Designing a data access control concept for the Knowledge4Retail platform

Kilian Dresse, 07.02.2022, Kick-Off Presentation

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Outline

1. Motivation
2. Research Design
3. Research Questions
4. Initial model
5. Timeline

Motivation

Knowledge 4 Retail

Artificial intelligence to accelerate retail

Optimize retailer’s internal product management

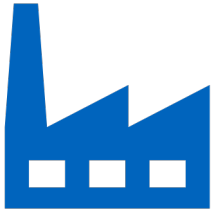
Enhance customer experience

Motivation

Knowledge4Retail needs a data access control concept

Handling traffic between various components controlled by a digital twin

The system must manage data between various stores



Potentially retail partners would be interested in some form of access as well

Research Design

Literature Review

Defining
- Data flows
- Roles on the platform
- Organizations

Semi-structured interviews

- Requirement analysis for roles and organizations
- Validate initial model
- Feedback interview round to evaluate the concept

Data access control concept

Incorporate results from
- Literature review
- Requirement analysis

Research Questions

RQ1

How to model data flows within the Knowledge4Retail platform for associated organizations and roles?

RQ2

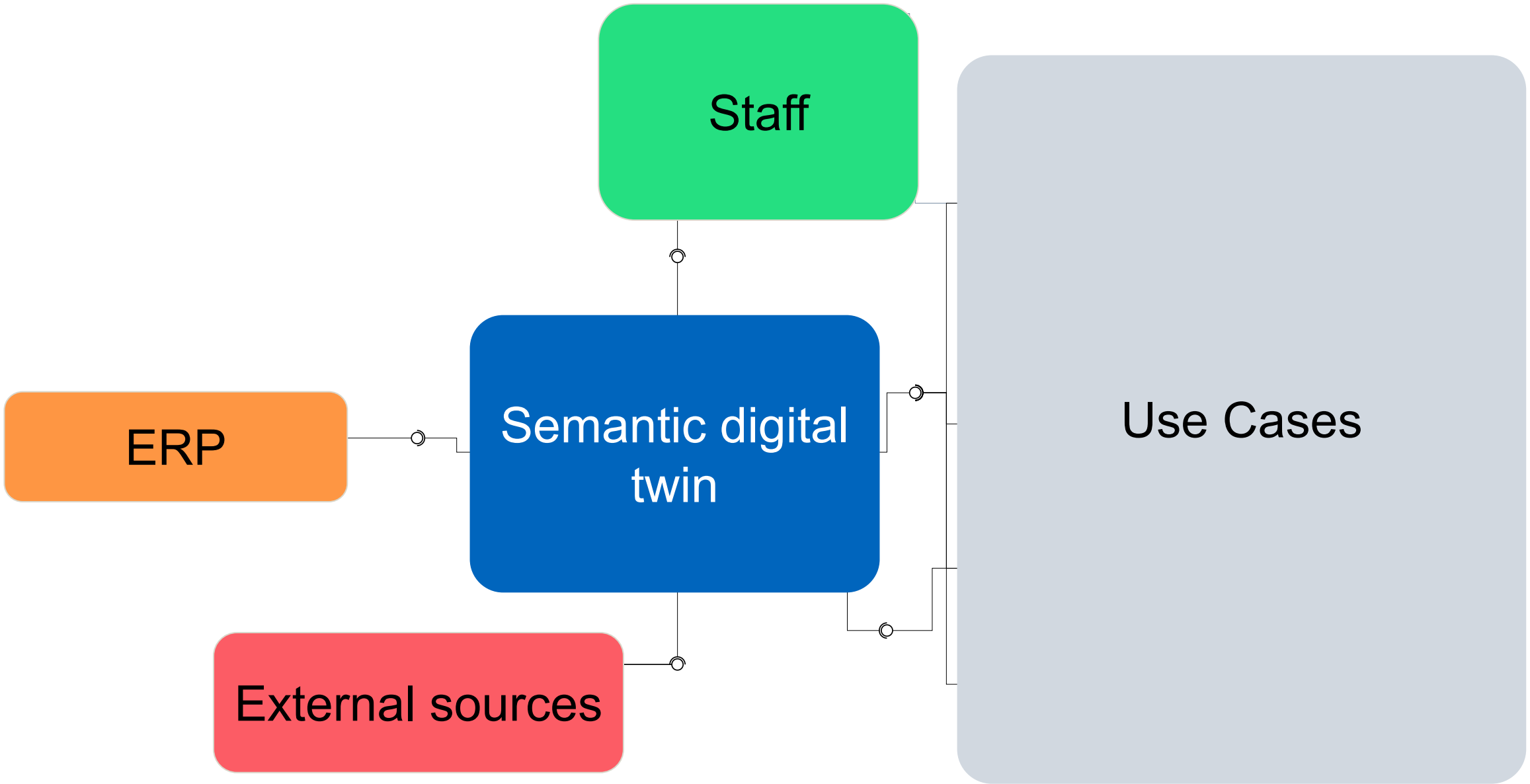
What are requirements of partner organizations for a Knowledge4Retail data access control concept?

RQ3

How to design a data access control concept for the Knowledge4Retail platform?

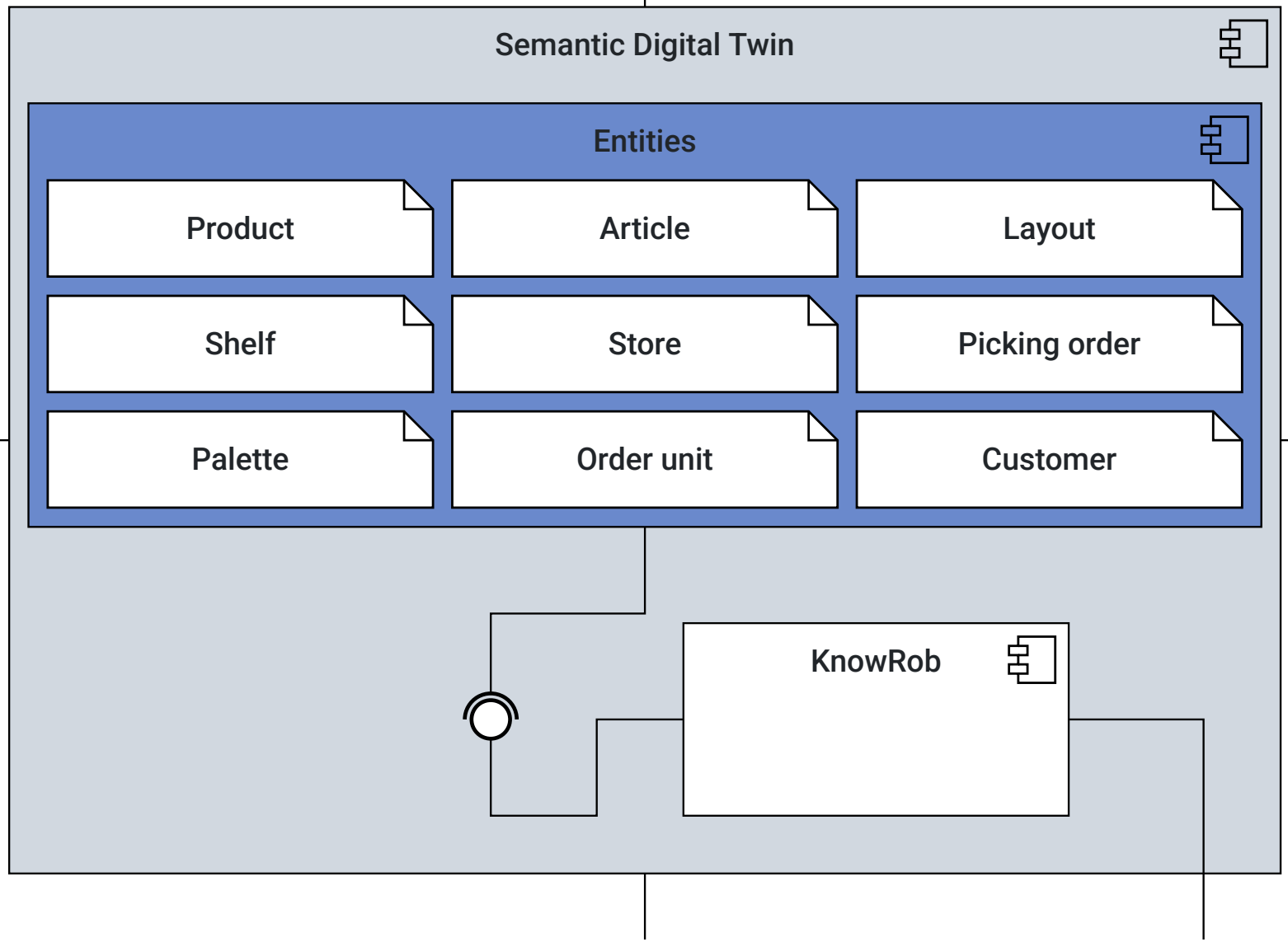
Component diagram

Initial model



Semantic digital twin

Initial model



- The brain of the system
- Communicates with all parties

- Database holding all entities' information
  - Position, orientation and many more

- Process and integrate data from use cases

Use Cases

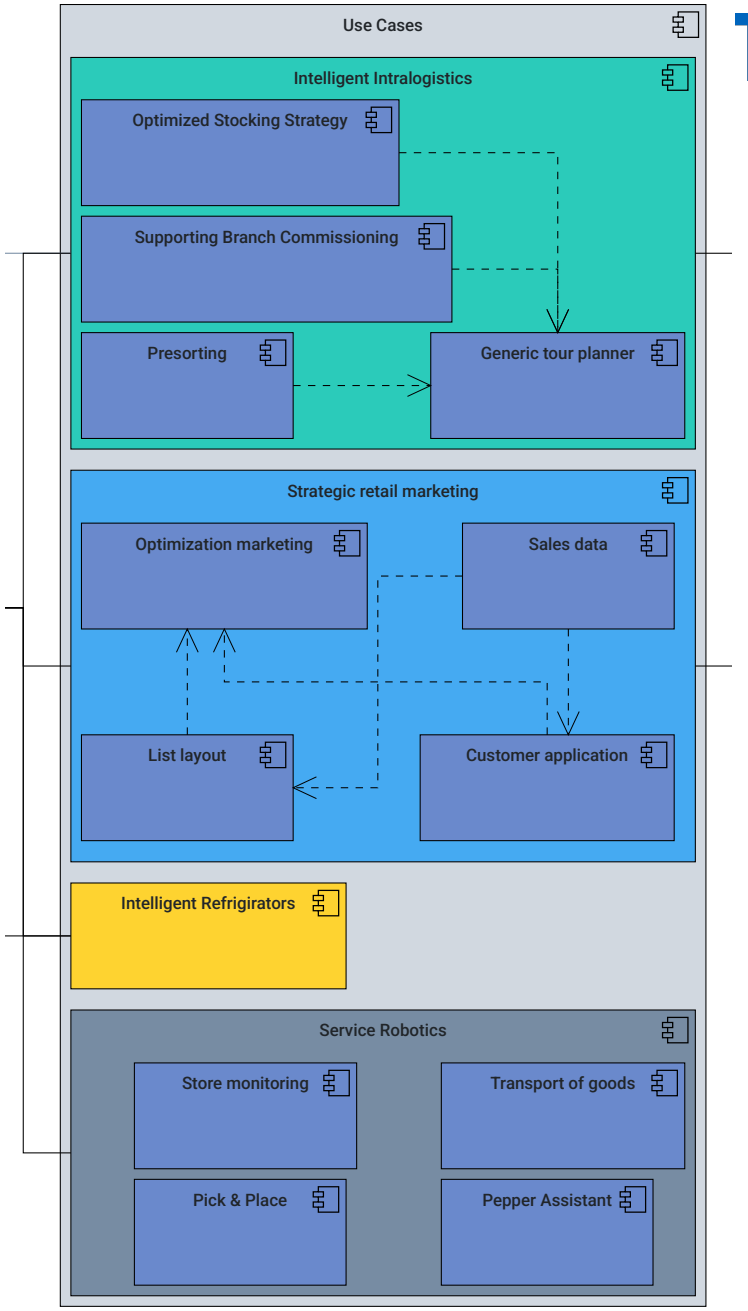
Initial model

Intelligent Intralogistics
- Using data from digital twin to optimize stocking and picking up items in the most efficient order
- Subsystems determine best options
  - Combined in the tour planner

Strategic retail marketing
- Using sales data to calculate the optimal placing of items in shelfs and aisles

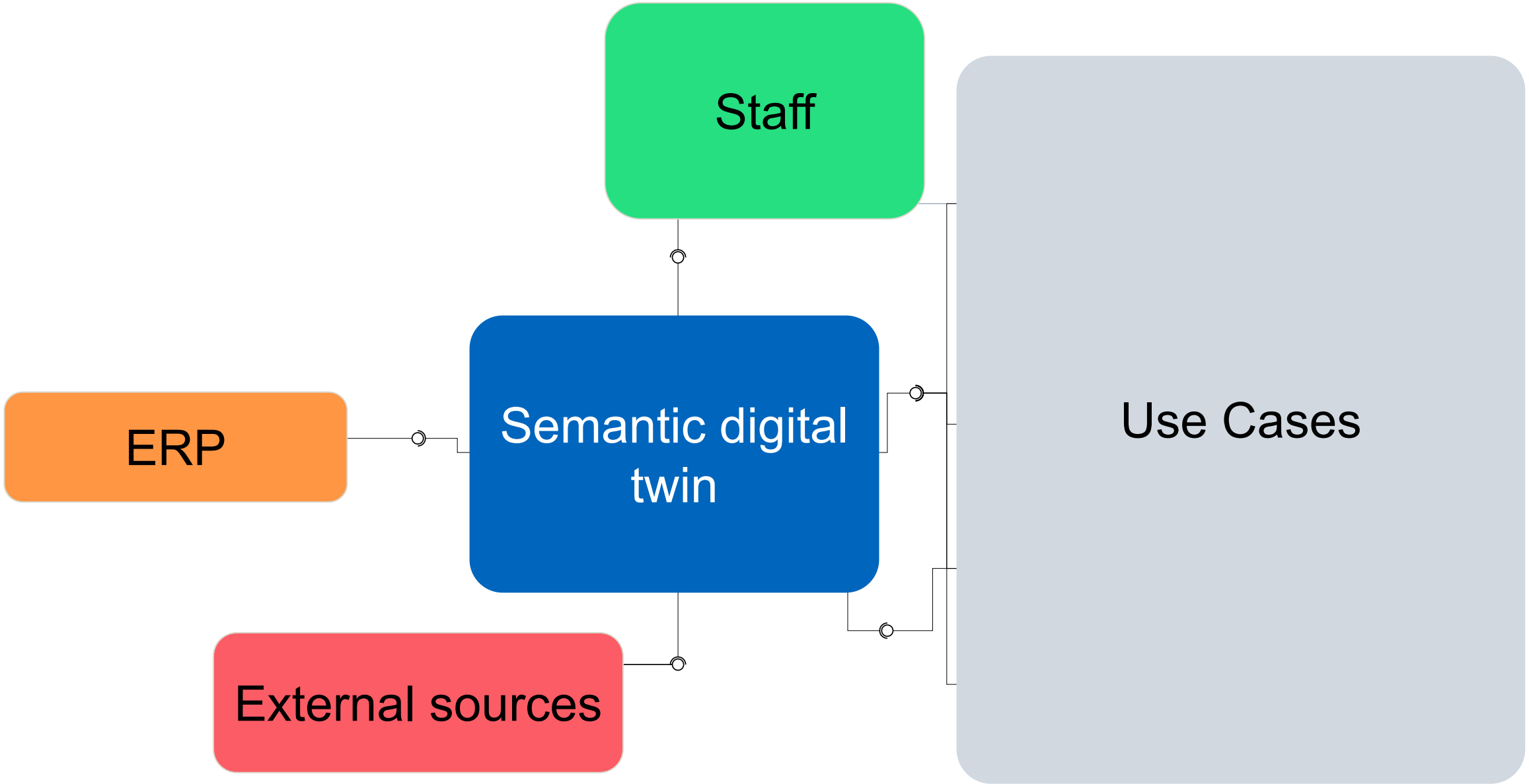
Intelligent Refrigerators
- Using sensors can track their own inventory
- Use as additional Point-Of-Sale

Service Robotics
- Four different robotic applications
  - Monitoring store inventory
  - Transporting goods to aisles
  - Placing items in correct positions
  - Assisting customers



Component diagram

Initial model



Research Design

Access control

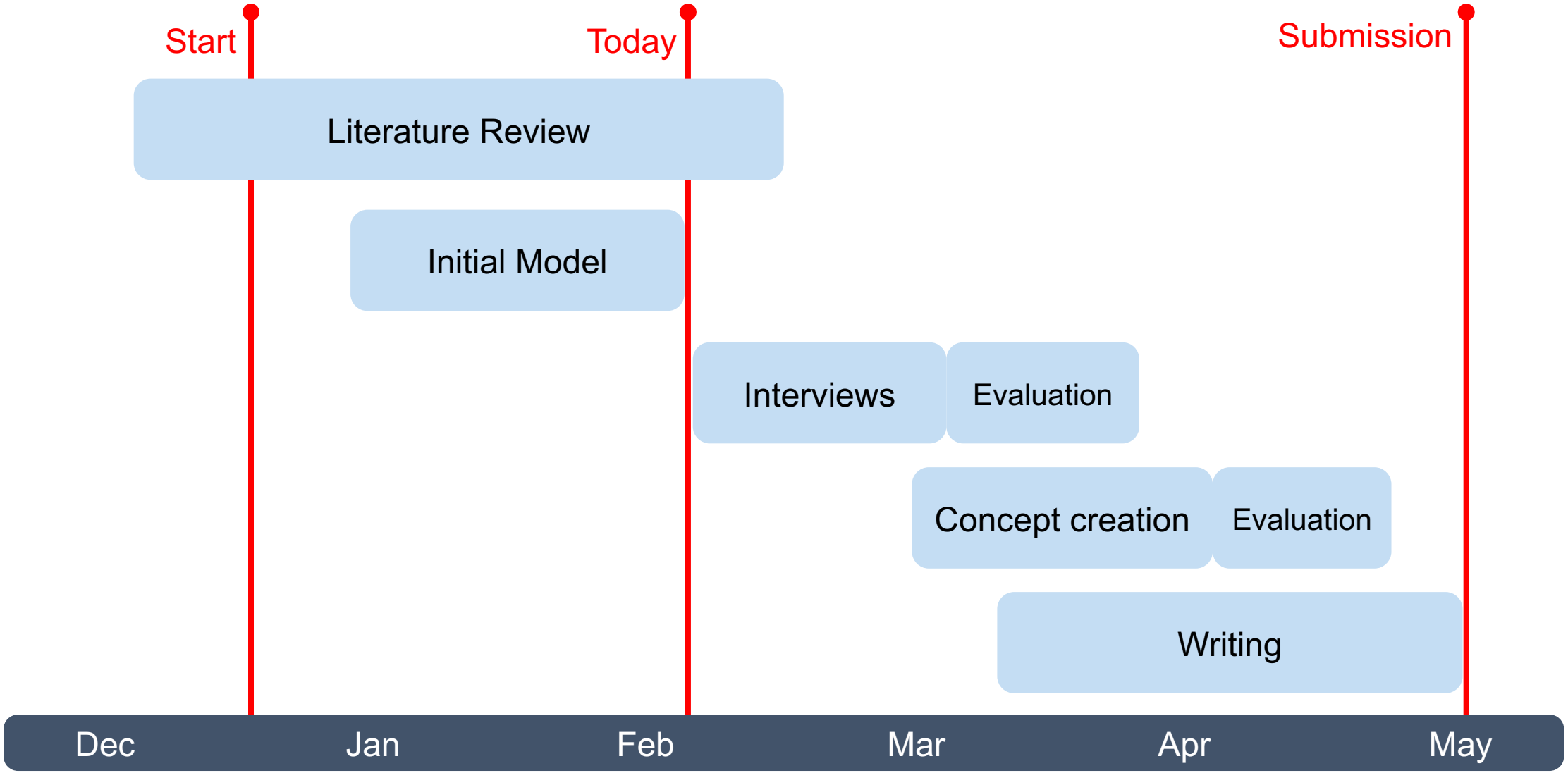
Data access control governs what entities in an IT-System are allowed to access

- Role-Based Access Control (RBAC) assigns roles to all entities about what it can access
  - Static access control
  - Roles need to be predefined
  - Perfect for an On-Premise approach
- Attribute-Based Access Control (ABAC) assigns rights as its trying to access
  - Dynamic access control
  - Permissions set by states
  - An entities attributes decide what they are allowed to see
    - E.g. depending on time or ownership
- Mixture may be needed for a centralized-cloud solution

[Hu16g] *Hu, Vincent; Kuhn, Richard; Ferraiolo, David; Voas, Jeffrey: Attribute-Based Access Control*

[Ro20g] *Ross, Anderson: Security Engineering:* a guide to building dependable distributed systems

Timeline


Start
Today
Submission
Literature Review
Initial Model
Interviews
Evaluation
Concept creation
Evaluation
Writing
Dec
Jan
Feb
Mar
Apr
May

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