Modeling Problems in Software

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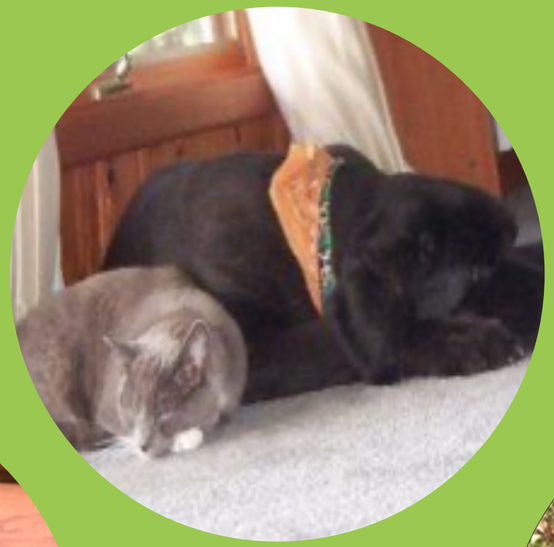
Overview

- Breaking up the veterinary office domain
- The importance of the domain experts
- A play! (Discovering the domain)
- Core elements of a domain model
- Subdomains and bounded contexts
- That ubiquitous term: ubiquitous language

Introducing our Domain

Some of Our Pets



Our Domain: A Veterinary Practice

Dr. Smith

More Than Just Caring for Pets

Schedule

Invoices

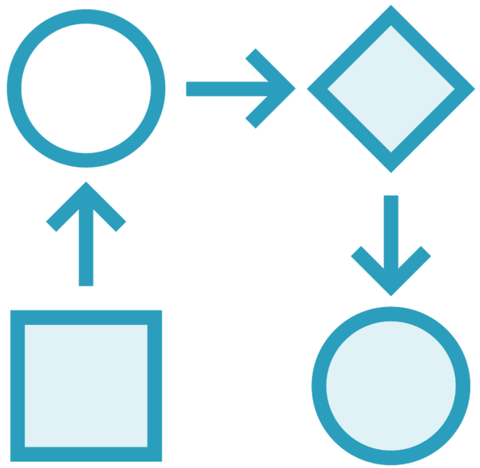
Payments

Records

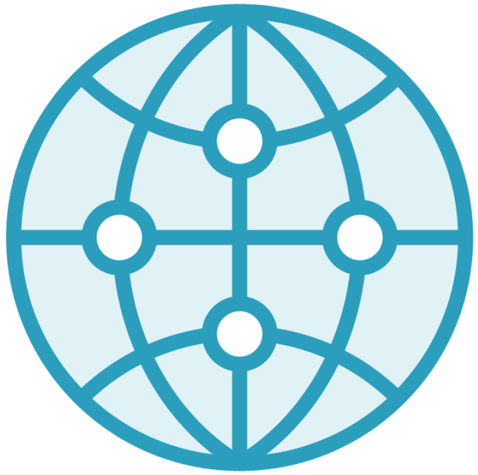
External Resources

Planning Ahead to Learn About the Domain

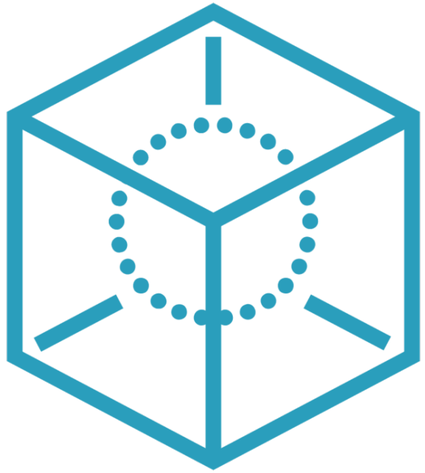
Our Goals for Learning About the Domain



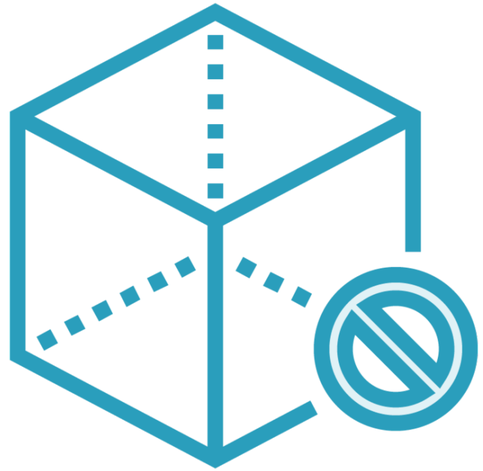
Understand client's business



Identify processes beyond project scope



Look for subdomains we should include

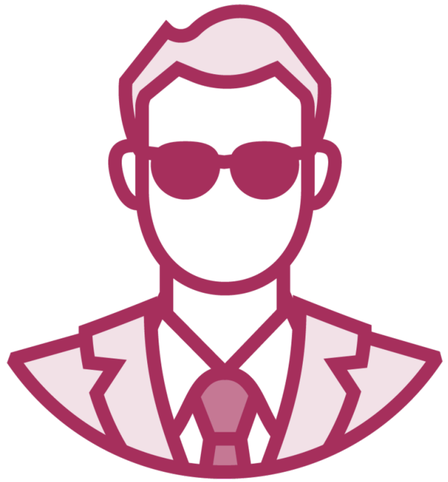


Look for subdomains we can ignore

Conversation with a Domain Expert: Exploring the Domain and Its Subdomains

Conversation with a Domain Expert

Dr. Smith



Steve

Julie

Learning about the Complete Domain

Patient scheduling

Owner and pet data management

Billing (External?)

Surgery scheduling

Office visit data collection

Sales and Inventory

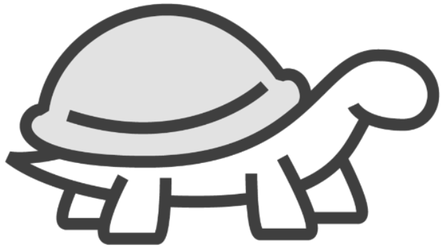
Lab testing
(schedule, results, bill)

Prescriptions

Staff scheduling

CMS (External?)

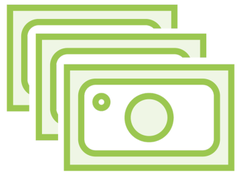
So Many Problems to Solve!



Some of the Identified Subdomains

Staff

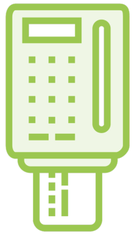
Visit records



Accounting

Appointment scheduling

Client and patient records

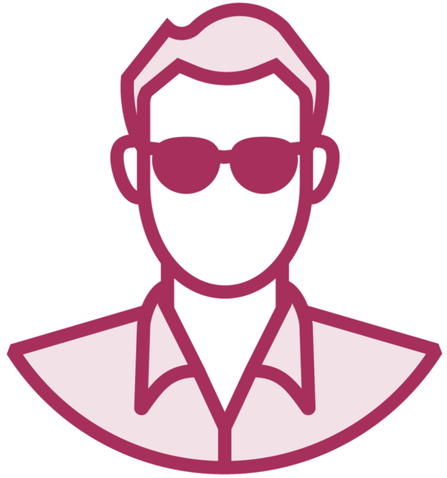


Sales

Conversation with a Domain Expert: Exploring the Scheduling Subdomain

Continued Deep Collaboration with Domain Experts

Dr. Smith



Steve

Julie

Notes from Our Conversation

Clients (people) schedule appointments for patients (pets)

Appointments may be either office visits or surgeries

Office visits may be an exam requiring a doctor, or a tech visit

Office visits depend on exam room availability

Surgeries depend on O/R and recovery space availability, and can involve different kinds of procedures

Different appointment types and procedures require different staff

Learn and communicate in the language of the domain, not the language of technology

More Questions for Dr. Smith

Any chance of concurrency conflicts?

Doesn't anticipate being big enough to have this problem any time soon

Do you need to schedule rooms and staff when you schedule an appointment? Dependencies?

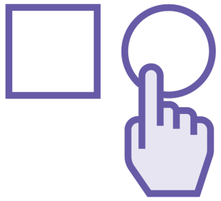
Room + tech OR...
Room + doctor OR...
Room + doctor + tech

Does "resources" work as an umbrella term for them?

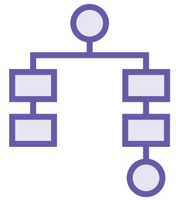
Yes!

Reviewing Key Takeaways from Meeting with Domain Expert(s)

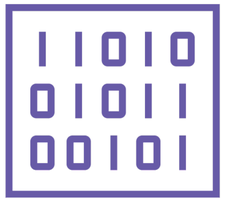
Key Takeaways From the Customer Conversation



Patients and clients are not the same thing to a veterinarian



The customer gained better understanding of their own business process by describing it in terms we could understand and model

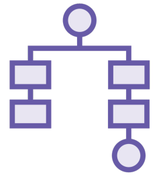


We did our best to avoid speaking in programmer terms

At this stage, the focus is on how the domain works, not how the software will work

Key Takeaways From the Customer Conversation

Important to get on the “same page” with the domain expert



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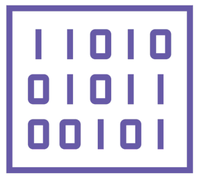


Avoid speaking in programmer terms

At this stage, the focus is on how the domain works, not how the software will work

Make the implicit knowledge of domain experts explicit

Domain Exploration Can Benefit the Domain Experts

“Wow, I never thought of that before!”

“Considering our rules more explicitly, can help us in the future.”

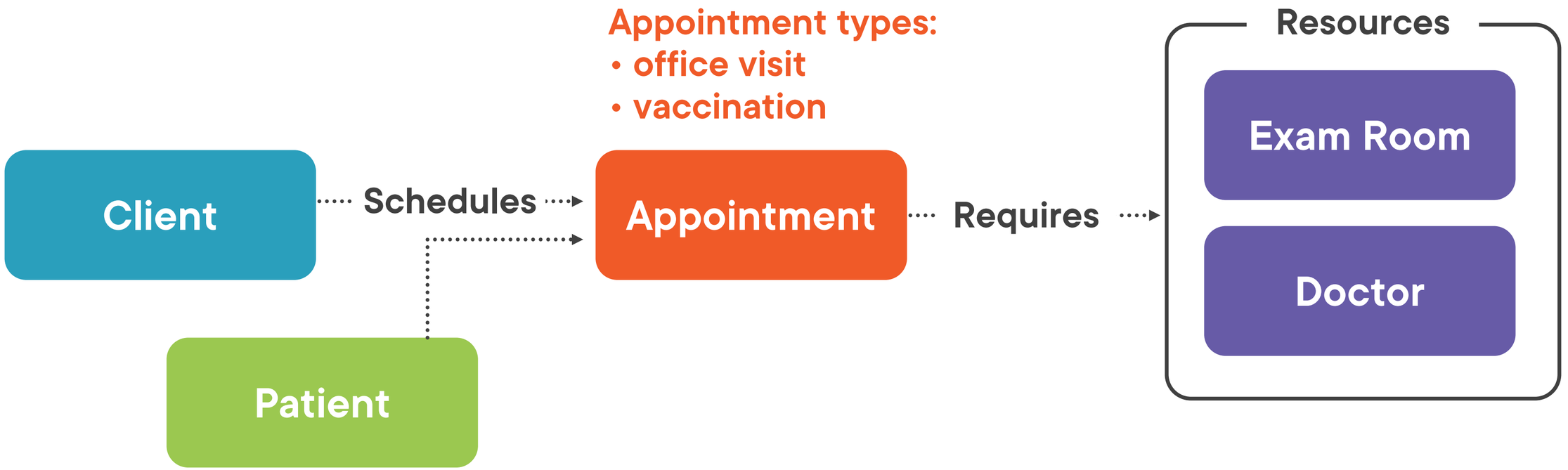
“This is going to be great!”

As software developers, we fail in two ways:
We build the thing wrong, or
We build the wrong thing.

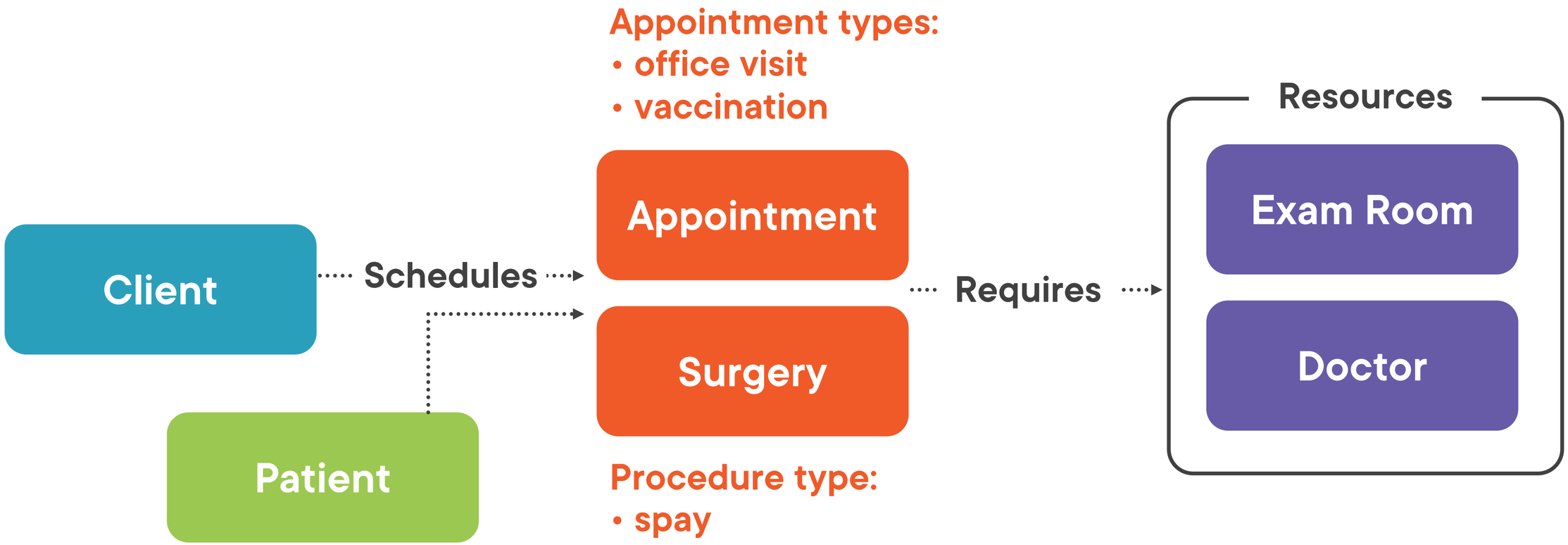
Steve Smith

Taking a First Pass at Modeling our Subdomain

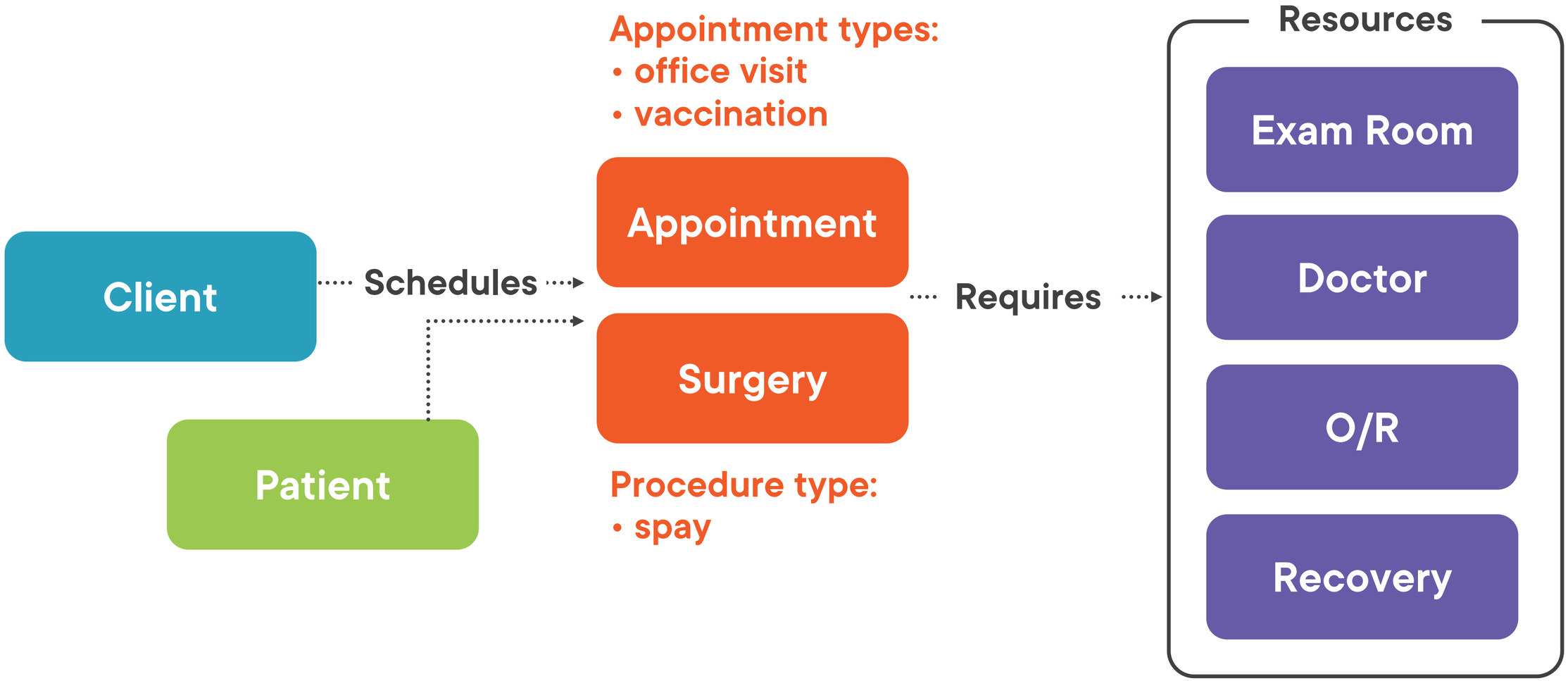
What We Know About the Appointment Manager Model



What We Know About the Appointment Manager Model



What We Know About the Appointment Manager Model



Using Bounded Contexts to Untangle Concepts that Appear to Be Shared

Defining Bounded Contexts

Define a strong boundary around the concepts of each model

Ensure model's concepts don't leak into other models where they don't make sense

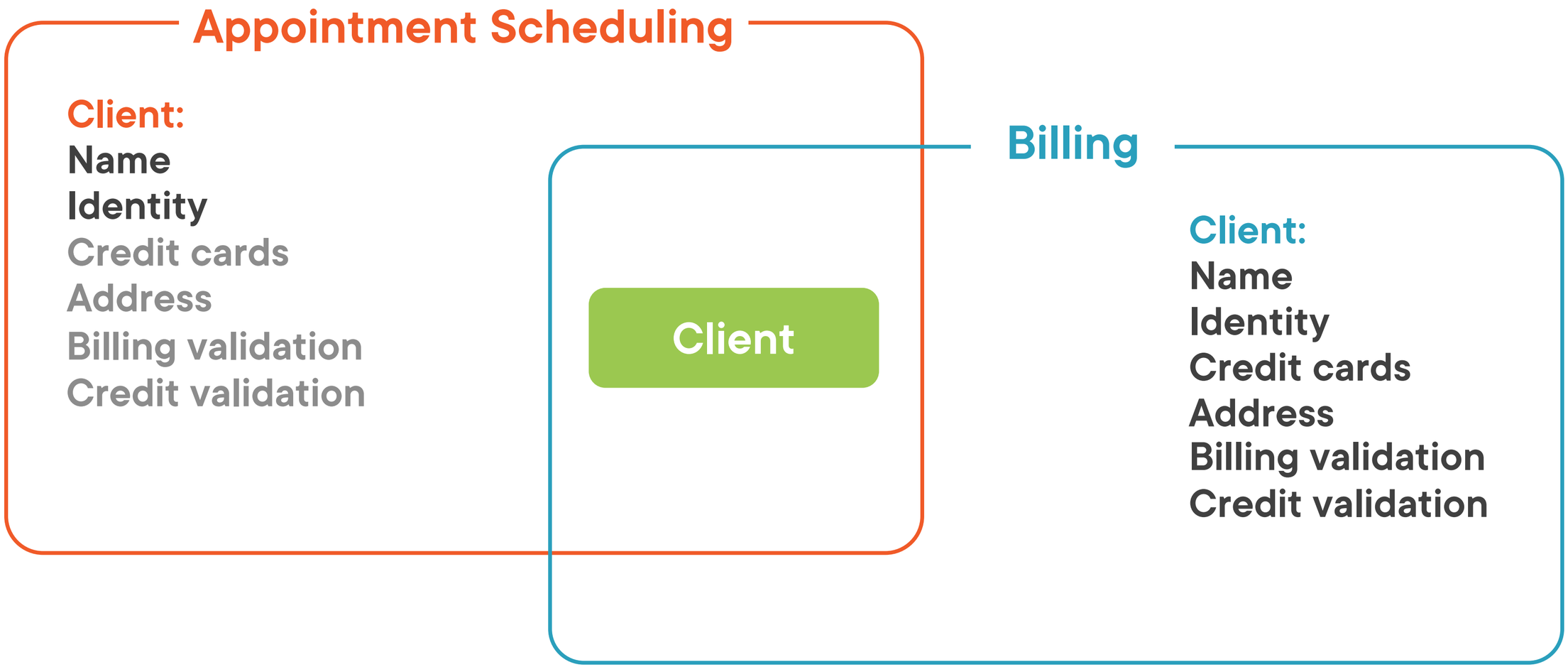
But What About those Common Types?

Appointment Scheduling

Client

Client:
Name
Identity

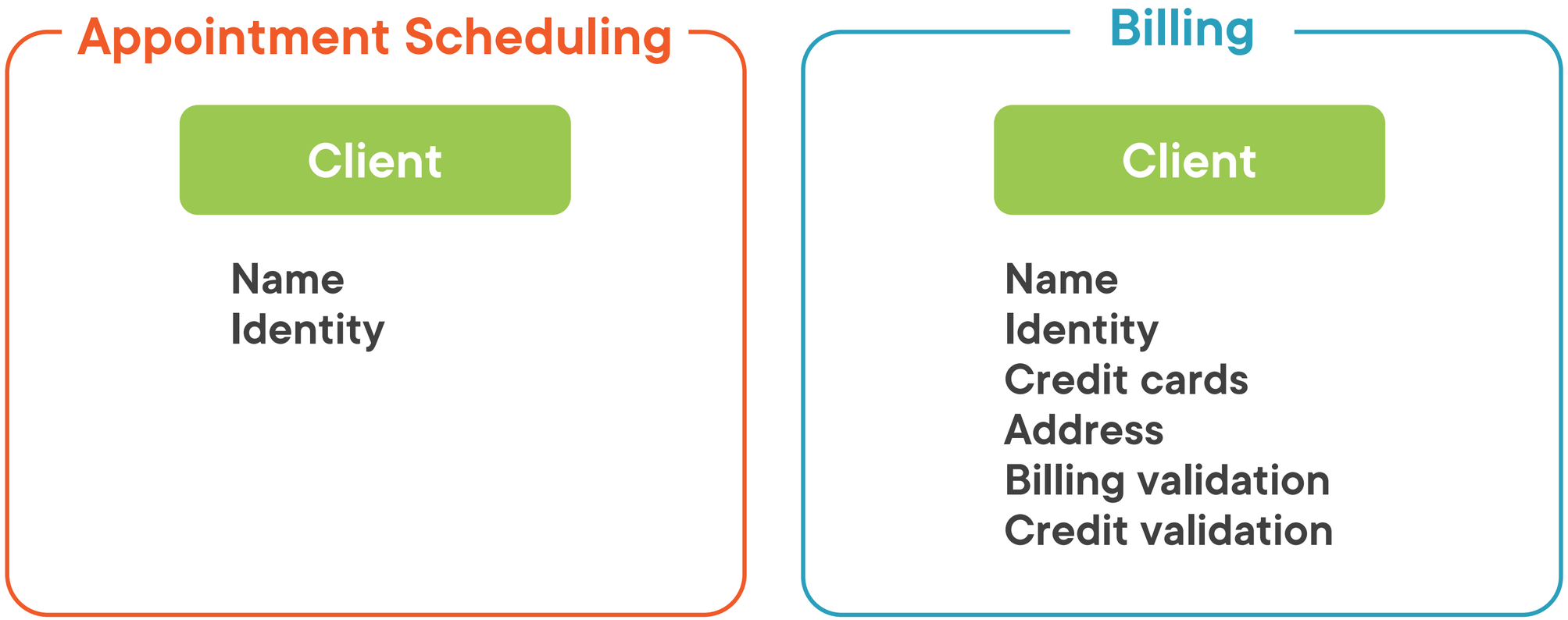
But What About those Common Types?



Explicitly define the context within which a model applies... Keep the model strictly consistent within these bounds, but don't be distracted or confused by issues outside.

Eric Evans

Bounded Context



Bounded Context

Appointment Scheduling

Client

Name
Identity

Billing

Client

Name
Identity
Credit cards
Address
Billing validation
Credit validation

Distinct Data, Code and Teams per Bounded Context?

Rarely see that level of separation in real world

You can introduce separation through namespaces, folders, and projects

While 100% is not achievable, strive for it

At least keep the concepts in mind for guidance

Not hard rules, but guidance

Let DDD guide you

Conversation with Eric Evans on Subdomains and Bounded Contexts

Subdomain

is a problem space concept

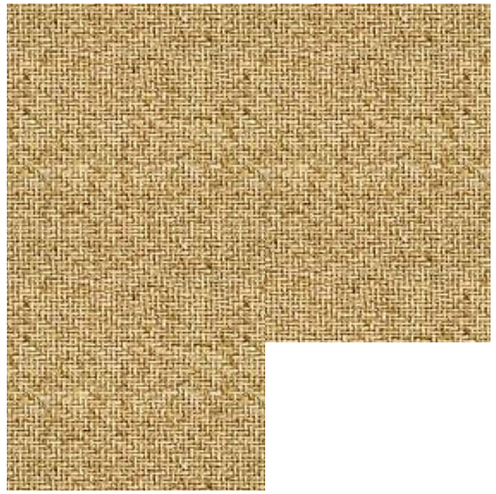
Bounded Context

is a solution space concept

Problem Space vs. Solution Space

Problem Space

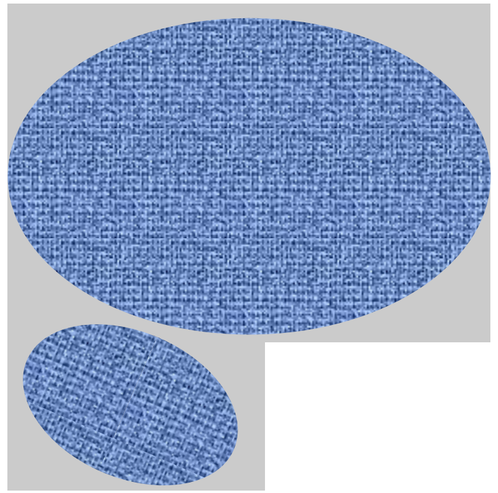
Bare floor of a room



Solution Space A

Wall to wall carpet

Same shape and size as the problem



Solution Space B

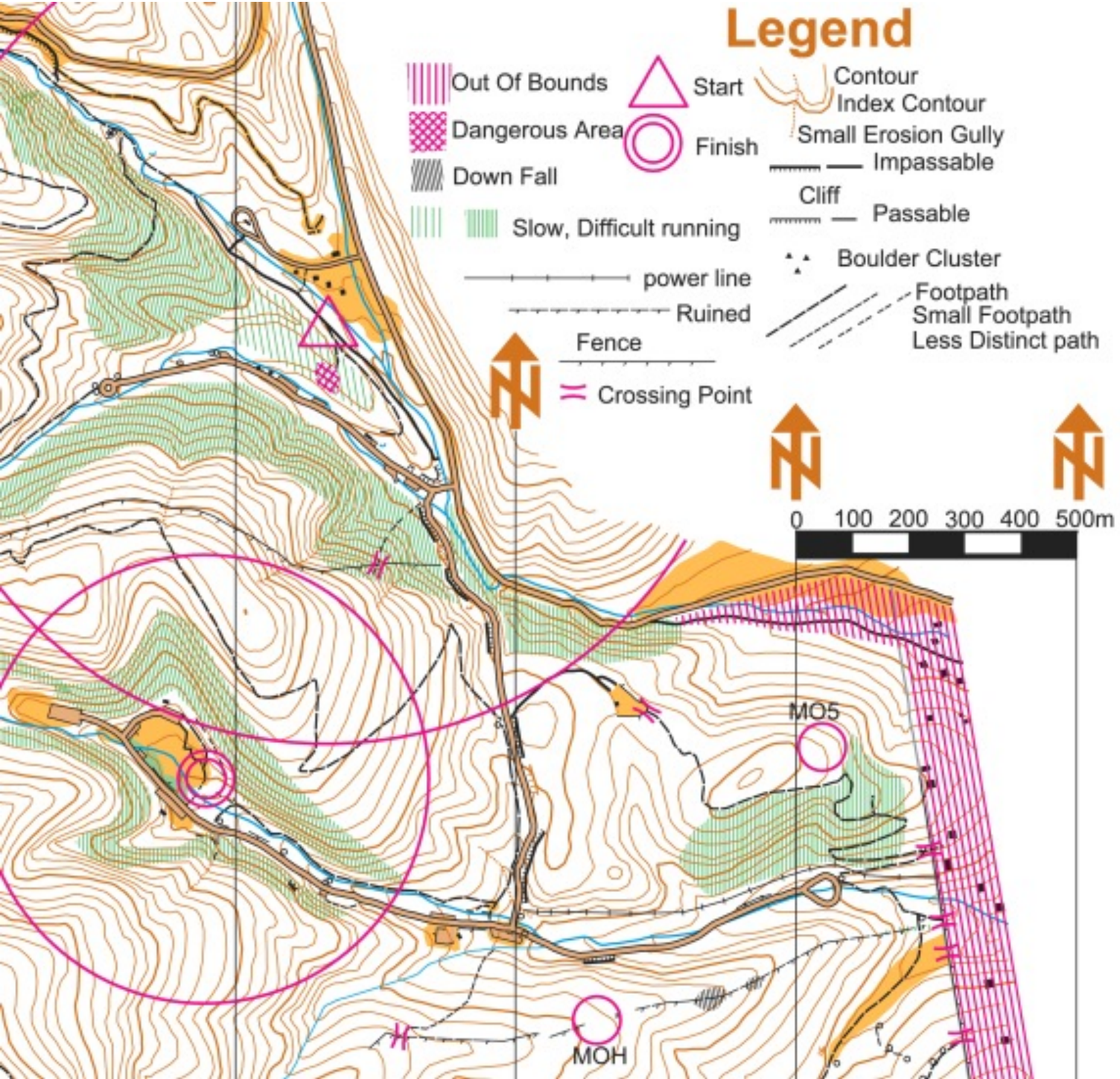
Area rugs

Clearly a different shape and size as the problem

Introducing Context Maps

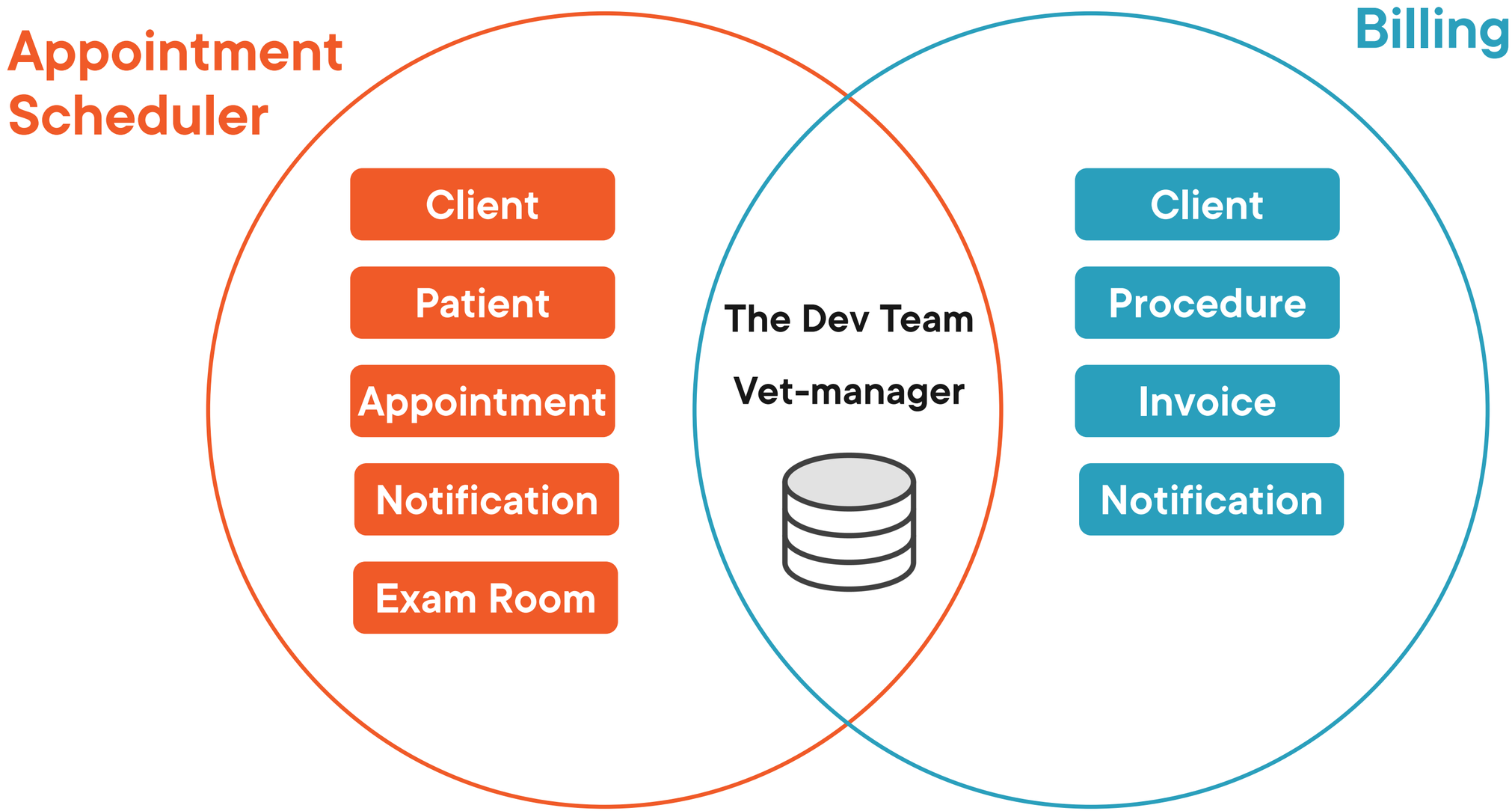
Context Map

Demonstrates how bounded contexts connect to one another while supporting communication between teams.



Source:
commons.wikimedia.org/wiki/File:Ardf_map.png

Context Maps



Context Maps

Appointment Scheduler

- Client
- Patient
- Appointment
- Notification
- Exam Room

Team Awesome
Vet-app-sched

Billing

- Client
- Procedure
- Invoice
- Notification

Team Ultimate
Vet-billing

Context Maps

Appointment Scheduler

- Client
- Patient
- Appointment
- Notification
- Exam Room

Team Awesome
Vet-app-sched

Shared Kernel

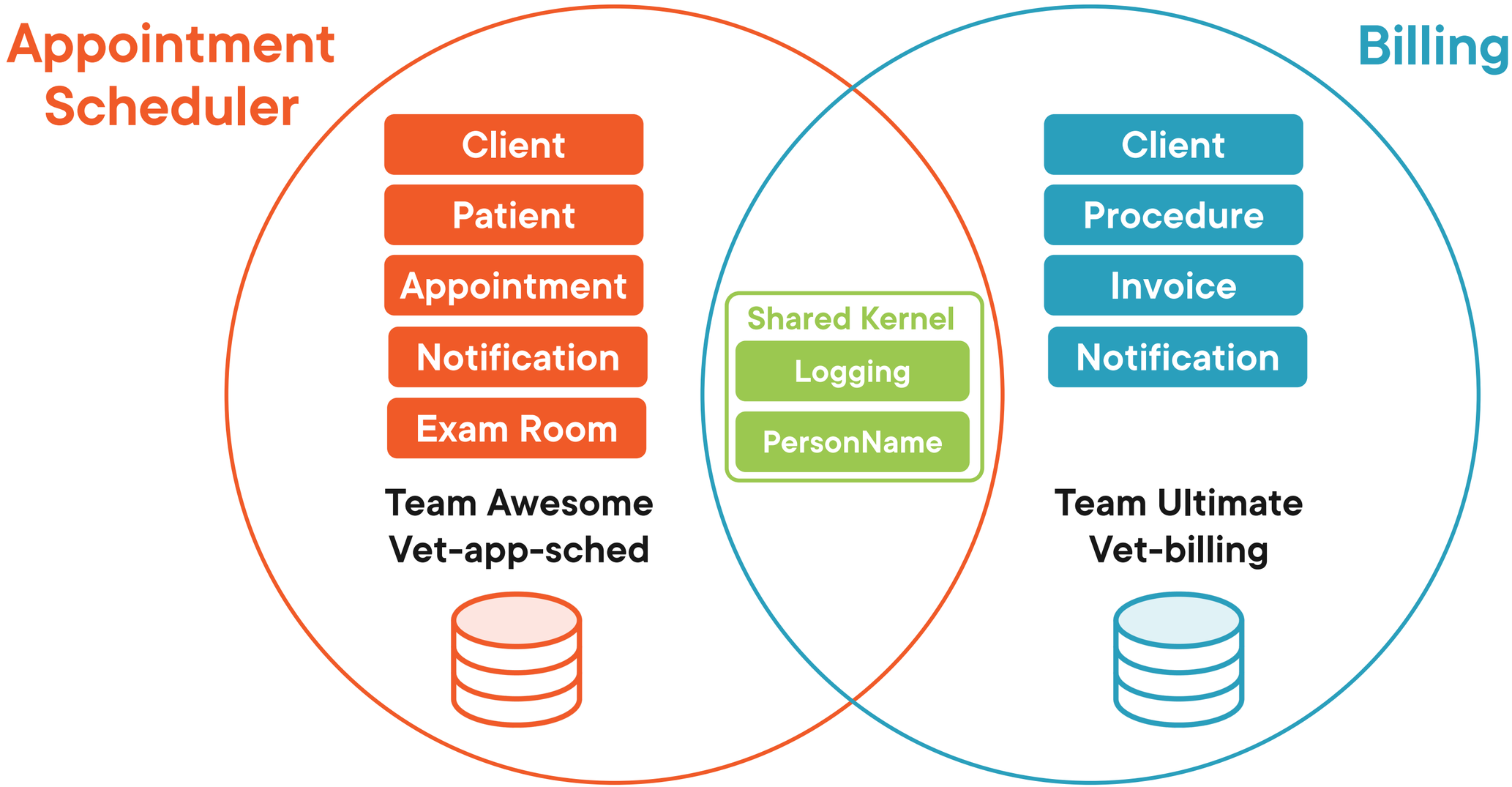
- Logging
- PersonName

Billing

- Client
- Procedure
- Invoice
- Notification

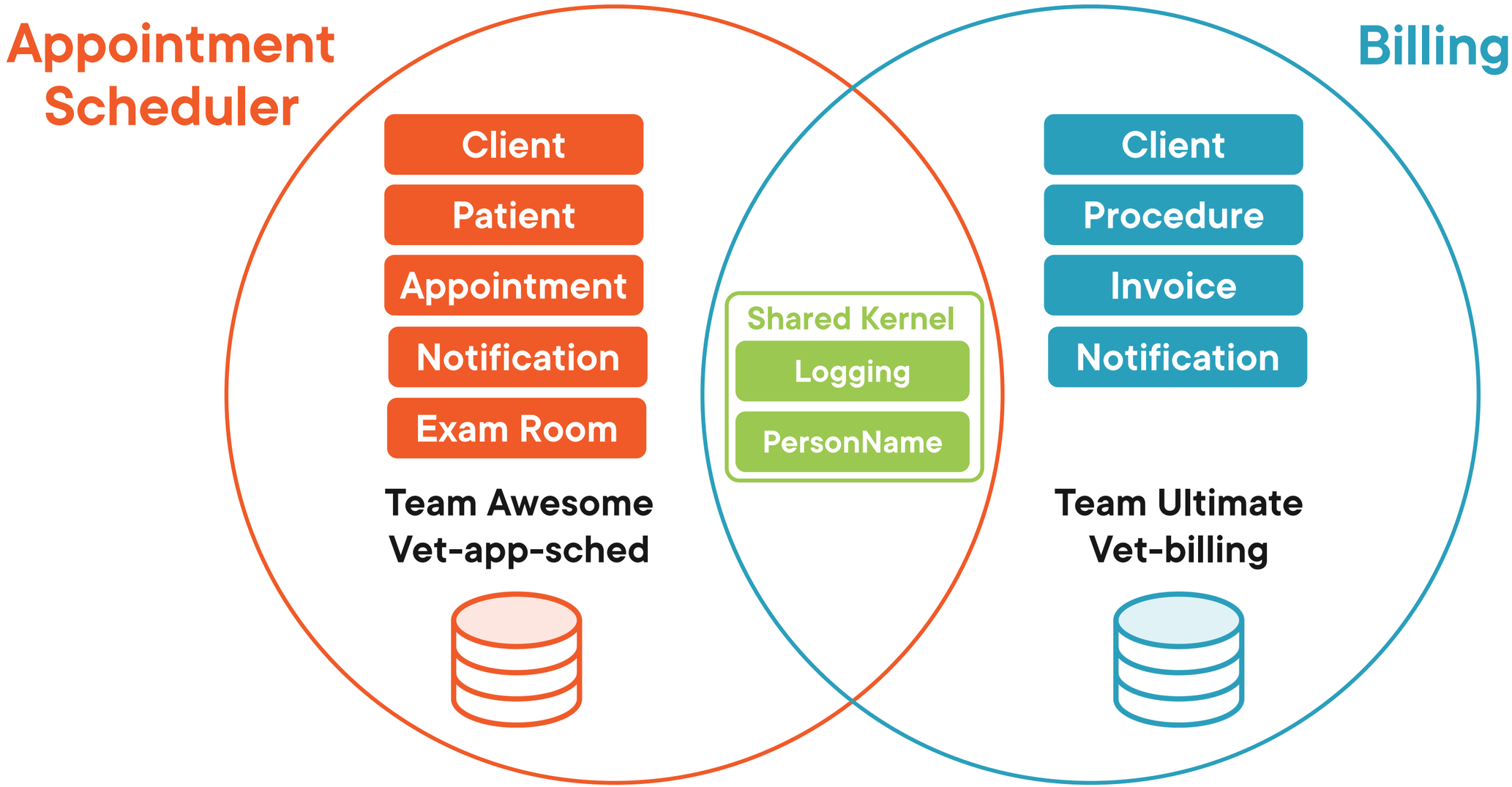
Team Ultimate
Vet-billing

Context Maps



Addressing the Question of Separate Databases per Bounded Context

Context Maps



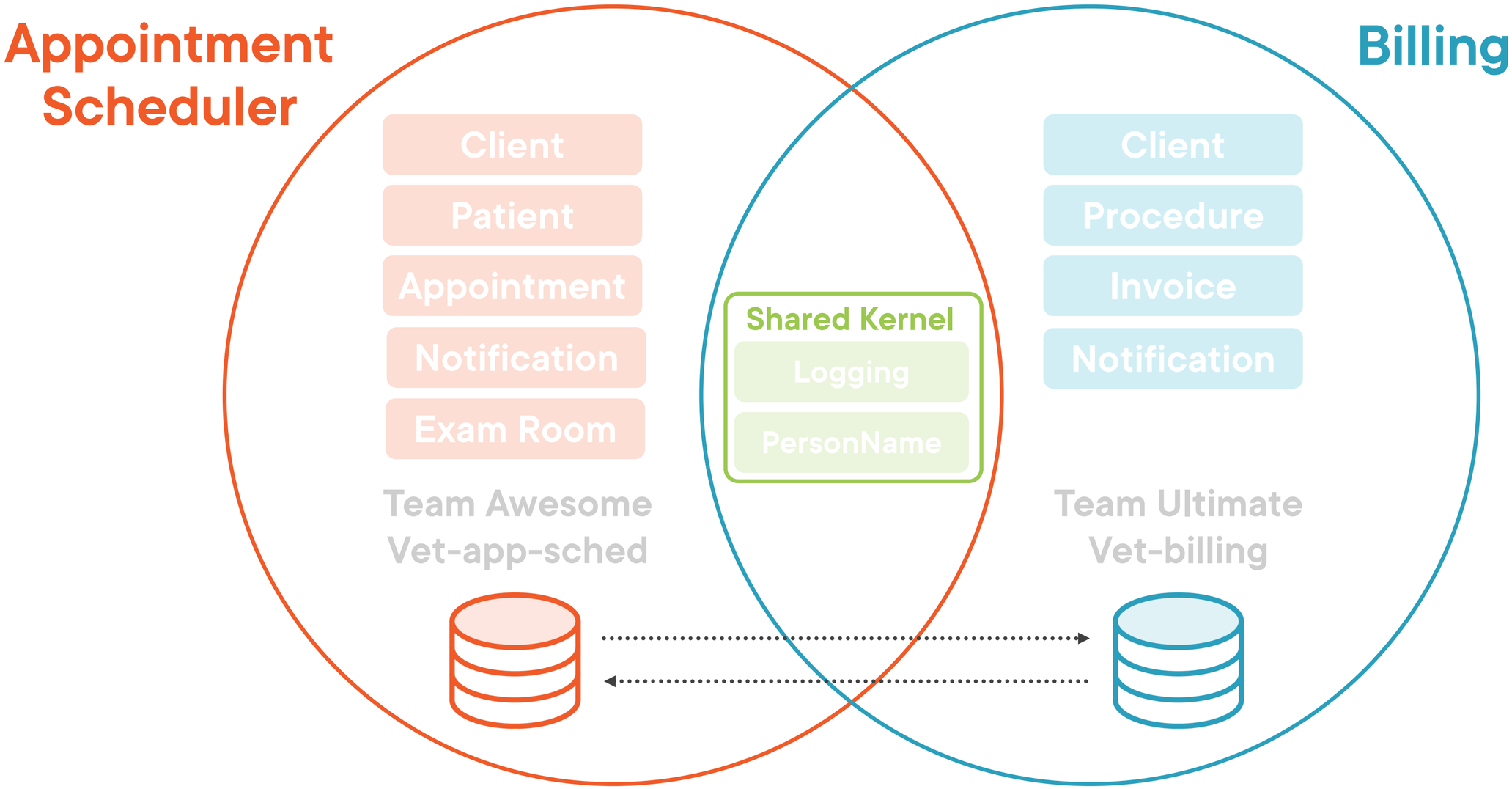
So Many Databases for Bounded Contexts

So Many Databases for Microservices

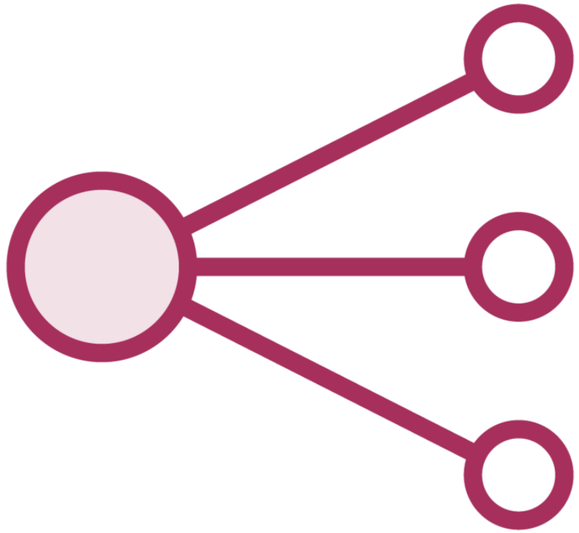
“If you’re in a company where you share your database and it gets updated by hundreds of different processes, it's very hard to create the kind of models that we're talking about and then write software that does anything interesting with those models.”

Eric Evans

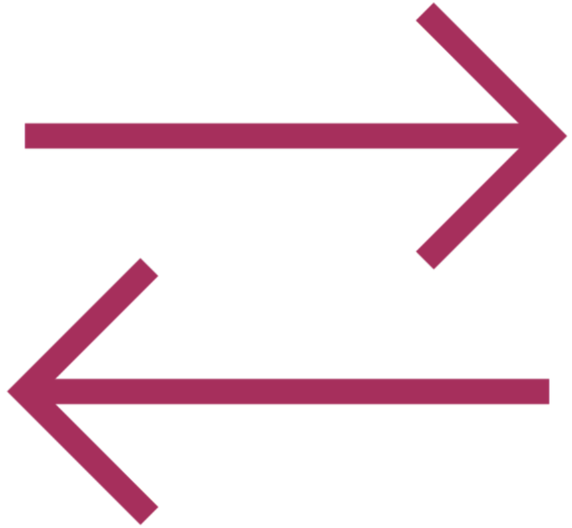
Syncing Data Between the DBs of the Separate BCs



Some Common Patterns for Data Syncing



Publisher Subscriber



2-way Synchronization

Implementations

Message Queues | **Database processes** | **Batch jobs** | **Synchronization APIs** | **& more ...**

Specifying Bounded Contexts in our Application

Eric Evans

It’s not a simple task, even with experience.

Lack of clear boundary impedes the application of DDD ideas.

Bounded context is an essential ingredient.

Defining boundaries is the biggest stumbling block.

Bounded Contexts in the Application

BC

Appointment scheduling

BC

Resource scheduling

BC

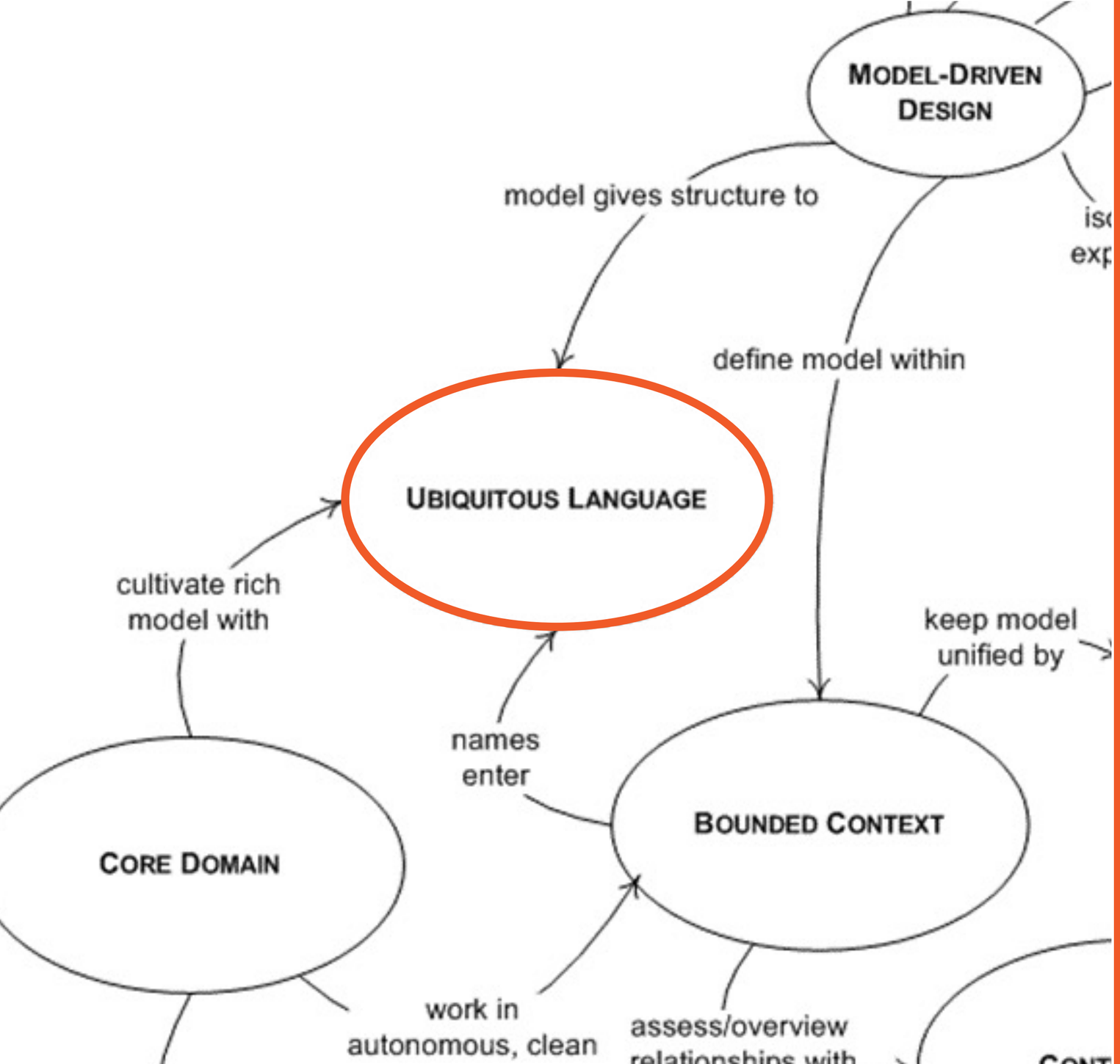
Client and patient management

Shared Kernel

Front End

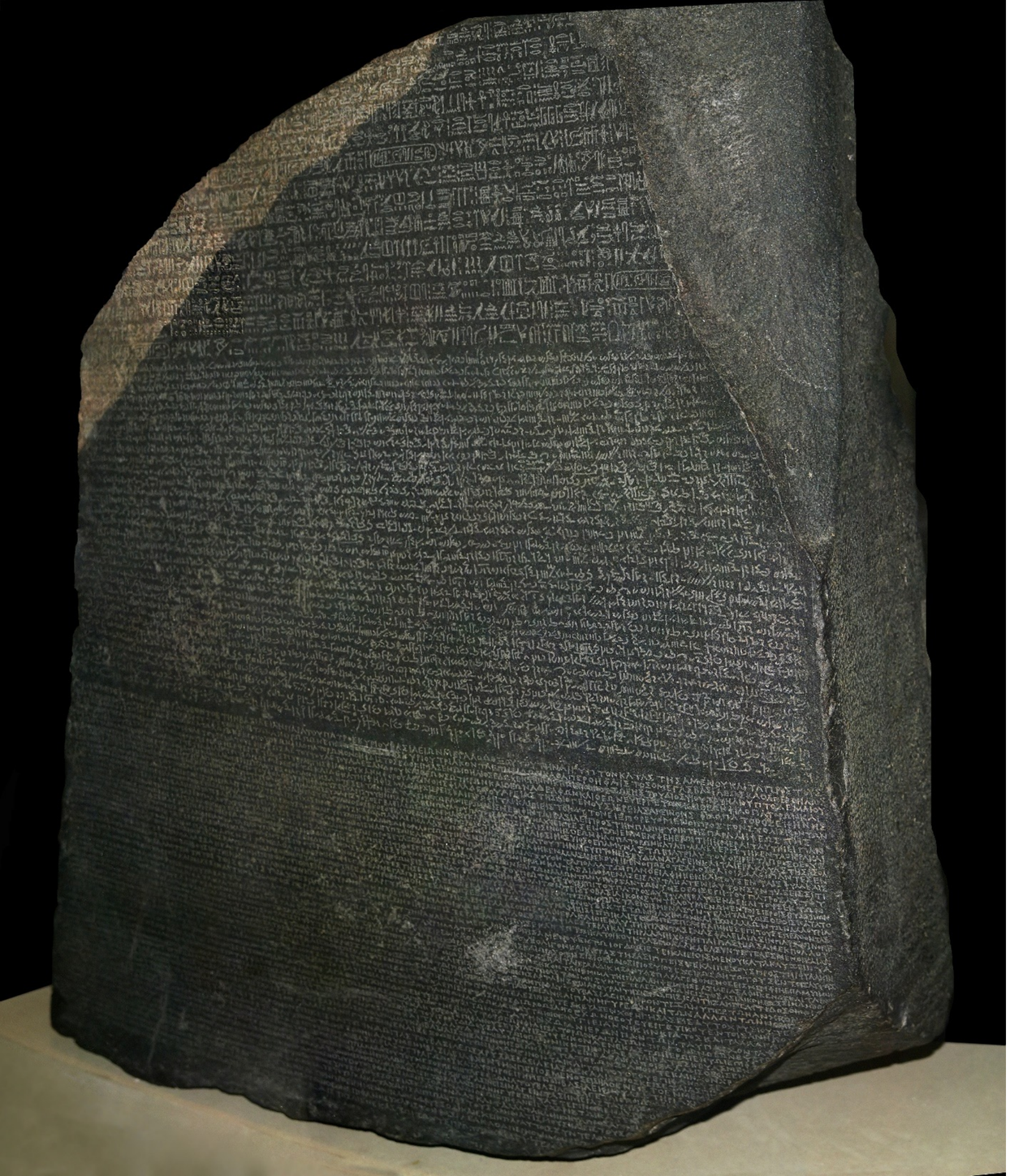
Understanding the Ubiquitous Language of a Bounded Context

The language we use is key to the shared understanding we want to have with our domain experts in order to be successful.



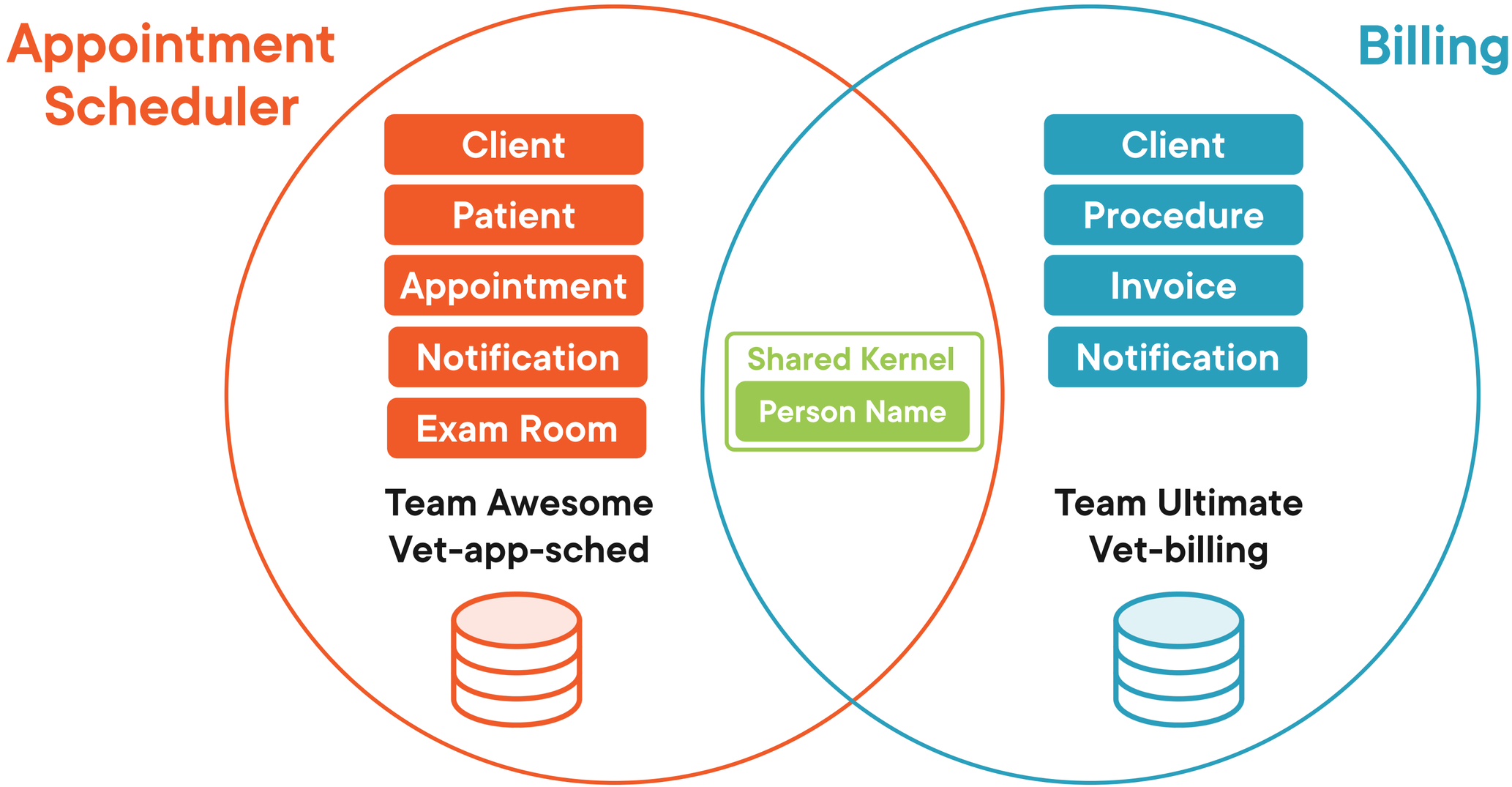
Ubiquitous Language

In the DDD Mind Map

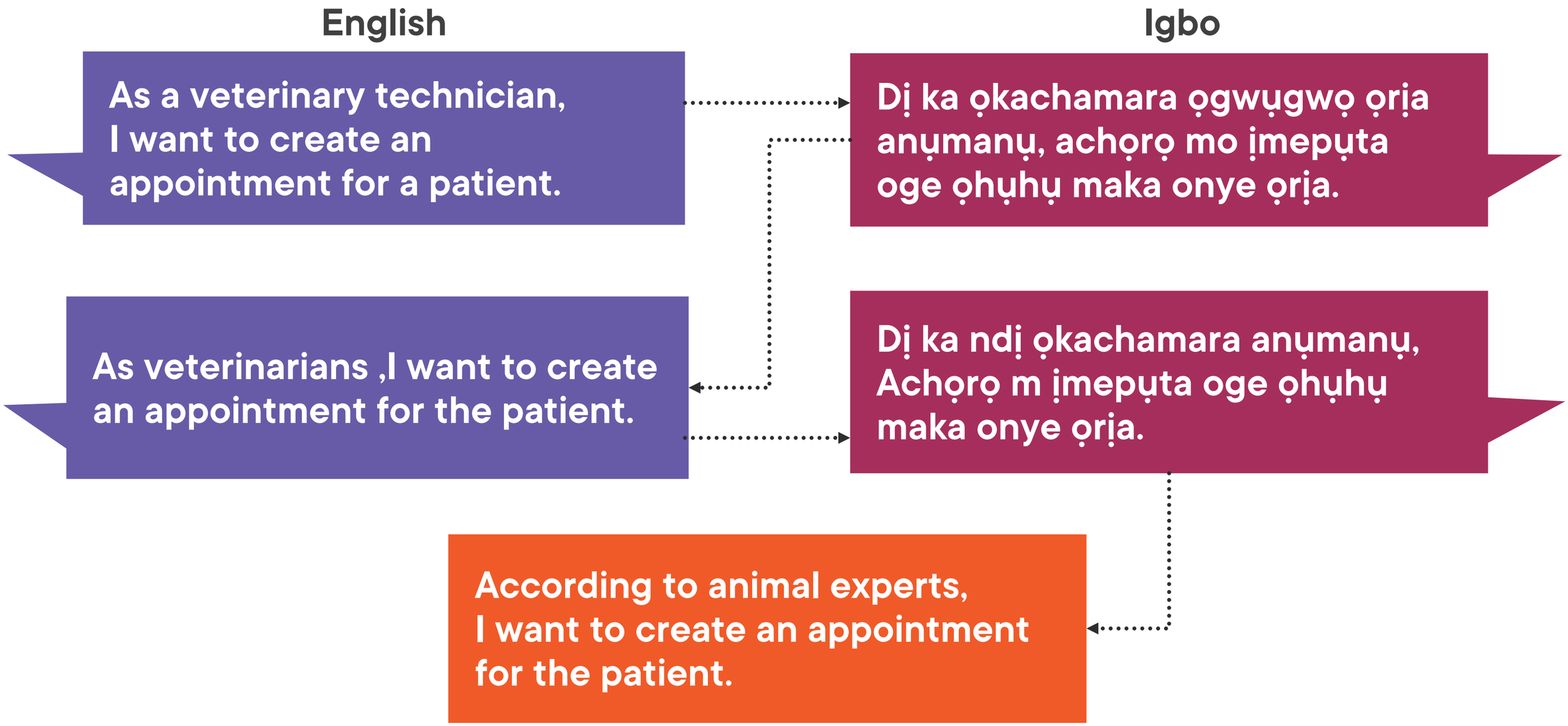


We don’t want to have to use a Rosetta Stone!

Context Maps



Lost in Translation



Pro Tip!

Try to explain back to the customer what you think they explained to you

Avoid:
“What I meant was…”

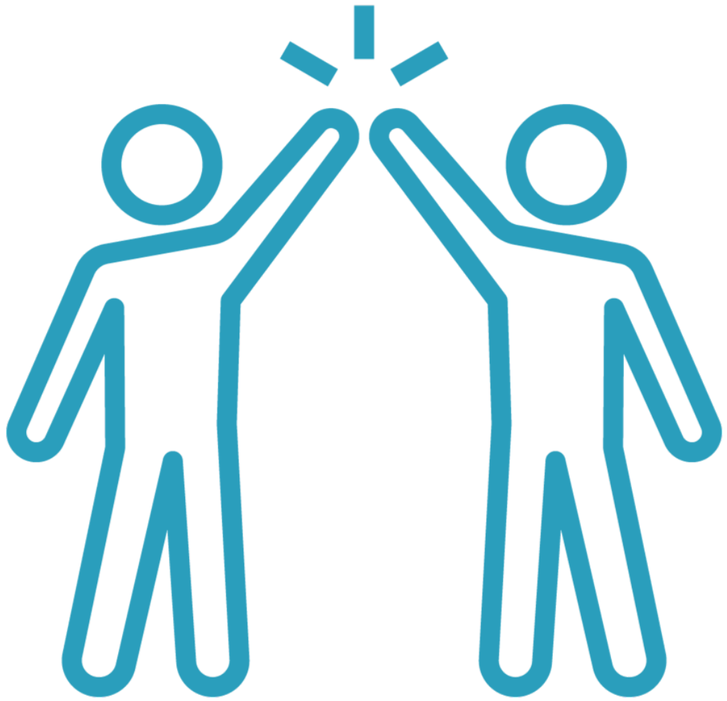
A project faces serious problems when its language is fractured.

Eric Evans

A ubiquitous language applies to a single bounded context and is used throughout conversations and code for that context.

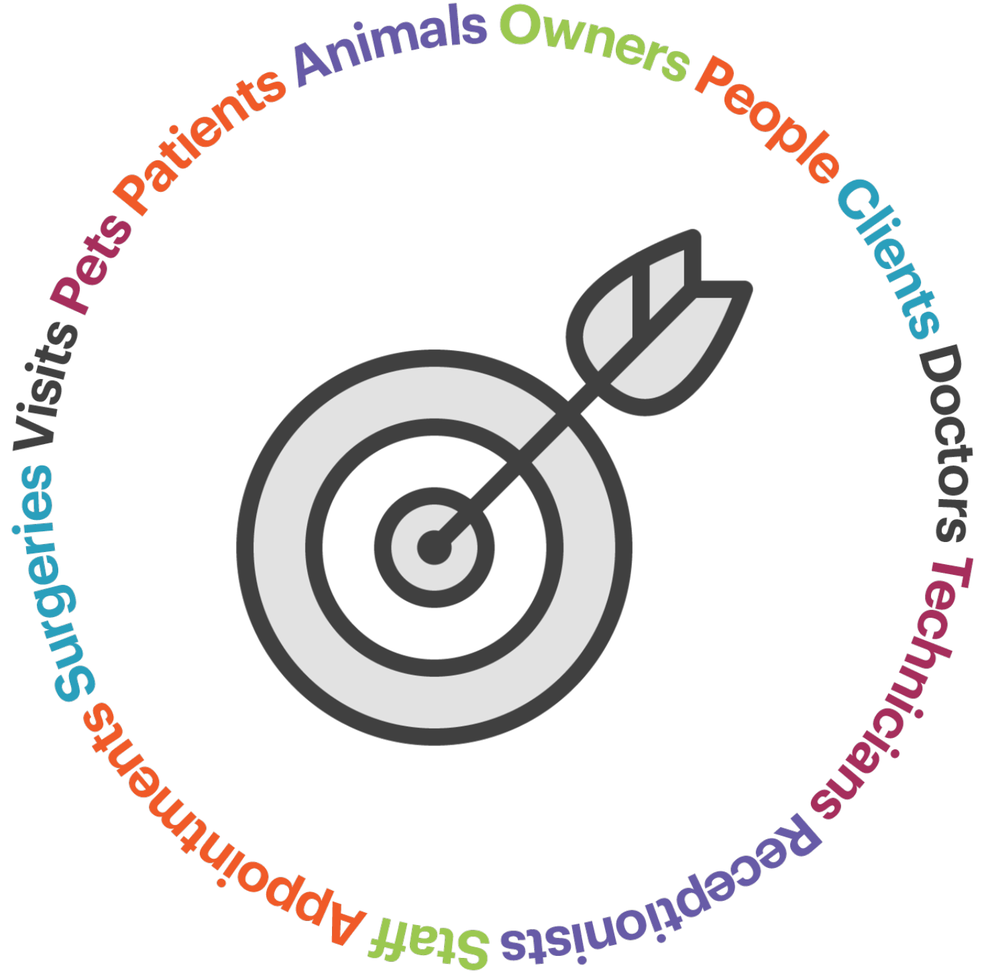
Conversation with a Domain Expert: Working on our Ubiquitous Language

Invest in Your Relationship with Domain Expert



Equal partners

Working on a Common, Ubiquitous Language for the Appointment Scheduling Bounded Context



Working on a Common, Ubiquitous Language for the Appointment Scheduling Bounded Context

Clients **Pet owners** **Owners** **Caretakers**

Business term

Real world

Person who:
Makes appointments
Pays the bills
Brings pets to clinic

Working on a Common, Ubiquitous Language for the Appointment Scheduling Bounded Context

Clients

Person who:
Makes appointments
Pays the bills
Brings pets to clinic

Pets

Clients

Patients

Animals

Working on a Common, Ubiquitous Language for the Appointment Scheduling Bounded Context

Clients

Person who:
Makes appointments
Pays the bills
Brings pets to clinic

Patients

Animal for whom:
Medical records are kept

Appointment

- **Surgery**

Office visit

- **Wellness exam**
- **Problem solving**
- **Tech task**

Working on a Common, Ubiquitous Language for the Appointment Scheduling Bounded Context

Clients	Person who: **Makes appointments** **Pays the bills** **Brings pets to clinic**
Patients	Animal for whom: **Medical records are kept**
Appointment	Scheduled time for: **Surgeries** **Any type of regular office visit**

Recognize that a change in the ubiquitous language is a change in the model.

Eric Evans

Reviewing Important Concepts from This Module

Problem Domain

The specific problem the software you're working on is trying to solve

Reviewing Important Concepts from This Module

Core Domain

The key differentiator for the customer's business -- something they must do well and cannot outsource

Subdomains

Separate applications or features your software must support or interact with

Bounded Context

A specific responsibility, with explicit boundaries that separate it from other parts of the system

Reviewing Important Concepts from This Module

Context Mapping

The process of identifying bounded contexts and their relationships to one another

Shared Kernel

Part of the model that is shared by two or more teams, who agree not to change it without collaboration

Ubiquitous Language

The language using terms from a domain model that programmers and domain experts use to discuss that particular sub-system

Julie & Steve Share Some More Thoughts About the Ubiquitous Language

Terms can seem overwhelming at first

But they are important to ensure a common understanding of the process

The terms are almost “the ubiquitous language” of DDD

Easier to convey meaning

The ubiquitous language of a bounded context is ubiquitous throughout everything you do in that context – discuss, model, code, etc.

In code, namespaces are helpful to quickly identify which bounded context you're working in

Review and Resources

Key Takeaways

- Introduced our domain: vet practice
- Many discussions with domain expert
- Identified core domain & subdomains
- Identified bounded contexts
- Addressed “shared” concepts
- Began deriving a ubiquitous language

Thanks to Eric Evans for
his great advice and insights

domainlanguage.com

Up Next: Elements of a Domain Model

Domain-Driven Design Fundamentals

Modeling Problems in Software

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