

CASTA09

Workshop on Context-Aware Software Technology and Applications

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# Automizing Home Environments and Supervising Patients at Home with the Hydra Middleware

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# Introduction

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## Context-aware applications

- Rapidly changing requirements
- Dynamic environments



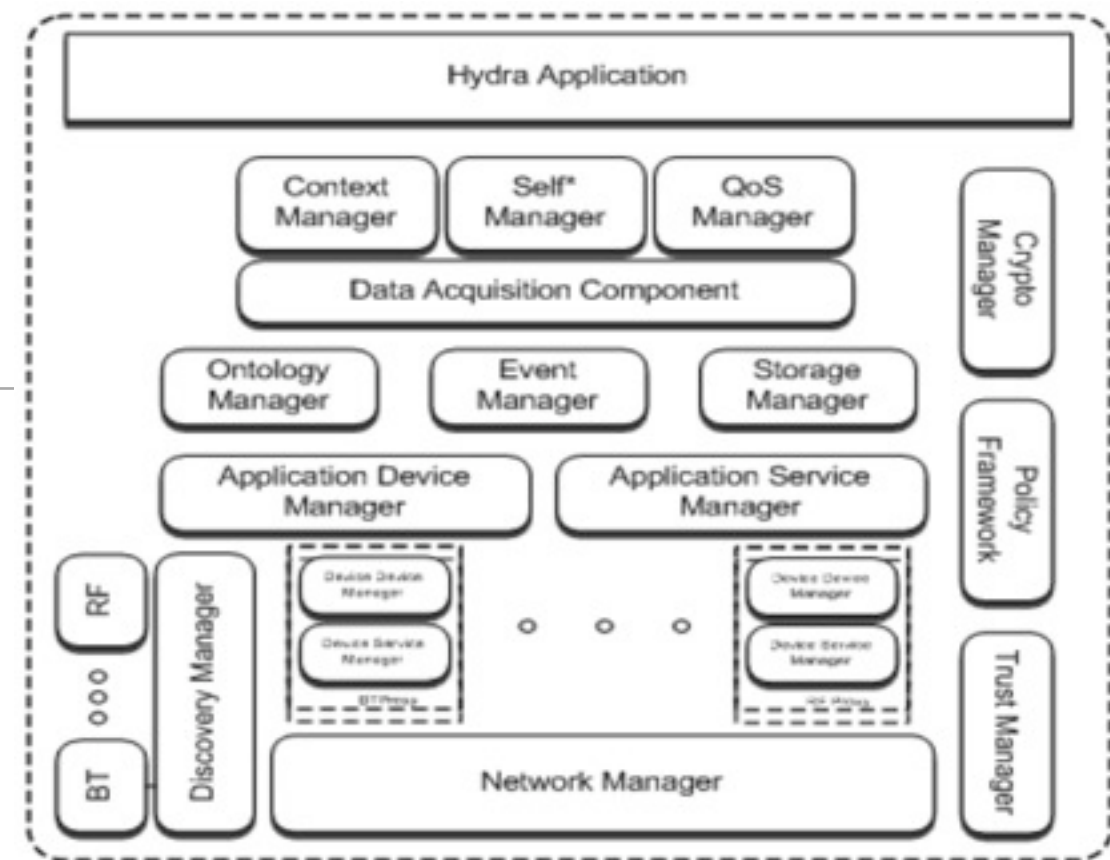
# Introduction

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- Middleware have been proposed for hiding low-level functionality.
  - They provide weak support for more complex functionalities.
    - Access control, actuation mechanisms, etc.
- The **Hydra middleware** provides these missing pieces by implementing more elaborated tasks and helping the software engineering process.

# The Hydra middleware

- Aims to support embedded systems development.
- Device's functionalities are distributed by offering web services.
- Depending of their characteristics, devices can directly or indirectly connect to the Hydra network.
- Connectivity is performed in a distributed fashion with regards of disconnections and peer failures.
- Hydra introduces a layered architecture for context-aware applications.



# The Hydra middleware: context-aware components

## Context Data Acquisition

Data sensing

## Context Management

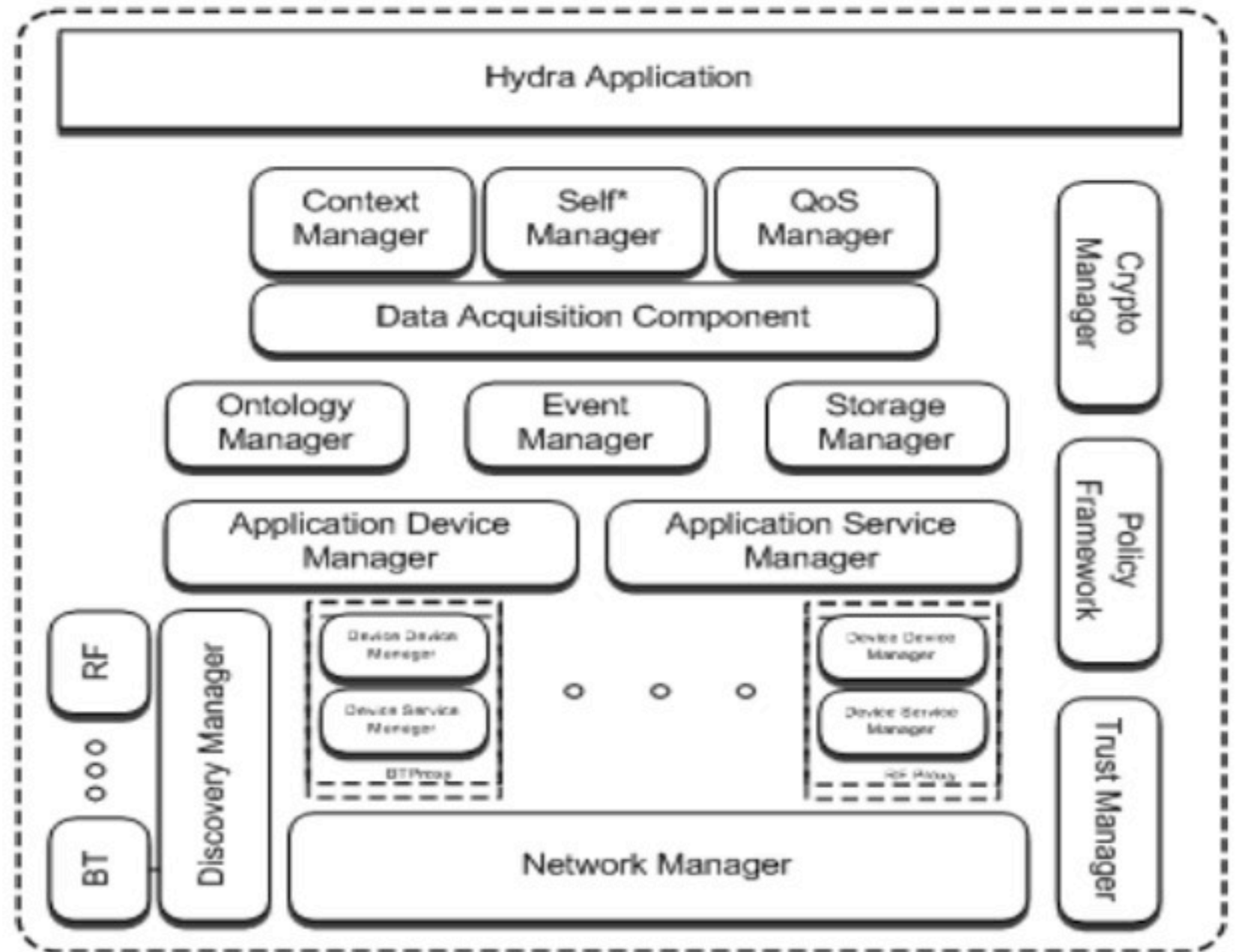
Context retrieval  
and life cycle

## Context Awareness

Support for  
context-awareness

## Context interpretation

Reasoning about  
context



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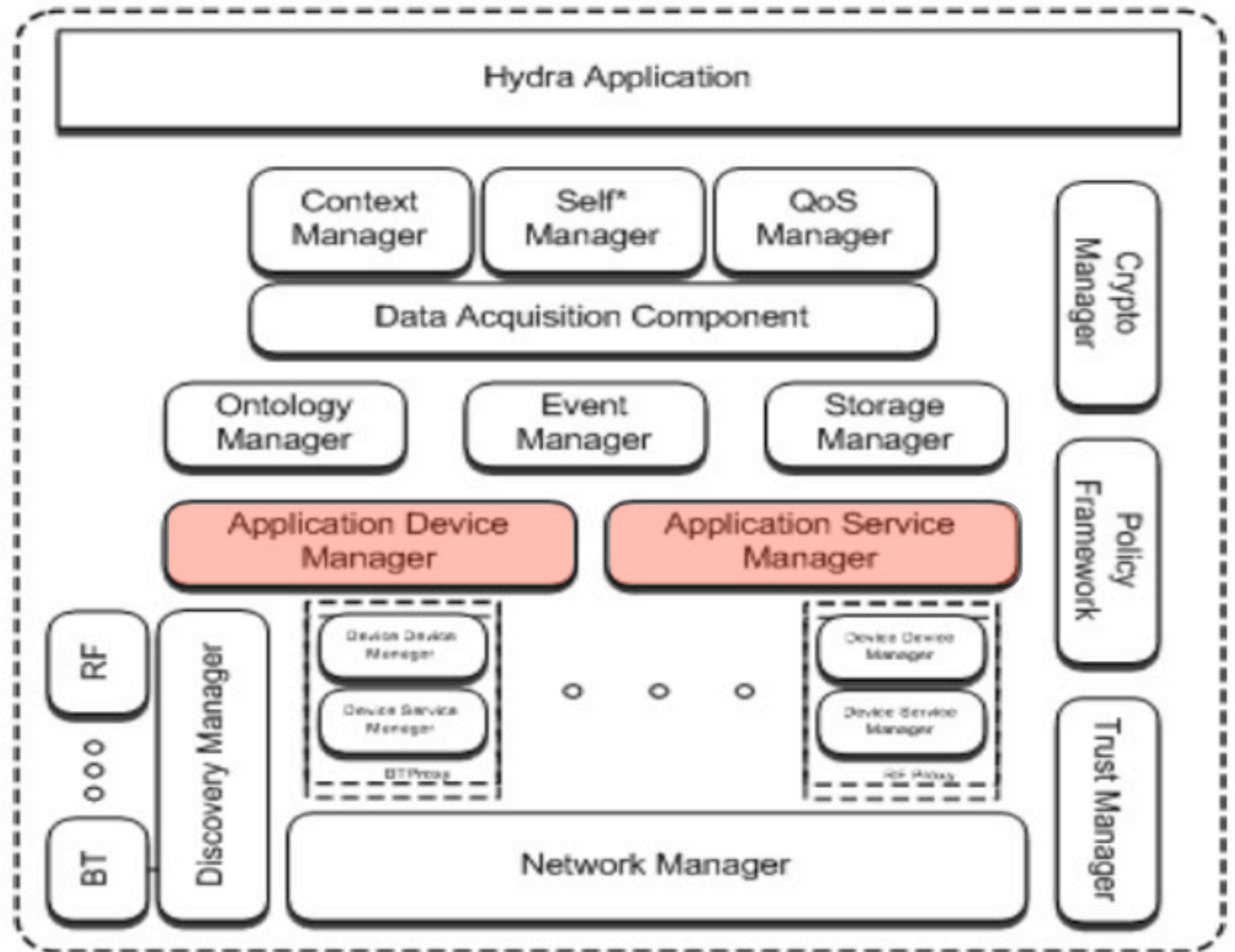
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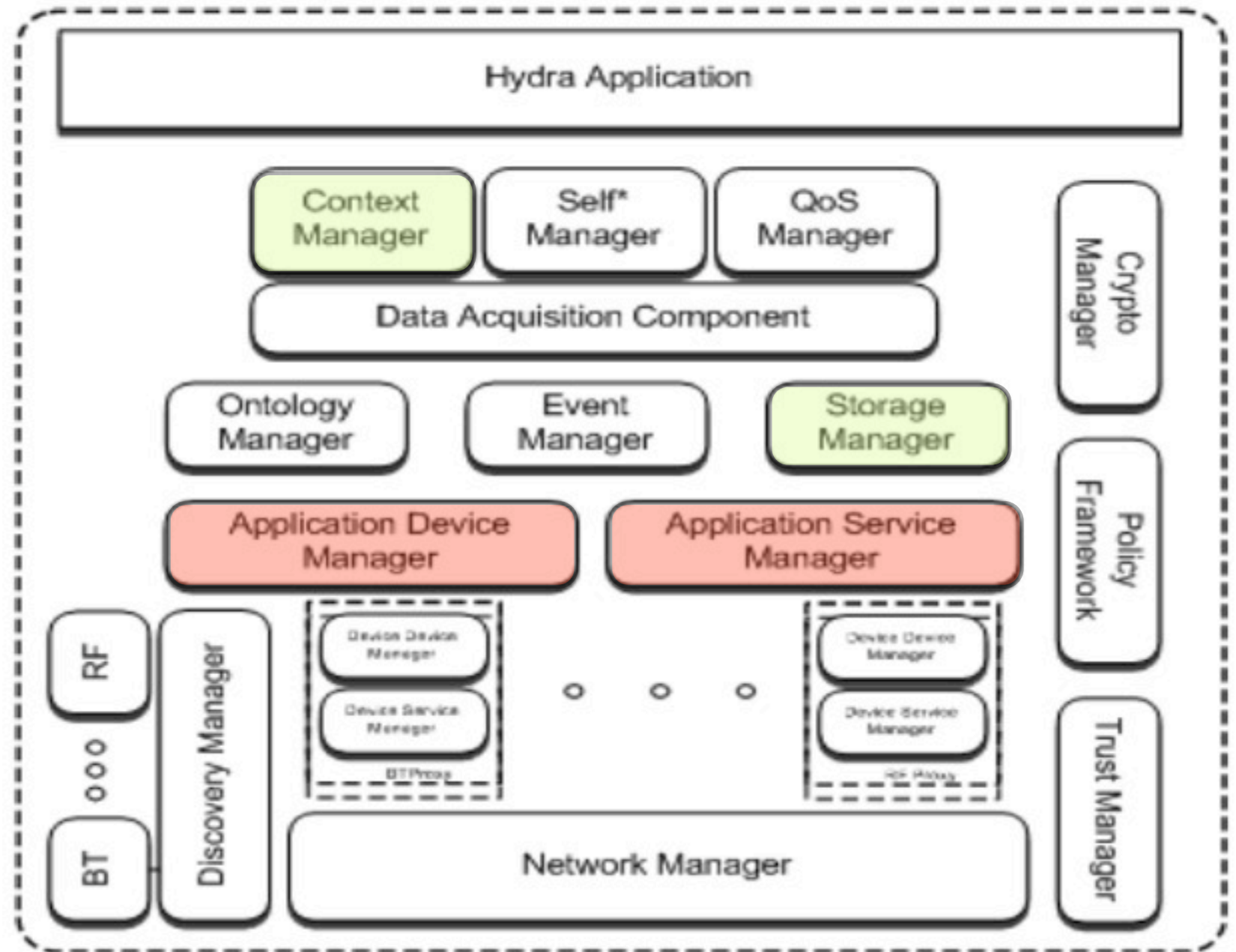
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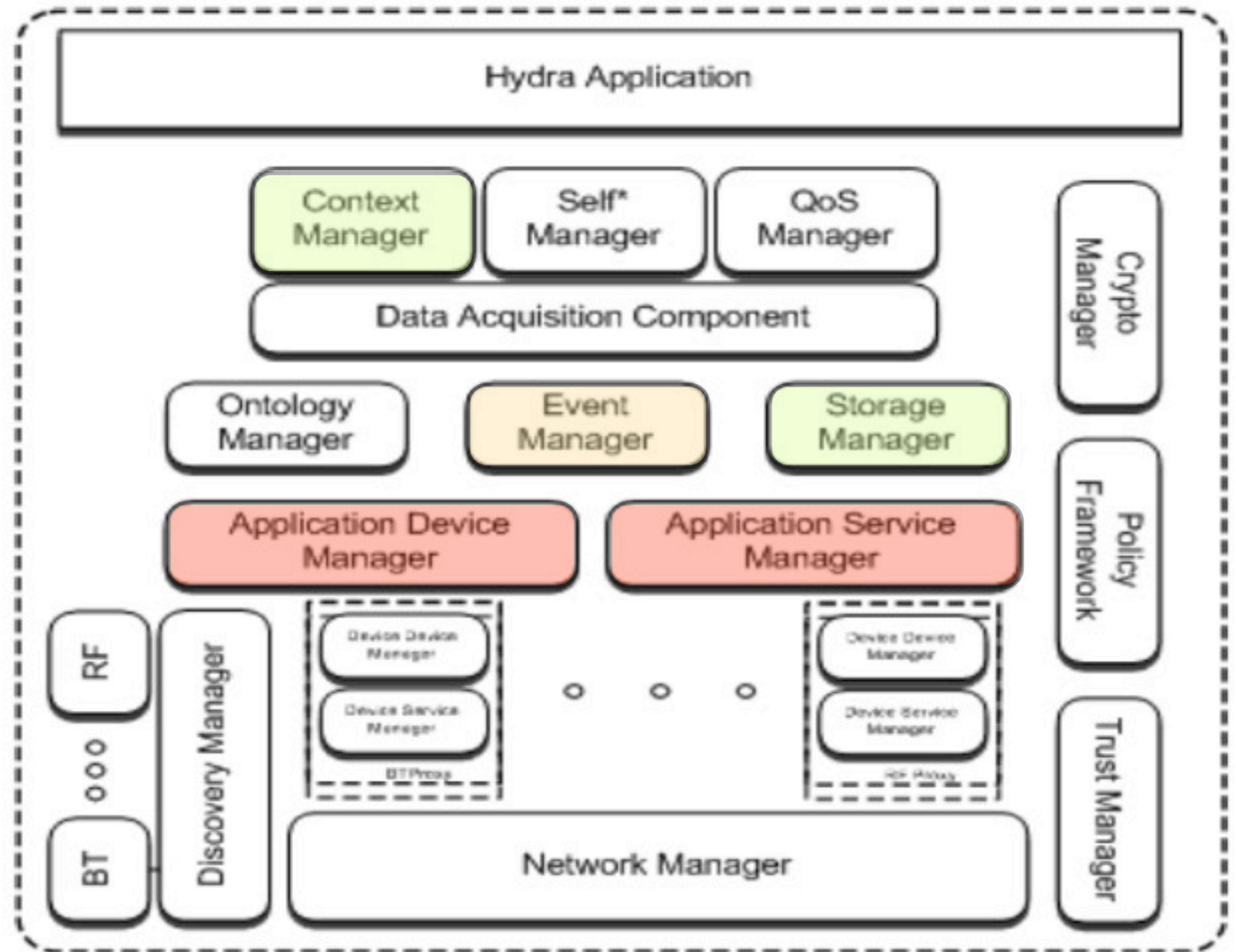
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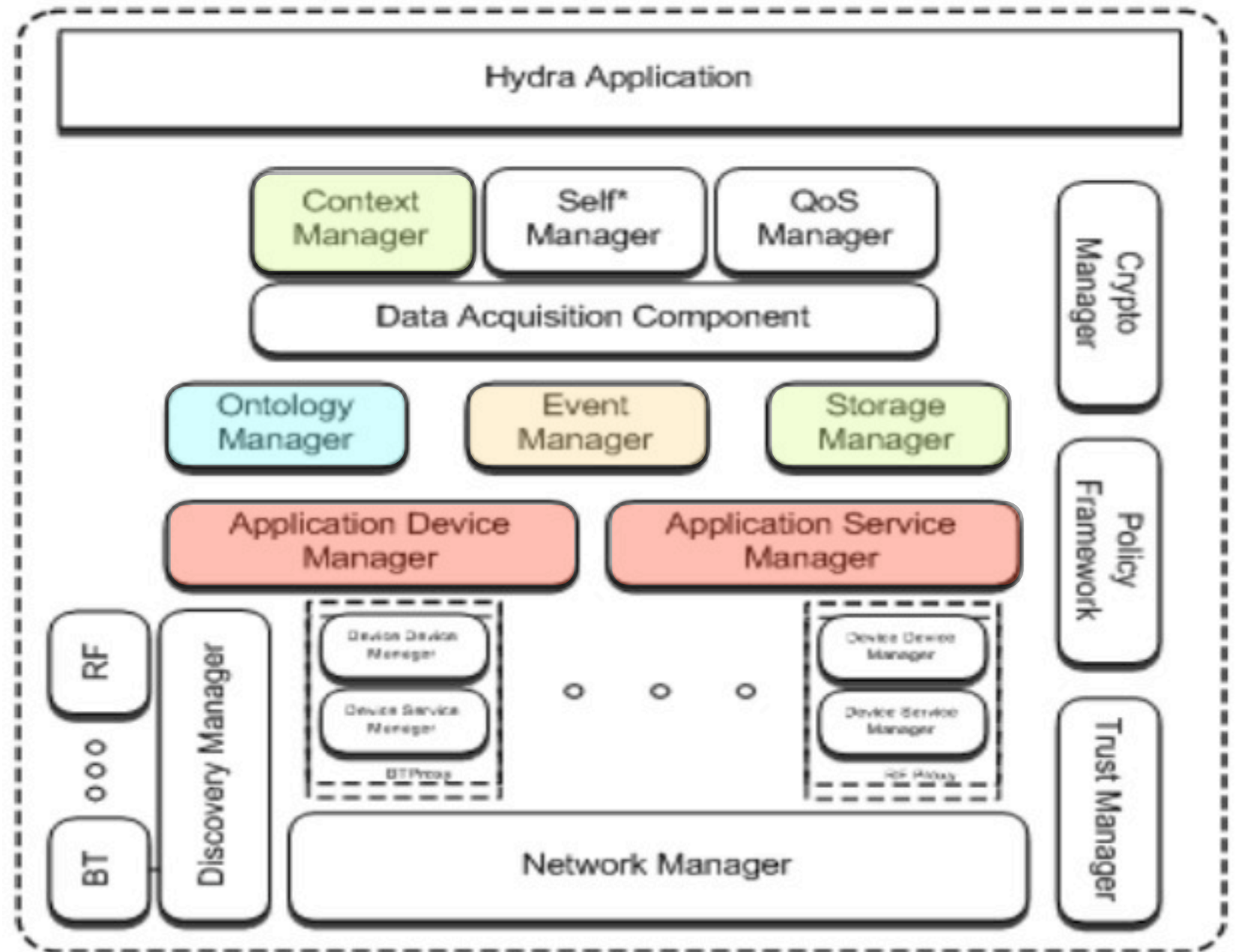
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# Application Scenarios: Home automation

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- Houses equipped with a large number of sensors.
- They can monitor and manage themselves.
- Depending of the owner presence they can take different measures.
- The user can remotely control the house and grant access to third persons.

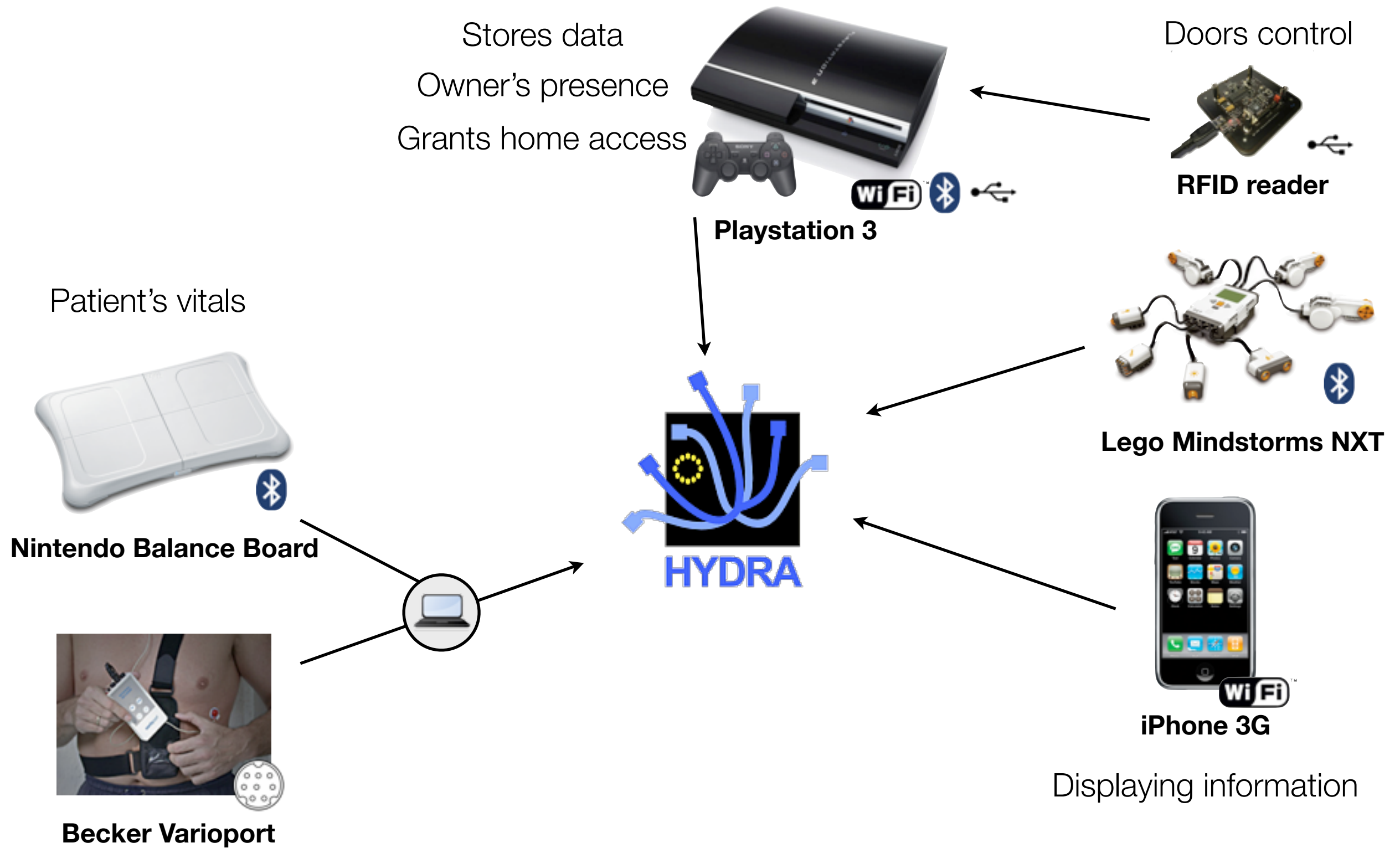
# Application Scenarios: Healthcare

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- Home-patient supervision
  - Patient's vitals can be monitored remotely.
  - Special tasks can be scheduled through a mobile device.
  - Direct conversation/messaging between the patient and the physician.
  - In emergencies: Home access can be granted to specialists.

# Devices and infrastructure



# Summary

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- Hydra runs in heterogeneous devices and connection types.
- The system runs within a distributed schema.
- Context-awareness is not a critical mechanism but is an important contribution.
  - Device and service discovery and interoperability check.
  - Information access, granting permissions, owner's presence.
- Feedback of demos have been positive.
- Future work: more research on integrating context and creating scenarios.

# Open Questions

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- How the approaches presented fit in a more general architecture for Context-aware systems?
- Which are the essential and optional features for such systems?
- Can we model these systems using well-known notations (such as UML)?