

# Enabling IoT Platform Interoperability Using a Systematic Development Approach by Example

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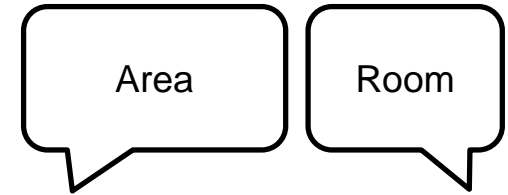
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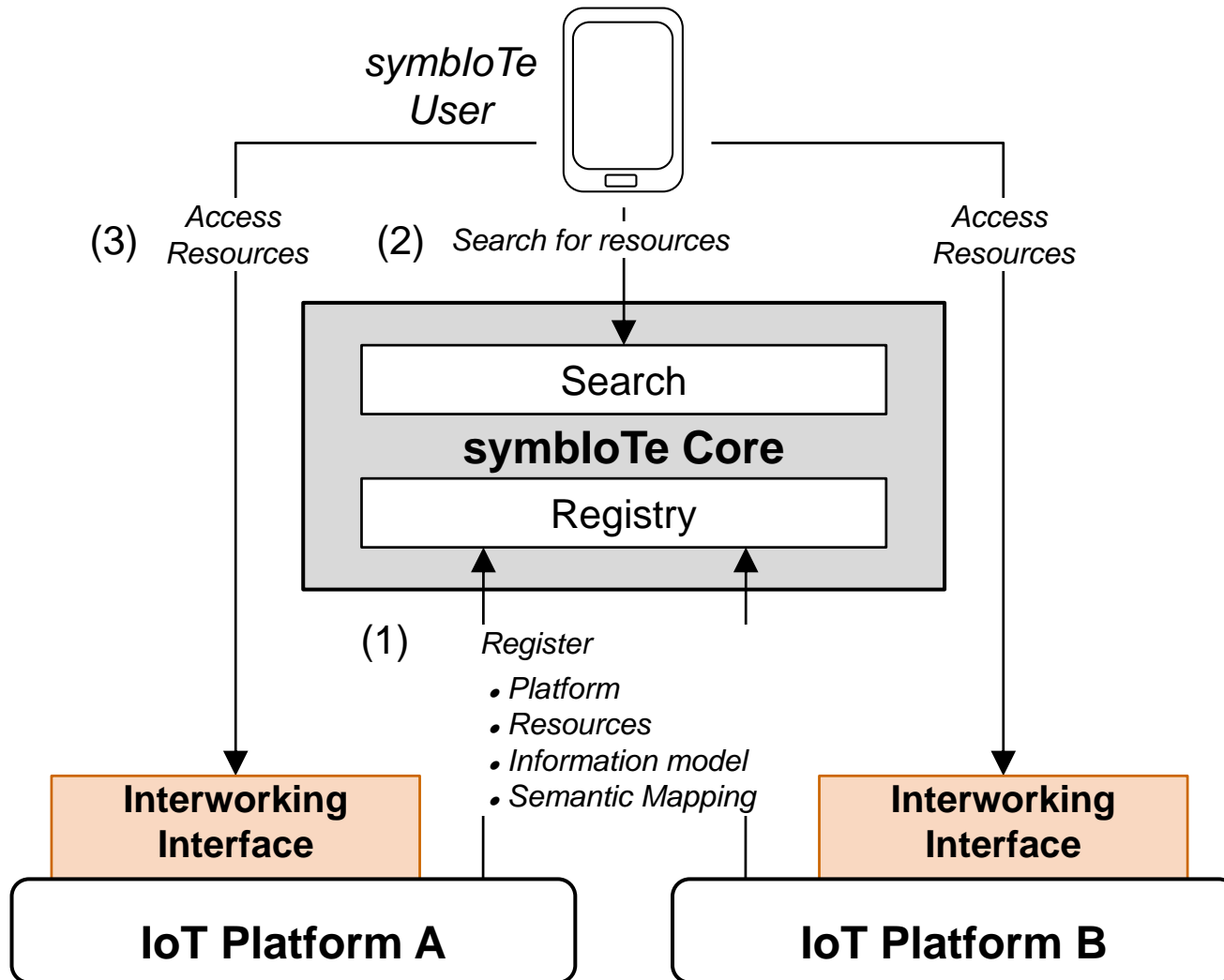


# Motivation

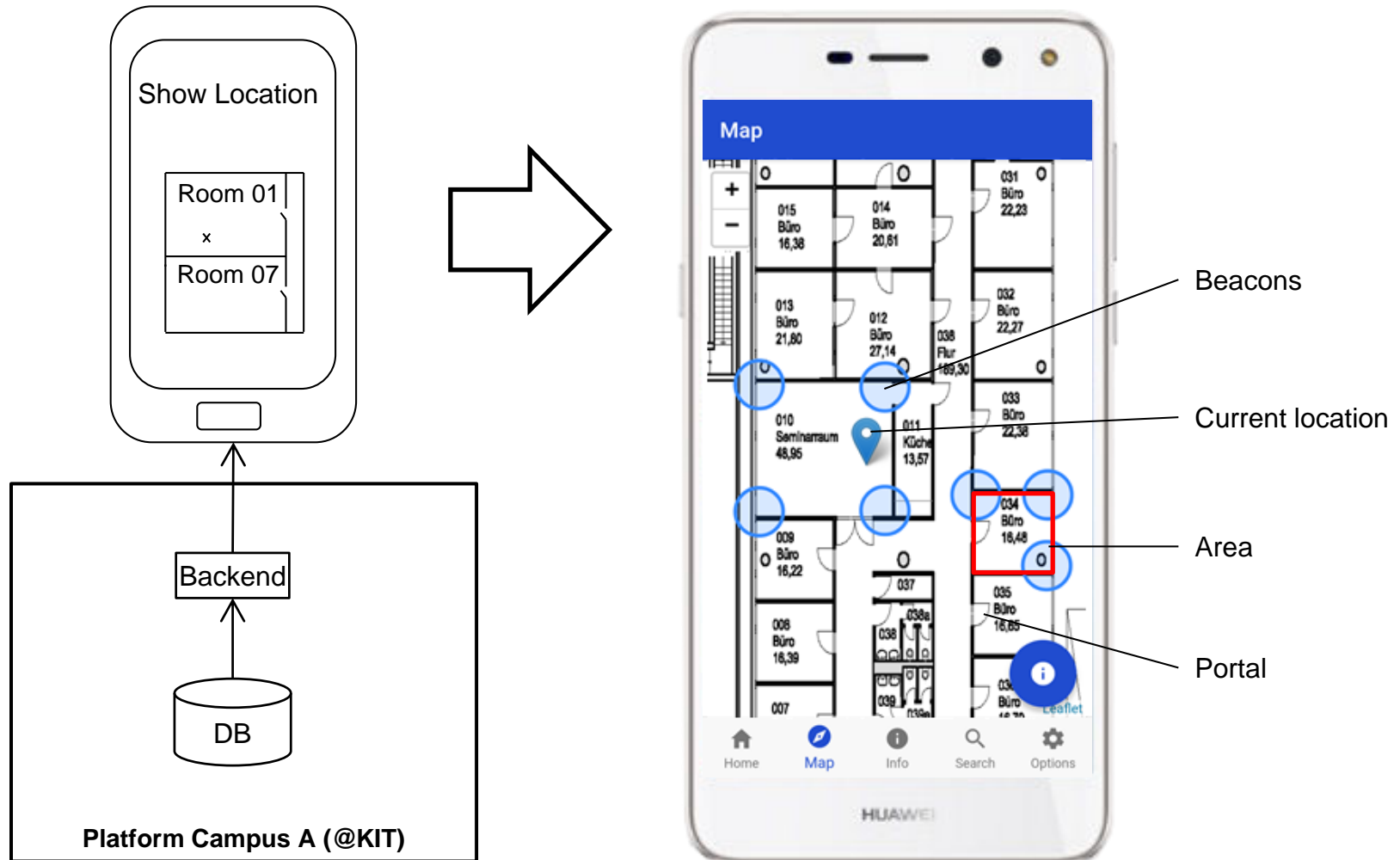
- IoT solutions are often vertical silos
- Communication across platforms is desired
- Exchanging data is important
  - Each platform uses its own data model
  - Semantic interoperability needs to be addressed
- The development of an interoperable IoT system is not easy
- Applying a systematic development process
  - Interoperability is considered in the analysis phase as a requirement
- symbloTe provides an interoperability framework



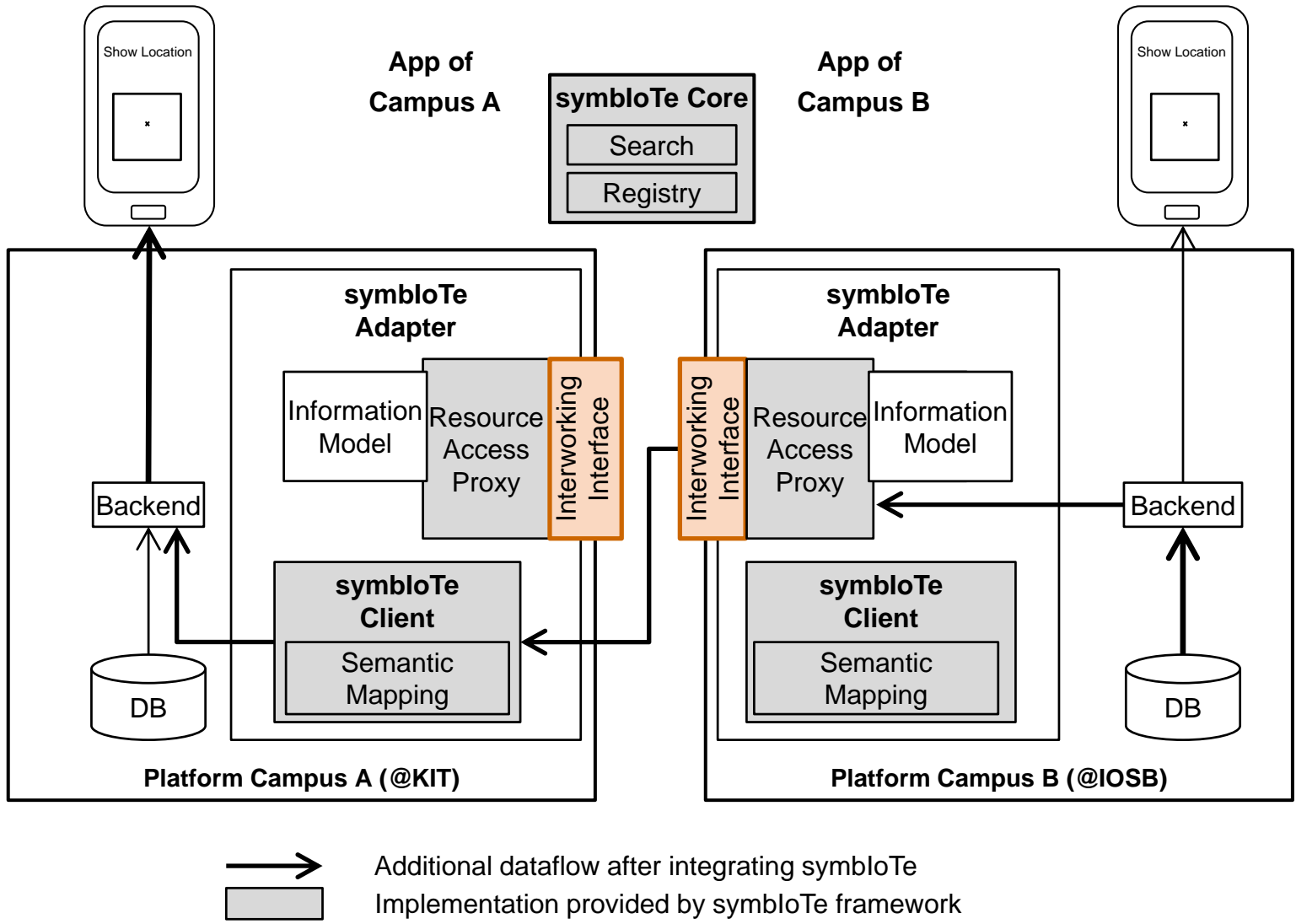
# Overview of symbloTe Functionality



# Use Case Example – Navigation Service



# Use Case Example with symbloTe



# Analysis Phase: Feature Description

- Behavior-driven development is used for analyzing the requirements
  - Specifying the requirements as features
  - Interoperability aspects

1.Feature: Show my location on Campus B  
2.As a member of Campus A  
3.I want to use my well-known application  
4.In order to determine my current location on Campus B

5.Scenario: Show my location on Campus B  
6.Given I am at Campus B  
7.And a **beacon** from Campus B inside a **building** is available  
8.When I open the "Current Location" page  
9.Then my current **location** on Campus B should be displayed

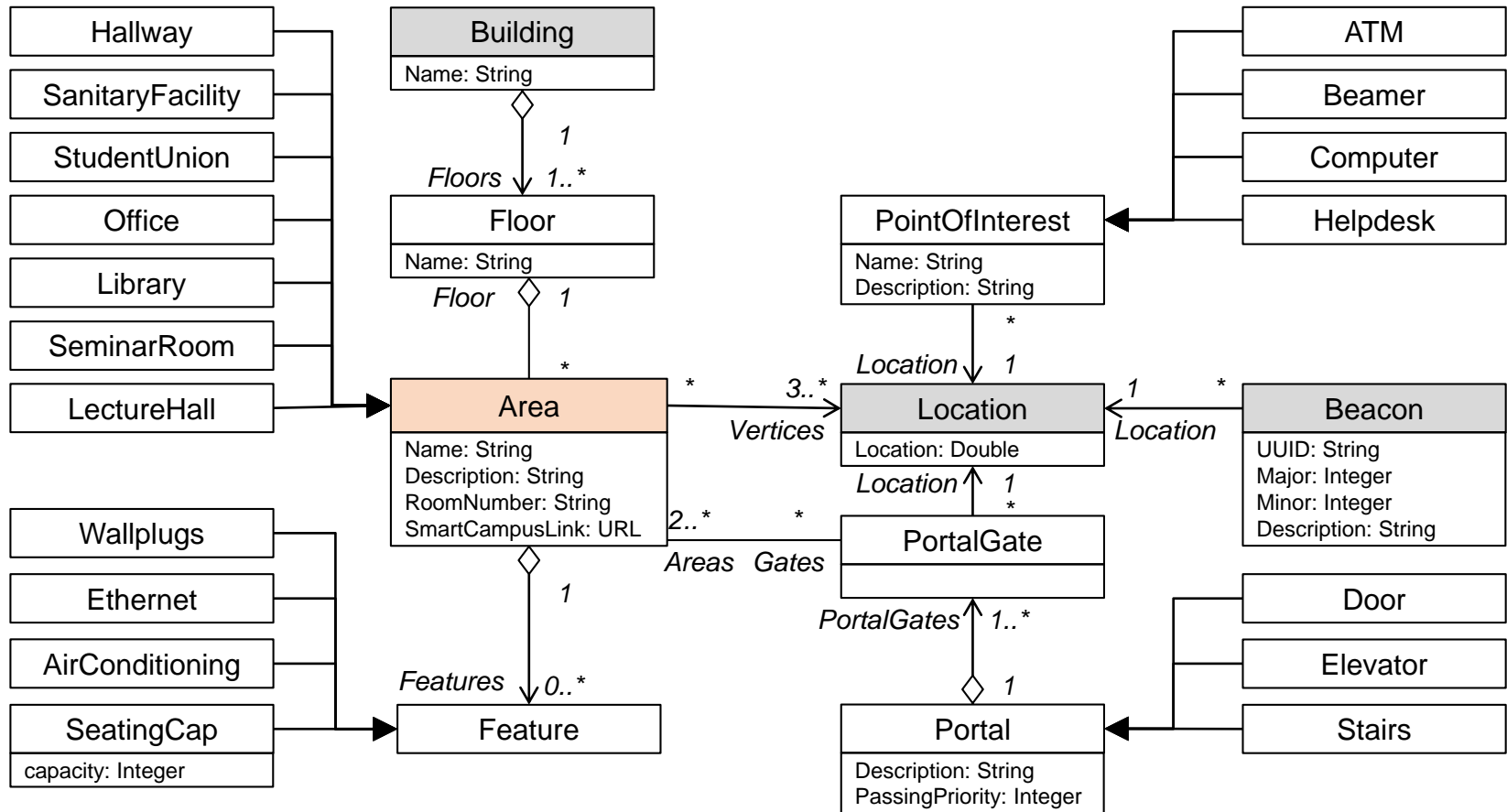
Location

Beacon

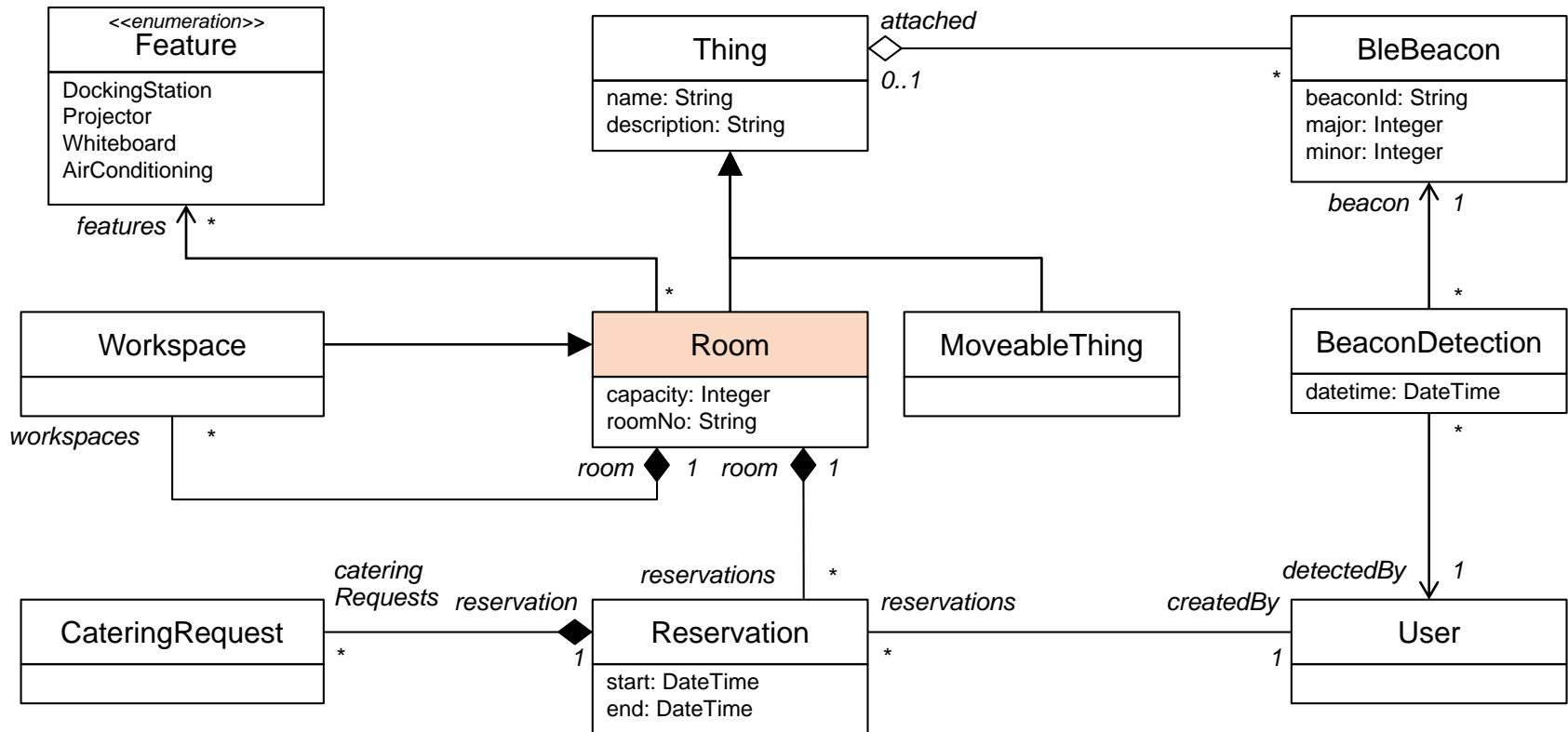
Building

# Design Phase: Information Model of Campus A

- Derived from the analysis phase using domain-driven design



# Information Model of Campus B

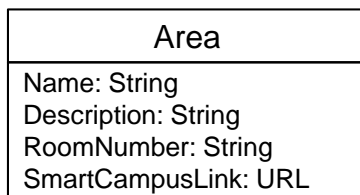




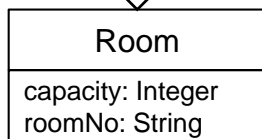
# Implementation Phase: Differences and Integration of the Models

- Area and room are different concepts and must be mapped
- Differences in naming and attributes

## Campus A



Semantic  
Mapping



## Campus B

## Example of semantic mapping

```
1. BASE <http://iosb.fraunhofer.de/ilt/ontologies/educampus#>
2. PREFIX kit: <http://cm.kit.edu/SmartCampus/DomainModel#>
3. PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>

4. RULE
5.   CONDITION
6.     CLASS :Room
7.       :name TYPE xsd:string
8.     AND :description TYPE xsd:string
9.     AND :roomNo TYPE xsd:string
10.    AND :capacity TYPE xsd:integer
11.   PRODUCTION
12.     CLASS kit:Area
13.       kit:Name VALUE REFERENCE :name
14.     AND kit:Description VALUE REFERENCE :description
15.     AND kit:RoomNumber VALUE REFERENCE :roomNo
```

# Conclusions

- Enabling interoperability using the framework symbloTe
- A formal information model is required
  - Registering at symbloTe Core
  - Creating this model is not easy for IoT platform providers
- The systematic development approach leads to the information model
  - Assists developers in this process

# Thank you for your attention!

## Questions?