

AGENT FOR DDD BACK AND FORTH

A. RICCI, S. BURATTINI, M. CASTELLUCCI
University of Bologna, Italy

A. CIORTEA
University of St.Gallen, Switzerland





Agent-Oriented
Software Development

MAS platforms & tools



Agent-Oriented
Software Development

MAS platforms & tools

(mainstream / in practice)

Software Development

Software Architectures

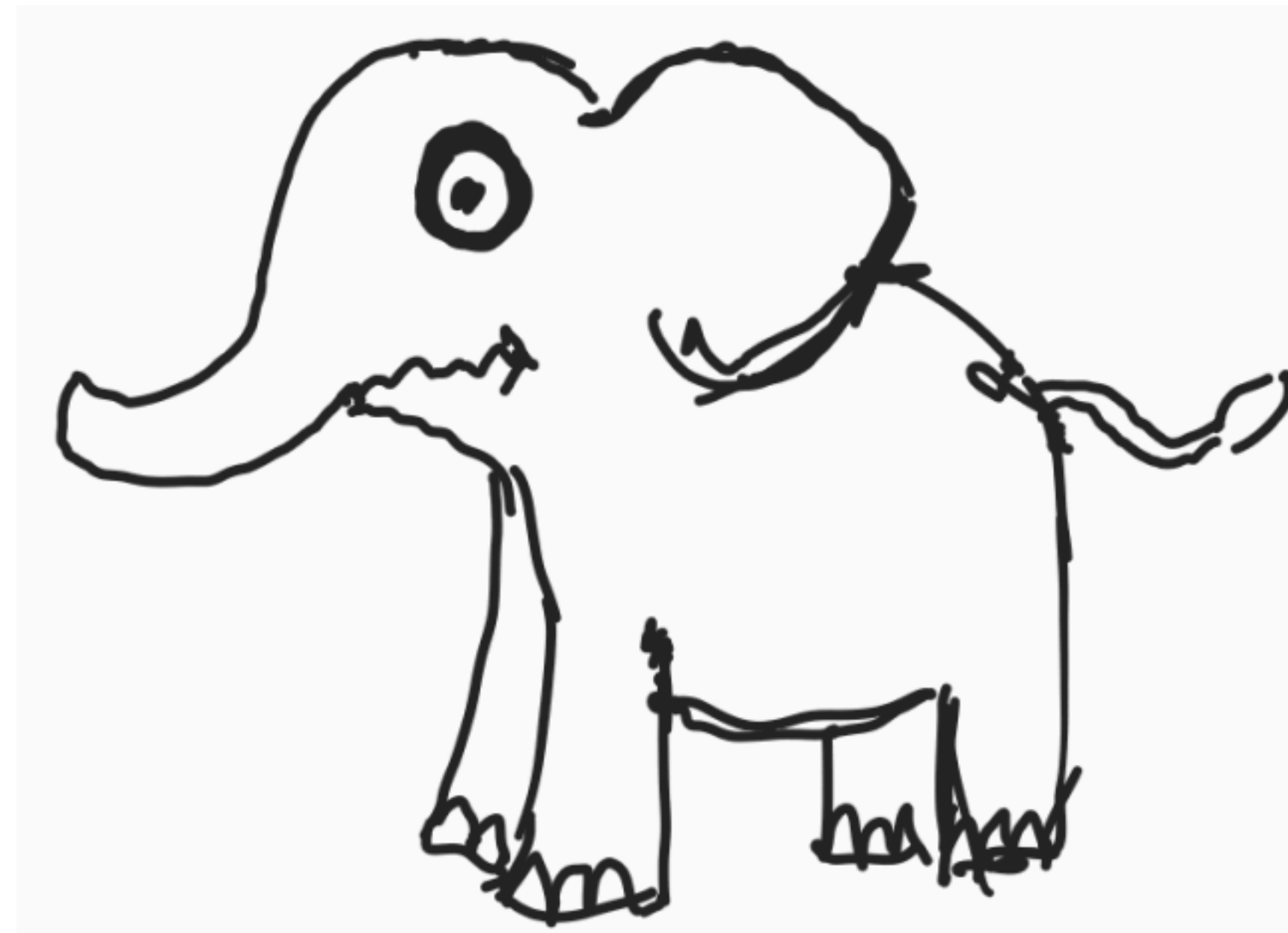
Distributed Systems

Applications | IoT + Web



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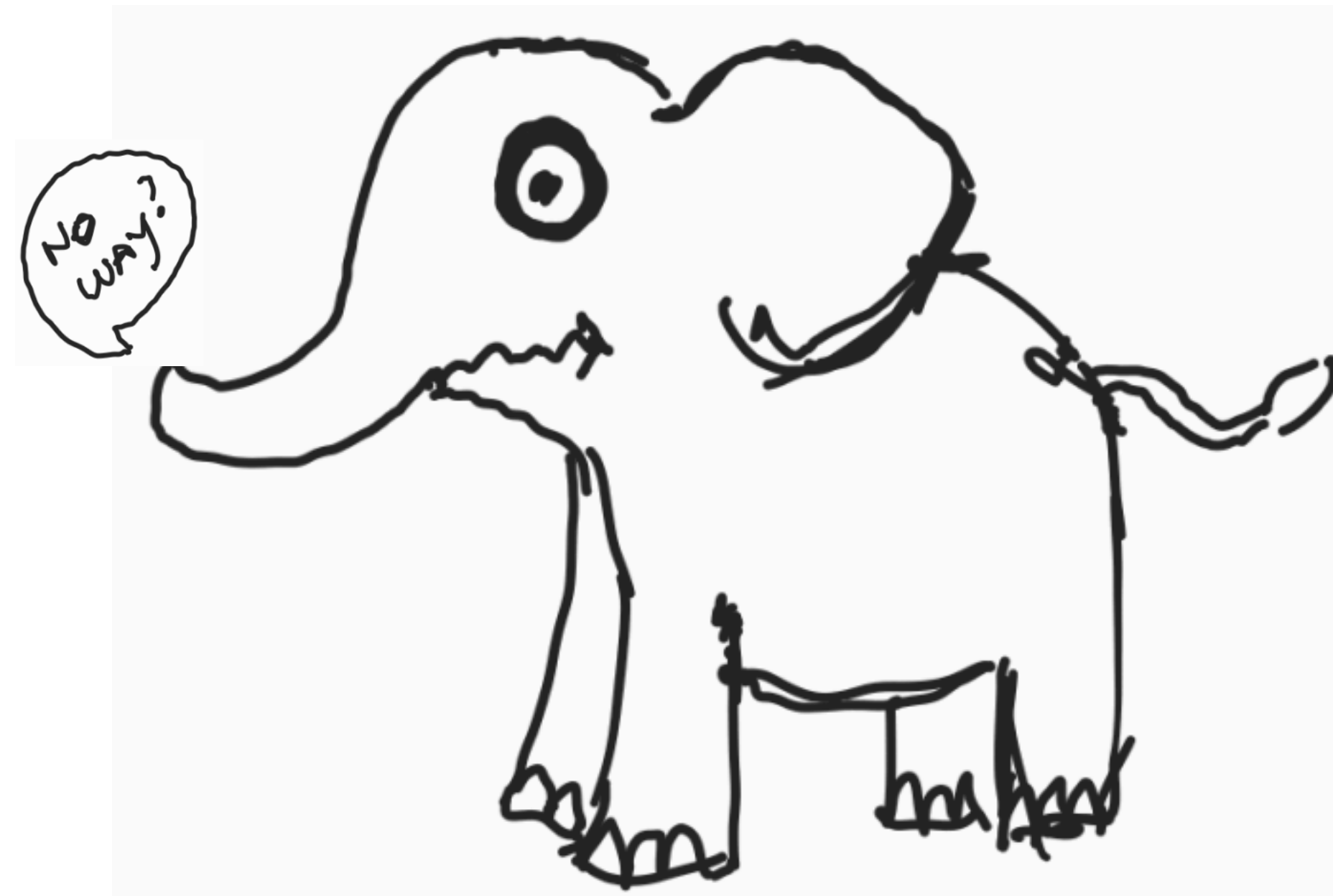
Distributed Systems

Applications | IoT + Web



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DOMAIN DRIVEN DESIGN (DDD)

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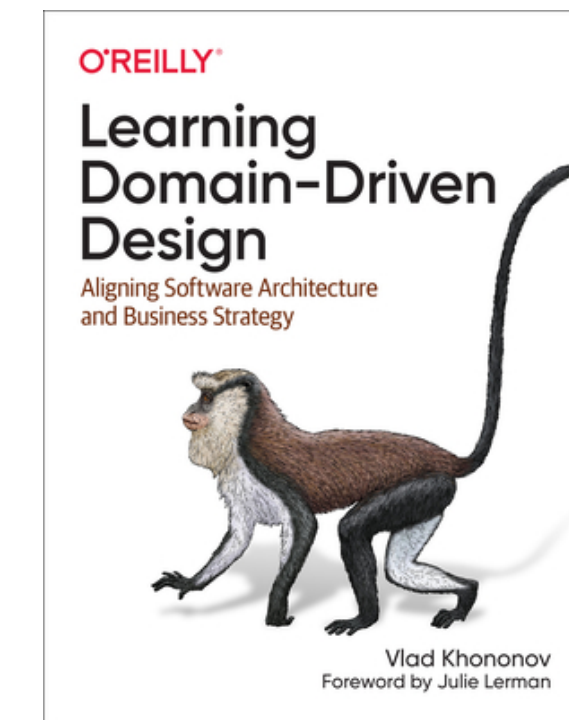
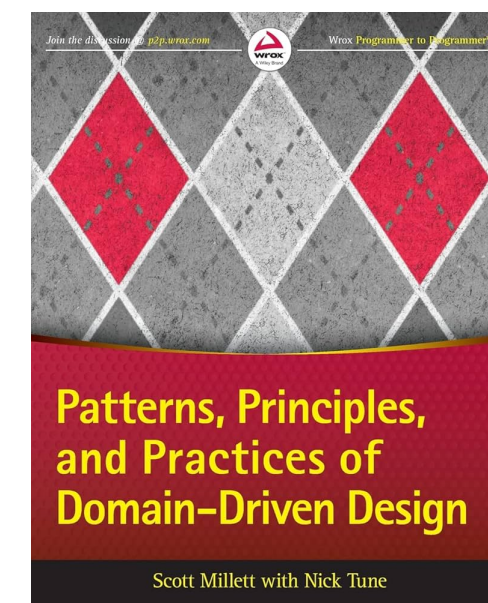
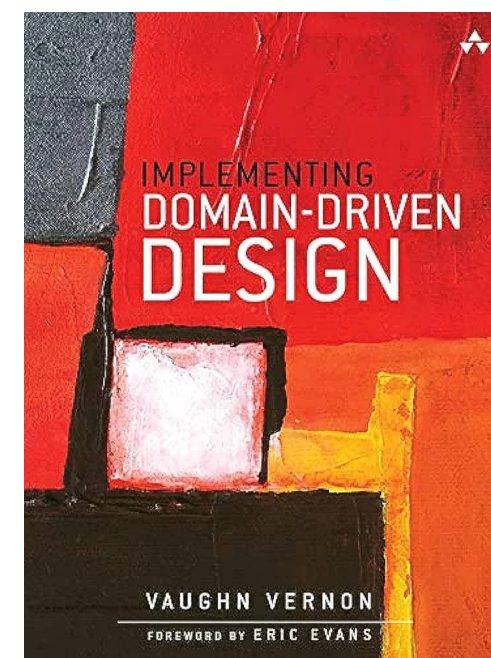
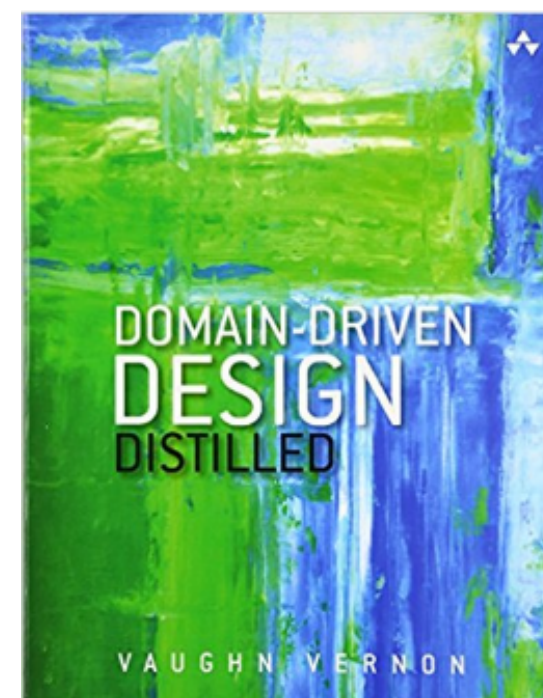
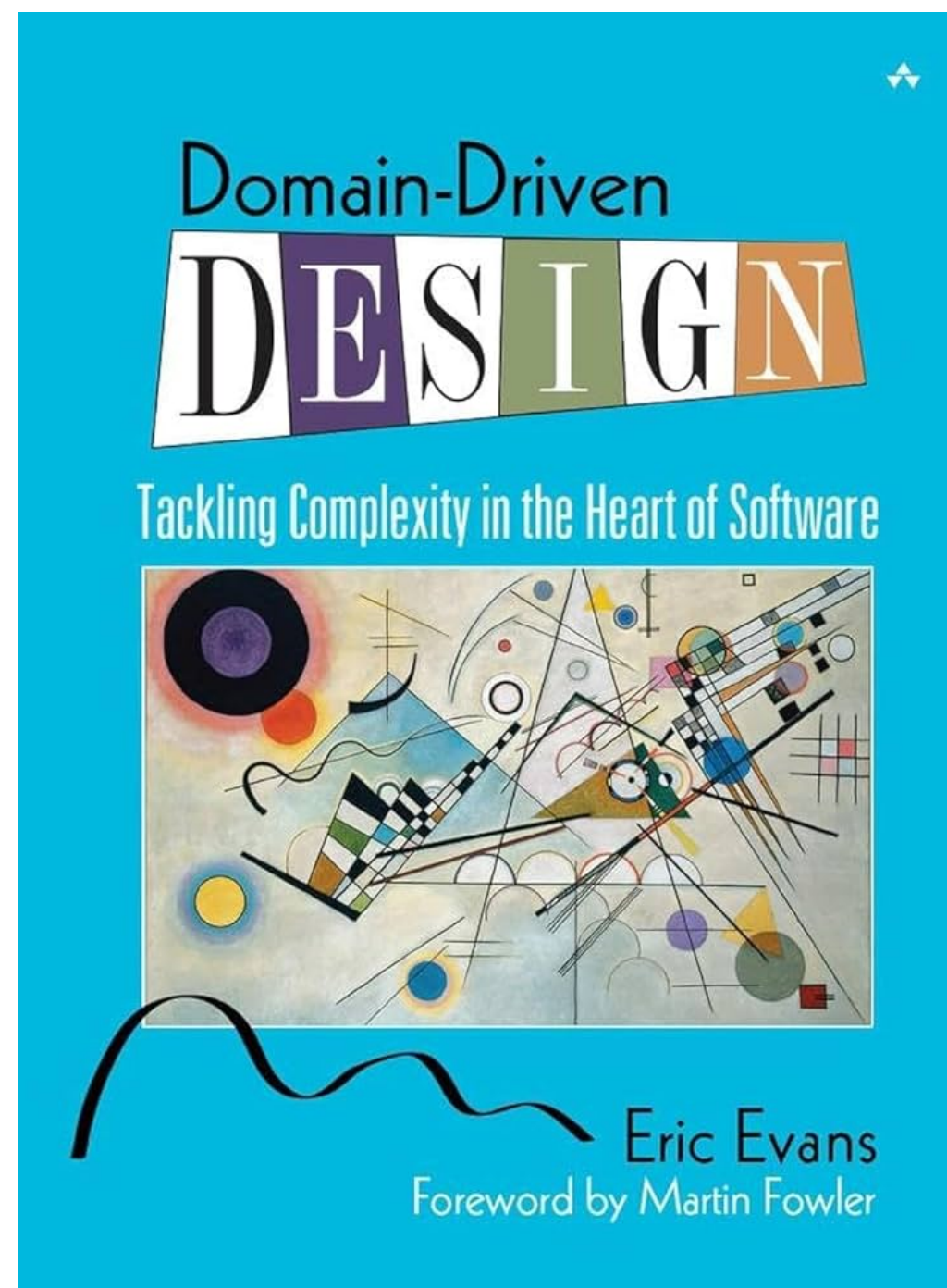
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DOMAIN DRIVEN DESIGN (DDD)

- Software design approach ***“tackling complexity in the heart of software”***
- Well-known and widespread in the “agile community”

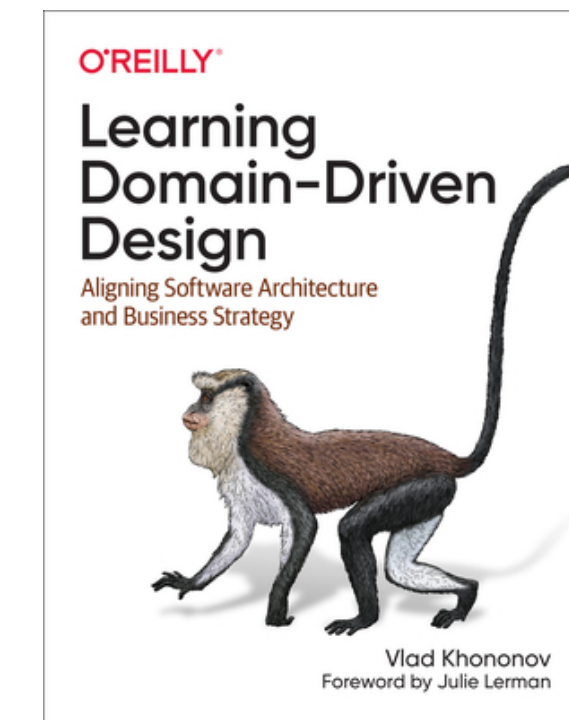
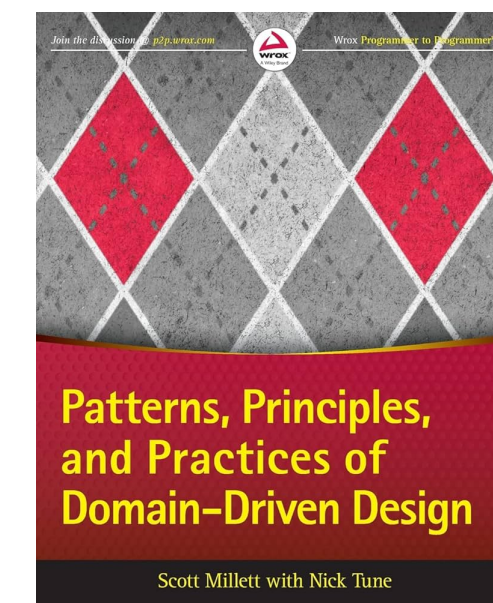
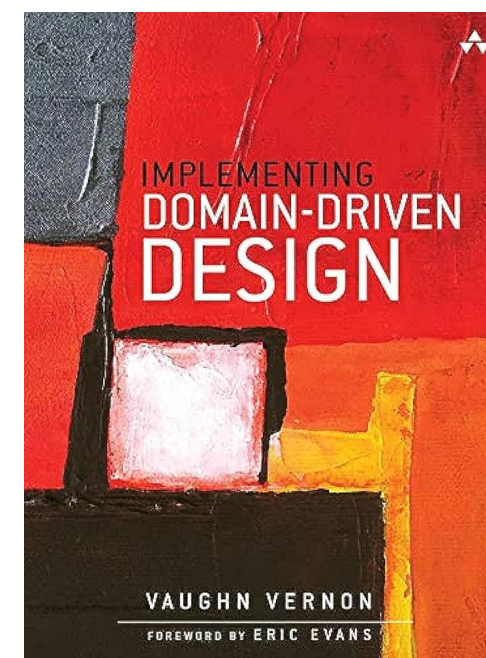
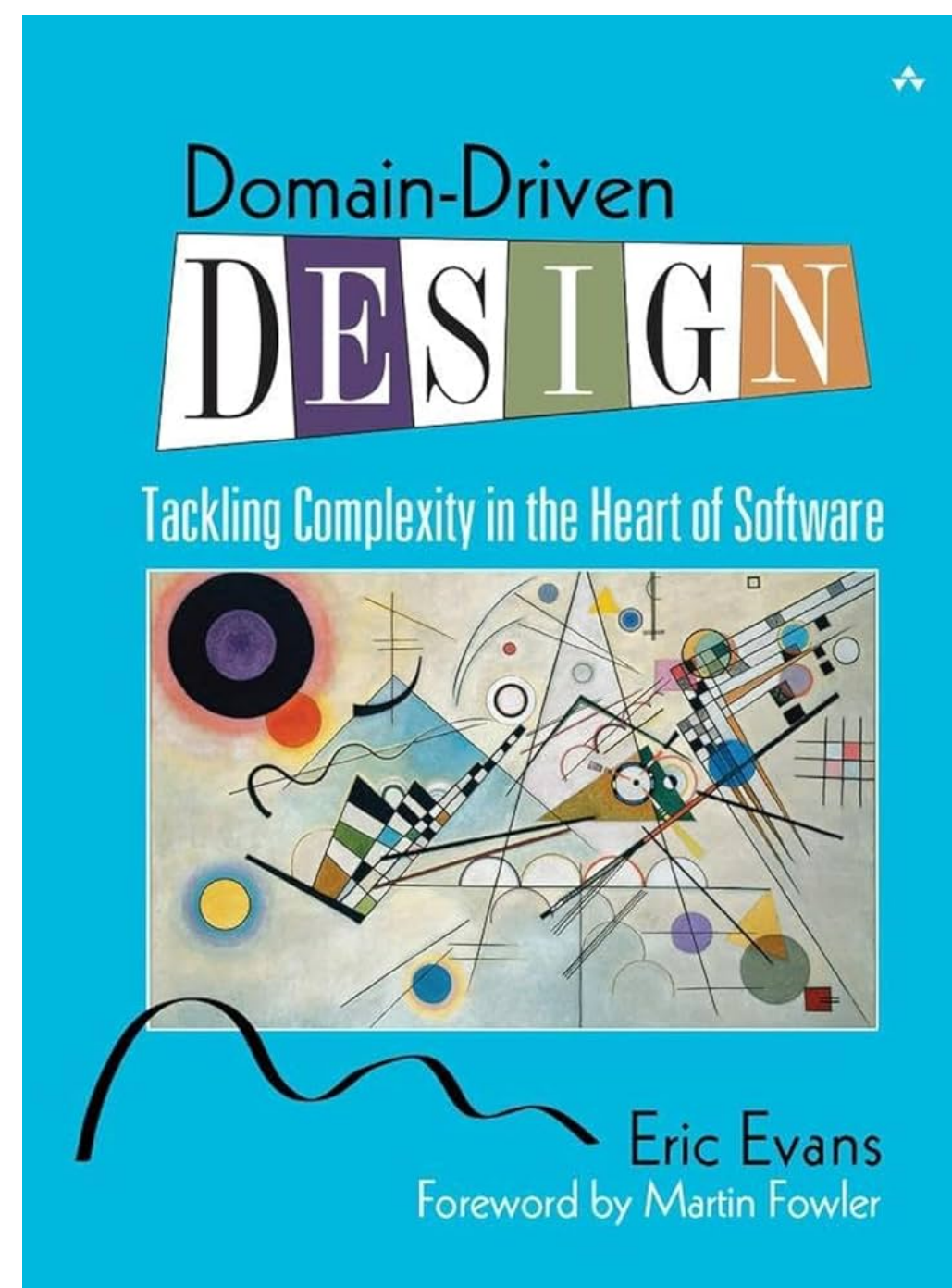
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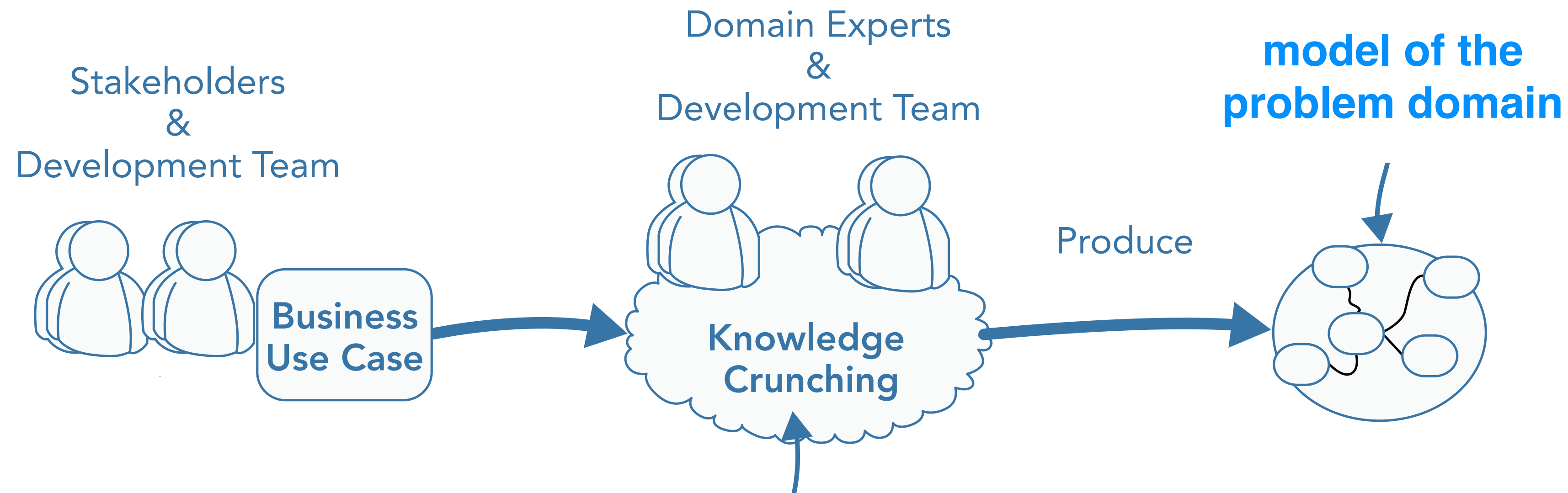
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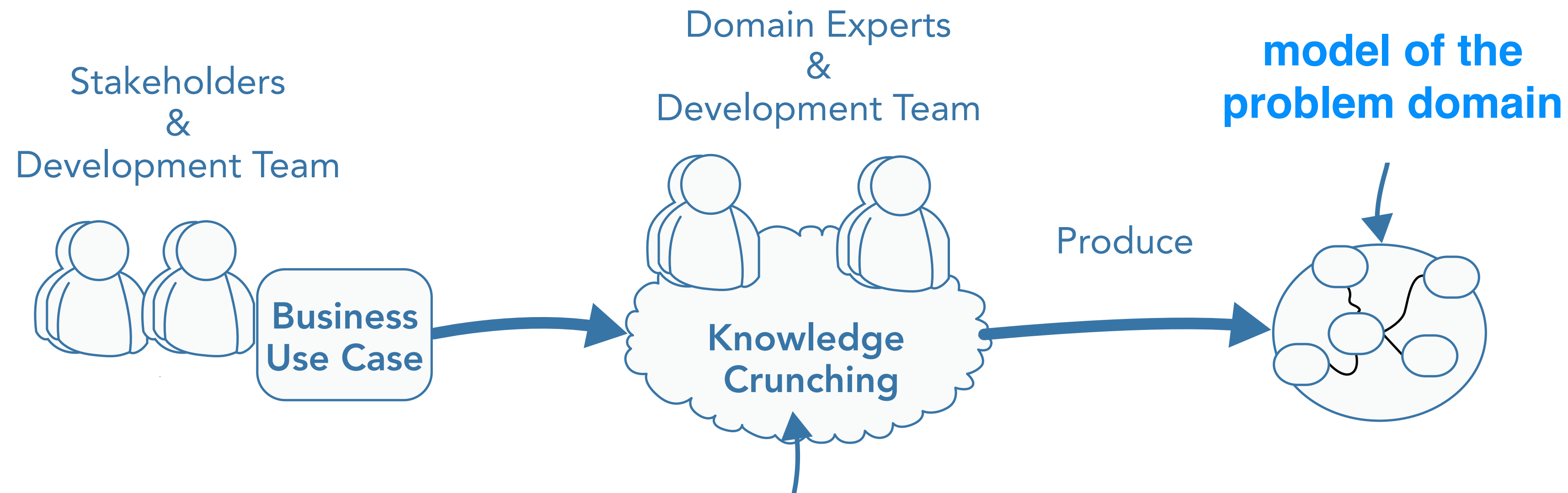
EXPLORE DDD conference
DDD Europe conference

DDD KEY PRINCIPLES



- Focus on the core **domain**
- Explore **models** in a creative collaboration of domain practitioners
- Speak a **ubiquitous language** within explicitly **bounded contexts**

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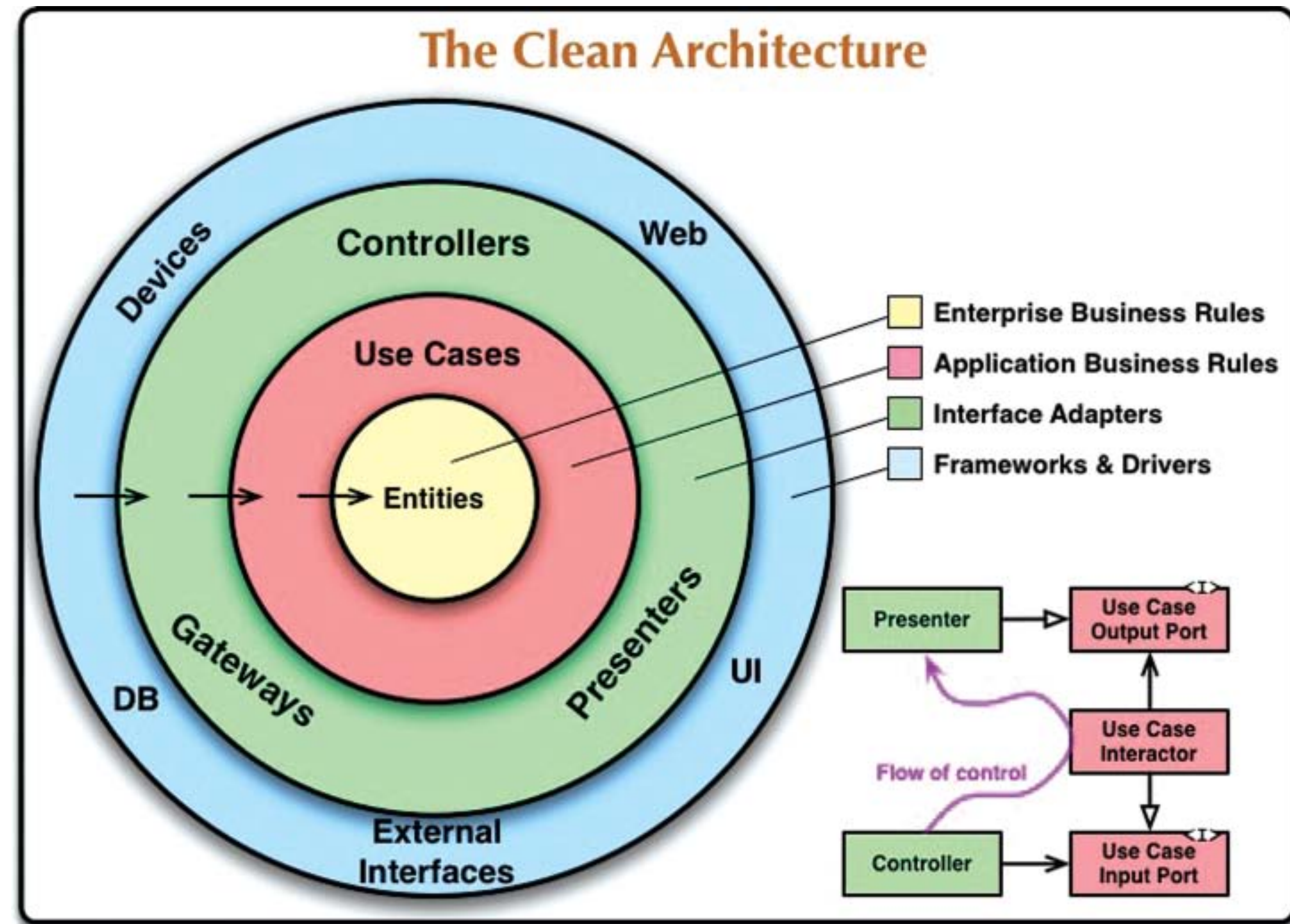


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AT THE ARCHITECTURAL LEVEL

the domain layer
as the *heart*
of the application

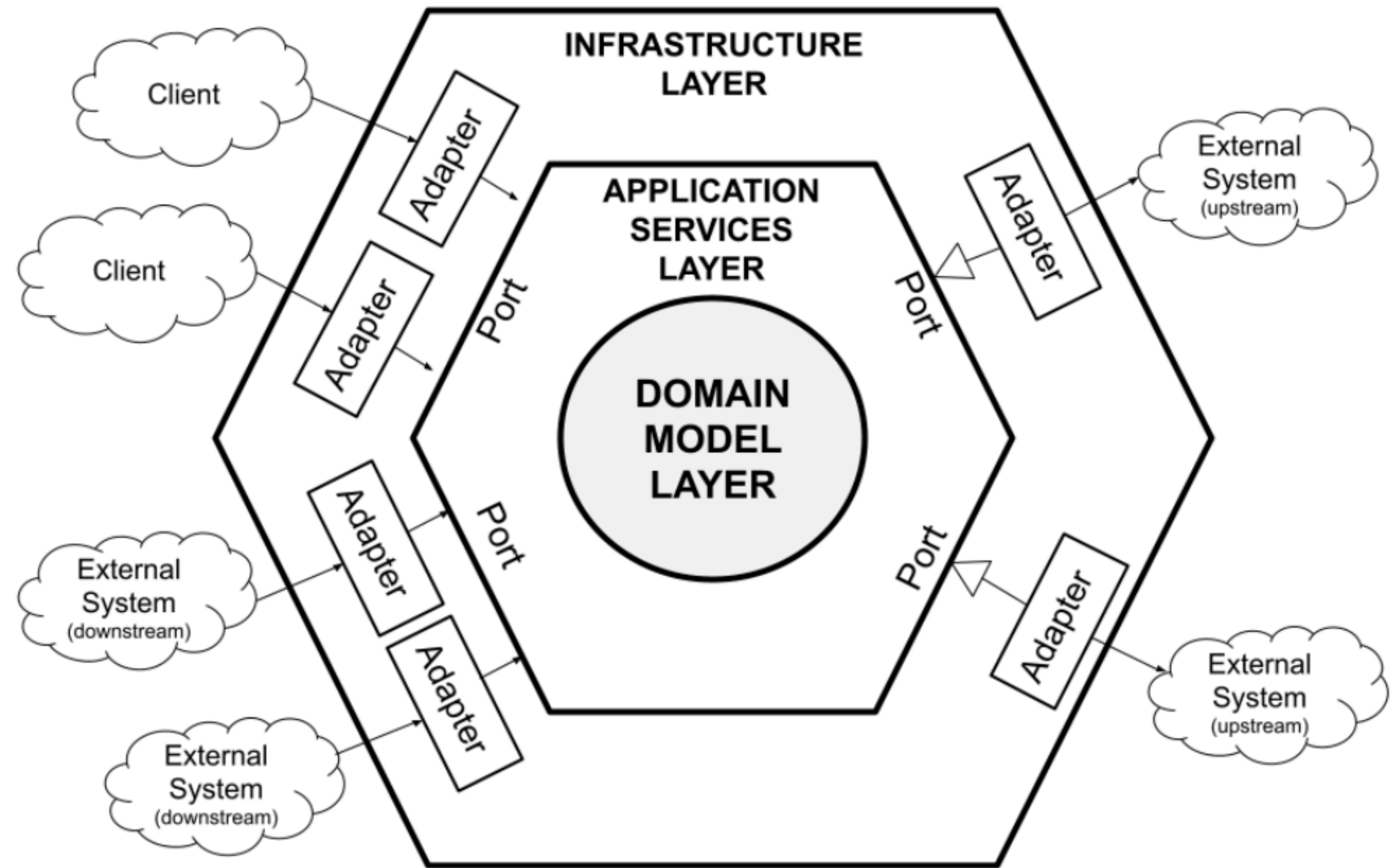
- not depending by
any other layer



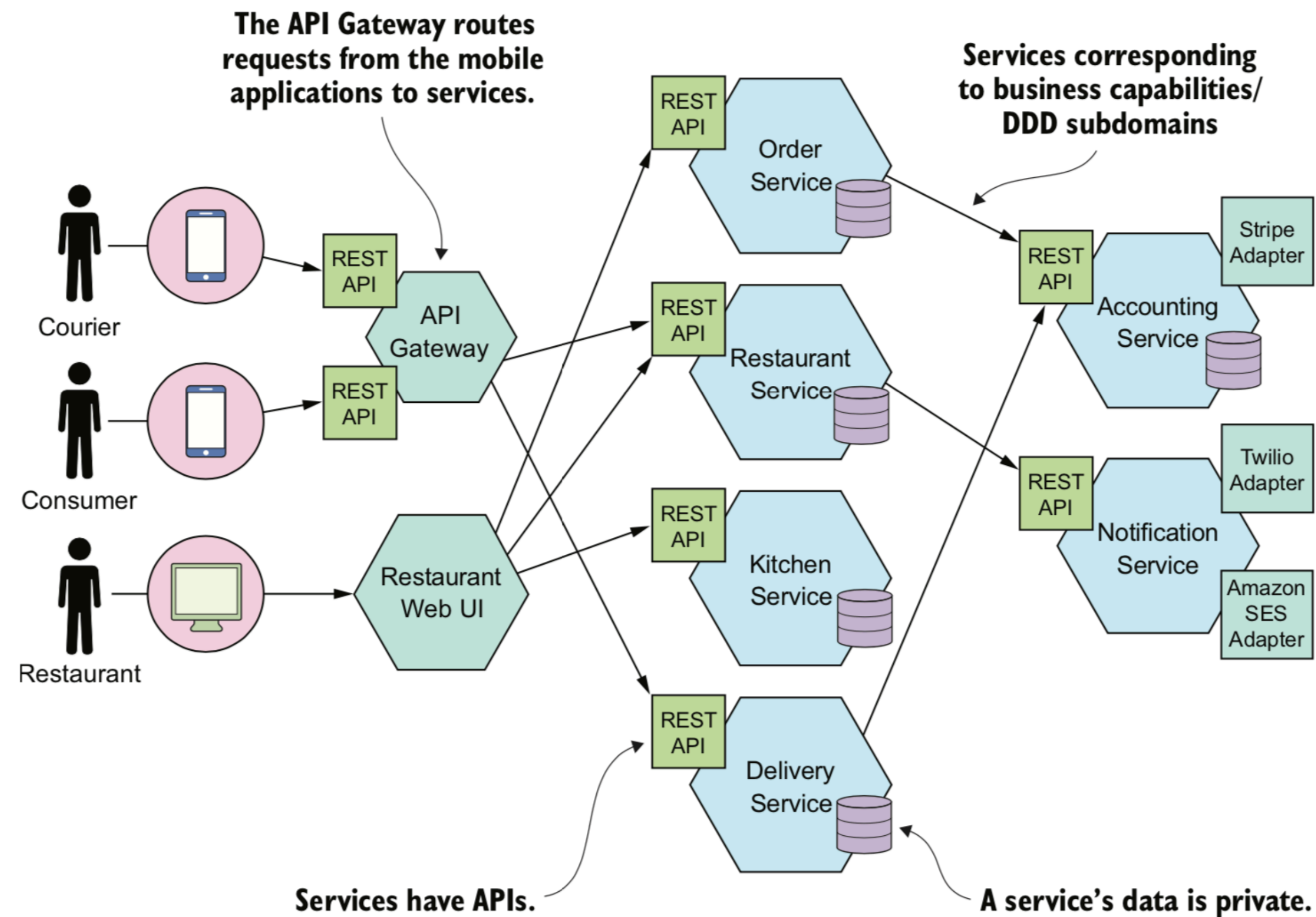
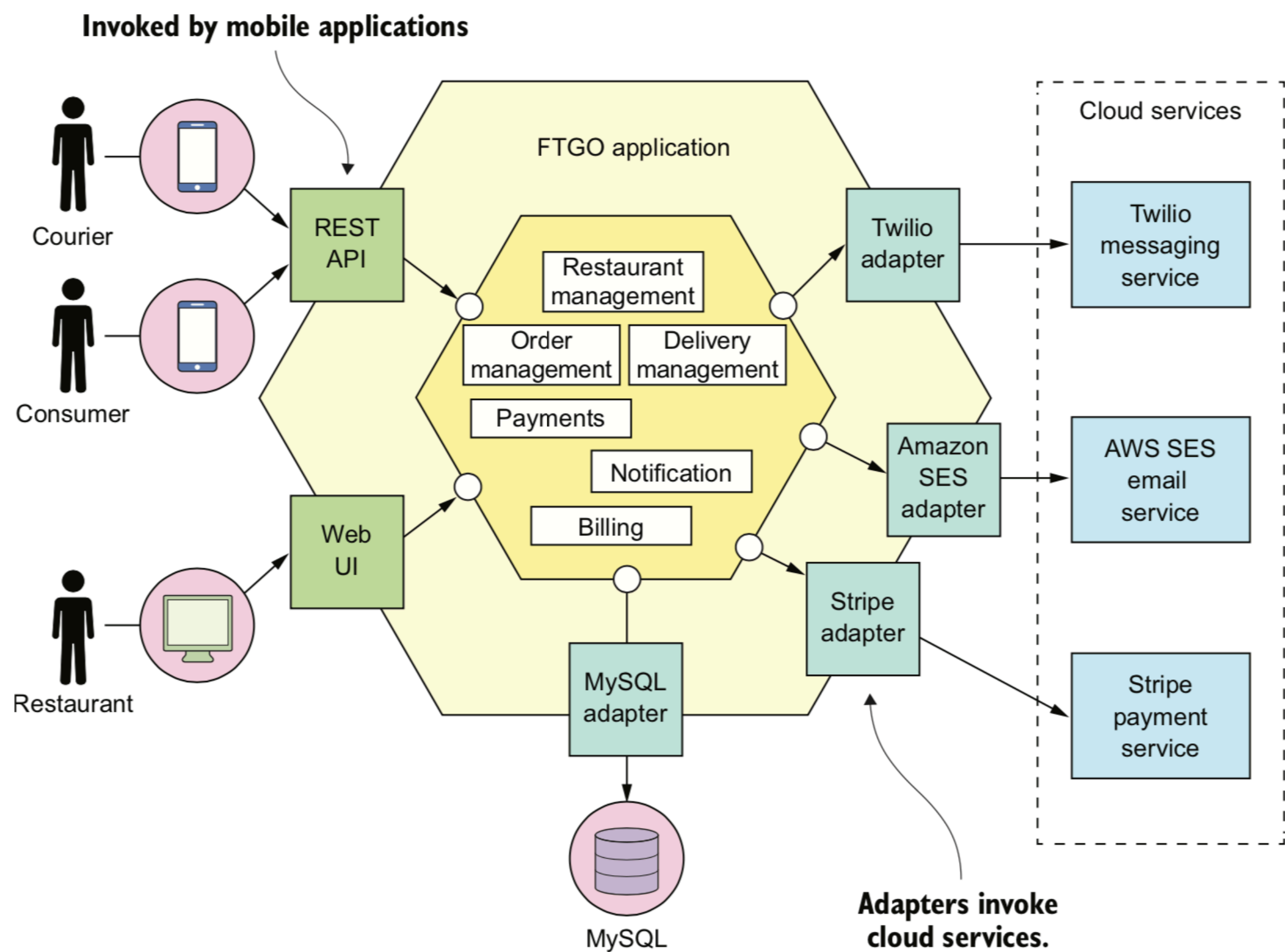
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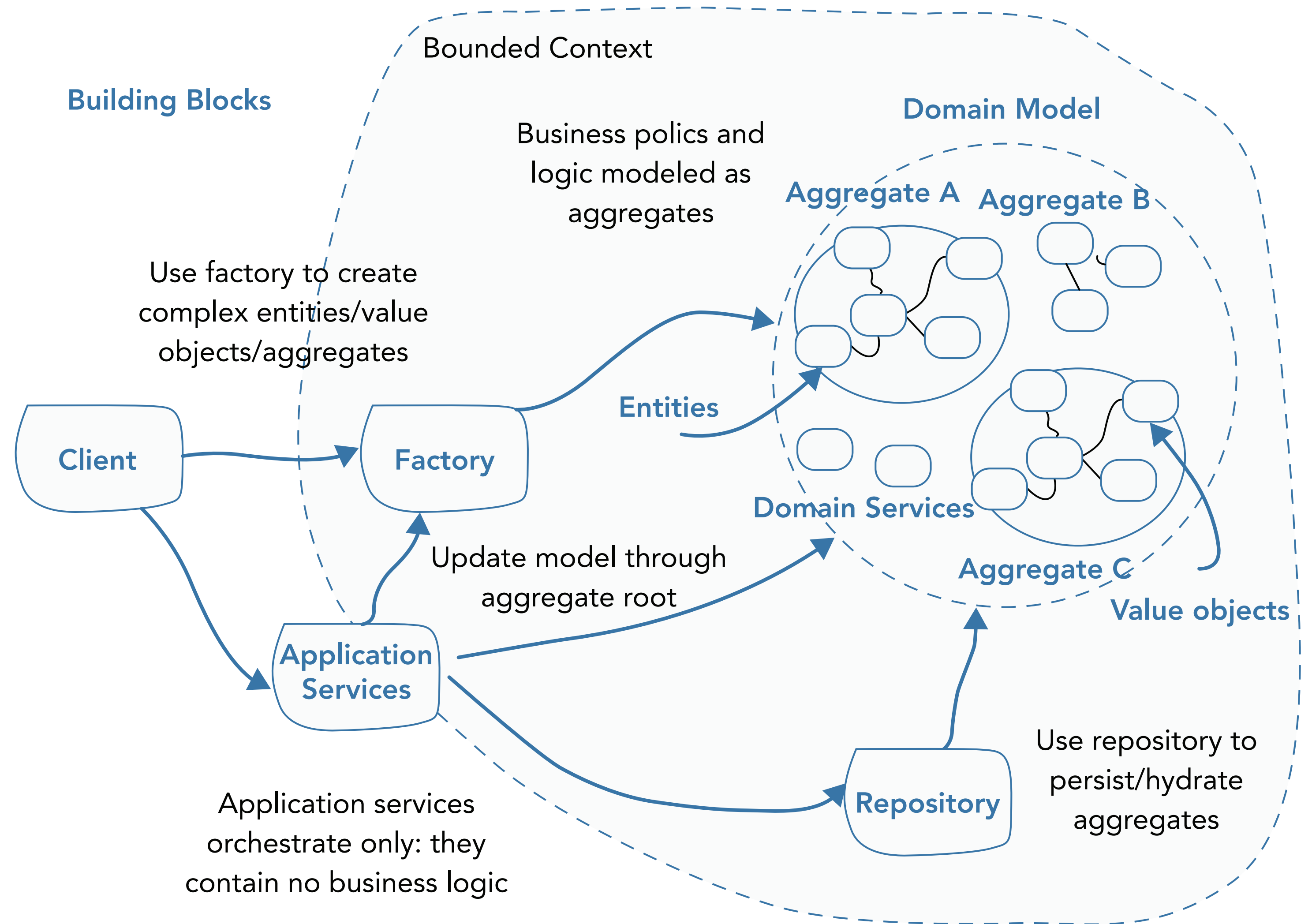
hexagonal/ports&adapter soft arch



THE DOMAIN MODEL PATTERN

Object-Oriented meta-model

- entities
- value objects
- aggregates
- services
- factory
- repository
- domain events



DDD AND AOSE/EMAS

DDD AND AOSE/EMAS

- Agents for DDD
- DDD for Agents (AOSE, EMAS)

RELATED WORK

- Agents & Agile methodologies
 - TDD, BDD
- Domain-oriented AOSE methodologies
 - e.g. Tropos
- Knowledge-based software-engineering
 - MAS-commonKADS

AGENTS FOR DDD

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DDD addresses *structural* complexity *but not* ***dynamic complexity*** [Lundre]

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- levels of non determinism/uncertainty ...

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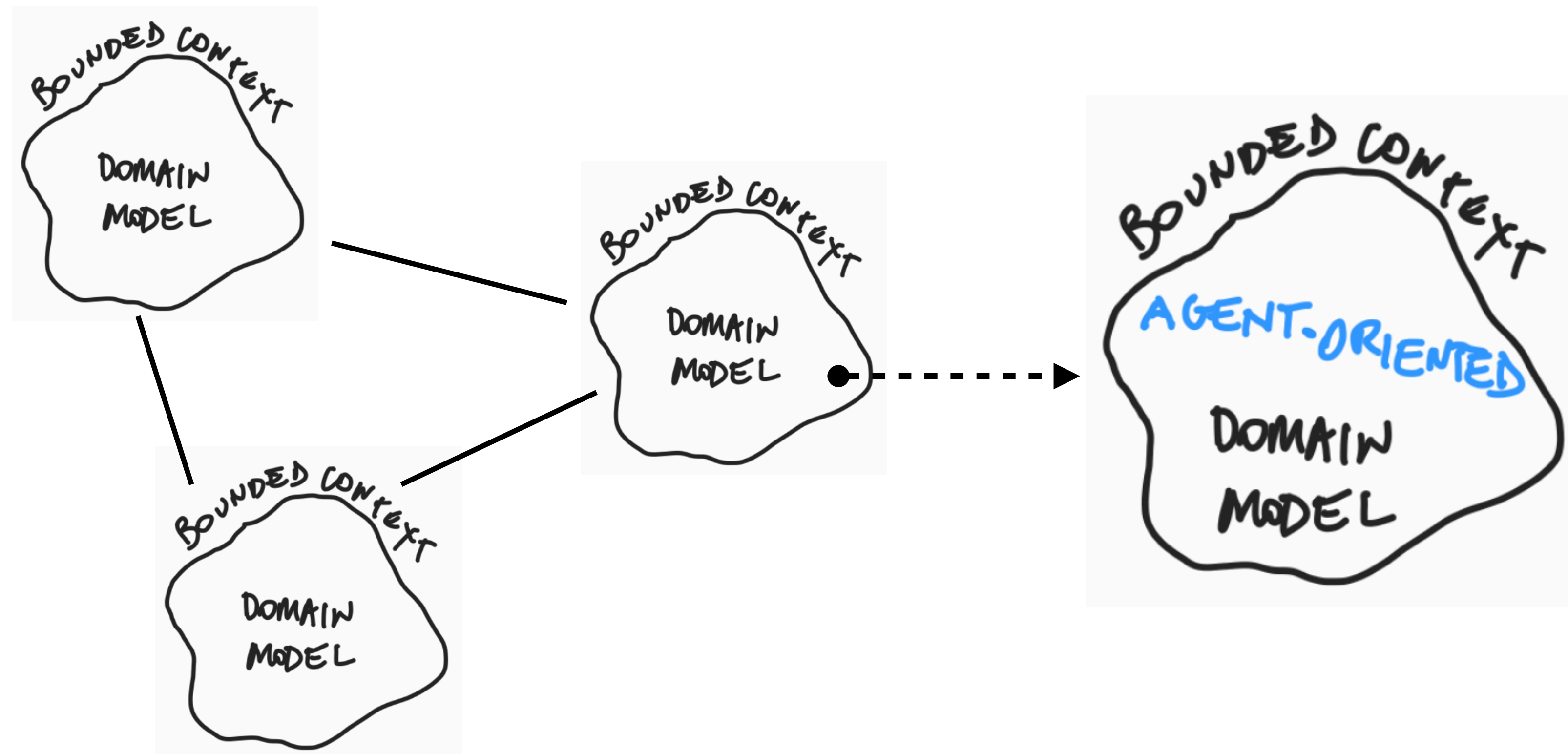
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=> where agents and AOSE/EMAS can help

AGENTS AT THE DOMAIN LEVEL

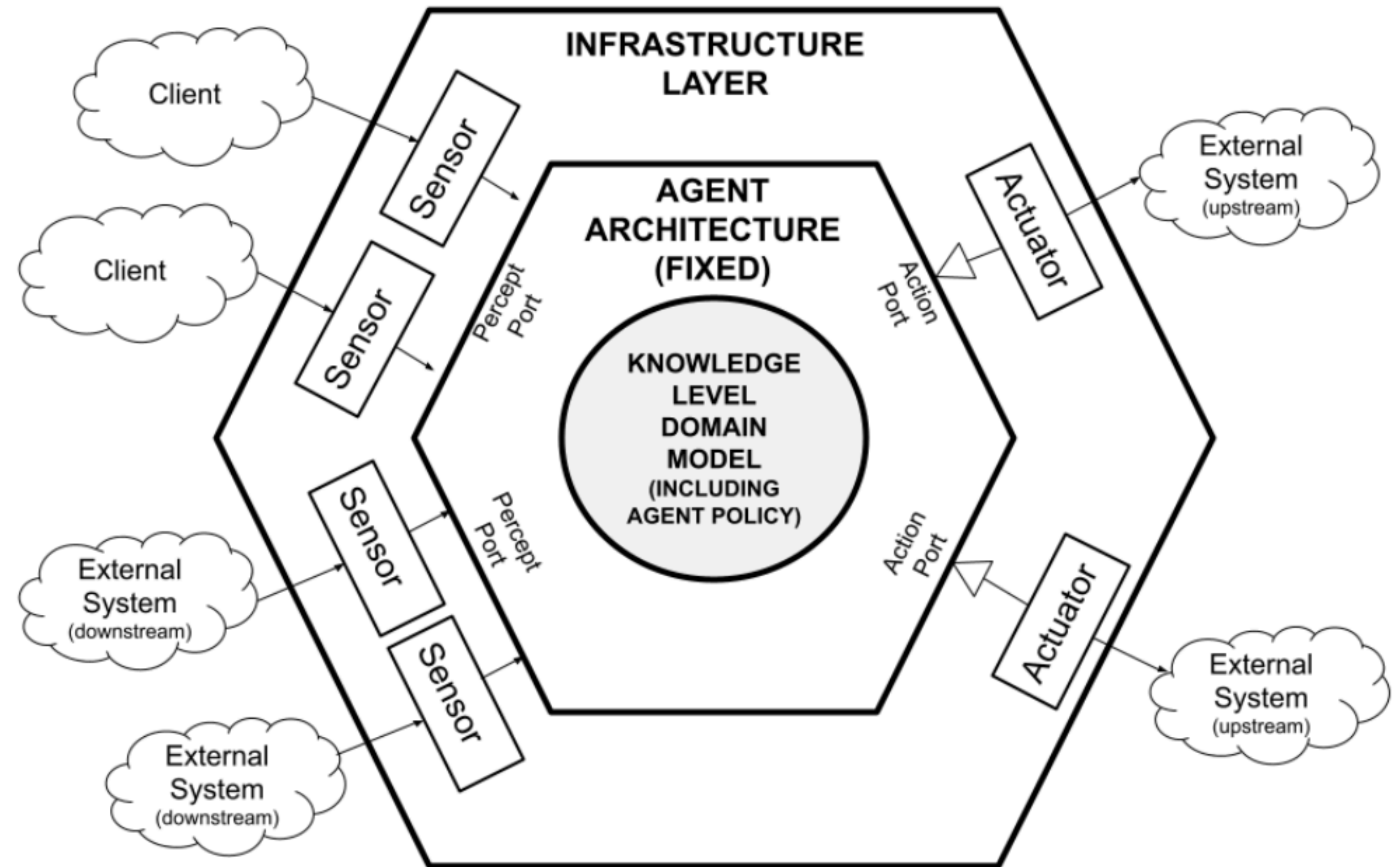
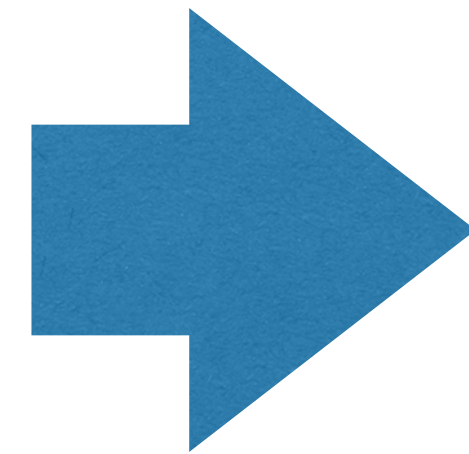
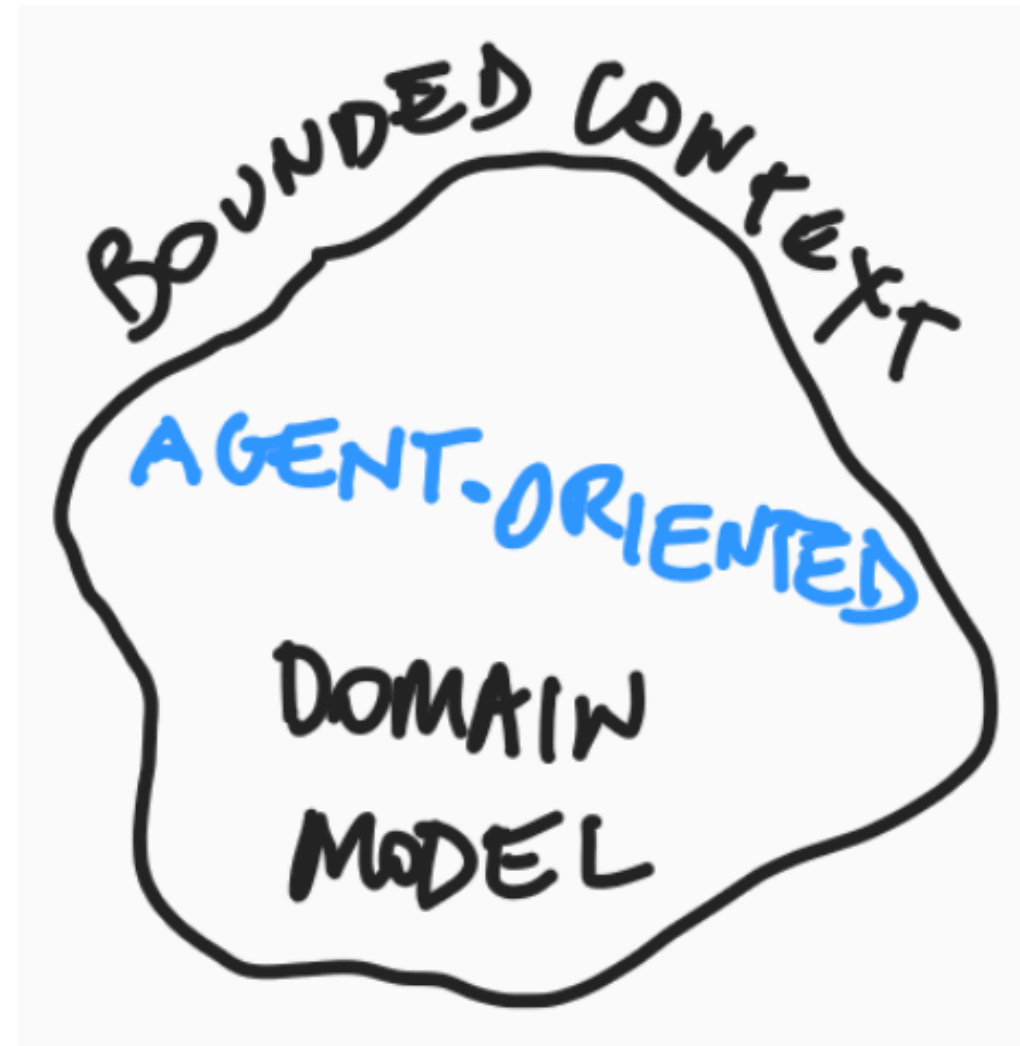
- Individual bounded-context level



Applying existing
AO metamodels

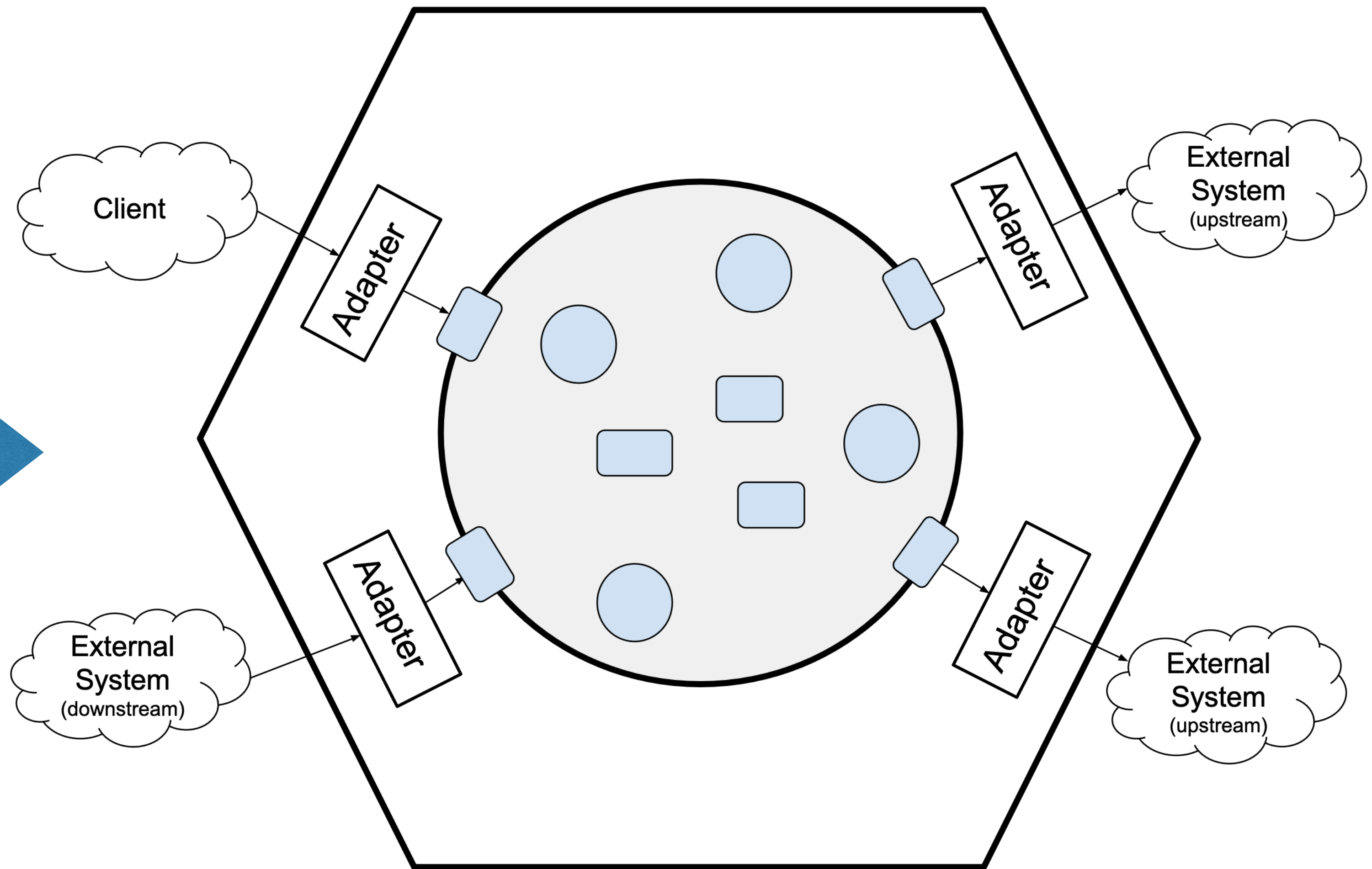
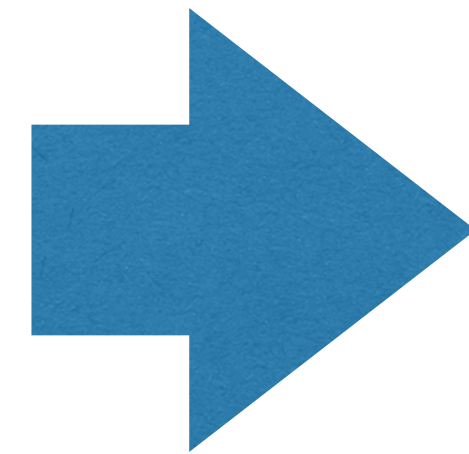
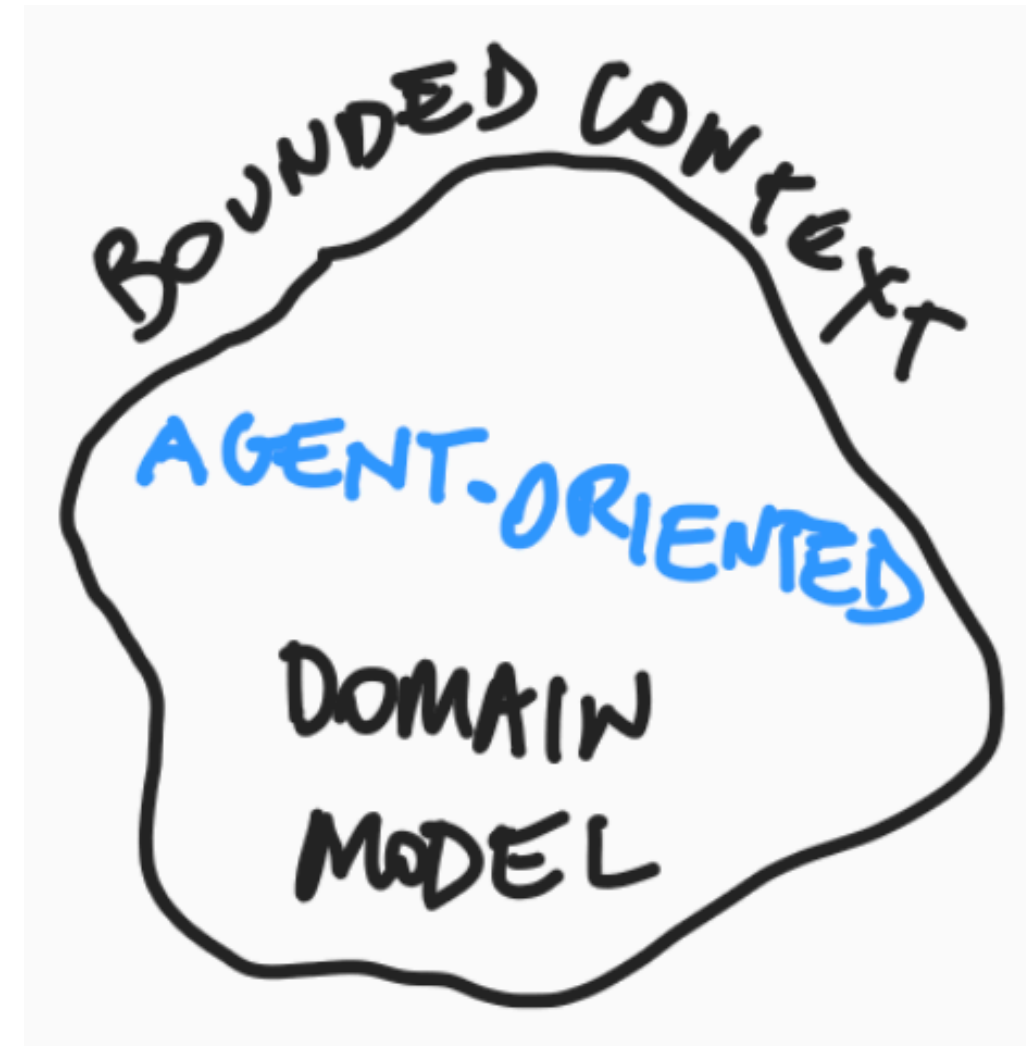
- cognitive e.g. BDI
- A&A
- AGR
- ...

AGENTS AT THE DOMAIN LEVEL



single (cognitive) agent perspective

AGENTS AT THE DOMAIN LEVEL

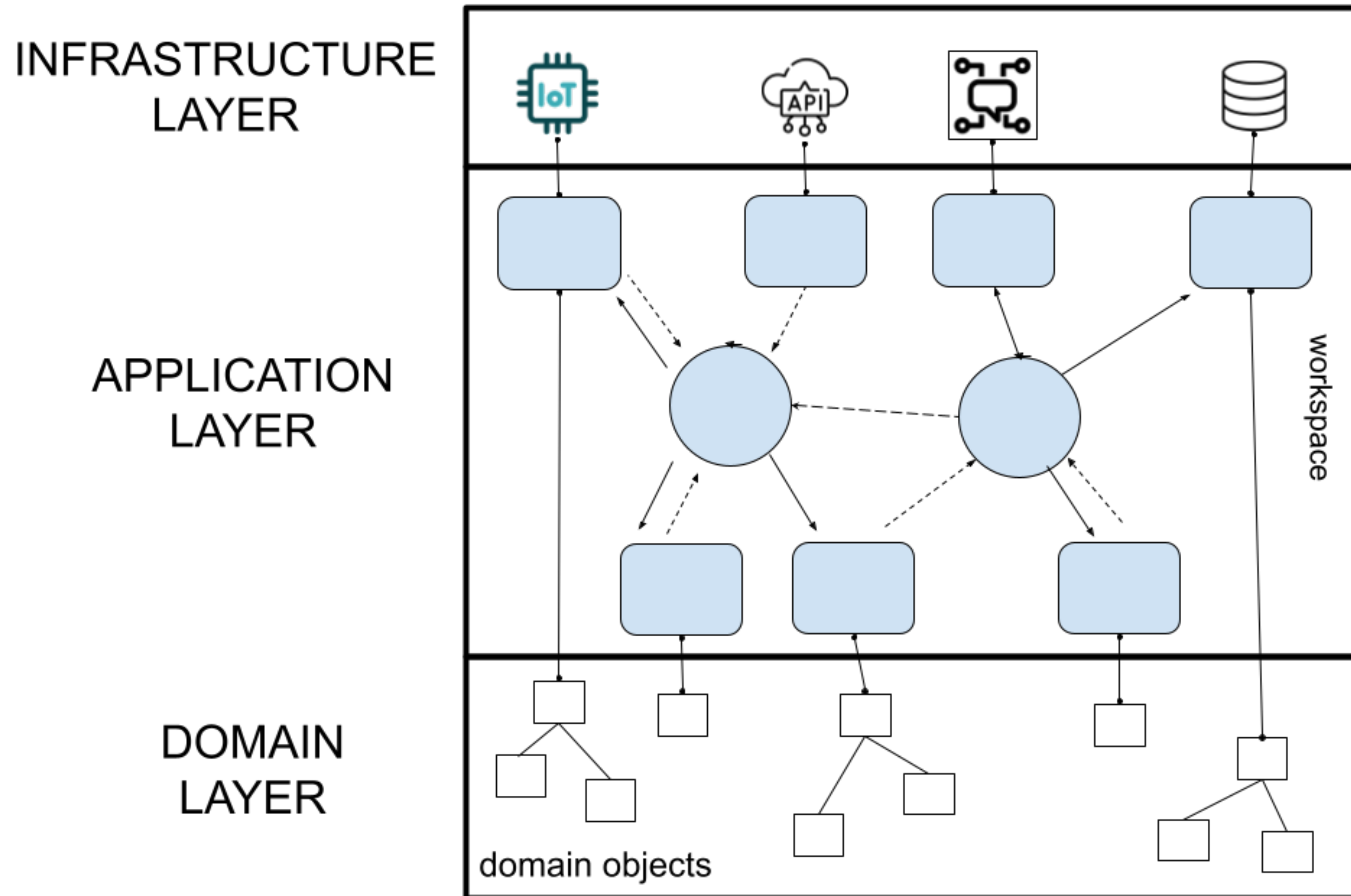


Modelling the domain with A&A

AGENTS AT THE DOMAIN LEVEL

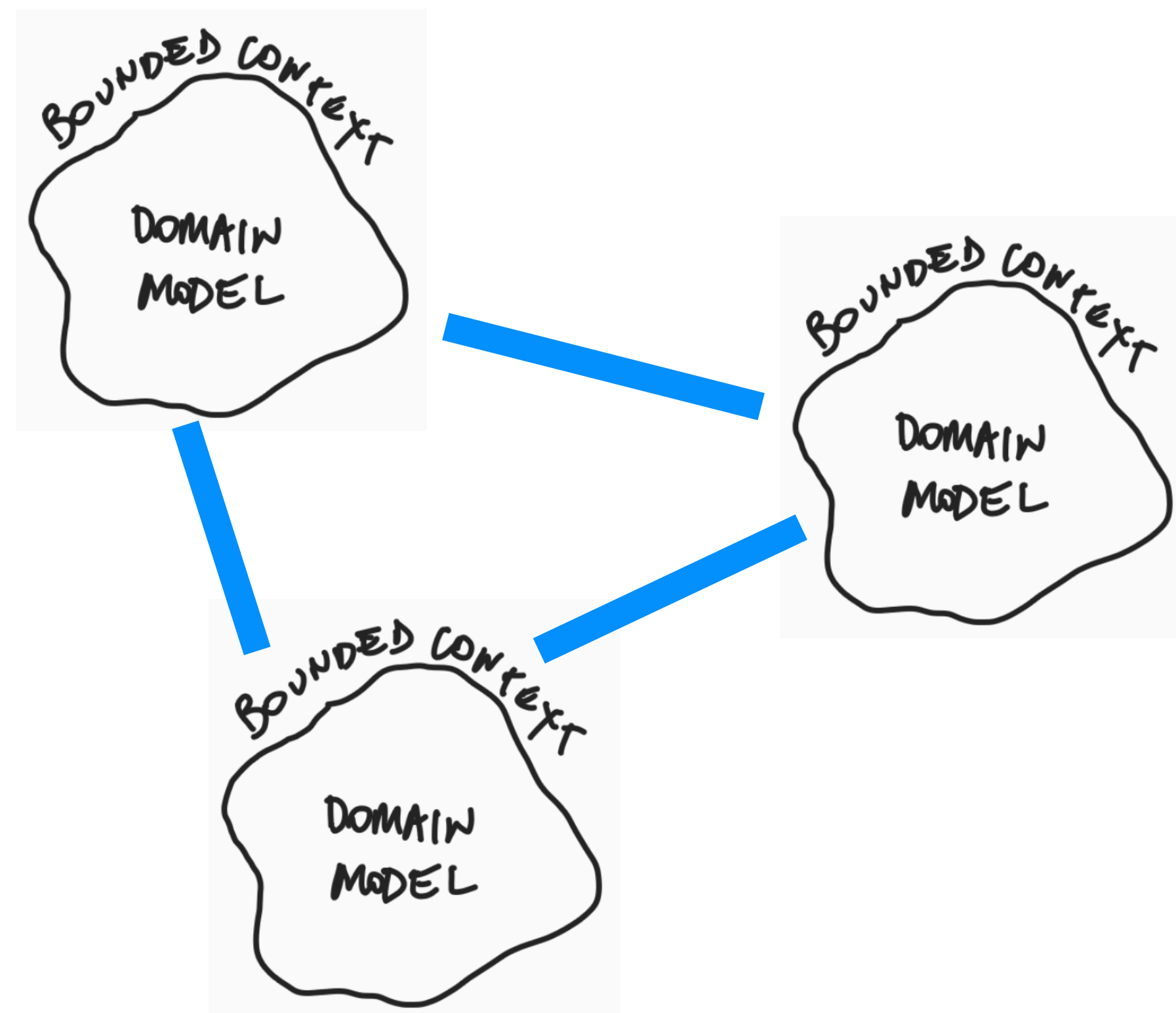
- DDD requirements on agent-oriented metamodels and their applications (aka models)
 - to be effective for the domain level (of abstraction)
 - building models that “speak” the ubiquitous language
 - understandable by (developers +) domain experts
 - explainable/predictable by (developers +) domain experts

AGENTS AT THE APPLICATION LEVEL



AGENT-ORIENTATED ABSTRACTIONS AT THE **INTEGRATION** LEVEL

- Bounded-context integration - “context map”

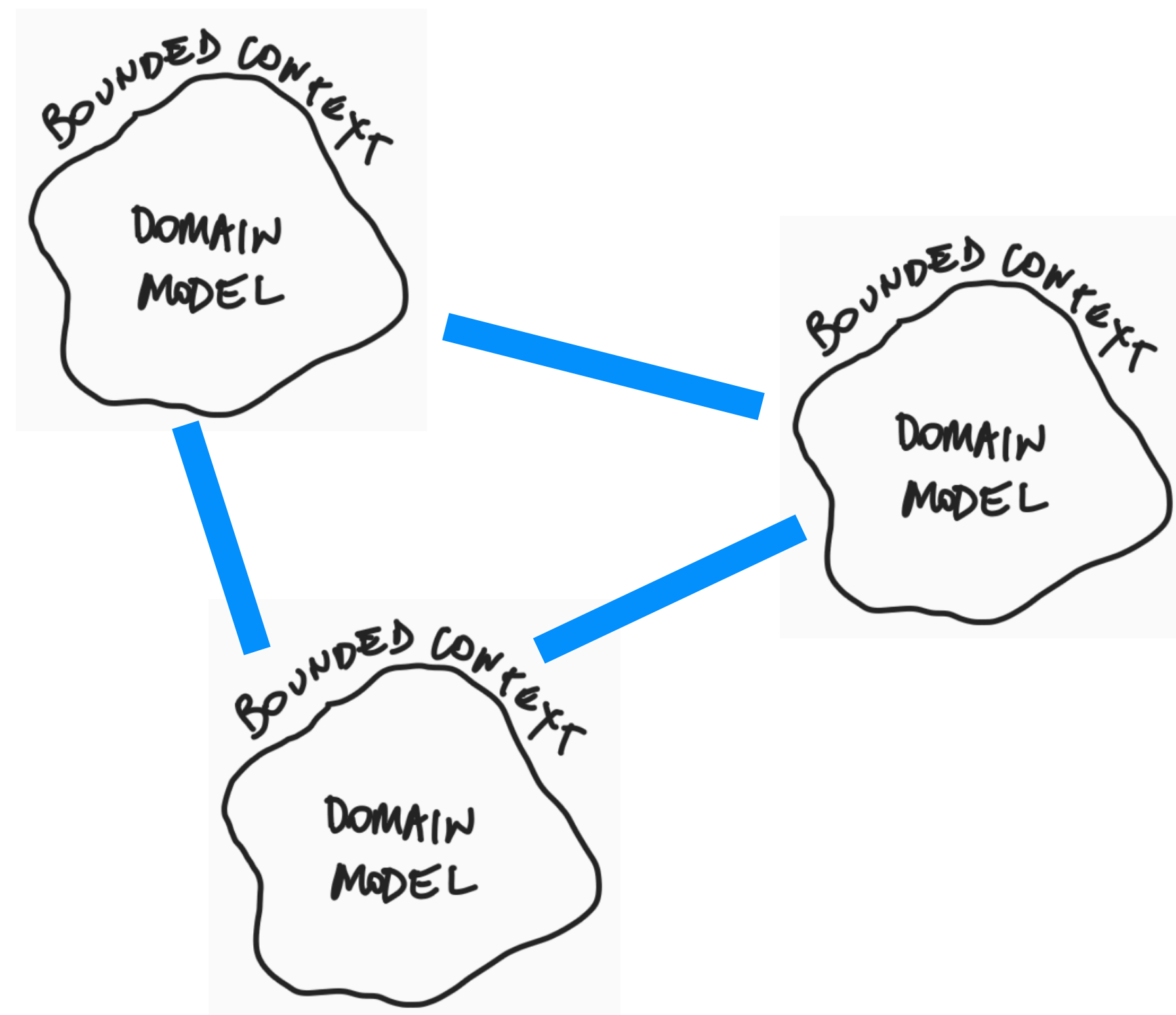


Extending DDD **integration patterns**

- cooperation
 - partnership
- customer-supplier
 - conformist
 - anticorruption layer
 - open-host service
 - ...

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MAS metamodels for interaction & coordination

- speech acts
- IOP / BSPL
- A&A
- ...

DDD FOR AGENTS

- Helping to remove the elephant from the room
- Contributing to Agile for AOSE
- Rethinking | refining
 - existing AOSE methodologies
 - existing MAS platforms/tools to fully support DDD

ONGOING | FUTURE WORK

- **DDD+A**
 - domain model pattern based on A&A+BDI
 - refining A&A+BDI to support domain-driven
 - integrated with related work
 - TDD and BDD [Rodriguez et al.]
- Refining JaCaMo platform to be effective with DDD+A
- Applying DDD+A to IoT/Web use cases

THANKS.