# Benefits of Context Models in Smart Environments


Daniela Nicklas, Susanne Bürklen,
Tobias Drosdol, Nicola Hönle

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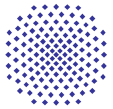
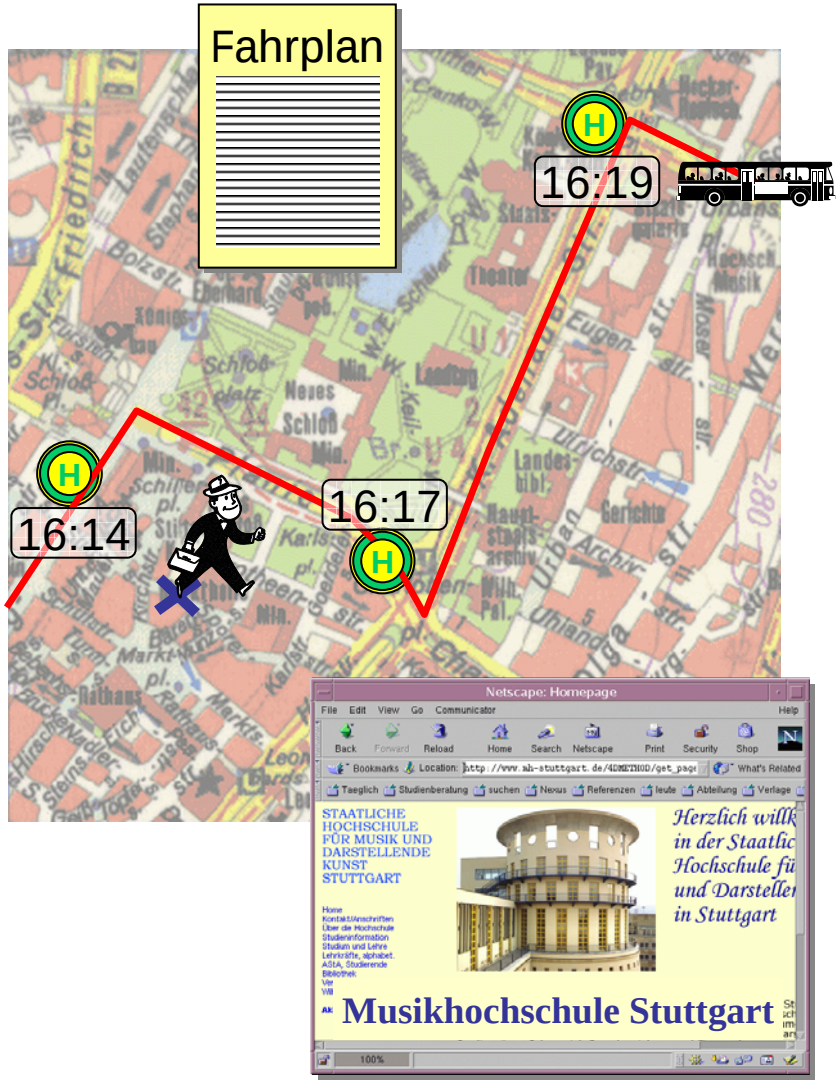
# Overview


- Motivation
- Context models
- Nexus platform
- Benefits for smart environments
- Conclusion

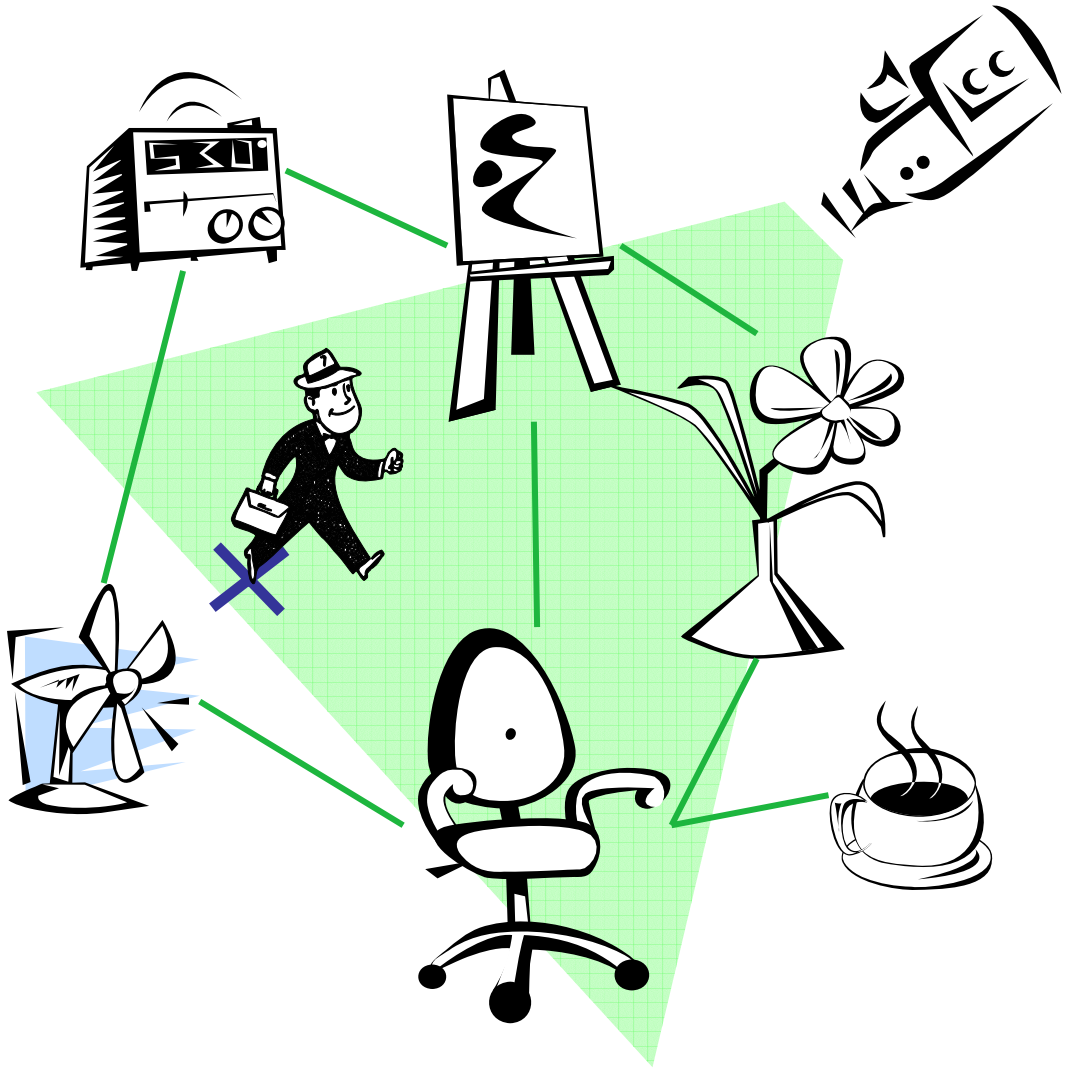


# Context-aware applications

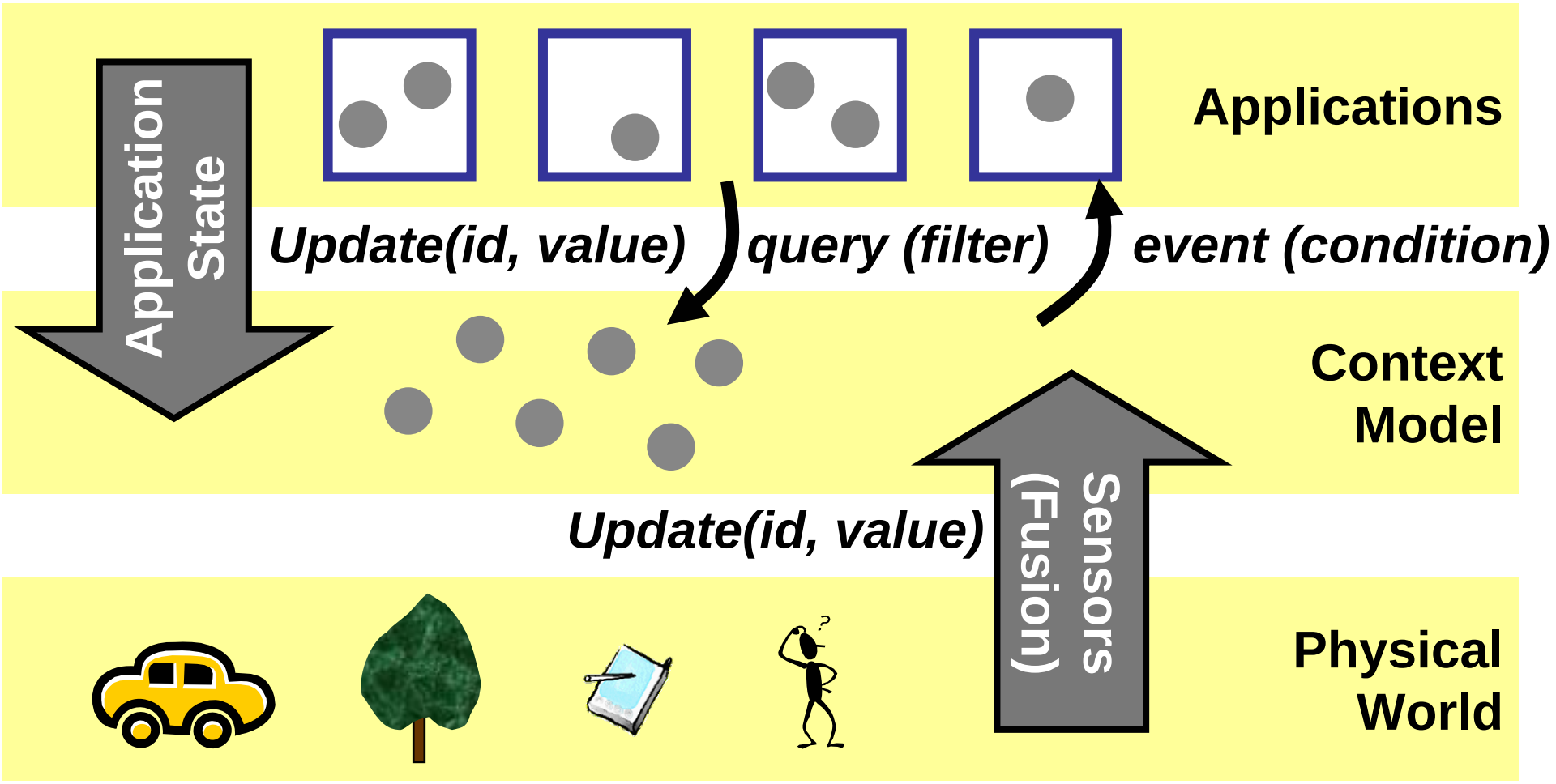
mobile computing




"smart" environments

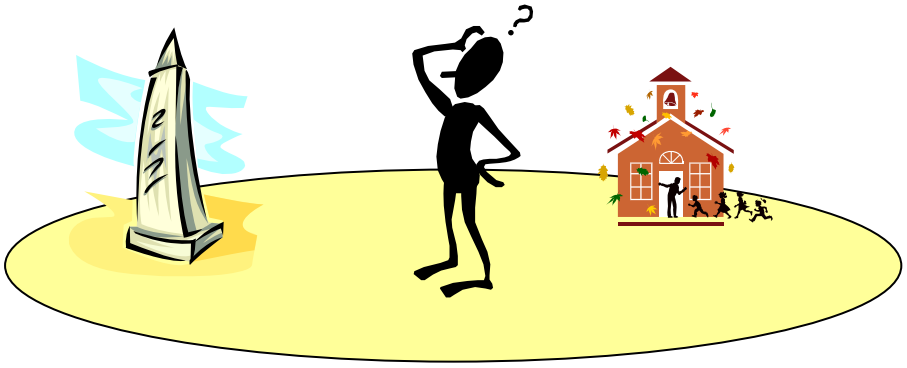


# Context models



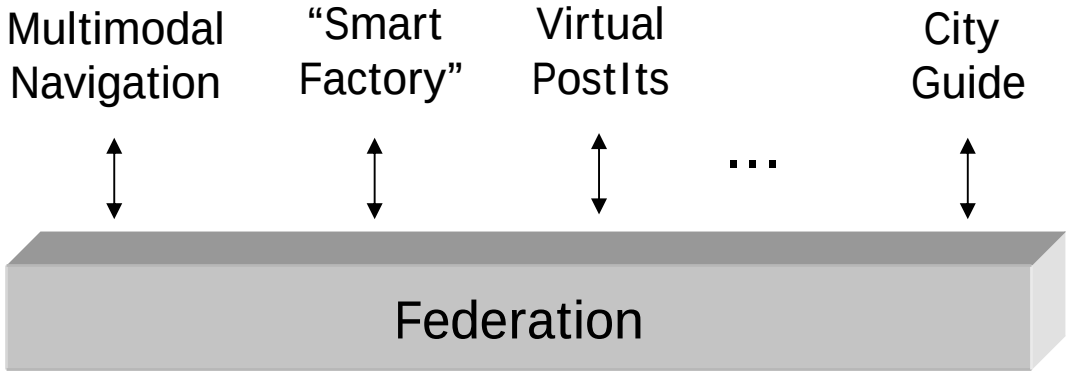
# Location, identity, and time

- properties of each spatial object
- location and ID: primary access path for context
  - used for selection:
    - What is there? (location)
    - What is John doing? (ID)



- time: often implicit ("now")
  - explicit for history and prognosis
  - combined with location or time:
    - who was here yesterday? (location + time)
    - where was I yesterday? (ID + time)

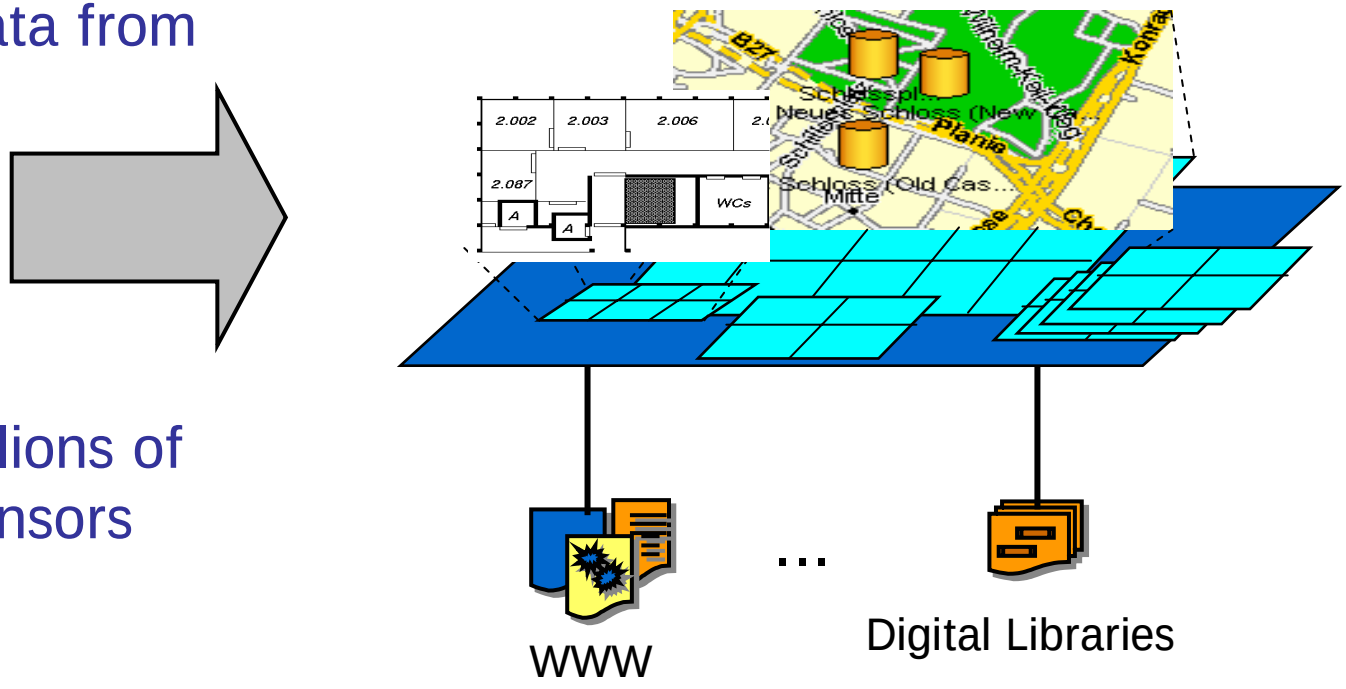
# Vision: federated world models




context-aware applications

global context model

Data from

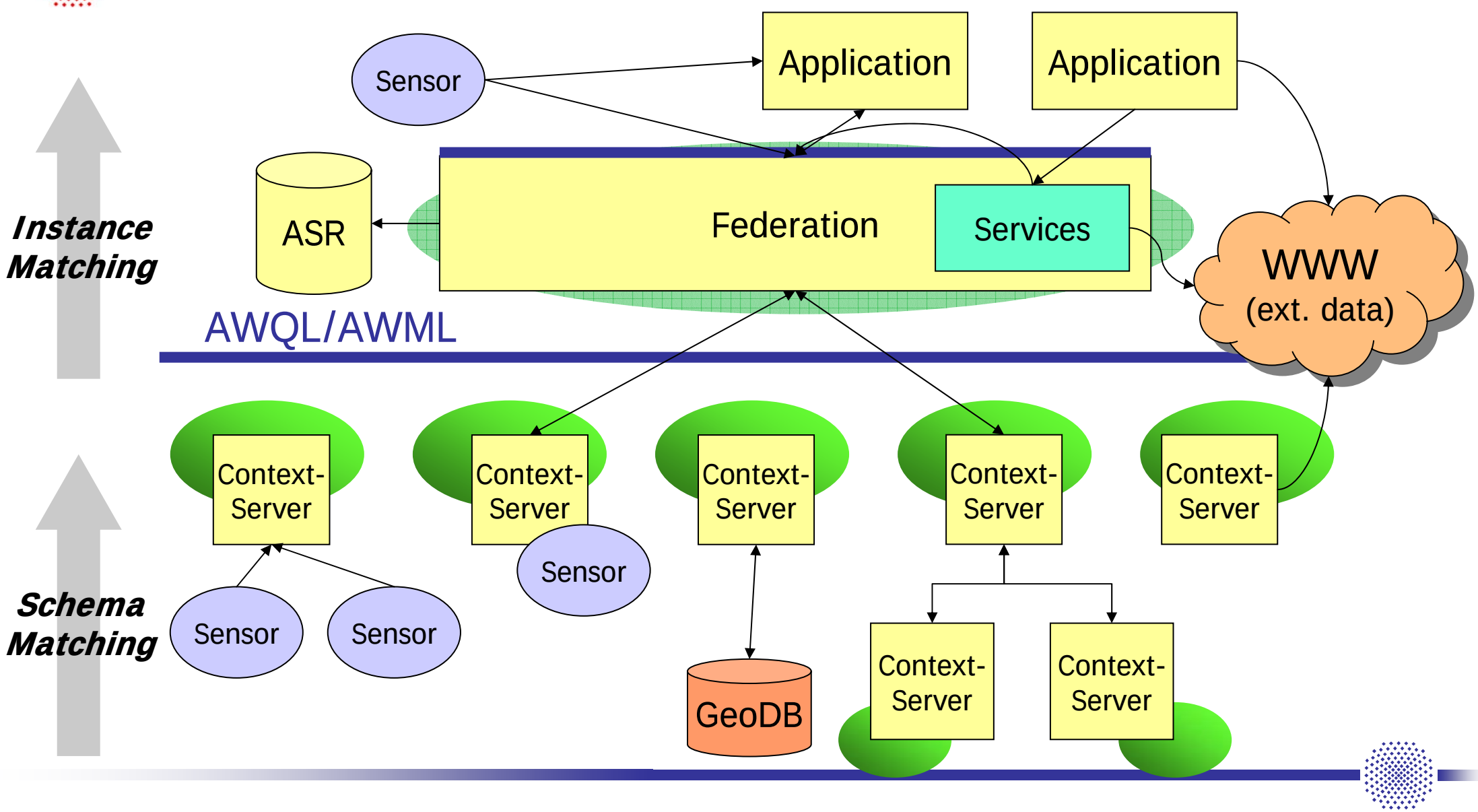



local context models

billions of sensors

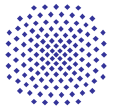
information spaces

# Nexus platform architecture



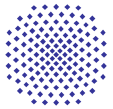
# Benefits for smart environments


- service discovery
- object positioning
- object identification
- integration of new hardware
- remote control of entities
- context events



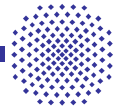
# Service discovery ("find")

- Typical: publish – find – bind
- Sensors, actuators, services are part of the context model
- Use context model as location-aware service registry
  - → (complex) spatial queries
  - → (complex) spatial events
- Manipulate physical objects through the context model
  - → bind services to context server



# Object positioning


- Hide the complexity of various positioning systems
- Use context model to improve accuracy

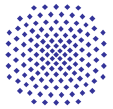


# Object identification

- User points at physical object (e.g. laser pointer, observed by mobile or stationary camera)
- Application reacts (add. information, action, ...)
- Use context model for:
  - analyse frames, compare with 3D model
  - link object to digital information

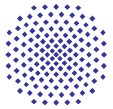
# Integration of new hardware


- Typical: tedious task, requires downtime of system and/or modification of application code
- With context model:
  - plug:
    - install (physical sensor)
    - model (important attributes of sensor)
    - insert (sensor object into context model)
    - *relate (sensor values to other attributes in context model)*
  - play (applications can use sensor information)



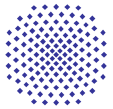
# Remote control of entities


- application has not to be present in the smart environment
- can use context model from everywhere
- e.g.:
  - VR like interaction with distant room (collaboration, ...)
  - remote control for heating, ...



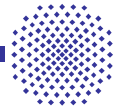
# Context events

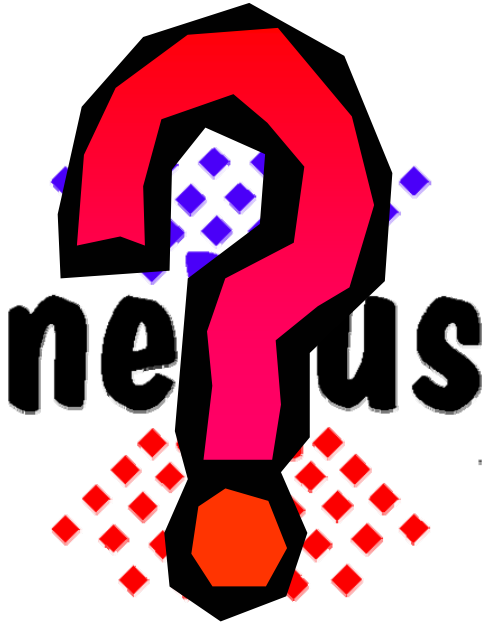

- many smart environment applications are event-based
- Nexus platform allows for context events defined on context model
- Easy developement of of such applications:
  - register event
  - implement reaction on notification
- Future work: ECA-tool?



# Conclusion


- context models are beneficial not only for mobile applications but also for smart environments
  - development
  - deployment
  - maintanance
  - interoperability
- Nexus platform can provide good support
- To do: prototyping, proof of concept



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