Management Dashboard in a Retail Environment

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Outline

- Motivation & Idea
- Related Work
- Background (IRL, SemProM)
- Technical Overview
- Architecture
- Outlook
- Research Questions

Motivation

Actions		Real World	Virtual Environment
considering side effects of sensors		✓	complex model of the sensors
measuring of user behavior	realistic data	✓	complex user simulation required
	measurement	needs different sensors	✓
changing objects in respect to their location, size, appearance, etc.		needs humans or robotics	✓
multiuser		needs humans	needs simulations

➙ combine advantages to obtain the „best of both worlds“

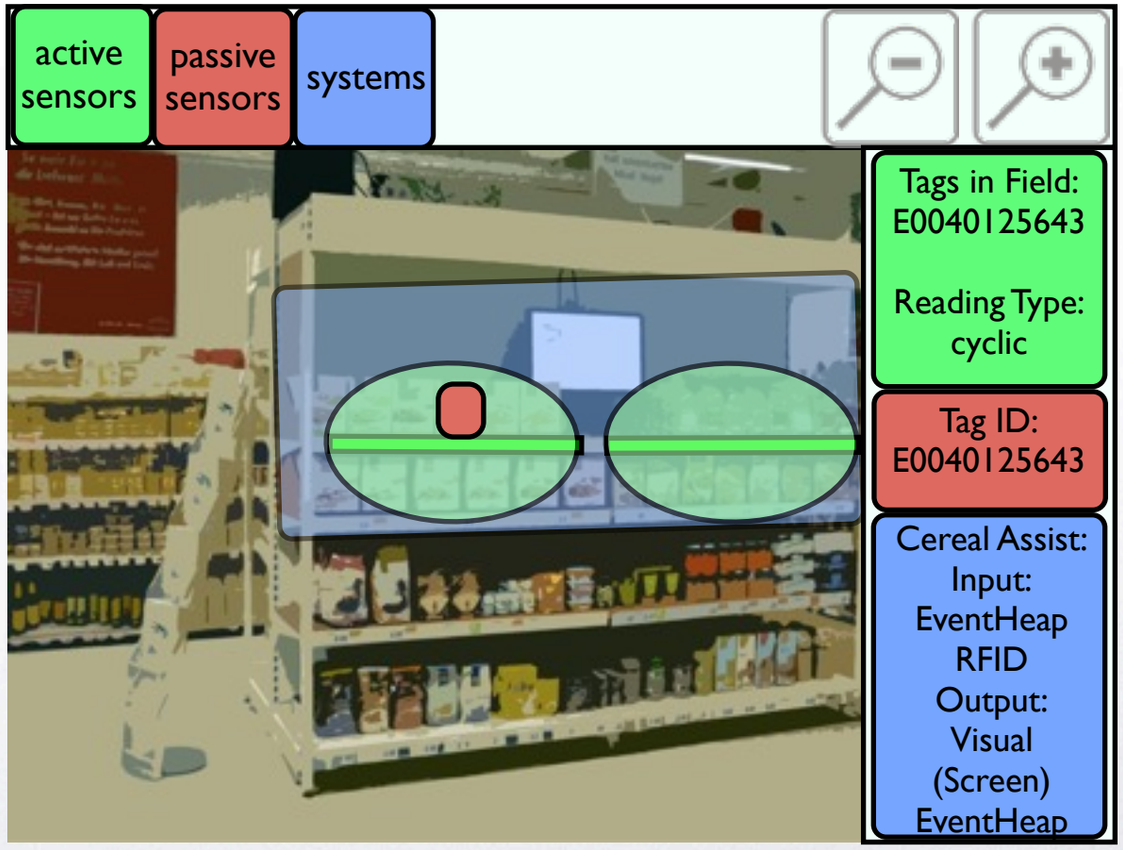
Idea

- Development of a management dashboard in a retail scenario
- Visualization of a real supermarket in an interactive three-dimensional model
- Reflect changes in the real world immediately in the virtual model
- Including business intelligence services
- Offering the possibility to run simulations

Example → RFID

Real World

Virtual World

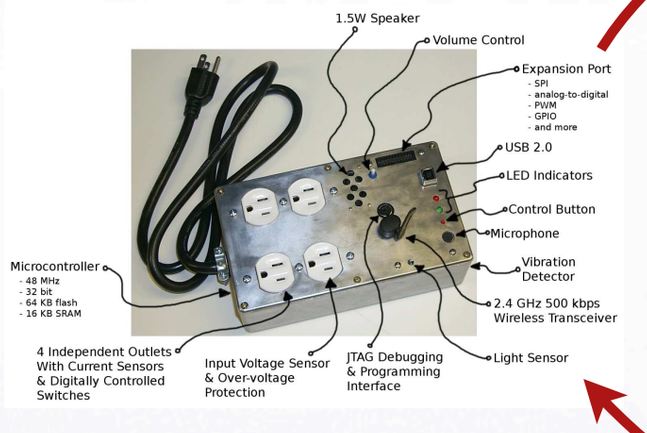


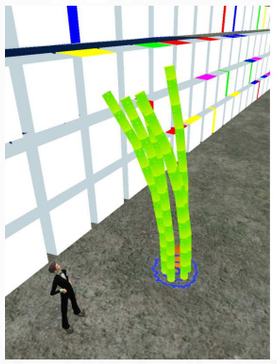
Background / Related Work

Plug

sensed data

Data Pond





control

J. Lifton and J.A. Paradiso, "Dual Reality—Merging the Real and Virtual," in the 1st Int'l Conf. Facets of Virtual Environments (FAVE 09), Springer LNICST, 27–29 July 2009.

Background / Related Work

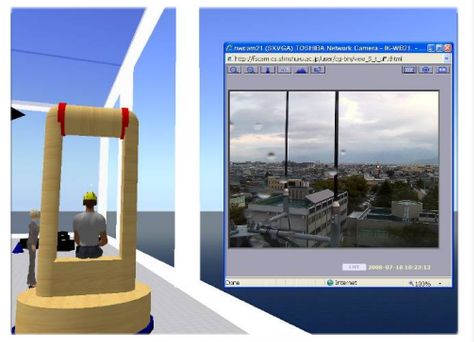
PTZ-Camera

sensed data
camera image

Twin-World
Mediator

control

Second Life



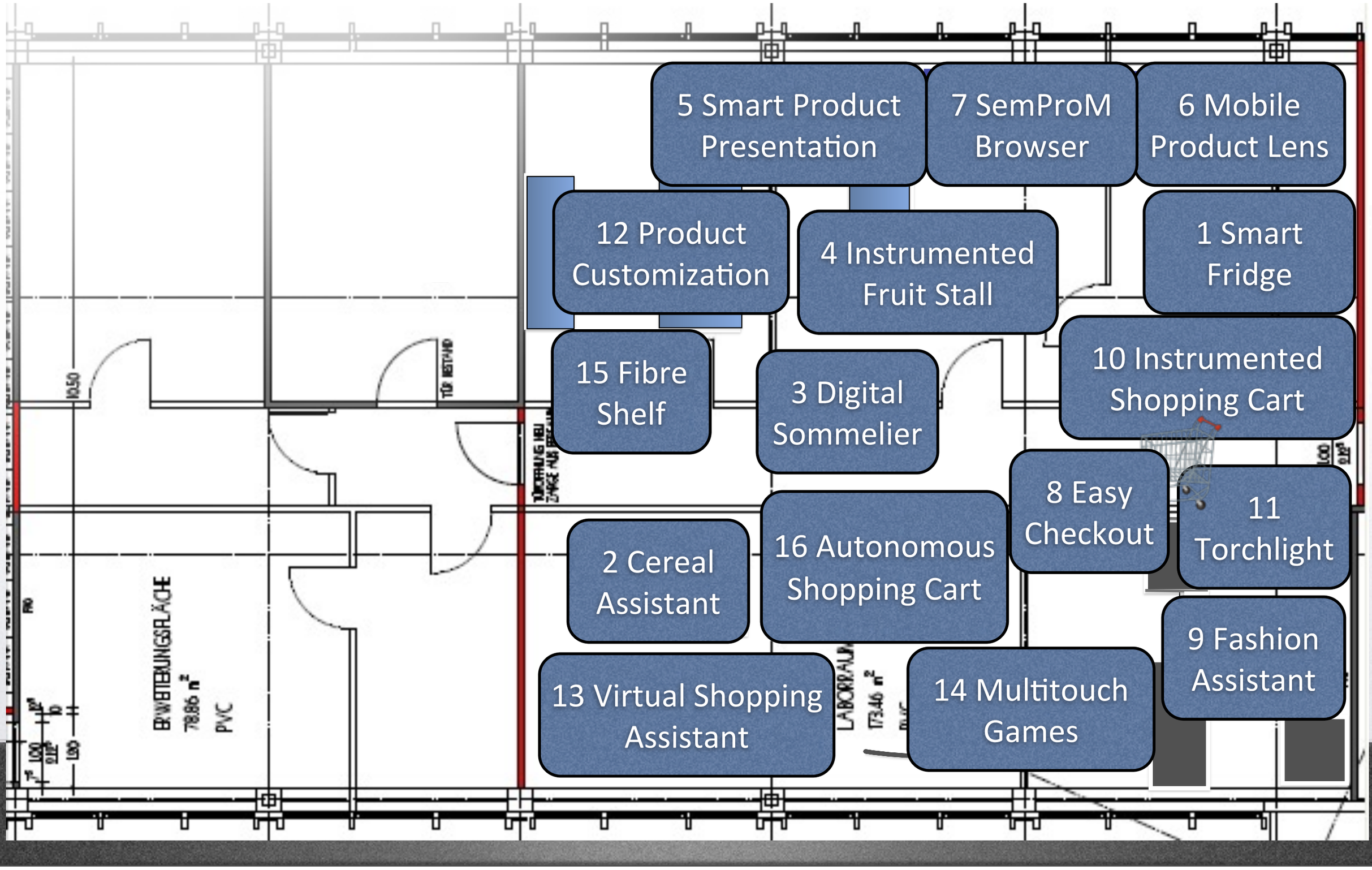
Boris Brandherm, Sebastian Ullrich, Helmut Prendinger. Simulation of Sensor-based Tracking in Second Life. AAMAS 2008: Proceedings of 7th International Conference on Autonomous Agents and Multiagent Systems, 2008.

Innovative Retail Laboratory

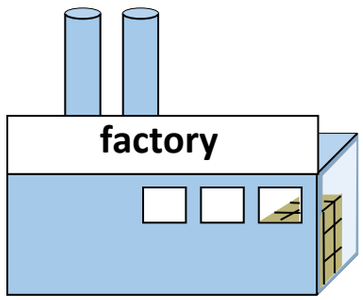
- ➡ one of five DFKI living labs
- ➡ since October 2007 a public-private partnership initiated by Globus, DFKI and Saarland University
- ➡ 450 m^2 of lab and office space in St. Wendel

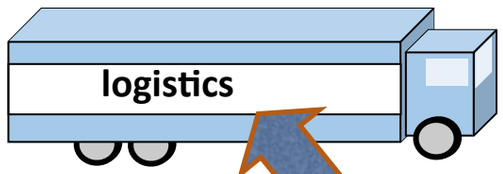
- ➡ focused on Intelligent User Interface in retail environments:
  - ➡ in-store navigation, product assistance, hybrid real-online-shopping, digital product memories, mobile shopping and easy-checkout.

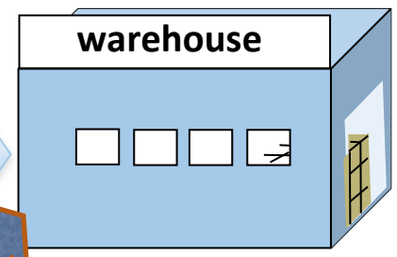
IRL Demonstrations



SemProM





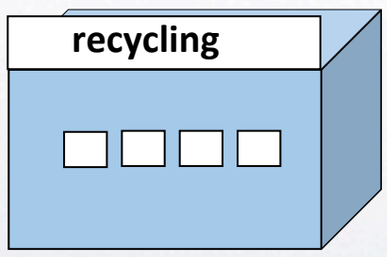


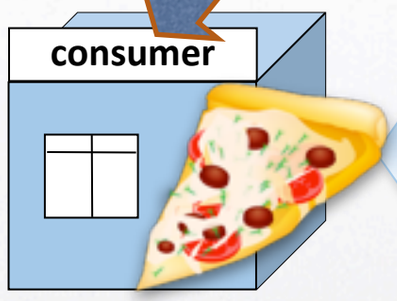
- transport conditions
- carbon footprint

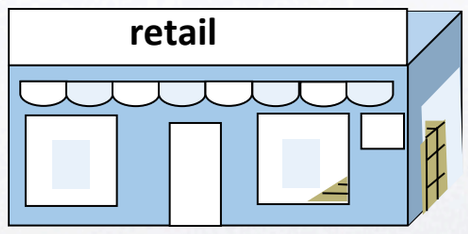
- storage conditions
- location
- dwell time

Product Memory

Improvement of Products







- durability
- usage
- disposal instructions

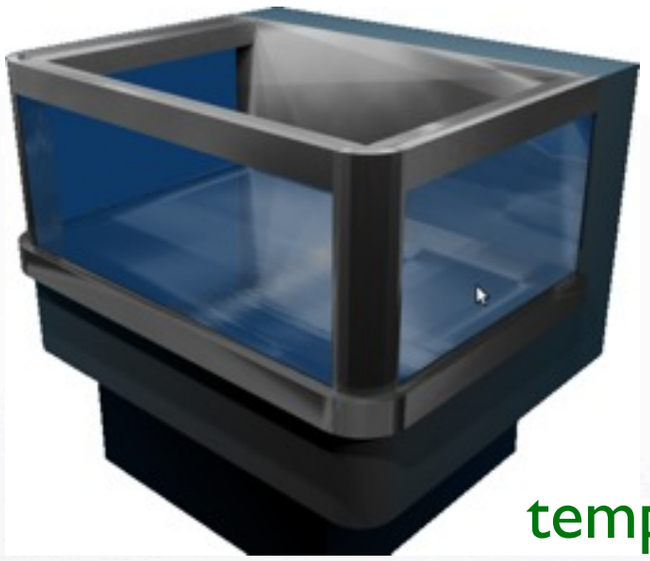
- cross-up selling information
- price
- durability

Agent Technology

Physical Layer

Agents Layer

RFID antenna at entrance ····· product registration sensor



Freezer Agent

RFID antenna ····· proximity sensor

temperature sensor ····· temperature sensor

Product Management Agent

Product Agents

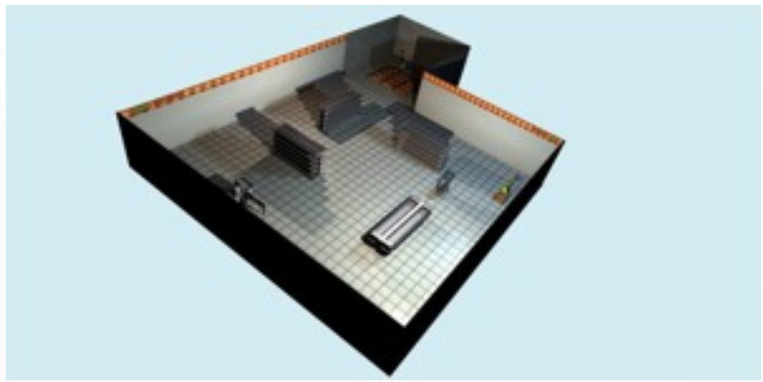
RFID antenna at cash desk ····· product registration sensor

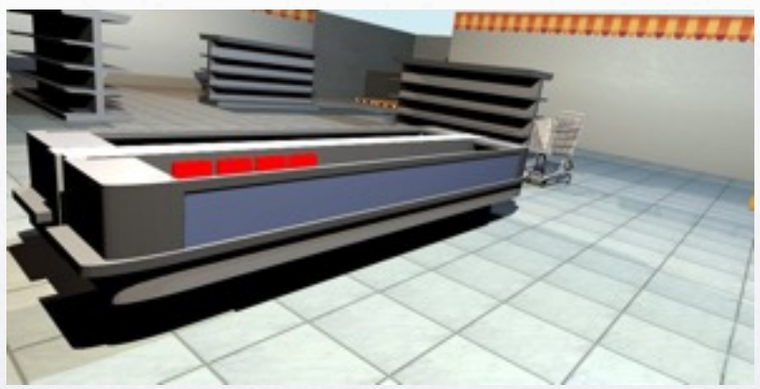
Visualization Technology

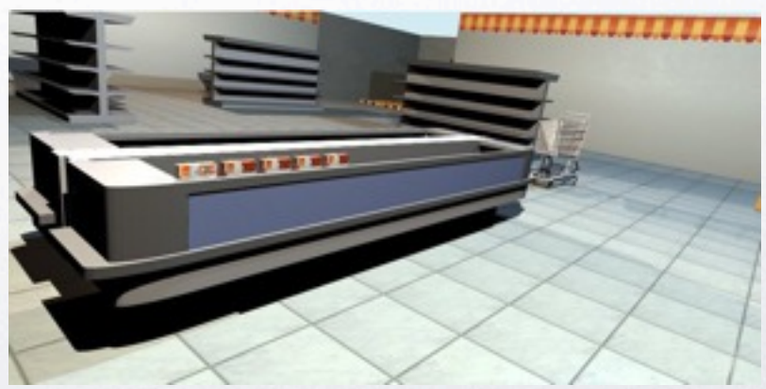
Predefined constraints

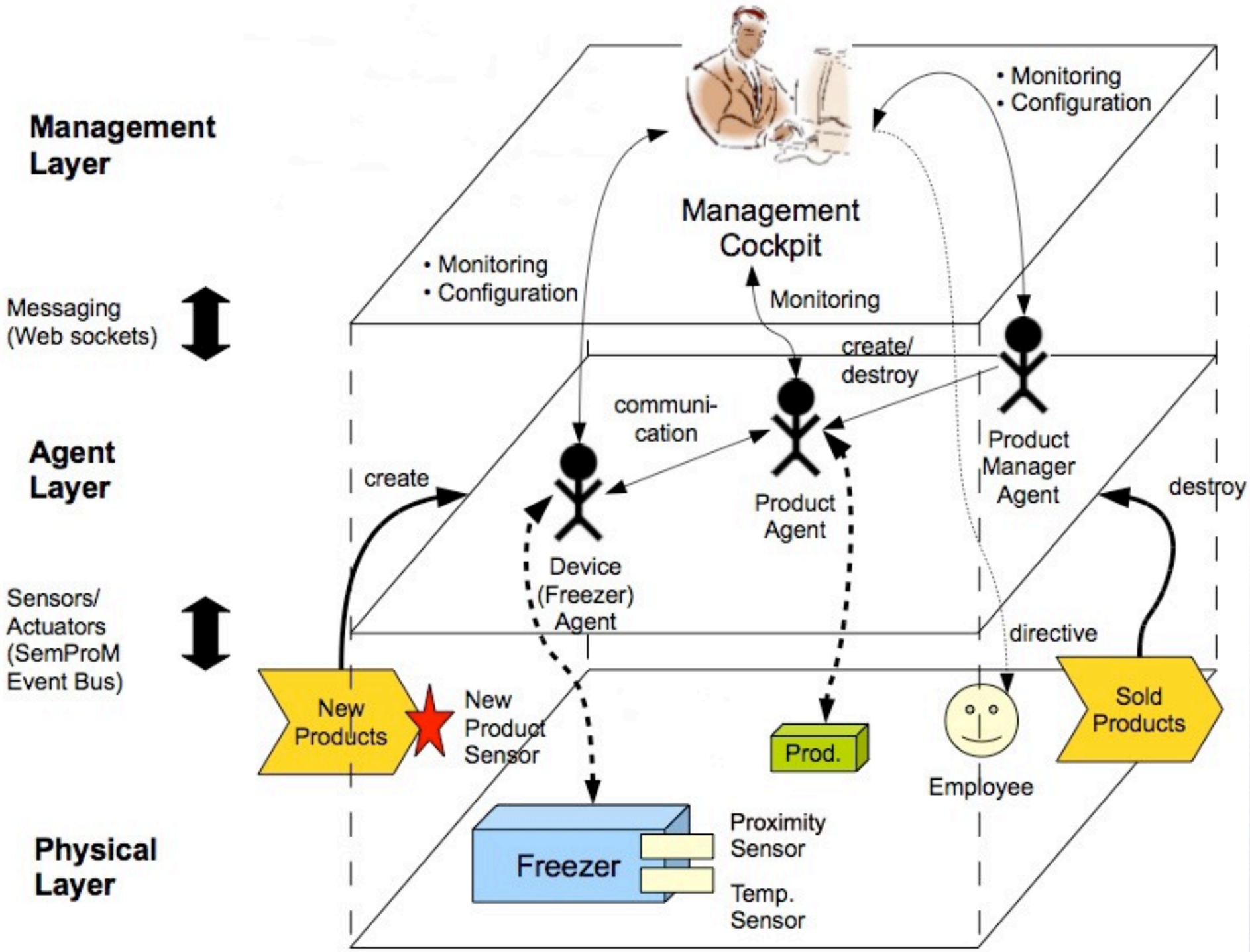
- ➡ at least n products in the shelf / freezer
- ➡ product at least n days fresh according to its best-before day
- ➡ freezer has optimal storage temperature for the product

Visualization of violations



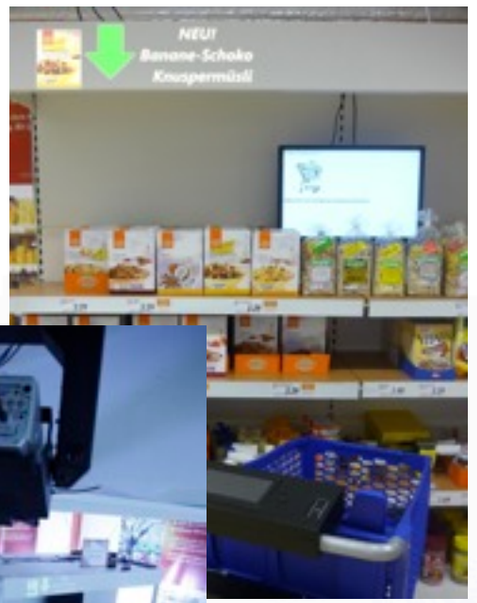


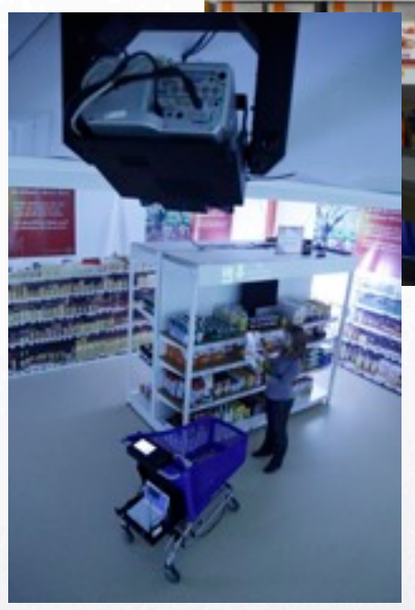



Management Layer
Messaging (Web sockets)
Agent Layer
Sensors/ Actuators (SemProM Event Bus)
Physical Layer
Management Cockpit
• Monitoring
• Configuration
Monitoring
• Monitoring
• Configuration
create/ destroy
communi- cation
create
destroy
Product Agent
Product Manager Agent
Device (Freezer) Agent
directive
New Products
New Product Sensor
Prod.
Employee
Sold Products
Freezer
Proximity Sensor
Temp. Sensor

Future Work

- Integrate connection from products to their representation in an ontology
- Complete the model of the IRL
- Integrate more interface RW ↔ VW
- Integrate BI services and simulations
- Next steps:
  - Integrate interface to electronic price labels
  - Integrate interface to a steerable projector





Approach and Questions

- How can the modeling of virtual worlds be facilitated?
  - objects bring their own geometrical representations into the virtual model (DPM)
- How can a synchronization of actions and reactions between both worlds be achieved?
  - problem of back coupling
- How can the information flow of simulators and assistant systems be visualized?
  - possibility to show or hide augmentation components
  - graphical presentation, whether the data is real or simulated
- How can interfaces be visualized?
  - editable simulator parameters
  - in- and output signals of simulators

Thank you for your attention!