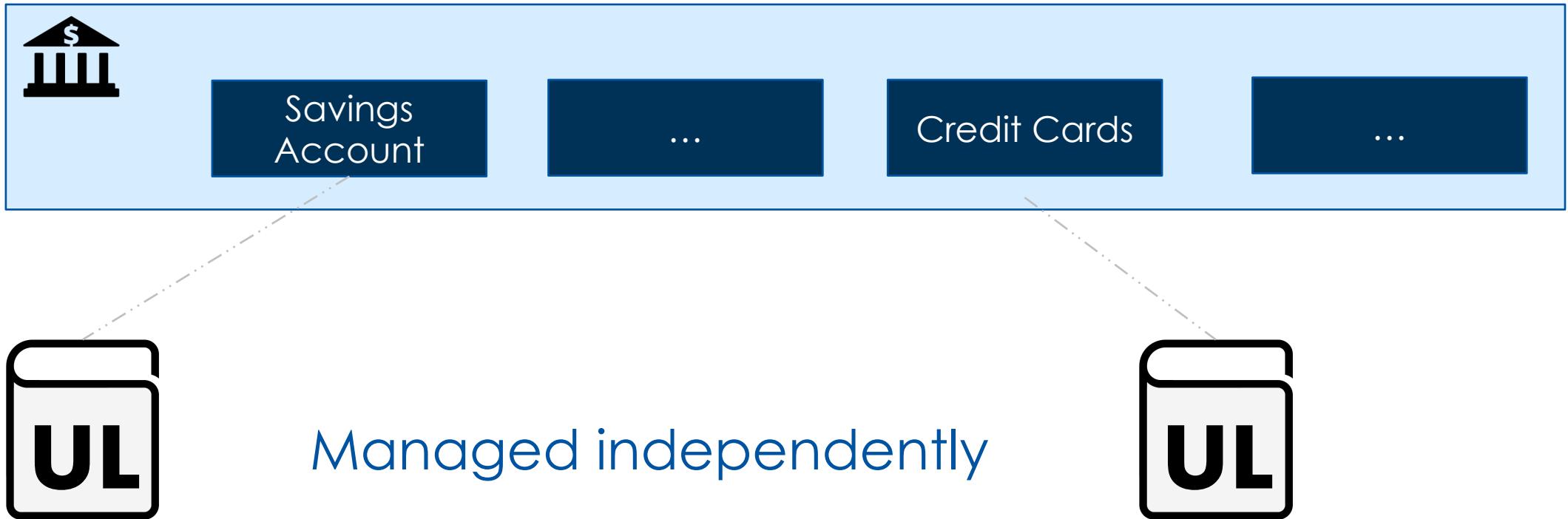
It means ...

ELSE ...

Managed Centrally by "Business Analyst" in an Excel sheet !!!

Ubiquitous Language

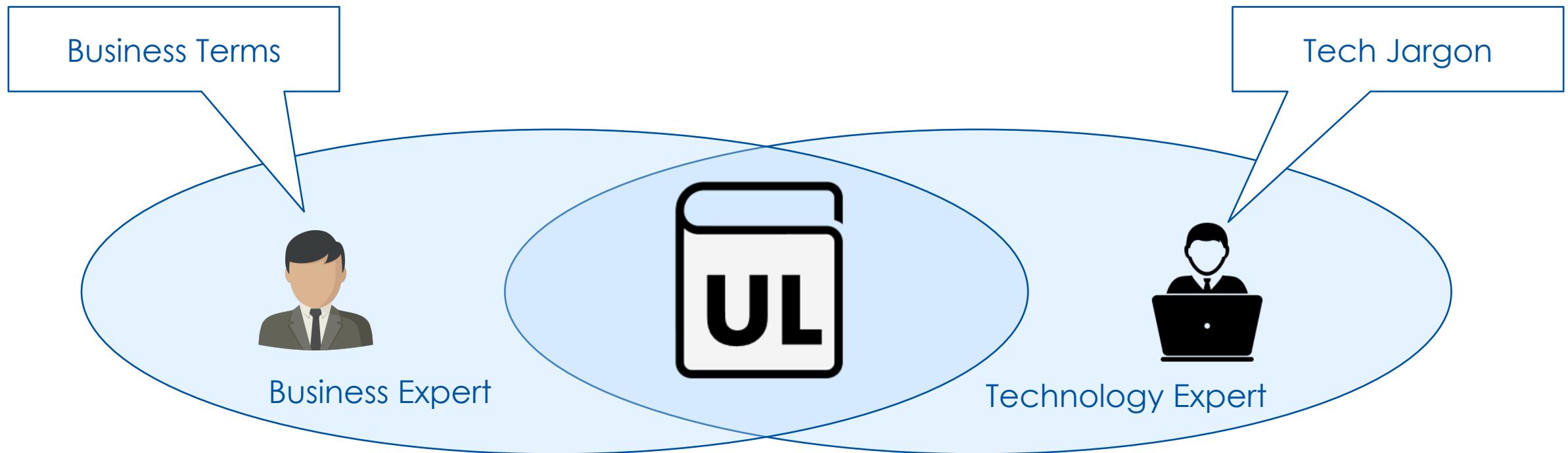
Multiple UL in an organization



Characteristics of UL

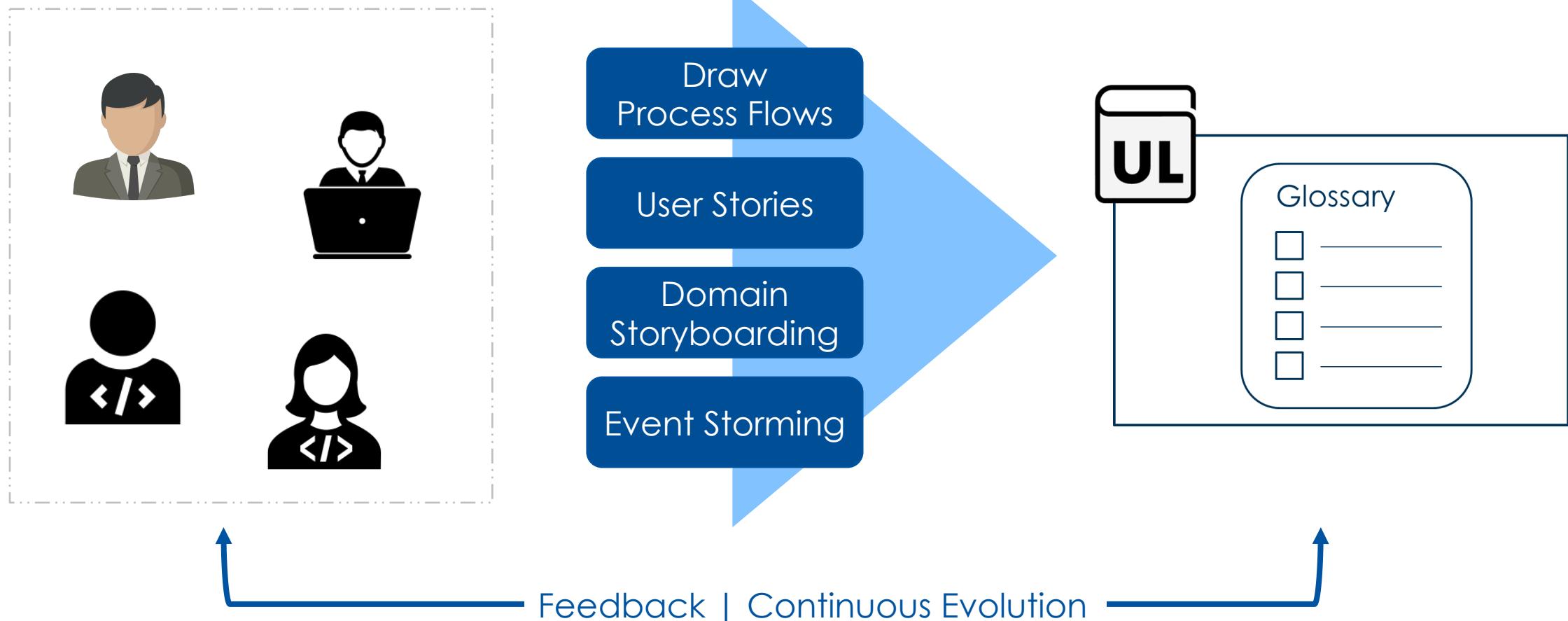
Not the business language imposed by experts

Not the language used in the industry



Characteristics of UL

Developed collaboratively by Business experts & IT experts



Are there any tools for UL?

MUST be easily accessible to all team members



Collaboration wiki tool for knowledge sharing



Salesforce collaboration tools

Example: Retail Accounts

UL

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

A

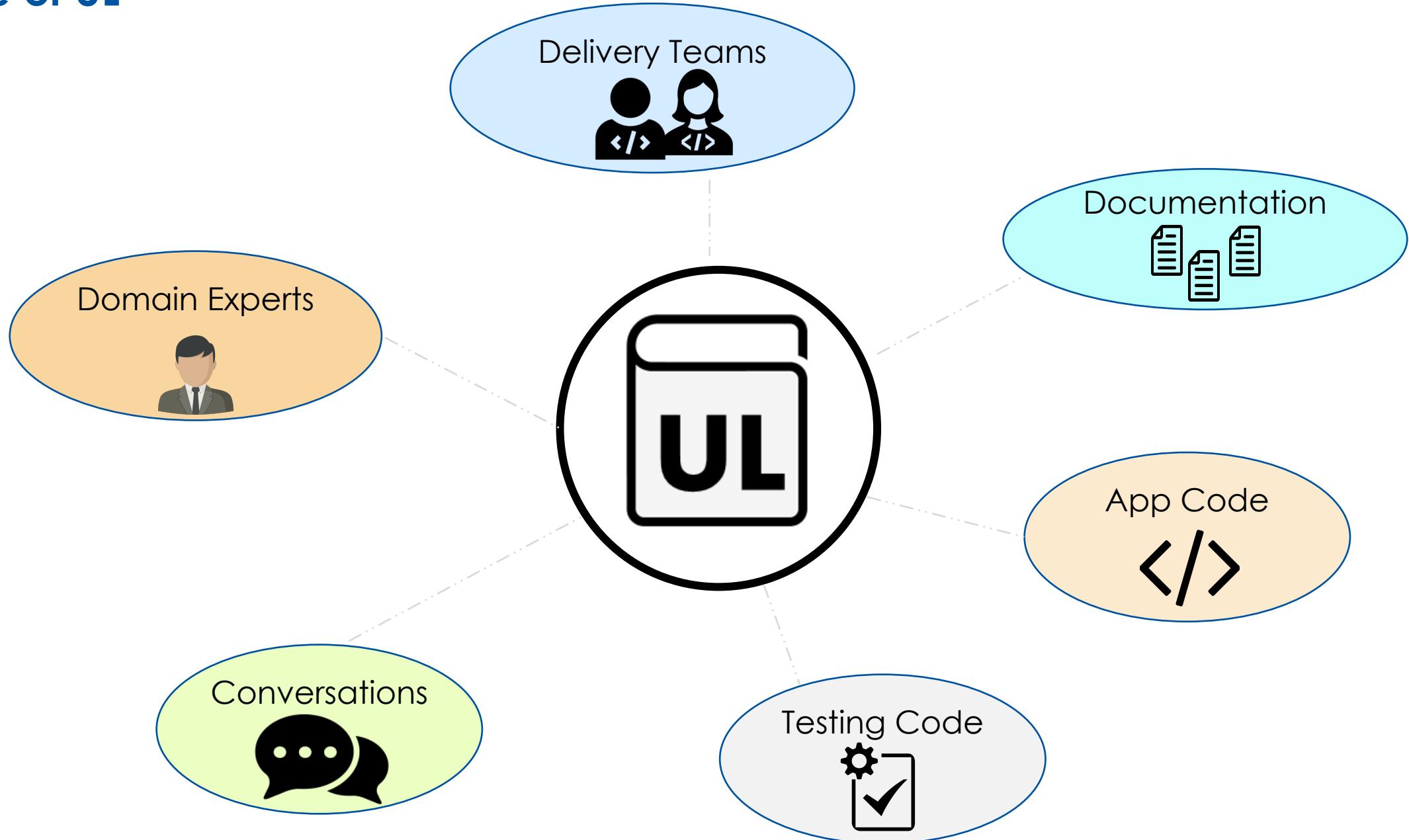
Account Agreement: The contract governing your open-end credit account, it provides information on changes that may occur to the account.

Account History: The payment history of an account over a specific period of time, including the number of times the account was past due or over limit.

Account Holder: Any and all persons designated and authorized to transact business on behalf of an account. Each account holder's signature needs to be on file with the bank. The signature authorizes that person to conduct business on behalf of the account. See related question [Joint Account Holder](#).

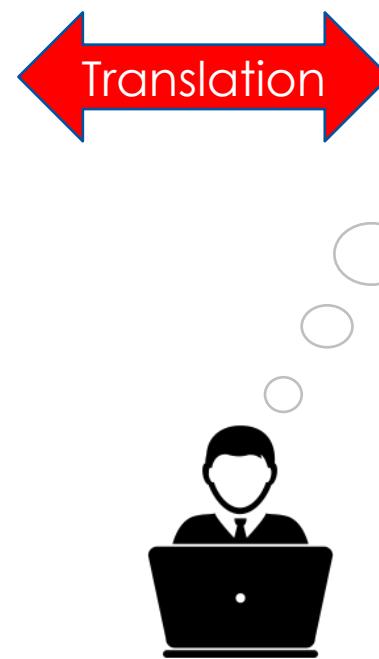
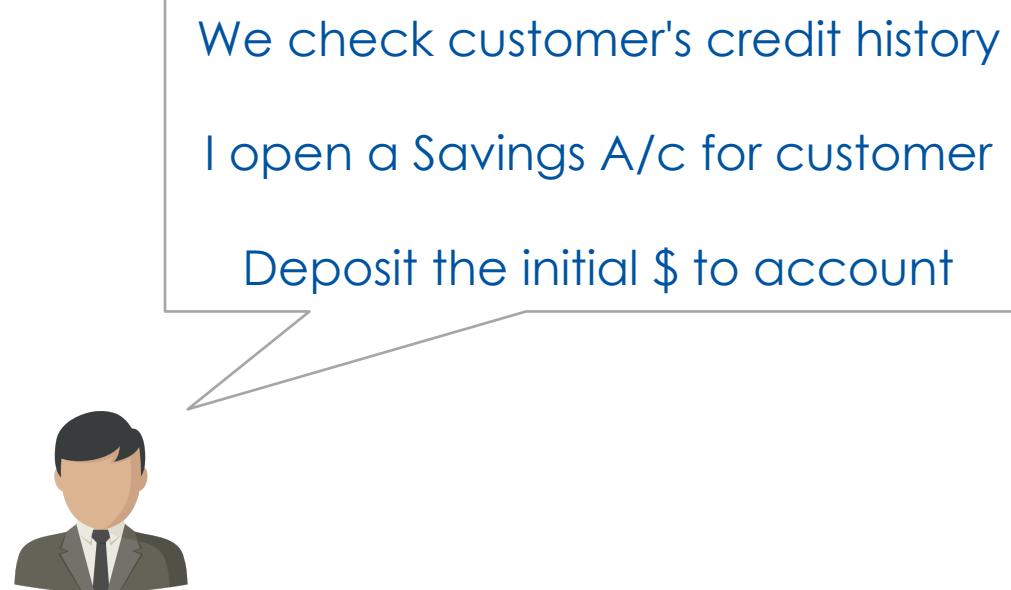
Accrued Interest: Interest that has been earned but not yet paid. See related questions [Interest-Bearing Accounts](#) and [FDIC Insurance](#).

Use of UL



Address Linguistic Challenges - Translation

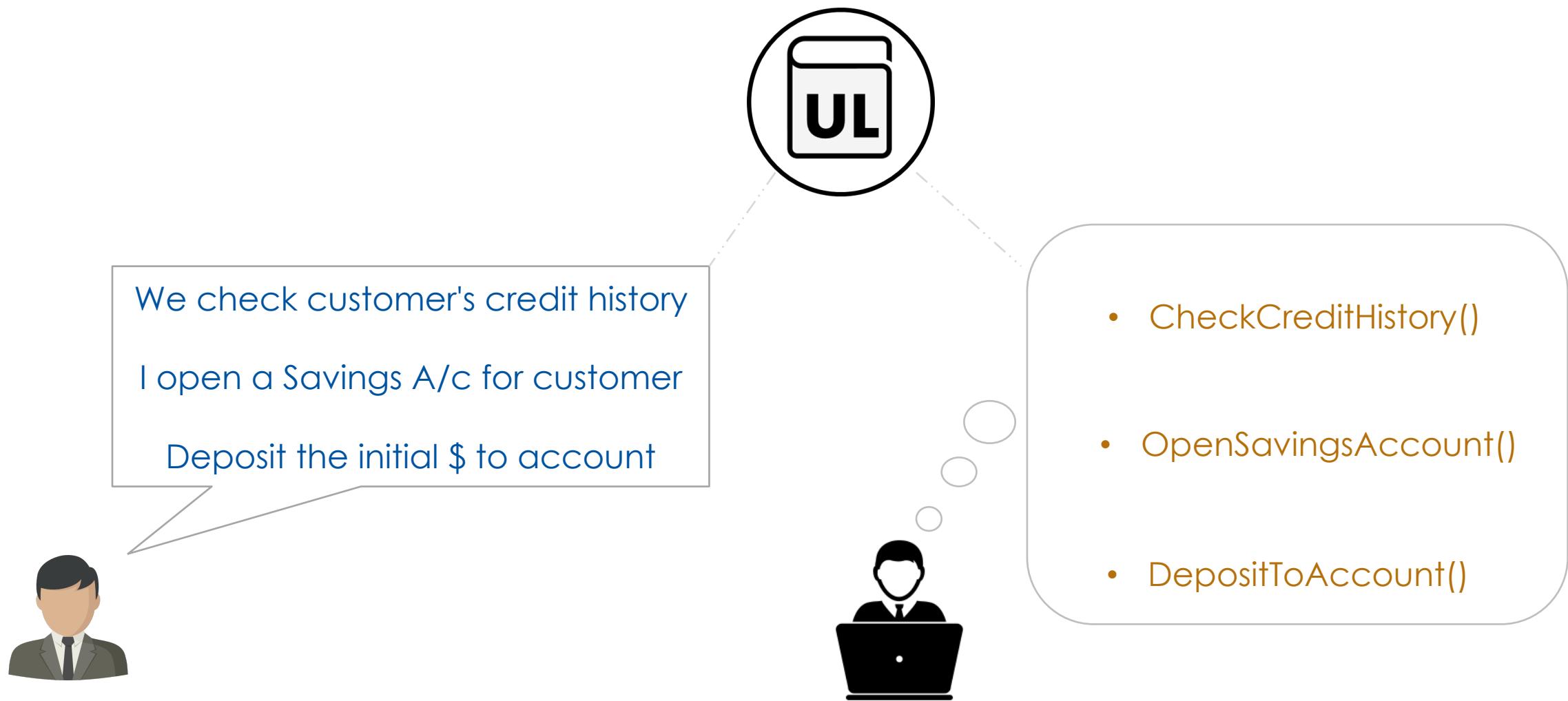
Technology teams tend to translate business terms to IT lingo



Customer deposits funds to the savings account

- Call `getCreditHistory()`
- CreateAccountInDB()
- AddToAccountObject()

UL Addresses the Linguistic Challenges



UL helps in identifying overlapping contexts

“

Ubiquitous Language helps in breaking the business context into smaller parts; in DDD these smaller parts are referred to as the *Bounded Context*

Bounded Context



Quick Review

- UL evolves over a period
- UL may be managed on any knowledge collaboration platform
- UL MUST be used in all form of communication & code

Exercise : ACME's UL Terms

Review of interview transcripts of two critical ACME stakeholders



1

Identify the UL Terms - Sales Team

2

Identify the UL Terms - Product Management

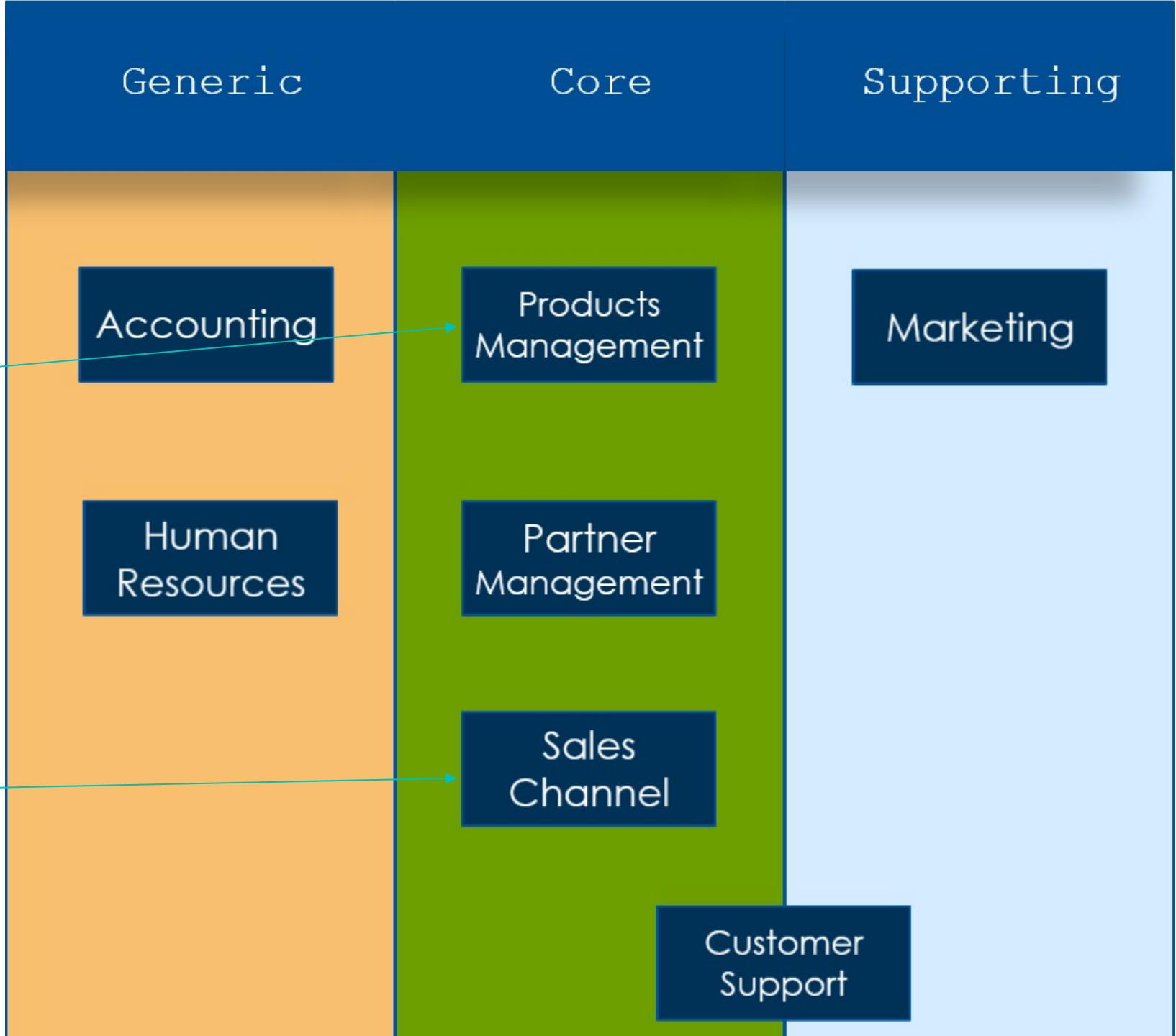
Meet the Experts



Paul, Product Manager



John, Travel Advisor



Business Experts



- Specializes in designing the vacation packages
- Manages the relationship with the partners

Paul, Product Manager



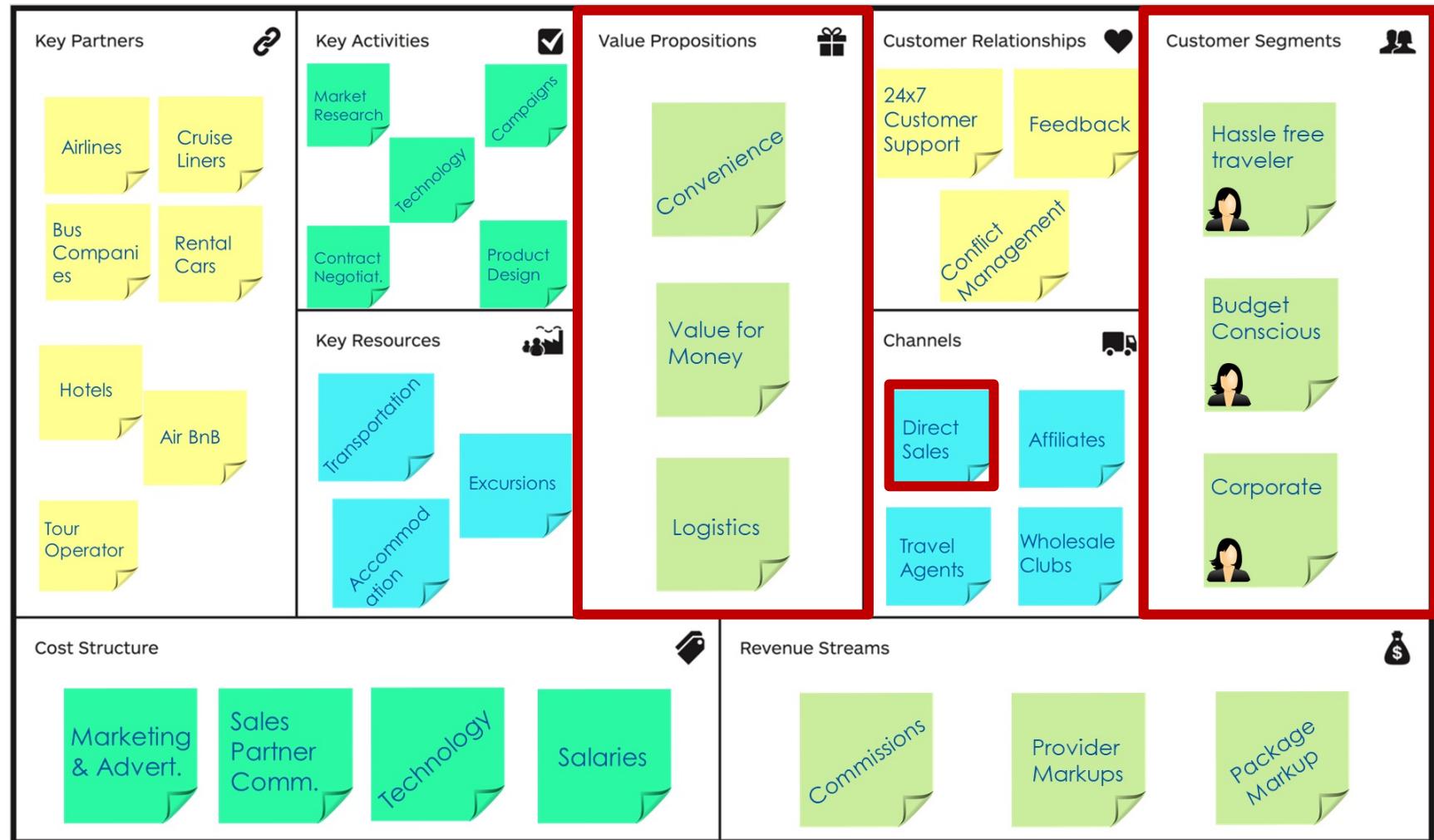
- Helps customers select the vacation package
- Understand the customer's needs

John, Travel Advisor



- Understand the customer's needs
- Helps customers select the vacation package

John, Travel Advisor



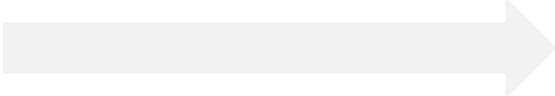


John, Travel Advisor

Identify the UL terms



John, Travel Advisor



IT Lead

We are in the business of selling vacation packages. The sale process starts with a Customer calling us. Based on Customer's desires we select the packages and describe it. If customer shows interest we start a proposal for the selected package.

Packages have a suggested retail price but our product team also puts out offers that we can apply to the packages. These offers are essentially the discounts based on various criteria.

Once the customer commits to the proposal, we gather the Pax details i.e., passengers details. All the information is gathered into a purchase order and then we get the Payment information submit the proposal for reservation and if everything goes fine we receive the Booking confirmation.



John, Travel Advisor



IT Lead

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Vacation Package

Proposal

Pax or Passenger

Payment Information

Customer

Offers

Purchase Order

Booking Confirmation



John, Travel Advisor



Package Pricing

Lump Sump Pricing

Satisfaction Index

All-inclusive

Partners

Itinerary

(PNR)
Passenger Name Record

(BAR) Best Available Rate

Market Price

(PO)
Purchase Order

Rack Rate

Blackout Dates

Vacation Package

Credit Card Hold

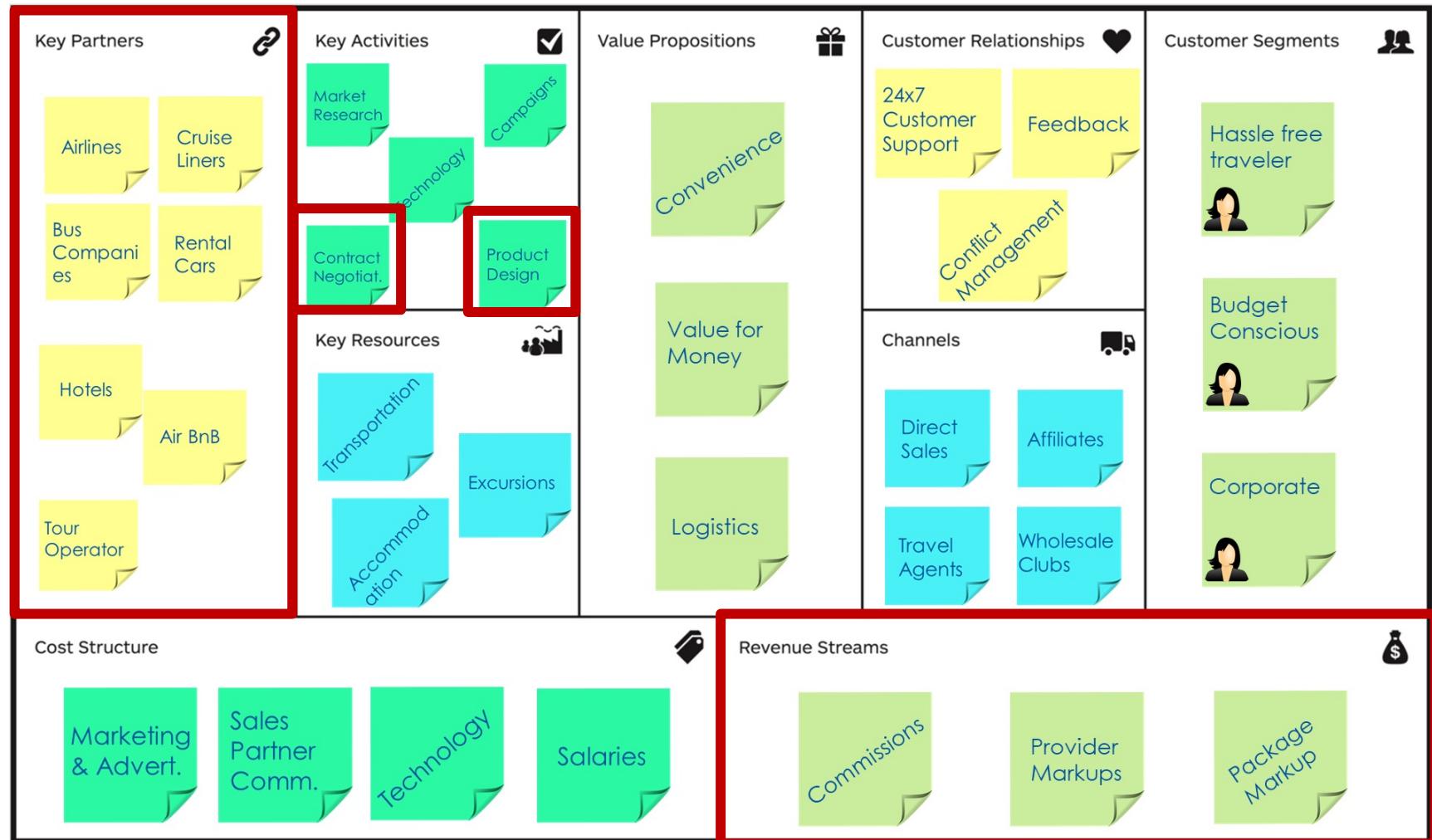
(SLA) Service Level Agreement

... ...



- Specializes in designing the ACME products
- Manages the relationship with the partners

Paul, Product Manager





Paul, Product Manager

Identify the UL terms



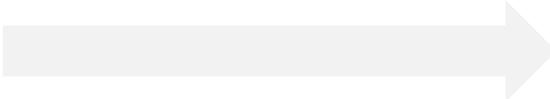
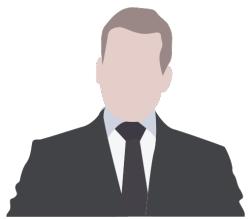
Paul, Product Manager

IT Lead

I am responsible for the product design and provider relationships. These products are what customers buy from Acme.

Based on the market research I pick up the parts of the product, sometime we refer to these products as bundle. There are certain markup guidelines that I need to follow in order to make the product profitable. Also I need to take into account the seasonality.

Correct pricing of the bundle requires careful negotiations with the providers. Some providers such as airlines & Hotels offer us bulk prices which are below the Market Prices. Some providers prefer to work with us on commissions. We sign contracts with providers that lists the commission structure as well as any penalties and the terms.



Paul, Product Manager

I am responsible for the **product** design and **provider** relationships. These products are what **customers** buy from Acme.

Based on the market research I pick up the parts of the product, sometime we refer to these products as **bundle**. There are certain **markup** guidelines that I need to follow in order to make the product profitable. Also I need to take into account the **seasonality**.

Correct pricing of the bundle requires careful negotiations with the providers. Some providers such as airlines & Hotels offer us **bulk prices** which are below the **Market Prices**. Some providers prefer to work with us on **commissions**. We sign contracts with providers that lists the commission structure as well as any penalties and the terms.



IT Lead

Product
a.k.a. Bundle

Provider

Customer

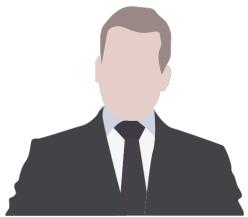
Markup

Seasonality

Bulk Prices

Market Price

Commissions



Paul, Product Manager



Product

Bundle

Terms

Satisfaction Index

Provider

Markup

Pricing

Catalog

Seasonality

Bulk Prices

Commission Structure

Contract

Market Price

Commissions

Penalties

... ...



John, Travel Advisor

Vacation Package

Proposal

Pax or Passenger

Payment Information

Booking Confirmation

Refers to similar concept
with DIFFERENT terms

Product a.k.a. Bundle

Customer

Seasonality

Market Price

Commissions



Paul, Product Manager

Customer

Offers

Purchase Order

Refers to end customer
with SAME term

Provider

Markup

Bulk Prices

No other terms overlap **so far !!!**



Quick Review

- UL evolves over a period

Bounded Context

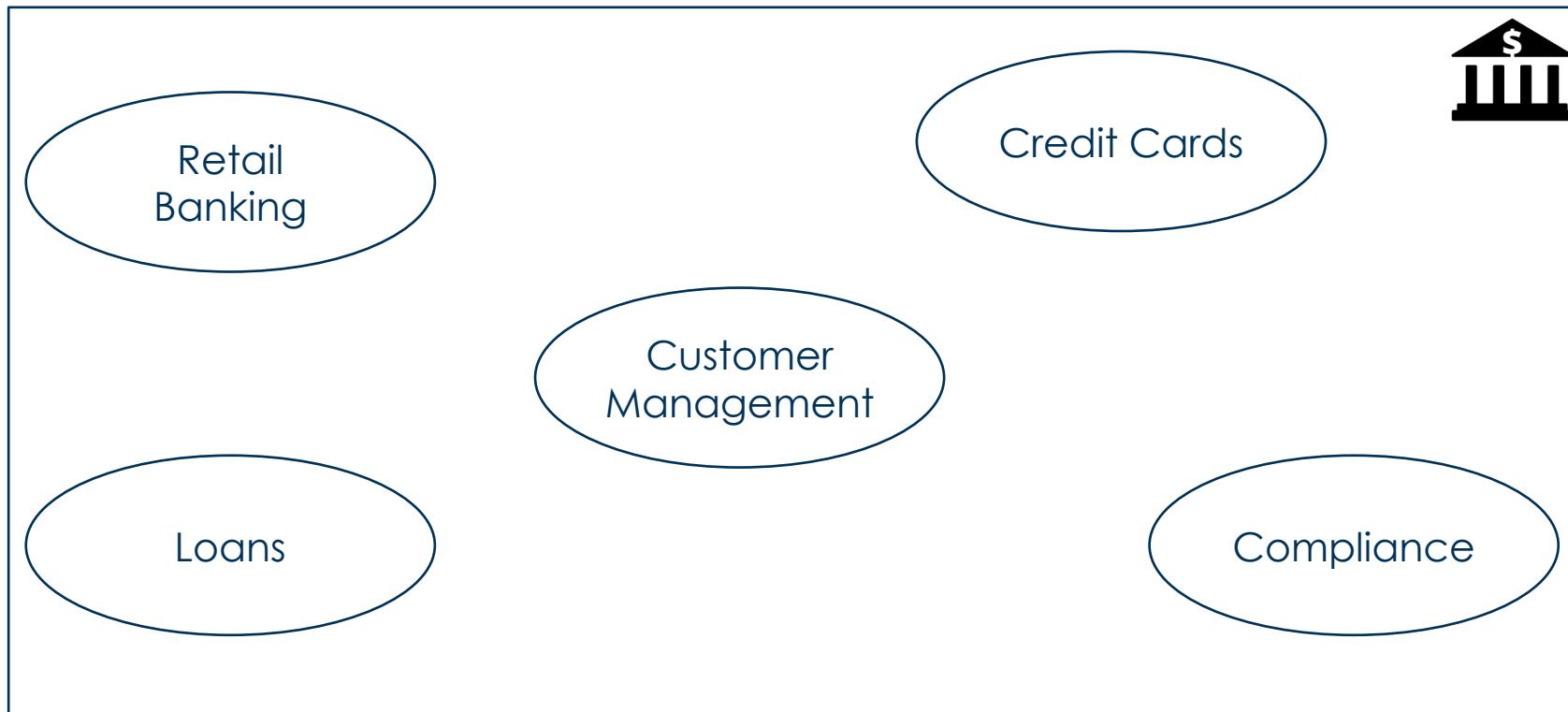
Strategic pattern in DDD



- 1 Common model challenges
- 2 Characteristics of Bounded Context
- 3 Relationship between BC and Domain Model

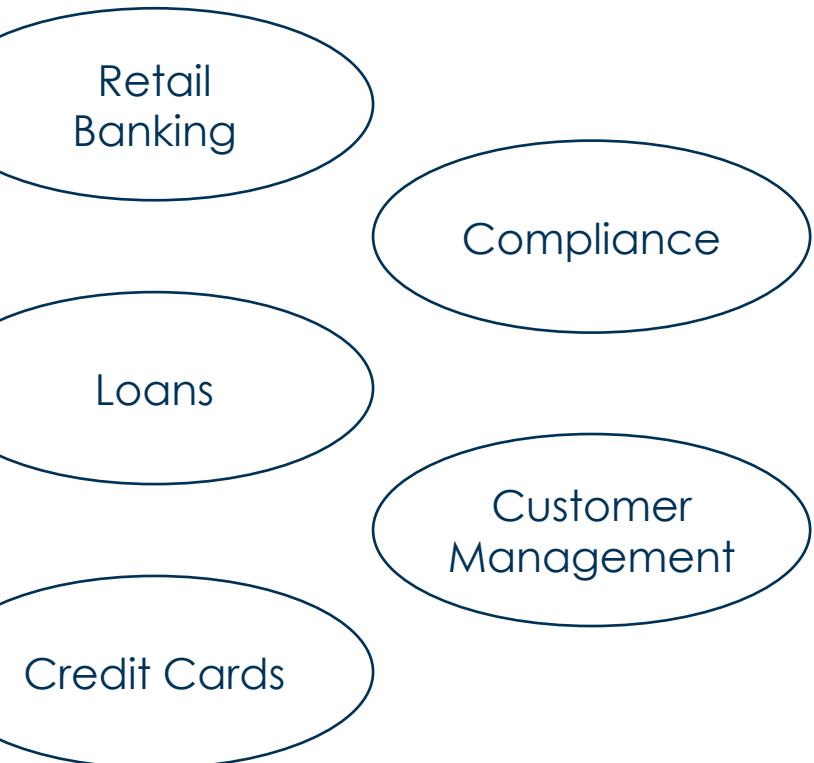
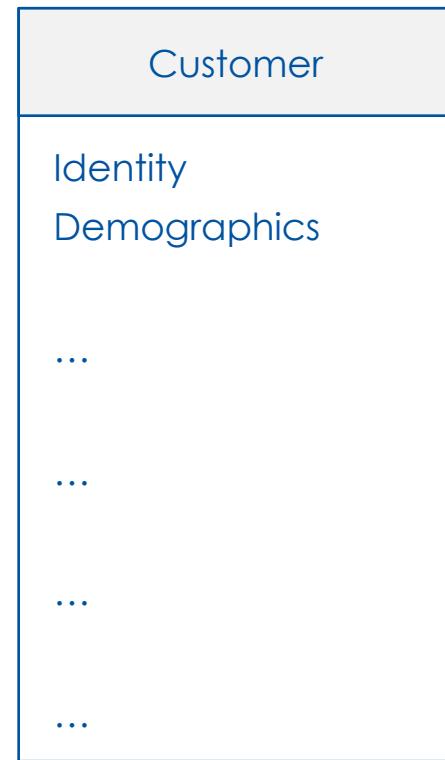
Simplified Business Domain Model

Created based on domain capabilities



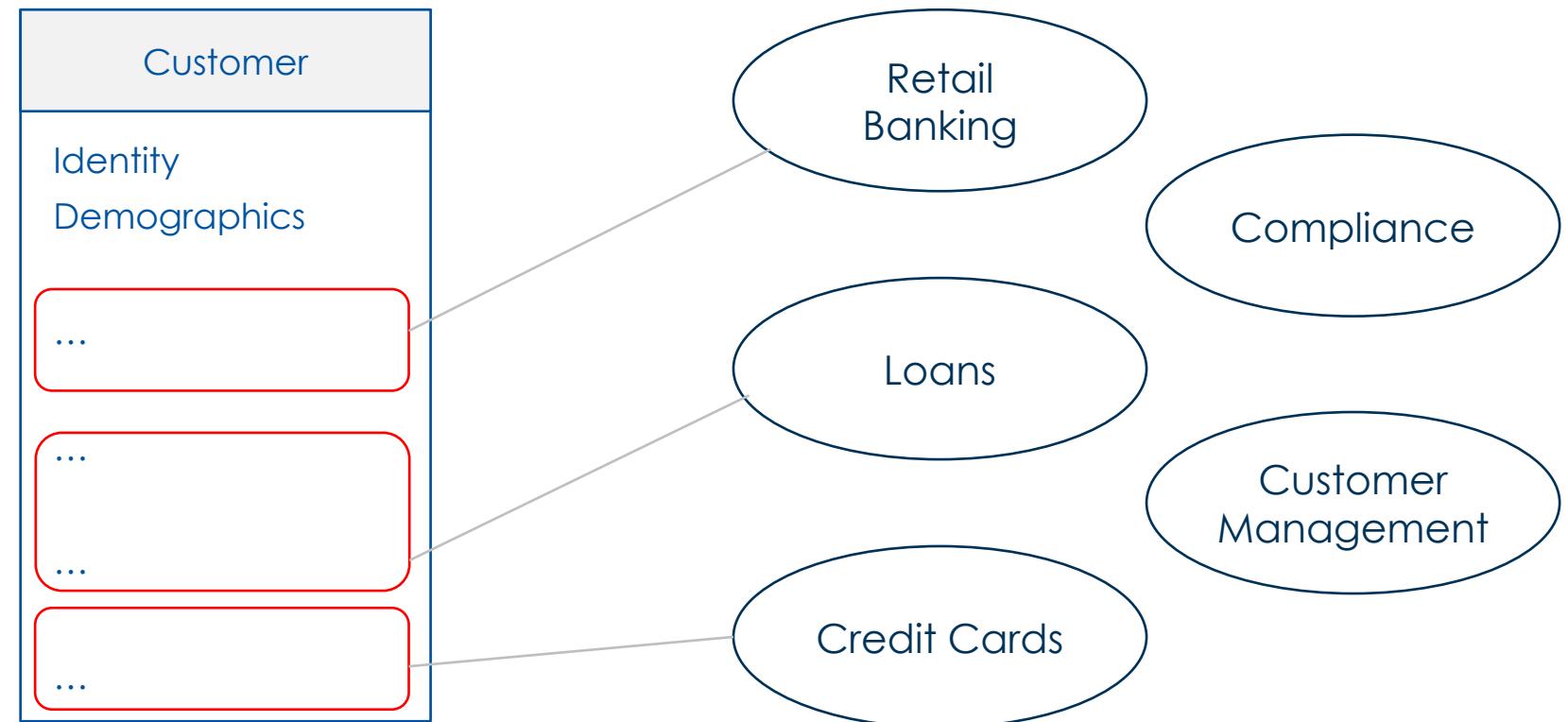
Common Domain Model

Intended to be used across the enterprise



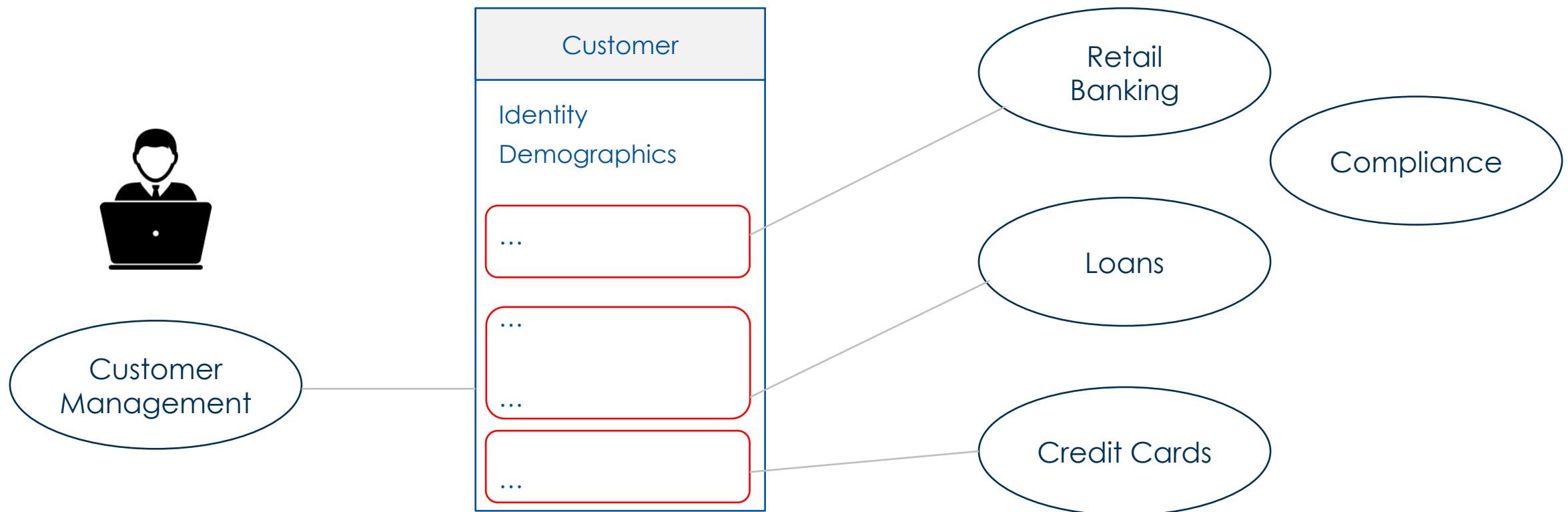
Common Domain Model

Tech Expert gathered the attributes from MULTIPLE experts



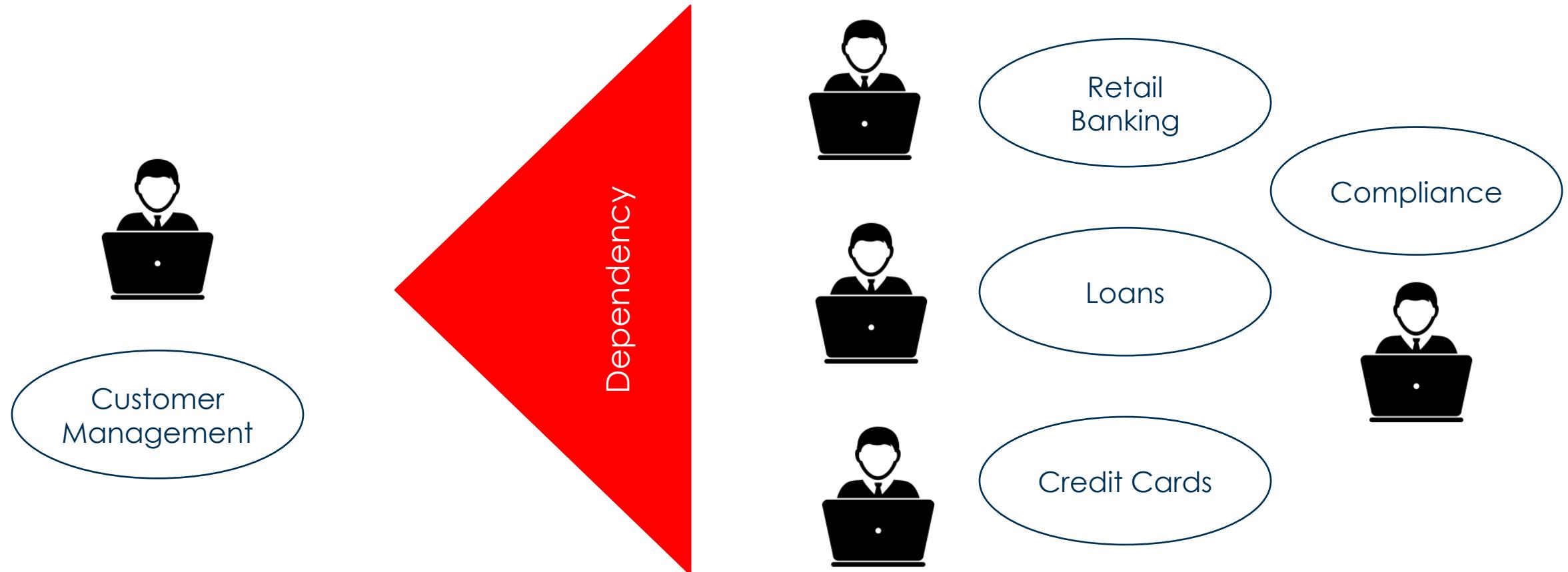
Common Domain Model

One Team takes ownership



Common Domain Model

Creates dependency = Loss of Agility, Conflicts, Complexity ...

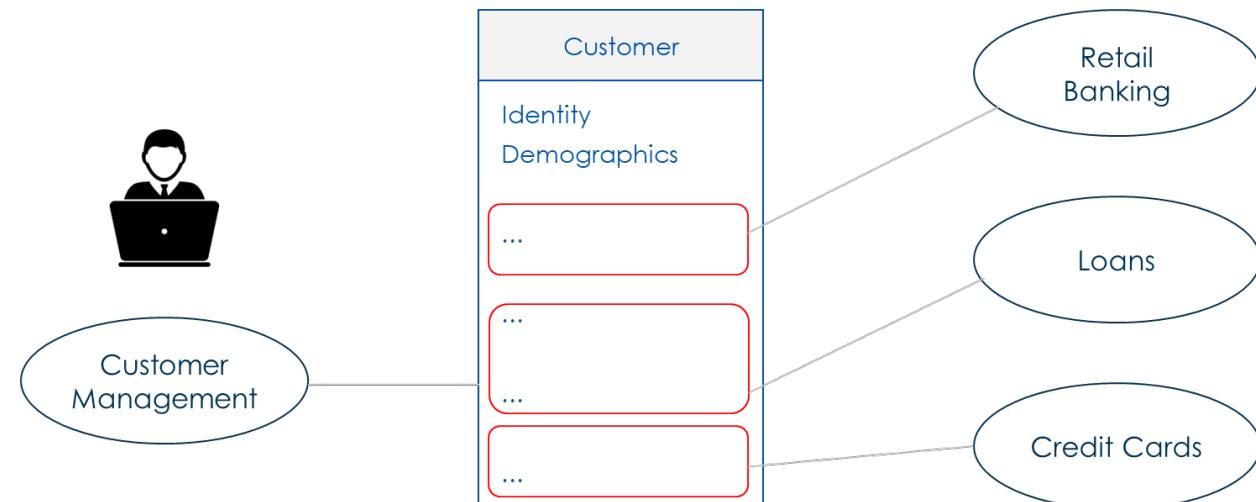


Challenges with Common Domain Model

Difficult to maintain as it cannot satisfy EVERYONE's needs

Models evolve i.e., change ➤ Impacts Everyone

Over a period model loses its value



Make the Business Contexts Independent

“

DDD addresses the problems with common domain model by breaking the domain into independent parts referred to as the Bounded Contexts



* Complexity

Inherent complexity due to scope and size

Bounded?

“

Limited to

Within some kind of boundary

Independent?

“

Free from outside control

Not dependent on another entity

Europe

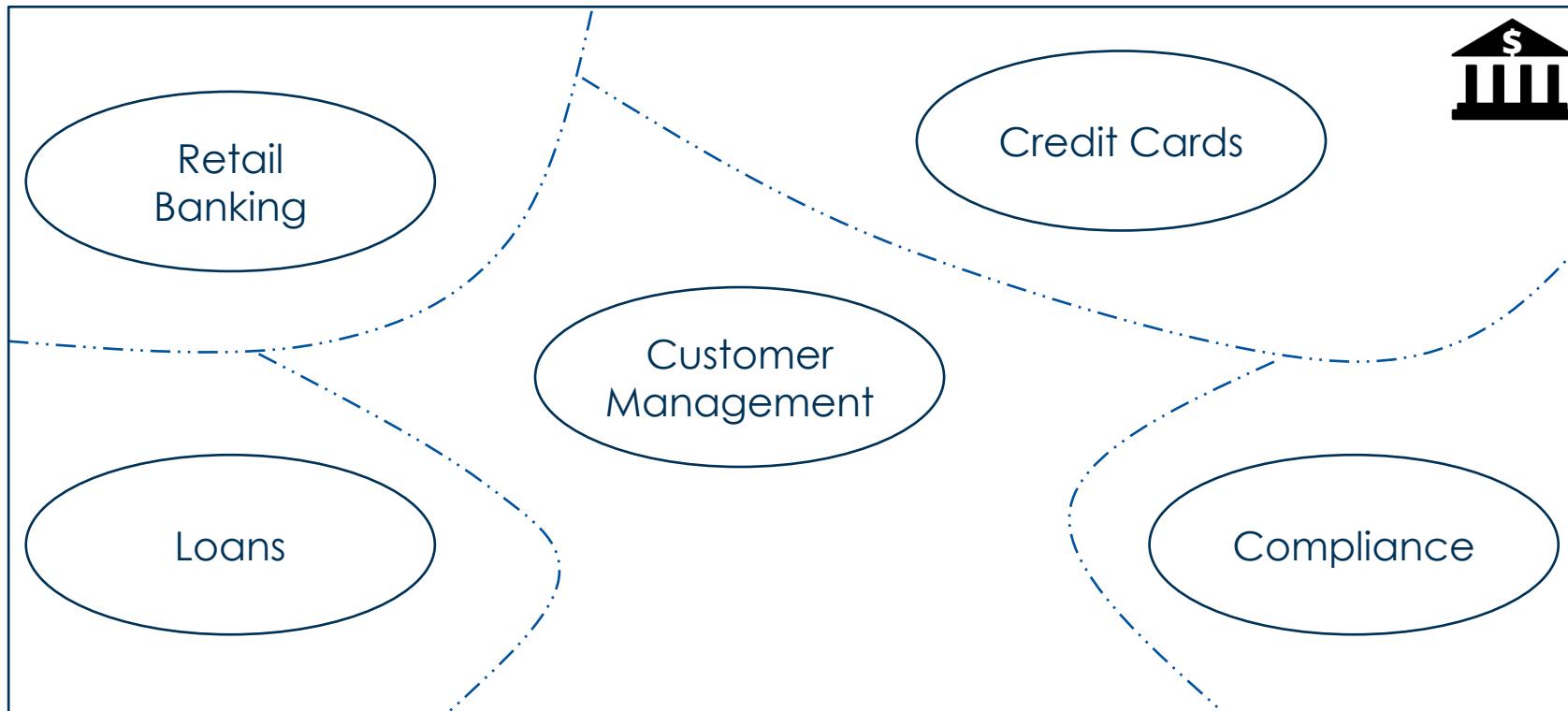
All these countries are independent with well defined boundaries



- Political & other changes in one country does not have direct impact on other countries
- Laws defined in a country are applicable within the boundary
- Culture, Social norms and Language are well understood within the boundary

Simplified Business Domain Model

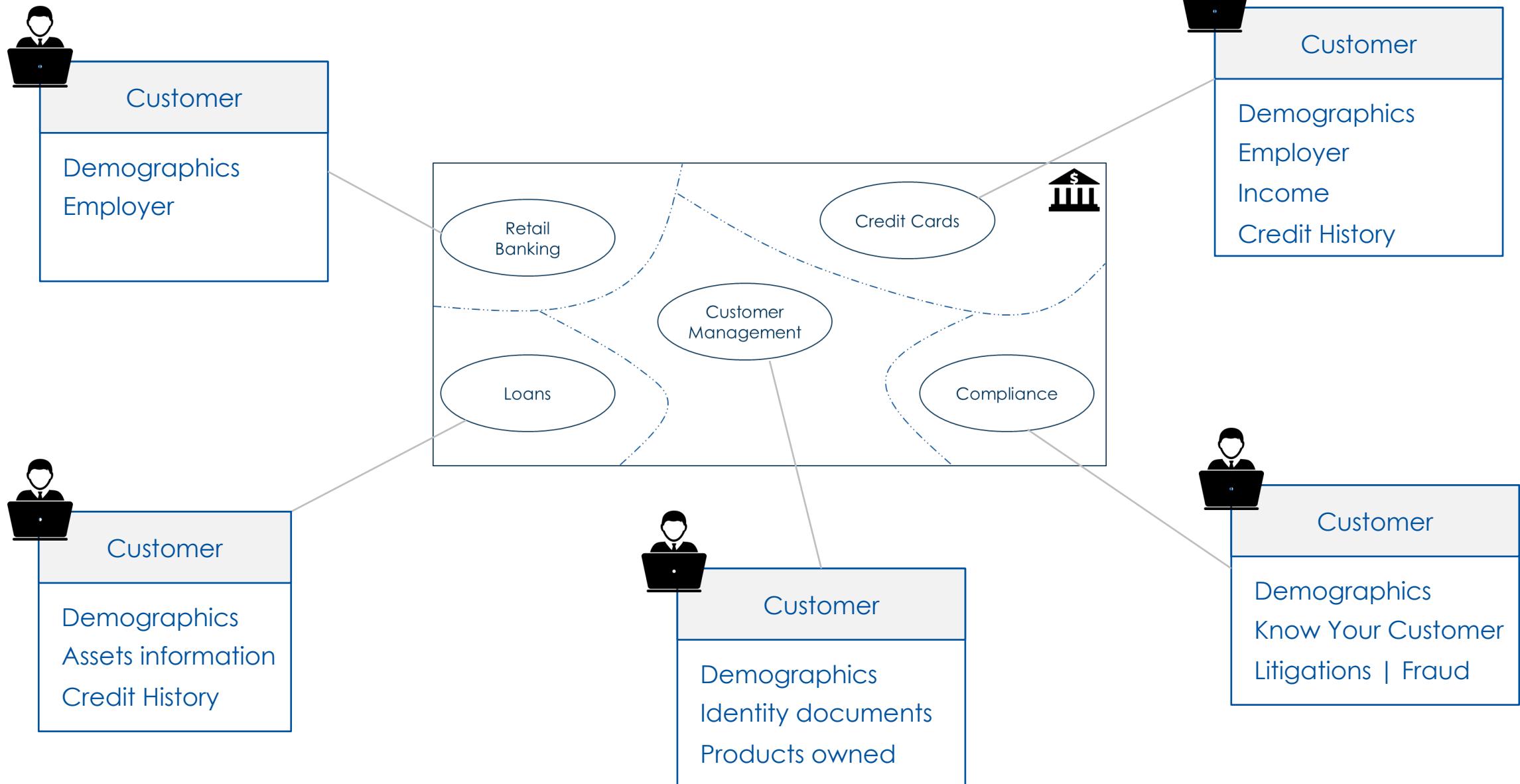
Created based on domain capabilities



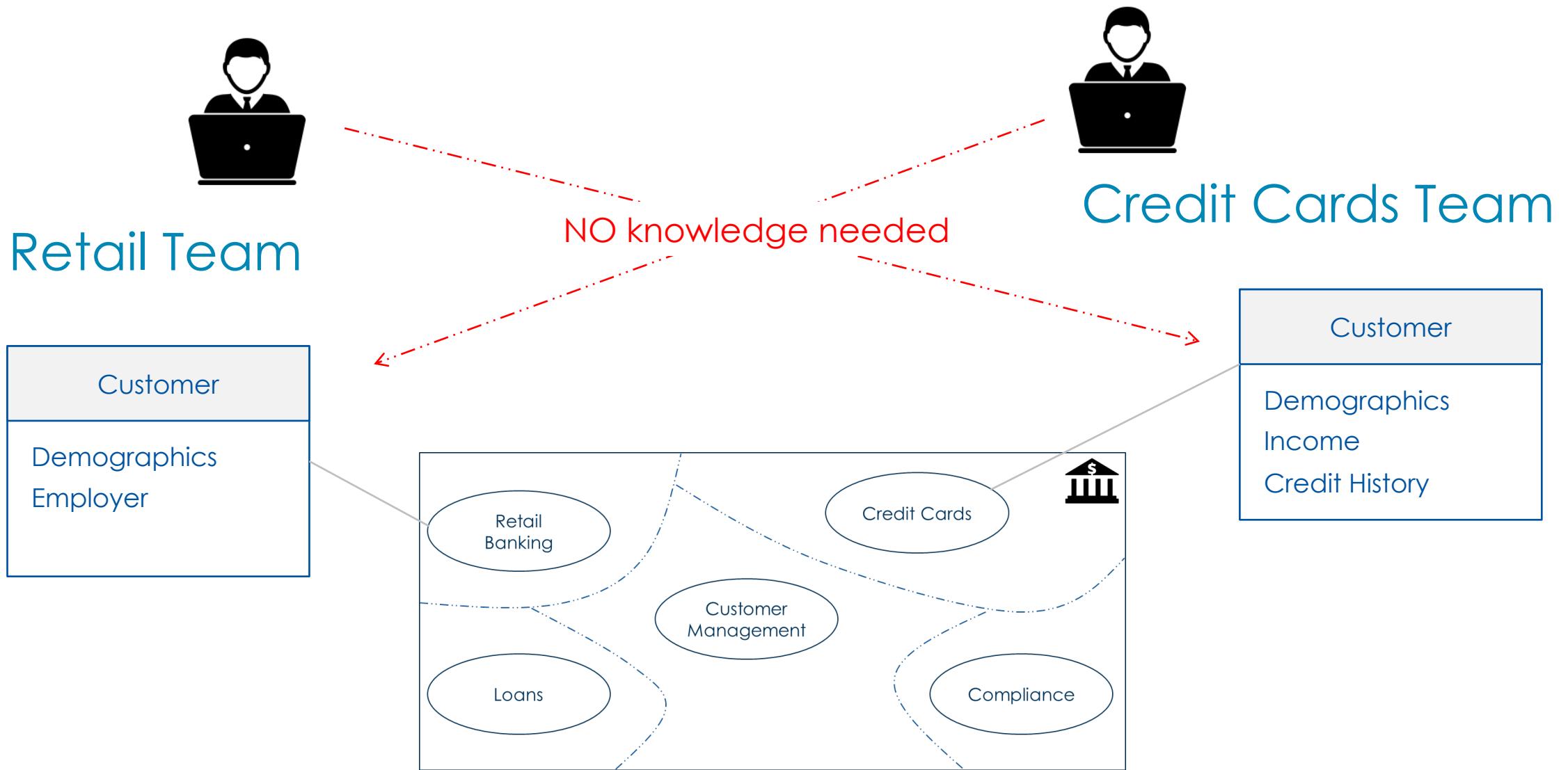
Characteristics of Bounded Contexts

1. Each BC represented with its OWN domain model
2. Domain model built for a BC applicable ONLY within its boundaries
3. Language used in BC does NOT suffer from Linguistic Challenges

1. Independent Domain Models



2. Model applicable within the BC



2. Model applicable within the BC

Retail Team



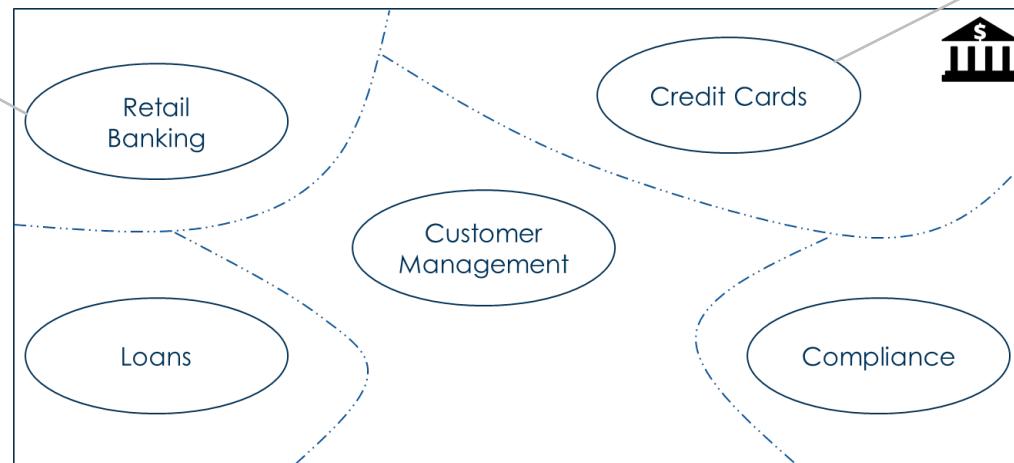
Customer
Demographics
Employer

Models can evolve independently



Credit Cards Team

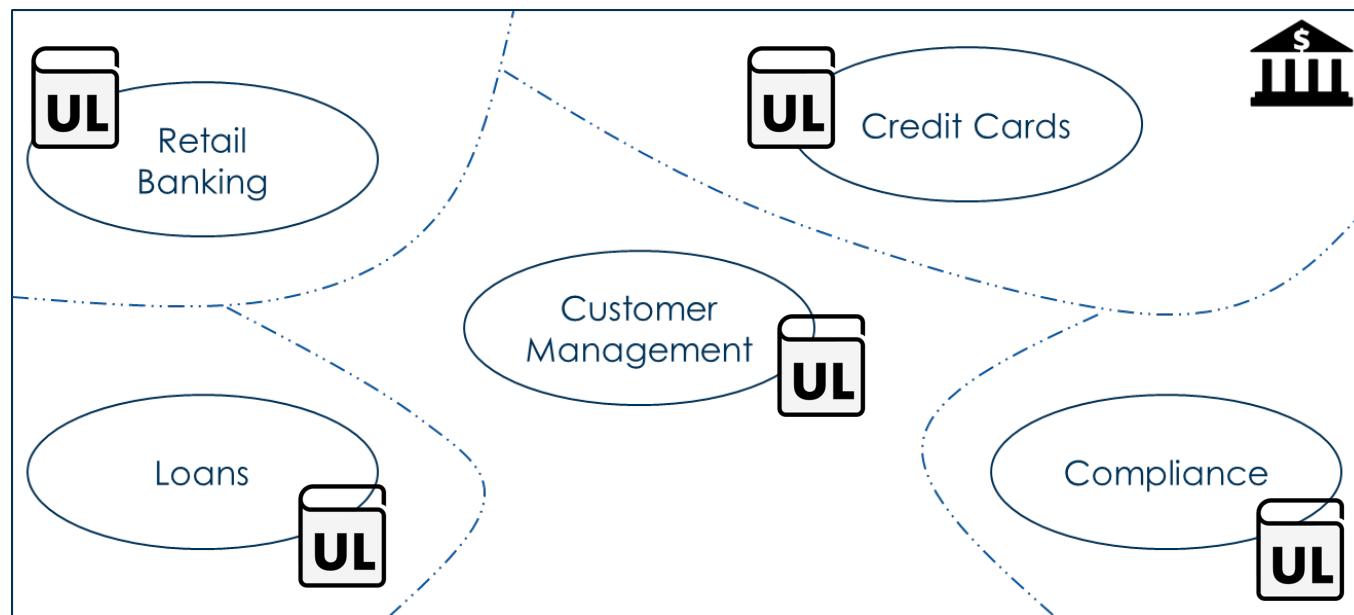
Customer
Demographics
Income
Credit History



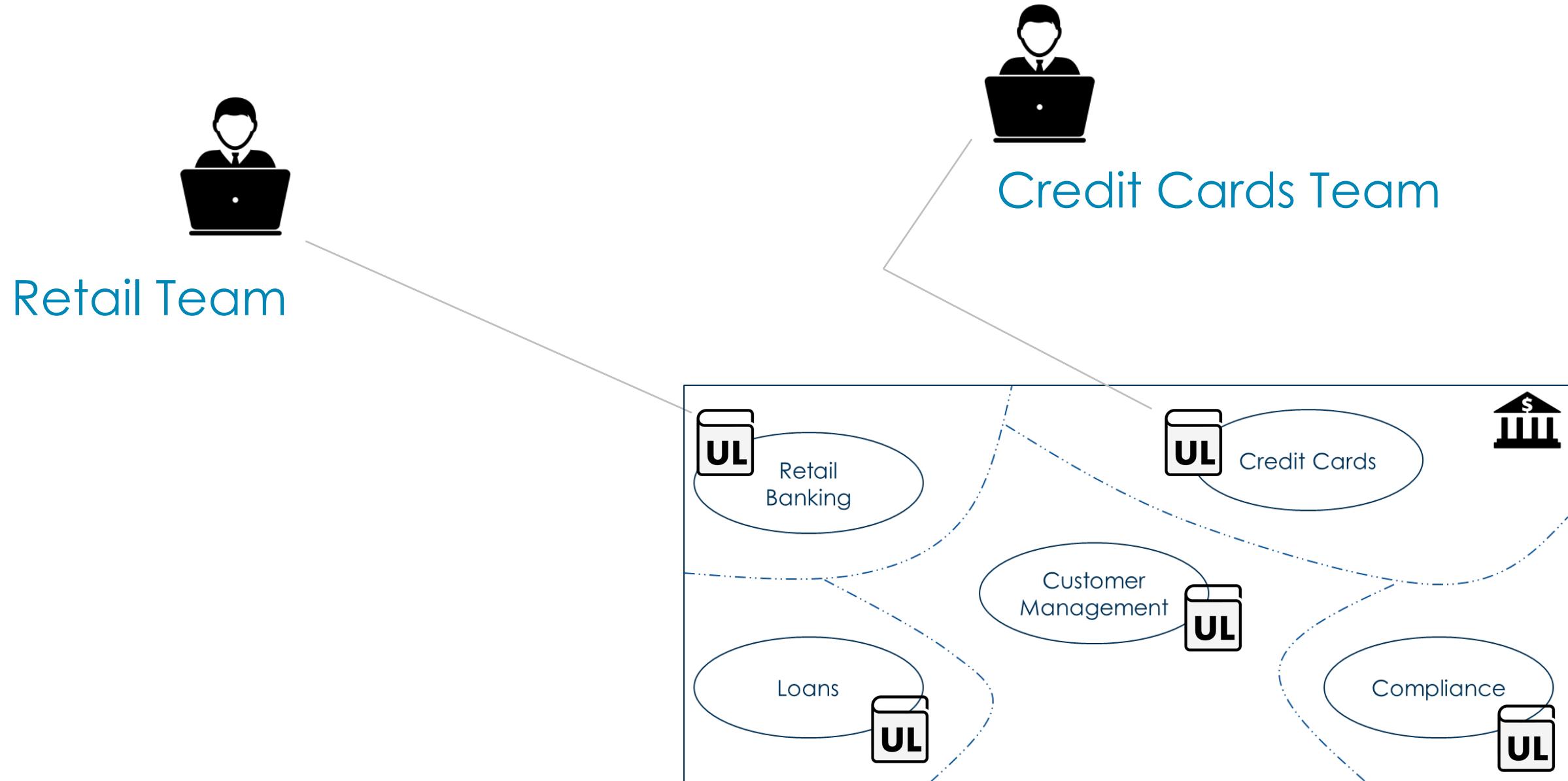
3. Ubiquitous Language & Bounded Context

“

Each Bounded Context has its own Ubiquitous Language; that is meaningful only within that bounded context



3. Ubiquitous Language & Bounded Context



Each Team uses its own UL



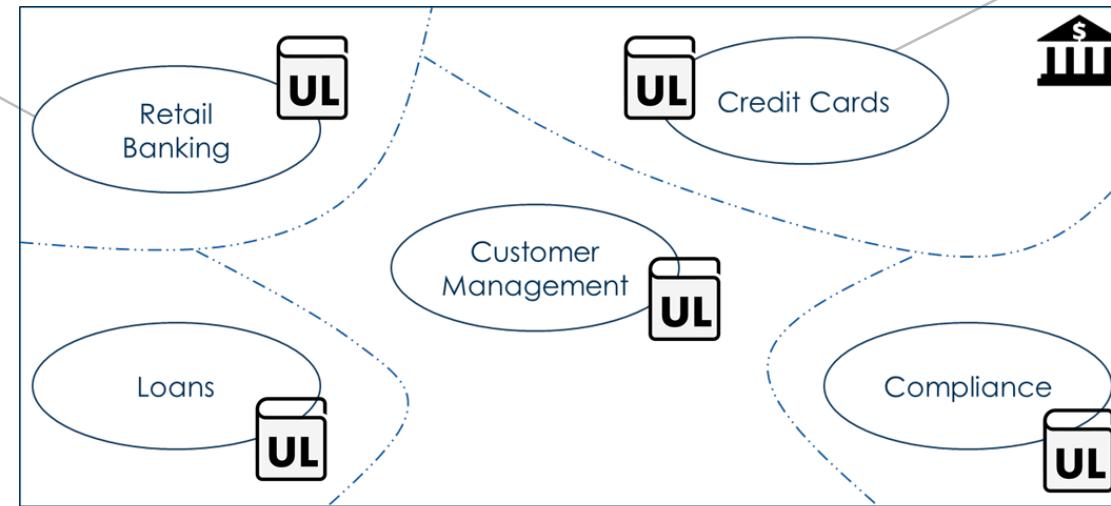
Retail Team

Customer
Demographics
Employer



Credit Cards Team

Customer
Demographics
Income
Credit History





Quick Review

- DDD suggests breaking the problem space into Bounded Contexts
 1. Models developed independently within each BC
 2. Model applicable within the BC
 3. Each BC has a Ubiquitous Language

Discovering the Bounded Contexts

An art rather than science



- 1 Guidance on discovery of BC
- 2 Clues to identifying the BCs

Bounded Context Discovery



There is **NO** silver bullet!!!

“ It's an Art not a Science

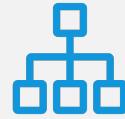


How to setup the Bounded Contexts?

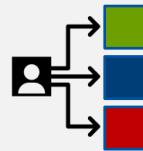
Guidance based on *Experience*

Art of discovering the Bounded Contexts

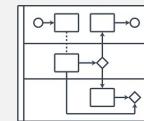
Leverage the existing assets; Partner with the Domain experts



Organization structure



Business Expert's Responsibilities



Key Activities

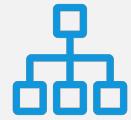
Business Language i.e., the linguistic clues



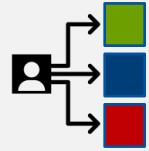
Existing monolithic applications | Modules

Art of discovering the Bounded Contexts

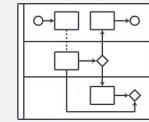
Leverage the available assets & collaborate with the experts



Organization structure



Business Expert's Responsibilities



Key Activities



Existing monolithic applications | Modules

Pay attention to the clues to demarcate the boundaries

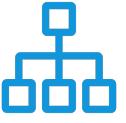
Do NOT get hung up on finding the perfect BC

“

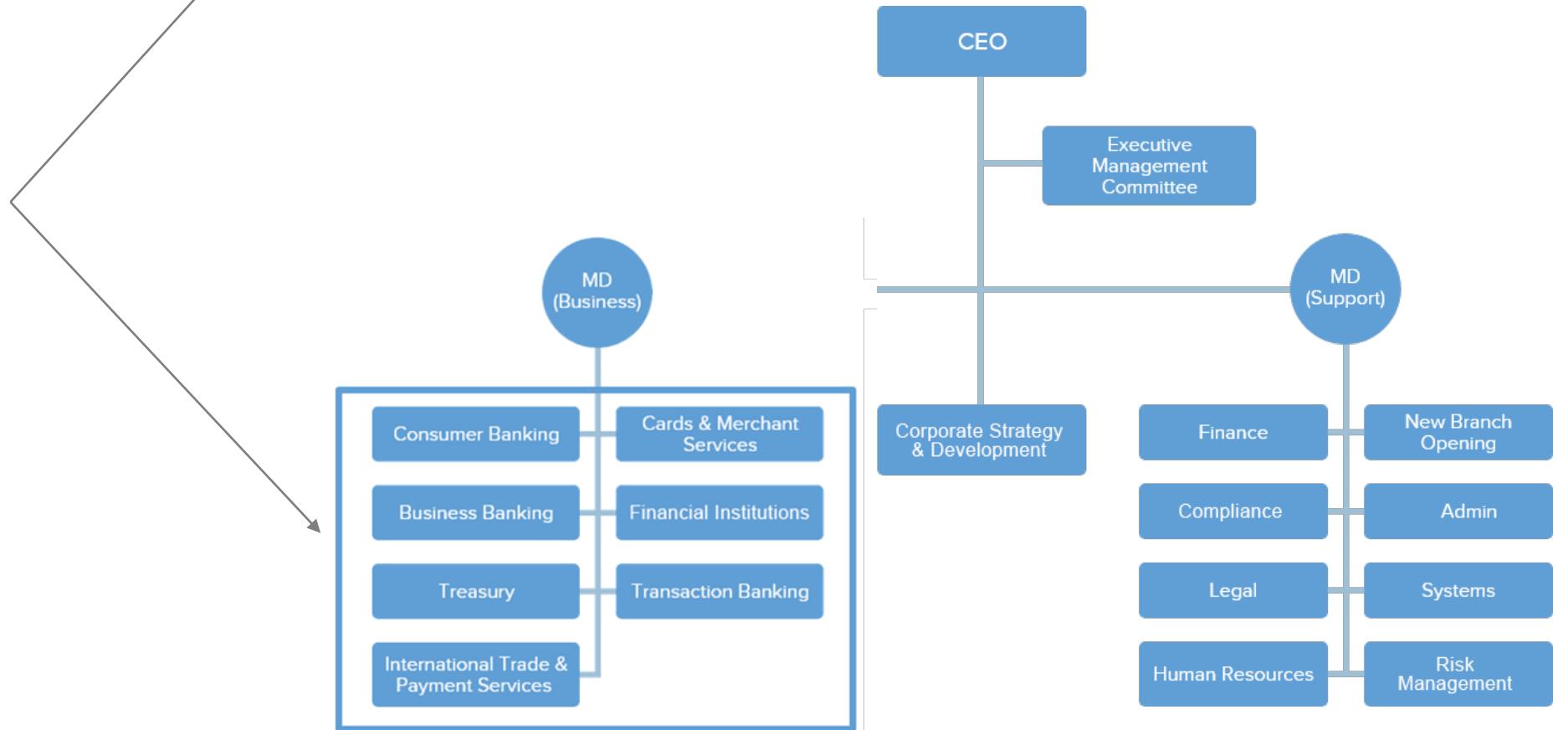
Do NOT get hung up on finding the perfect boundaries for the bounded contexts in your domain

OK to start with some boundary than None ☺

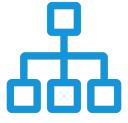
Organization Structure



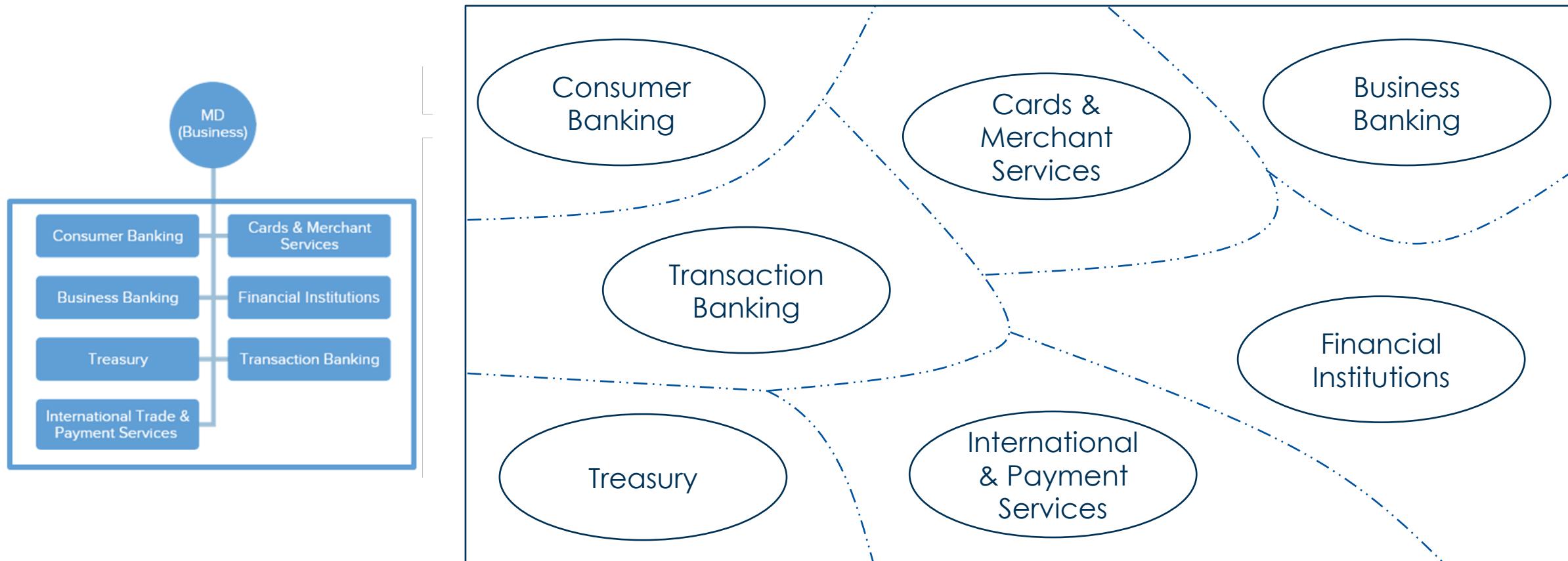
Pay attention to **Business Function areas**



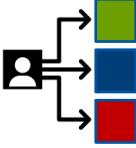
Business Capabilities



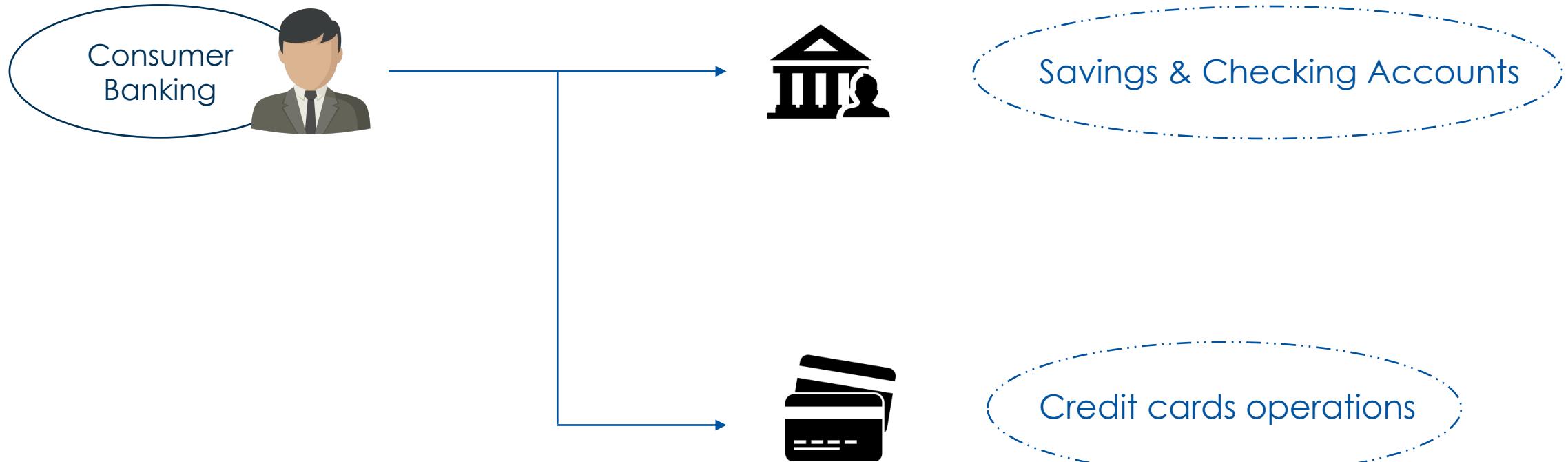
Start by drawing the boundaries around business functions



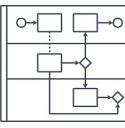
SME Responsibilities



Experts may be responsible for multiple functions



Build the business glossary & look for linguistic clues



Key Activities

Makes the business model work

Consumer
Banking

Customer
Support
Operations

Accounts
Management

Branch
Operations

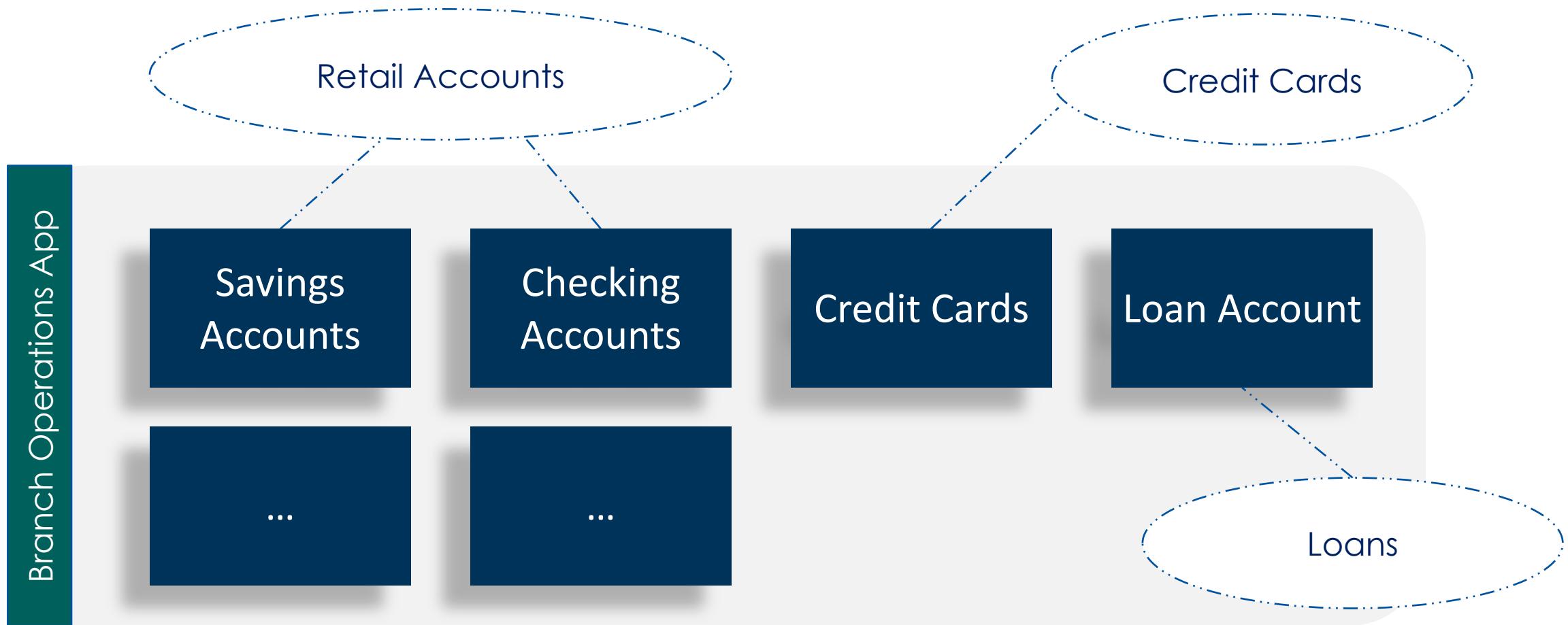
IT Expert & Business Expert chalks out the details of the key activities

Build the business glossary & look for linguistic clues



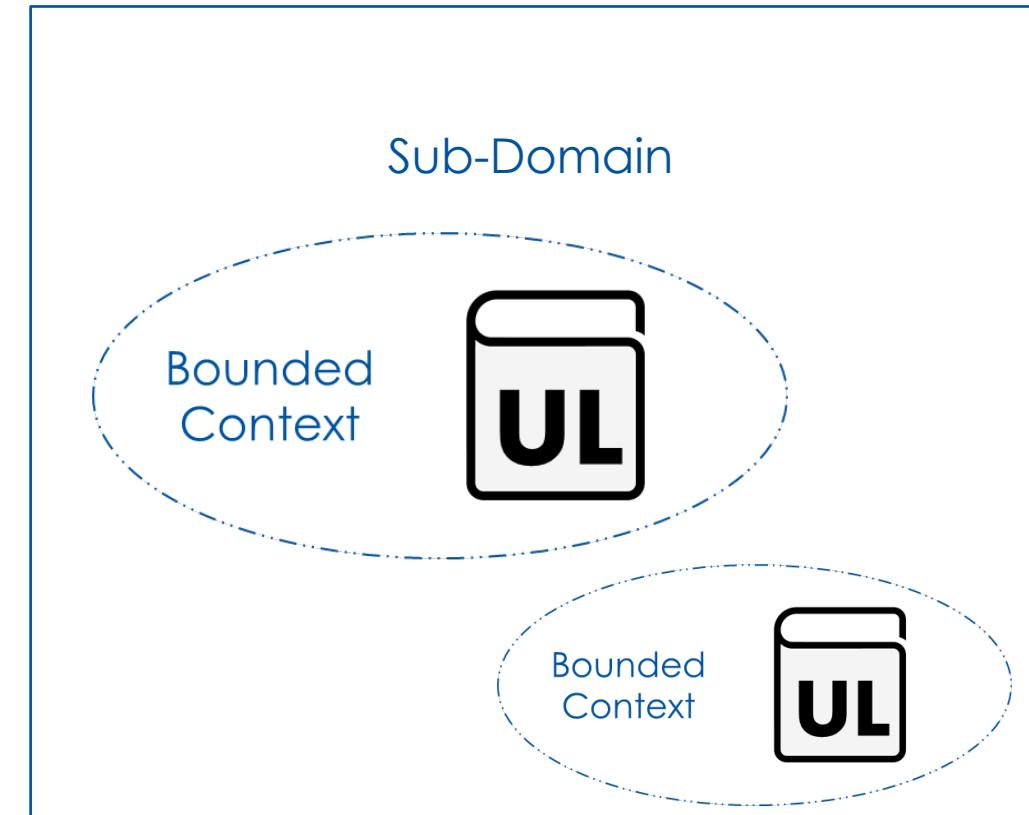
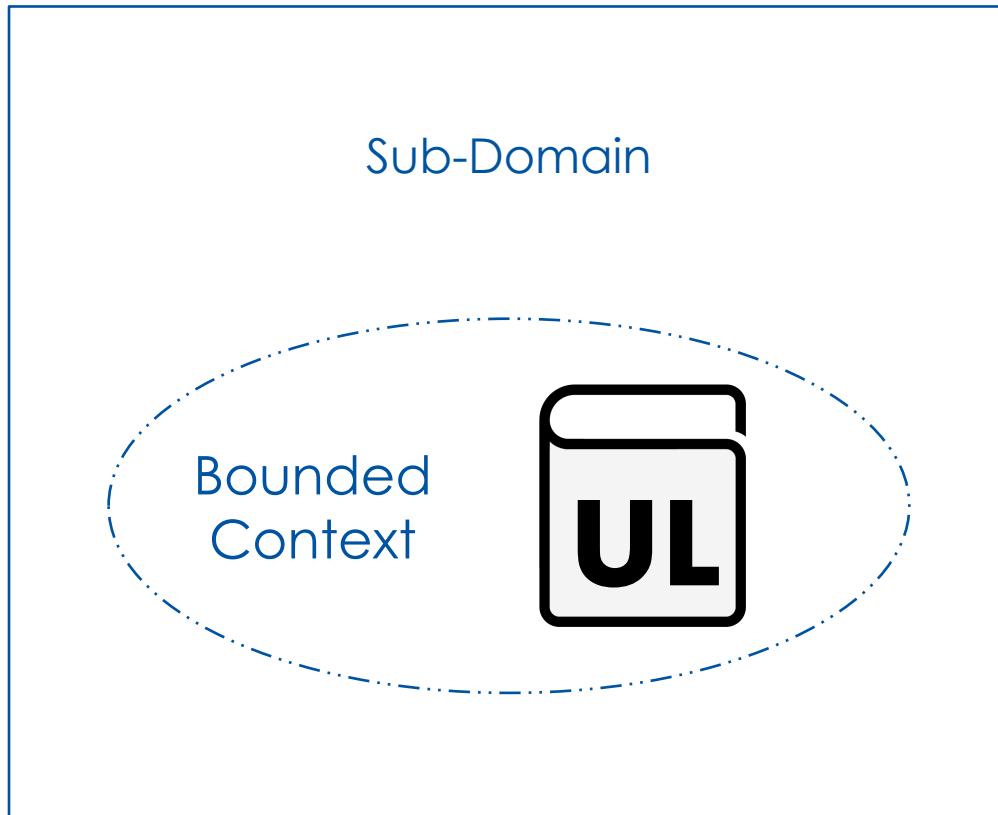
Existing Application | Modules

Existing application | modules may hold clues to boundaries



Bounded Context | Sub-Domain

Sub Domains may have 1 or more BC





Quick Review

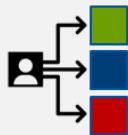
- Existing assets & business expert partnership



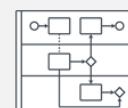
Organization structure



Existing monolithic applications | Modules



Business Expert's Responsibilities



Key Activities

Business Language i.e., the linguistic clues

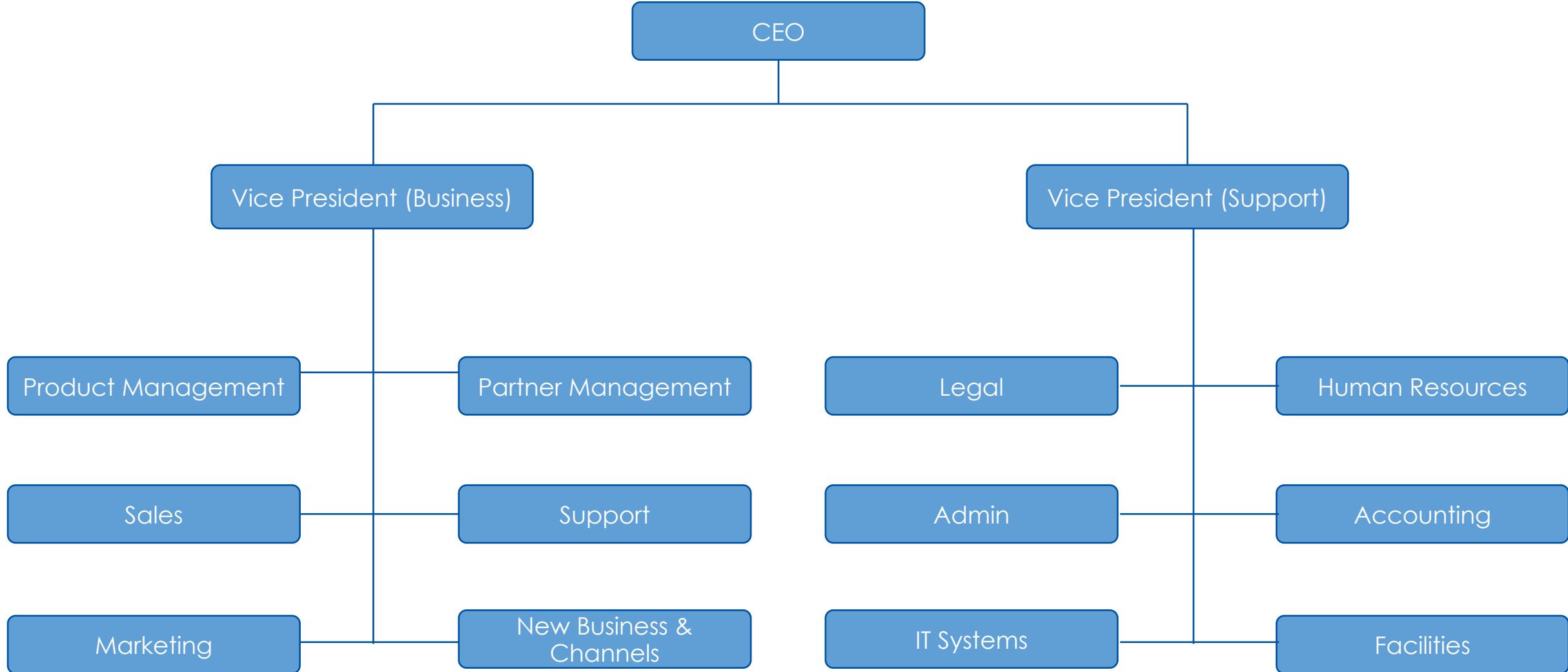
Exercise : Drawing the Boundaries

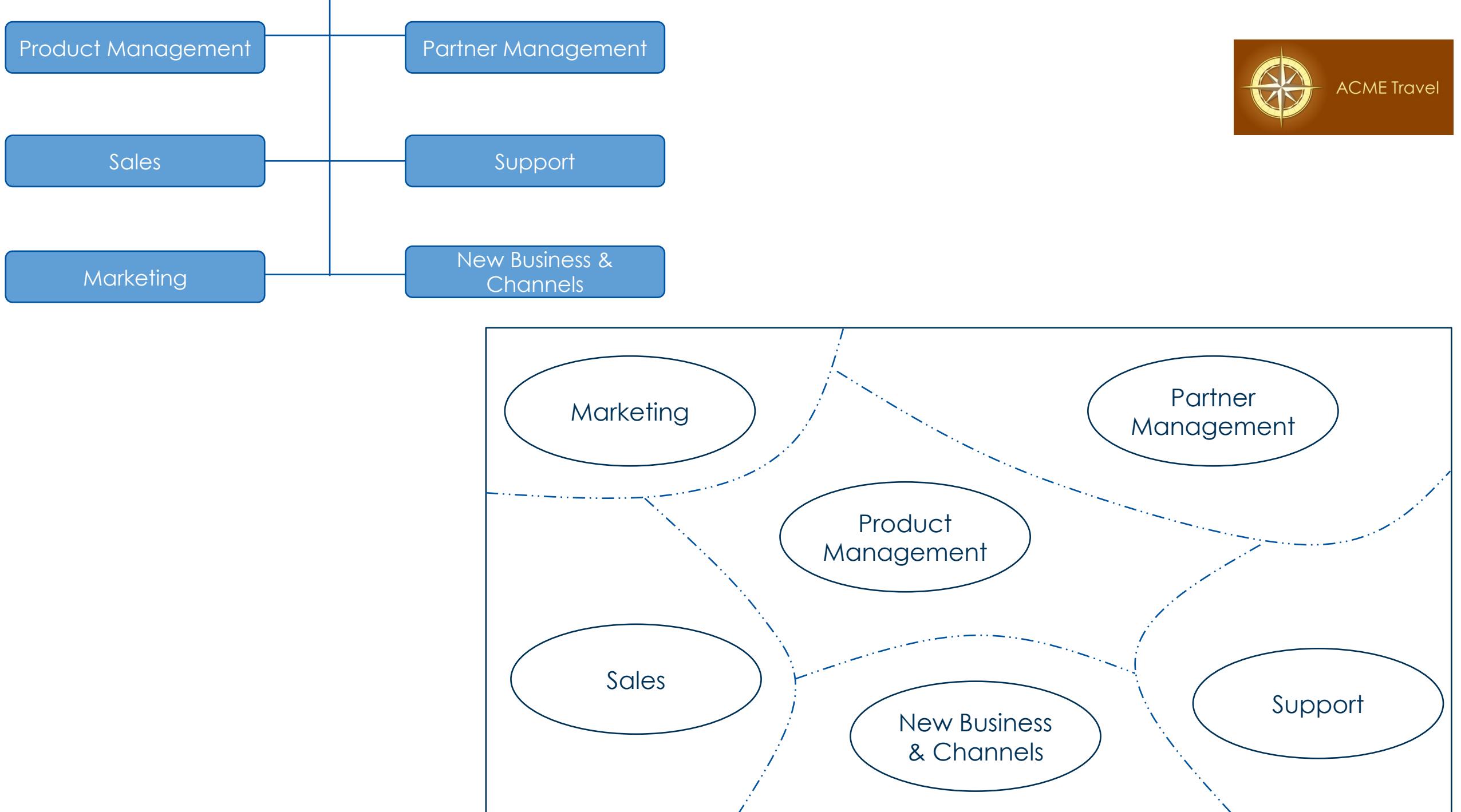
Discovering the BC for ACME

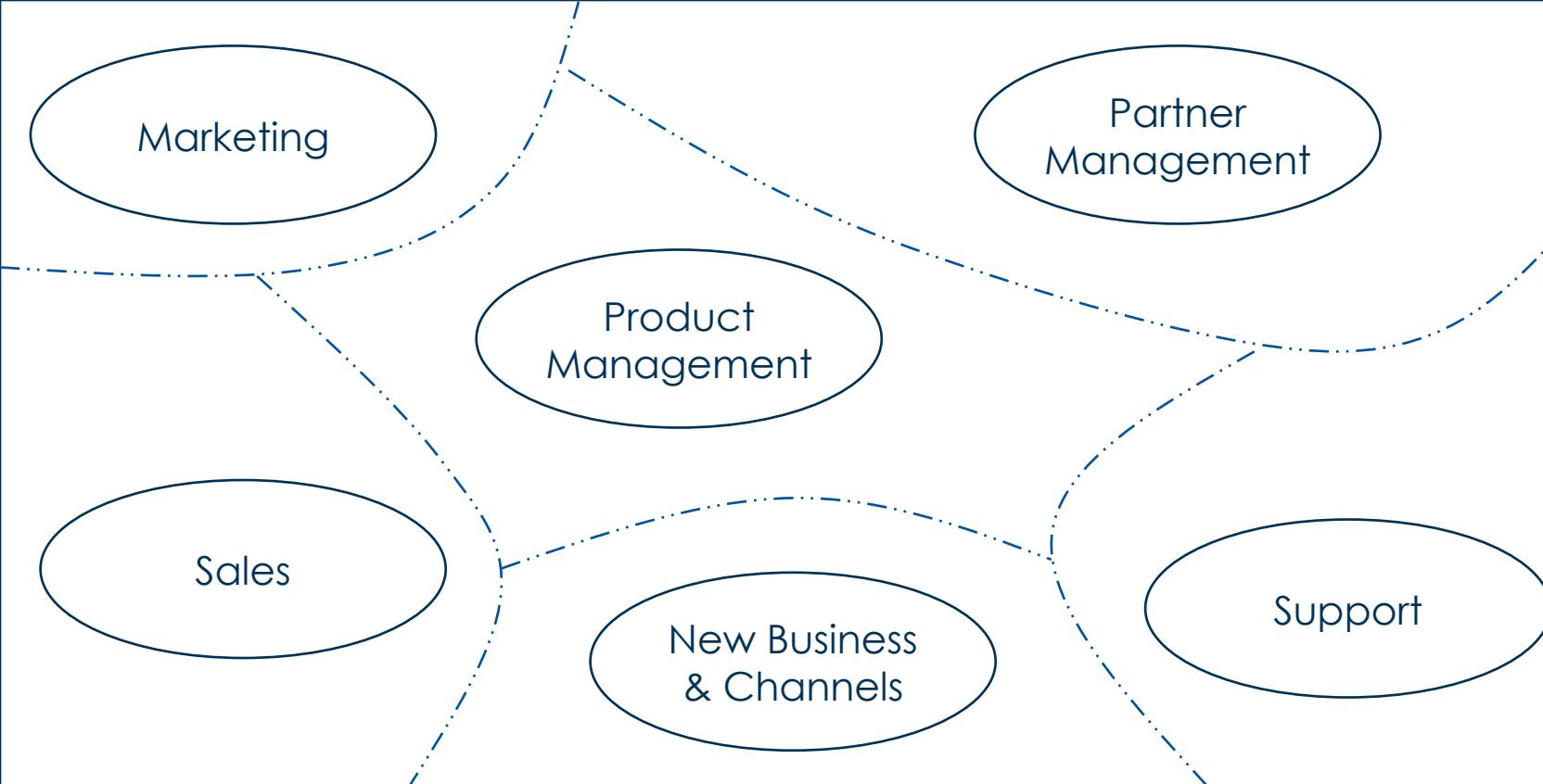


- 1 Setup Bounded Contexts based on capabilities
- 2 Go over the Key Activities for Support
- 3 Analyze the language clues from support

ACME Organization Structure







Kathy, Support

Responsible for supporting Customers and Partners

Support function at ACME

Responsible for supporting Customers and Partners



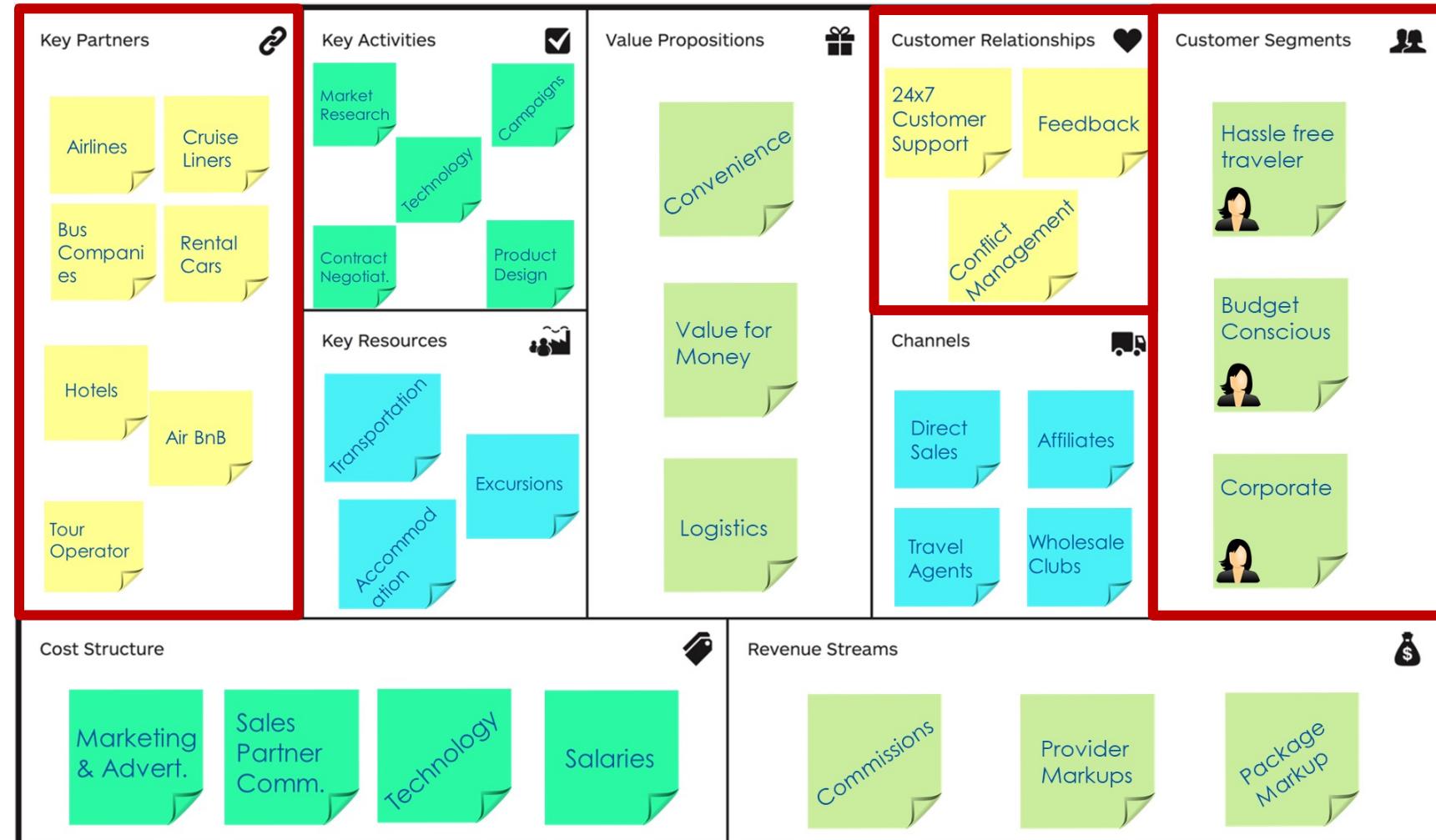
Kathy, Support

Customer Support

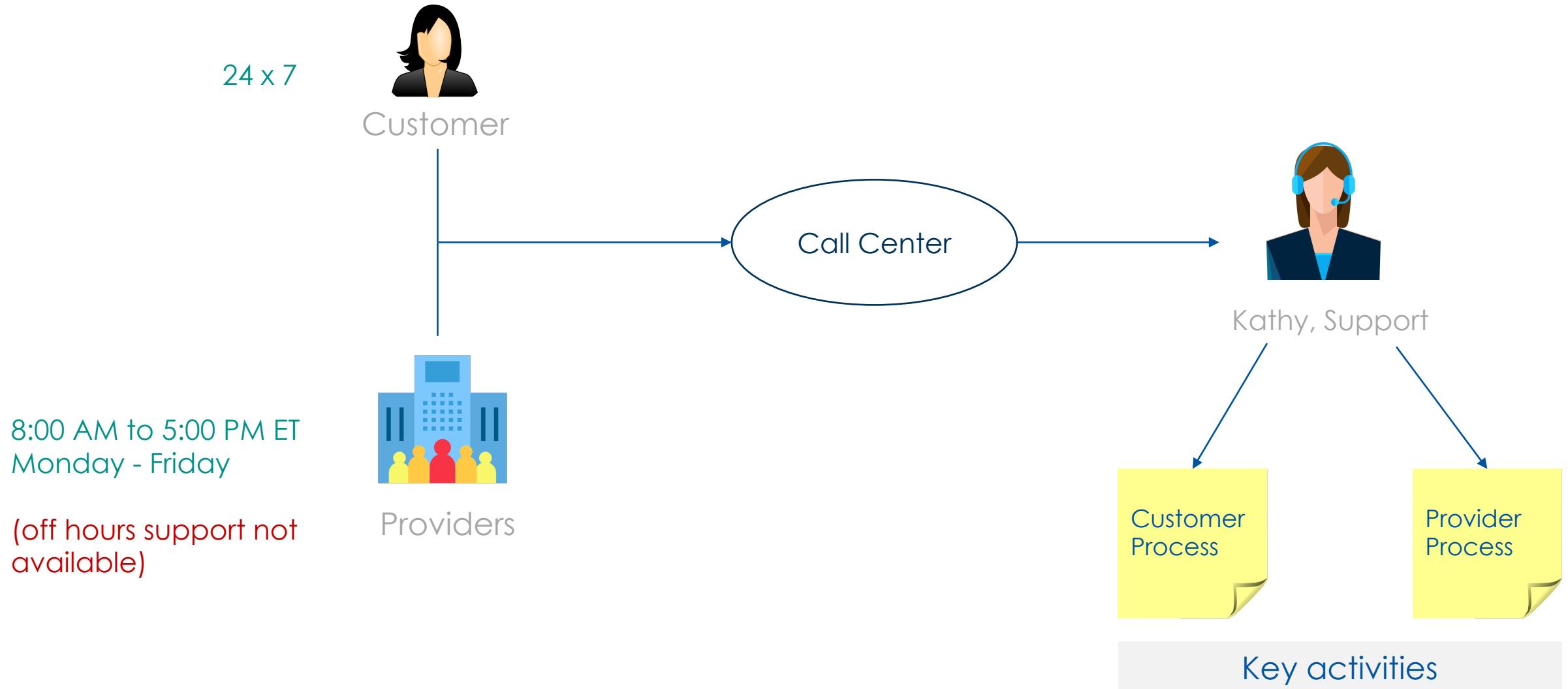
24x7

Partner Support

8:00 AM to 5:00 PM ET
Monday - Friday

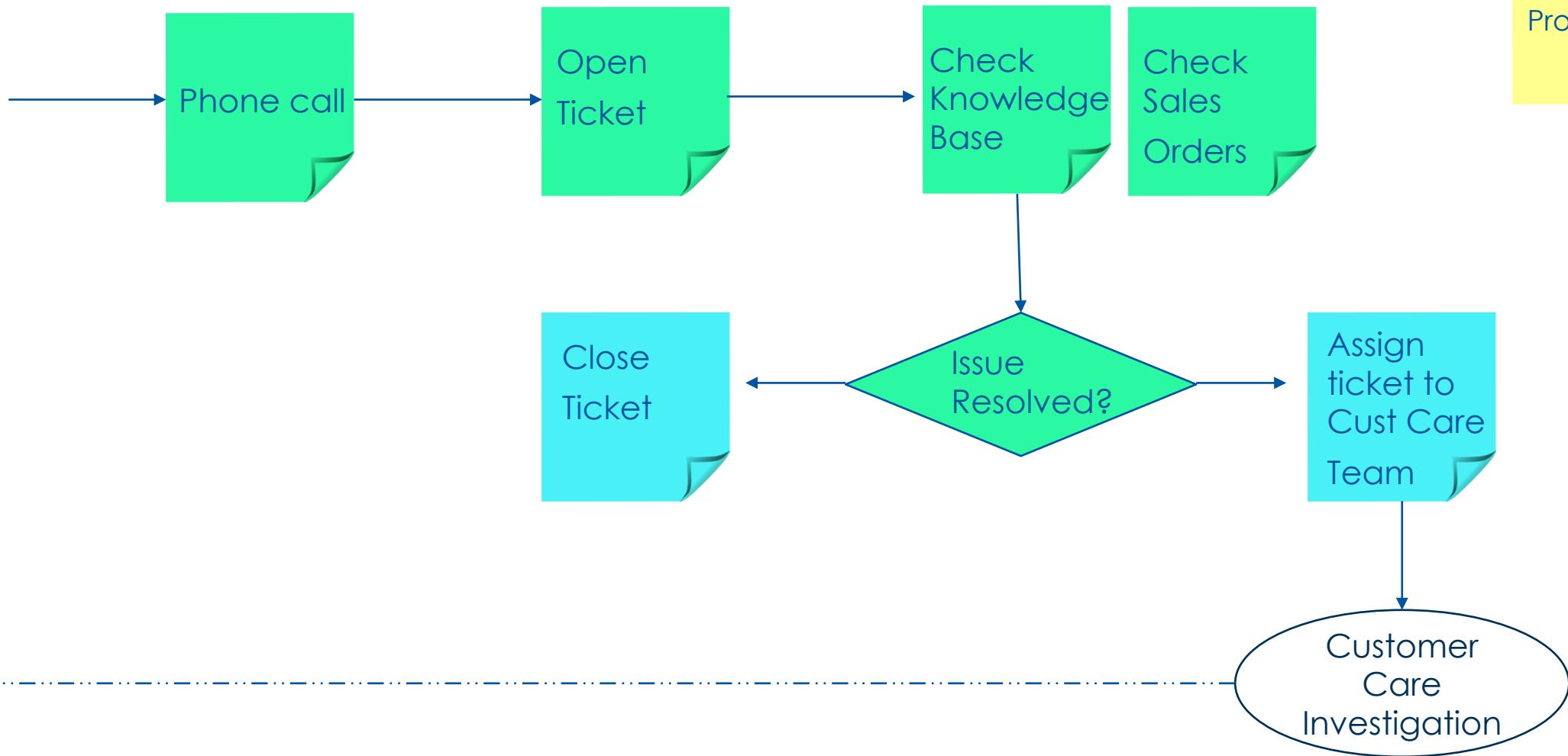


Support | Key Activities





Customer



Ticket

Knowledge Base

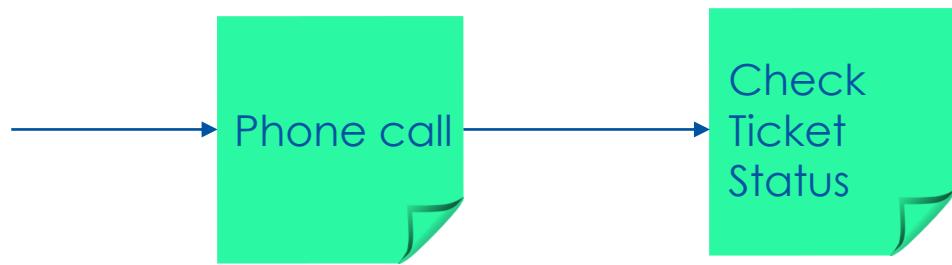
Sales Orders

Customer Care

Customer
Process



Customer



Customer
Process

Check the Ticket status



Ticket

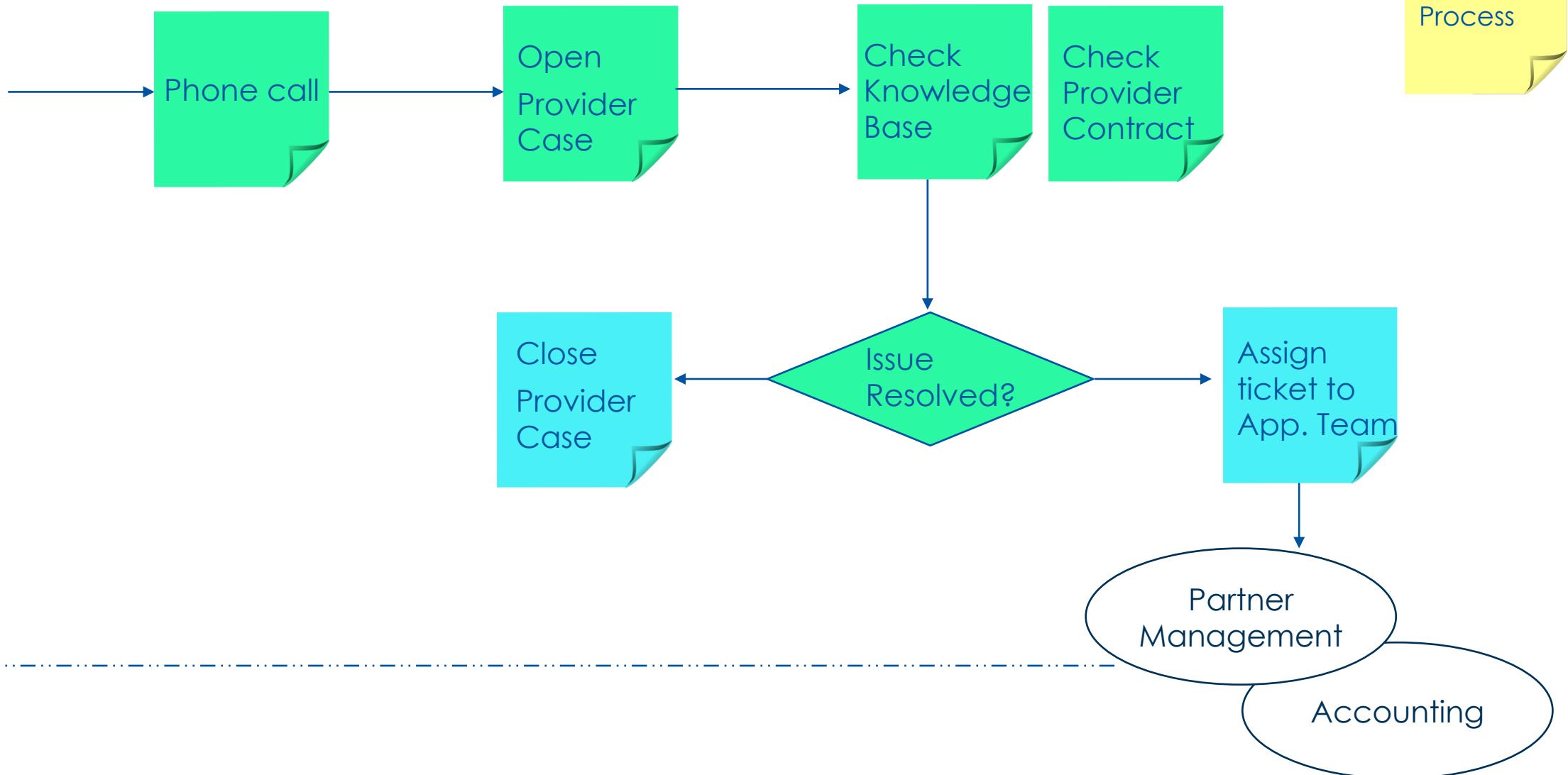
Knowledge Base

Sales Orders

Customer Care



Providers



Provider Case a.k.a. Partner Case

Knowledge Base

Provider Contract



Draw a rough sketch of the Business Capabilities in your organization

Support | Business Language

UL

Customer Process

Ticket

Knowledge Base

Sale Orders

Customer Care

Similar Concept
Semantically different

Customer support articles

Well defined ONLY within
Customer Support context

UL

Provider Process

Provider Case

Knowledge Base

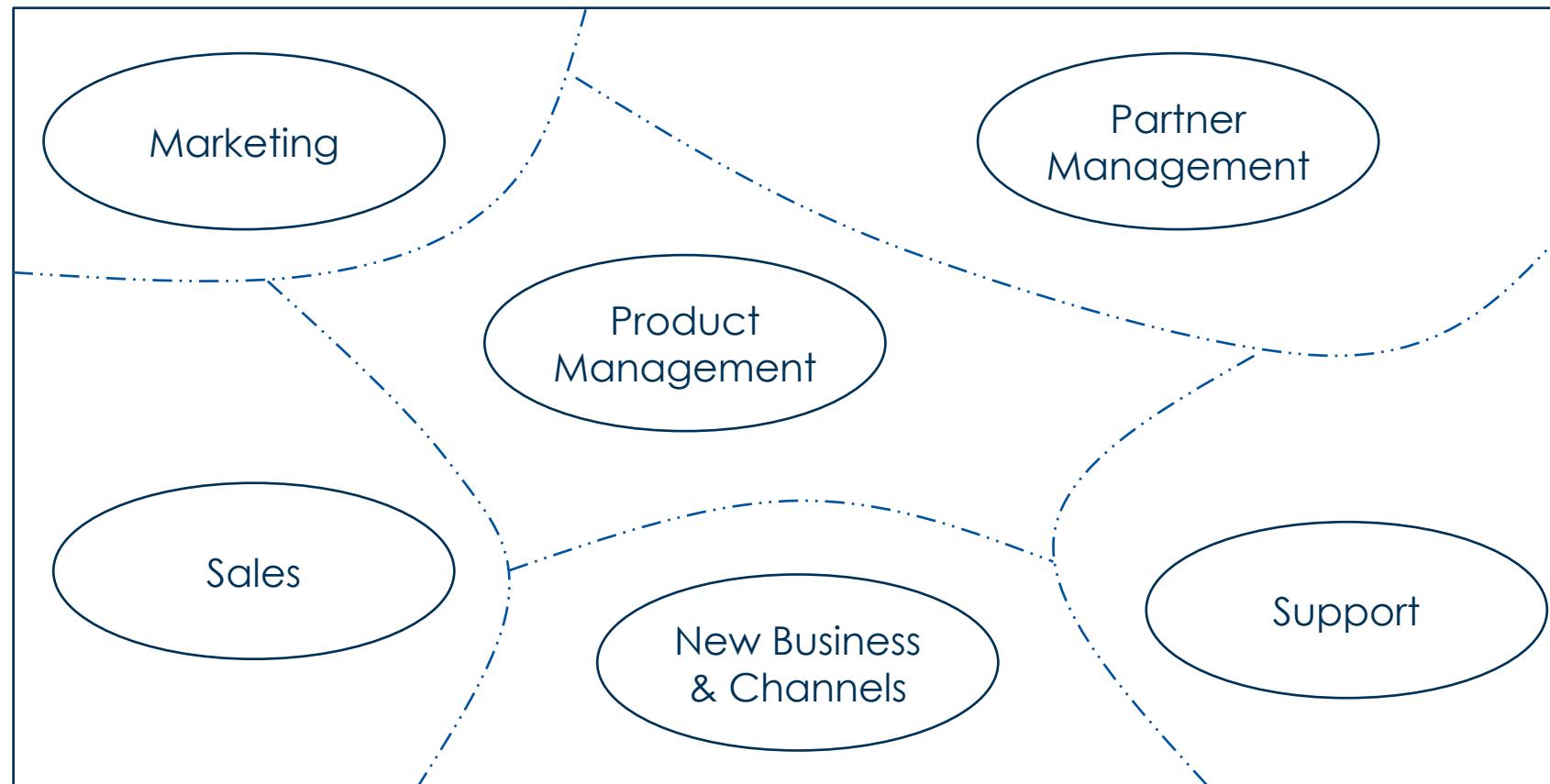
Provider Contract

Provider support articles

Well defined ONLY within
Provider Support context

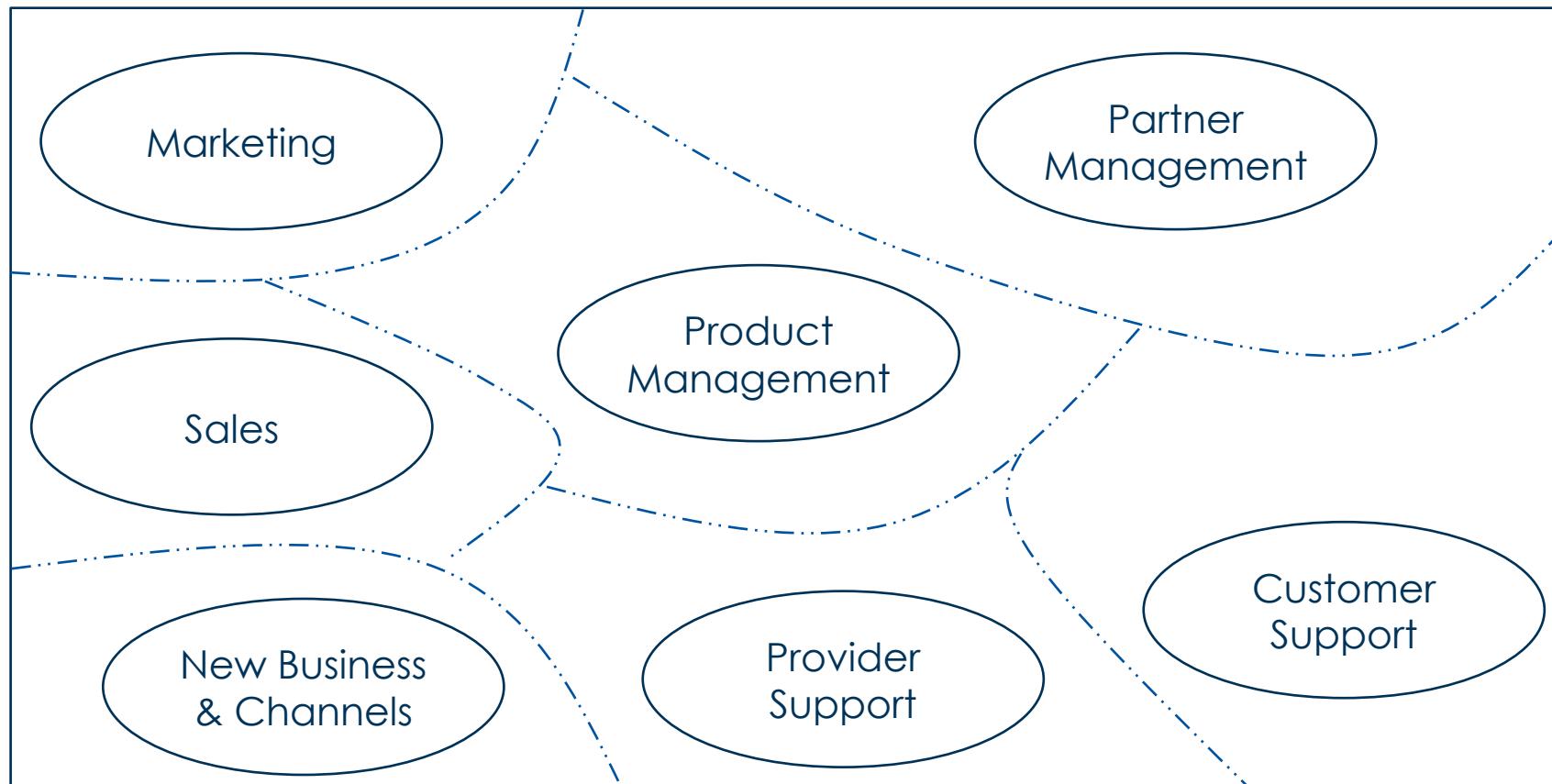
Business Capabilities | Organization structure

Drawing the boundaries based on domain capabilities



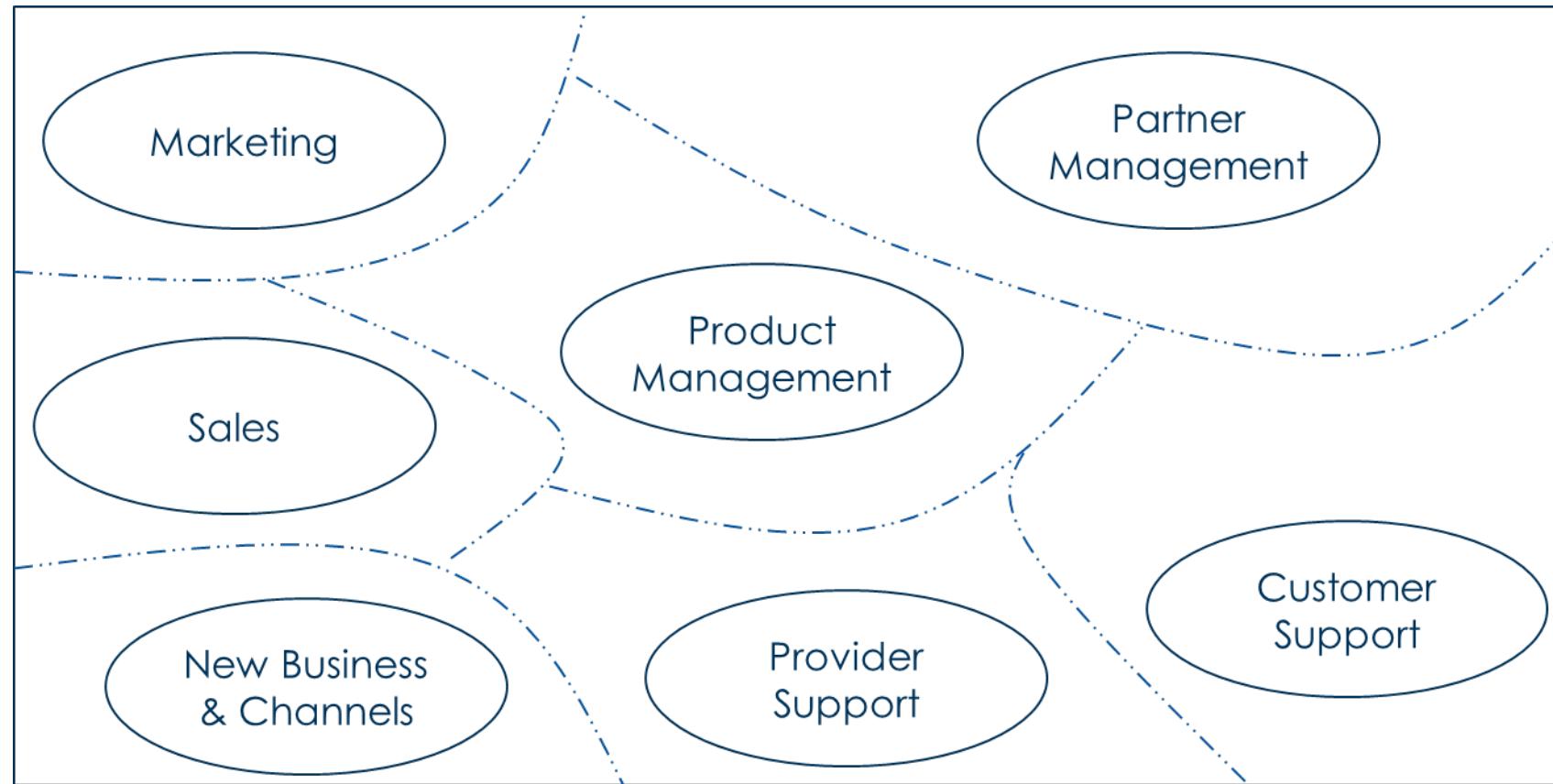
Business Capabilities | Organization structure

Support context split into 2 independent Bounded Contexts



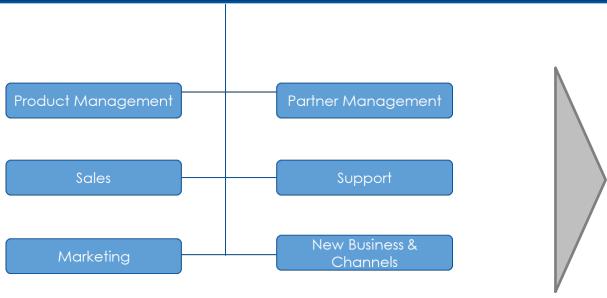
Business Capabilities | Organization structure

Support context split into 2 independent Bounded Contexts

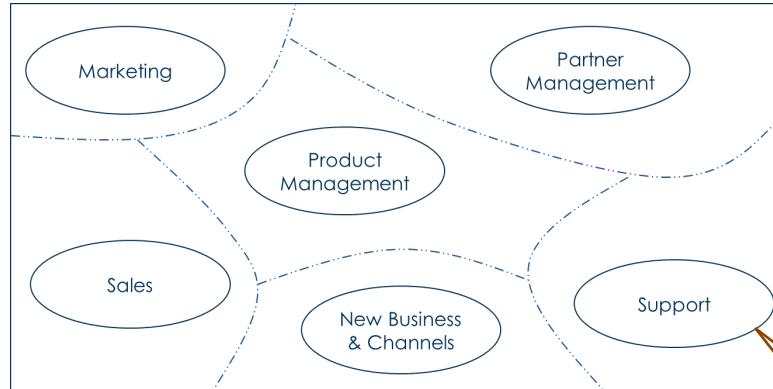




Quick Review



ACME Org Structure



Analyzed Support Activities



Analyzed Business Terms

