Grupo de Procesado de Datos y Simulación
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Universidad Politécnica de Madrid

CASanDRA mobile: An embeddable fusion framework to manage context information in mobile devices

HAIS 2010

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contents

- mobile middleware
- SOA and mobile OSGi
- CASanDRA: components and events
- CASanDRA: core system
- application example
- conclusions and future work

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- ***mobile middleware***
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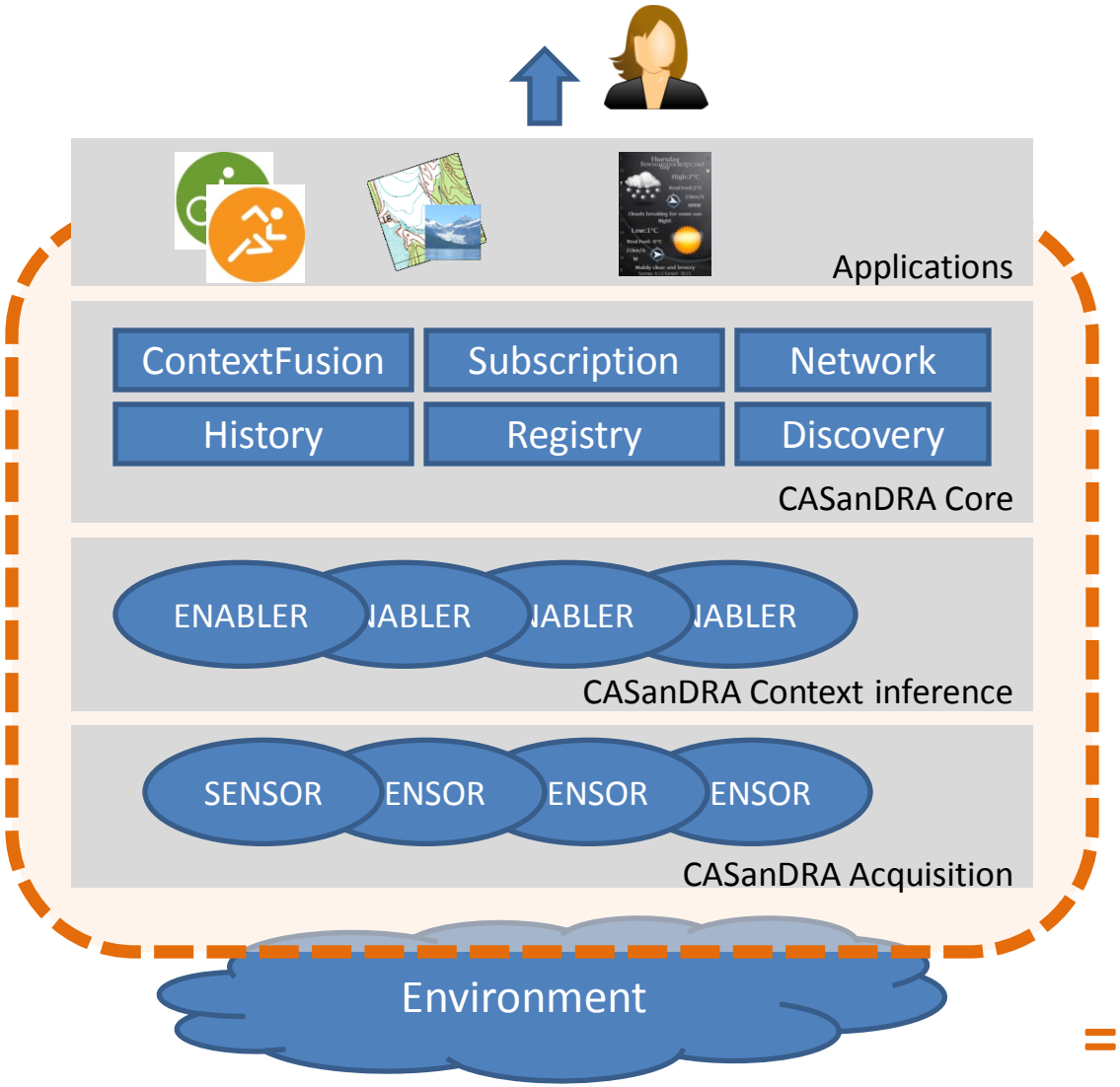
mobile middleware



mobile middleware:

tools to simplify application development

+

process sensor data intelligently

+

hide specific sensor characteristics

= **CASanDRA mobile**

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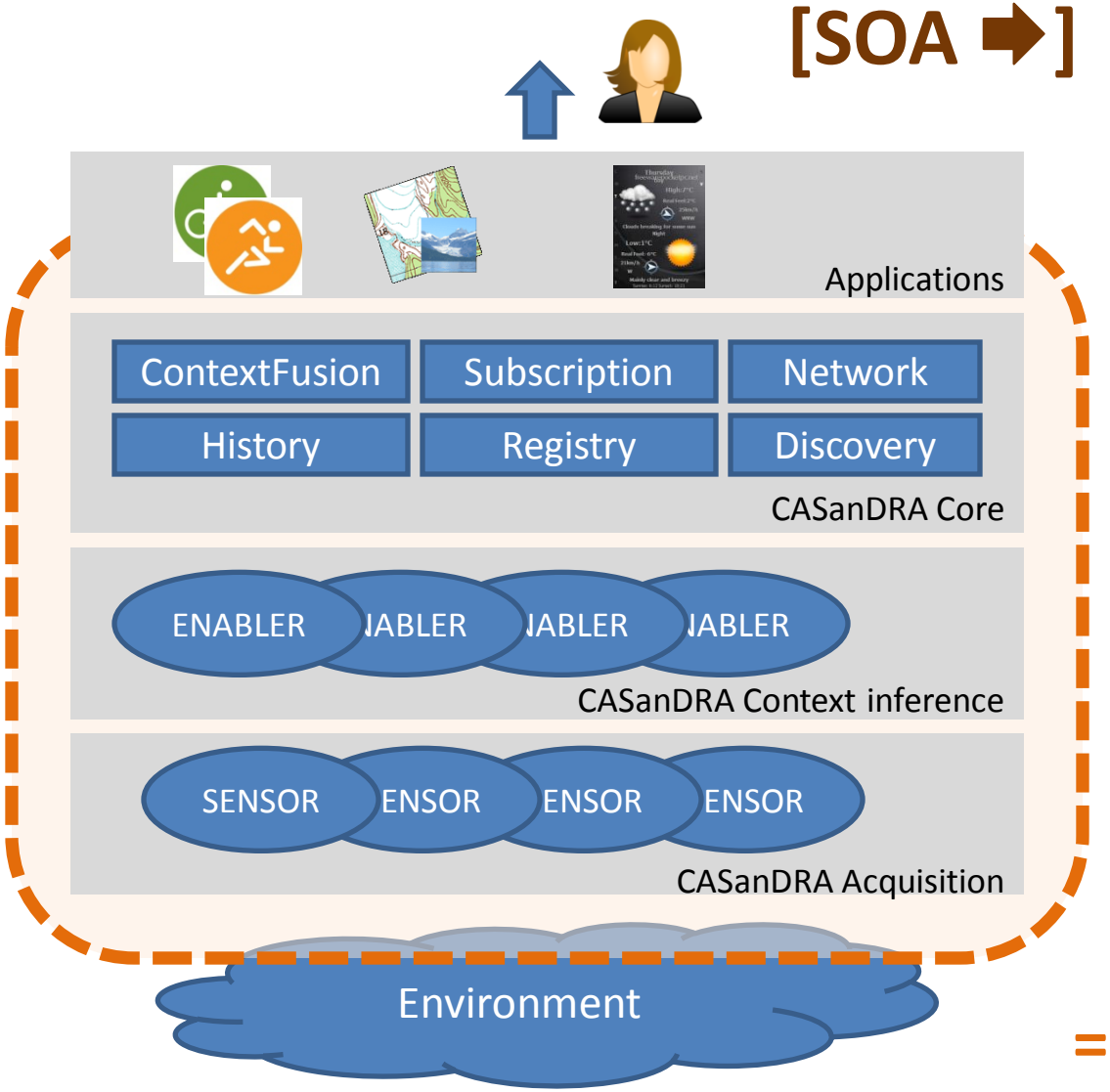
mobile OSGi



[SOA ➡] mobile OSGi:

- ❑dynamic component framework for Java
- ❑bundle: reusable software unit

- ☑reusability of components (bundles/services)
- ☑aggregation of (context) data
- ☑HW platform independence (Java-based)
- ☑services in framework
  - resource discovery
  - event management
  - log
  - [...]

= CASanDRA mobile

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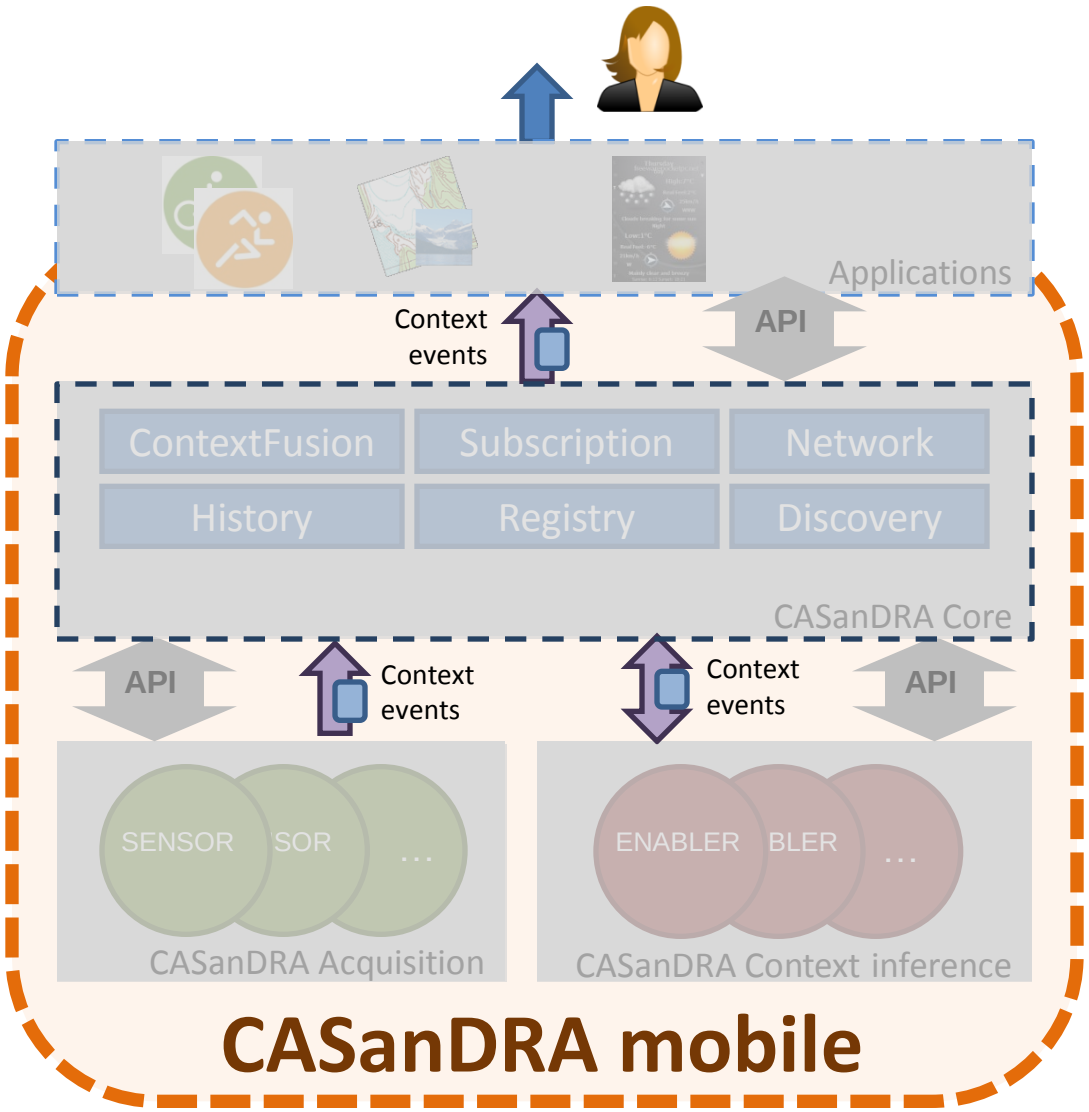
components and events



components

- **SENSORS**
  - encapsulate specific sensor characteristics
  - e.g.: GPS, temperature, etc.
- **ENABLERS**
  - process context information from:
    - SENSOR component
    - other ENABLER component
  - e.g.: activity recognition, location fusion, etc.
- **APPLICATIONS**
  - adapt service to the user context

context events

- generation:
  - sensors, enablers
- consumers:
  - enablers and application

core system [➡]

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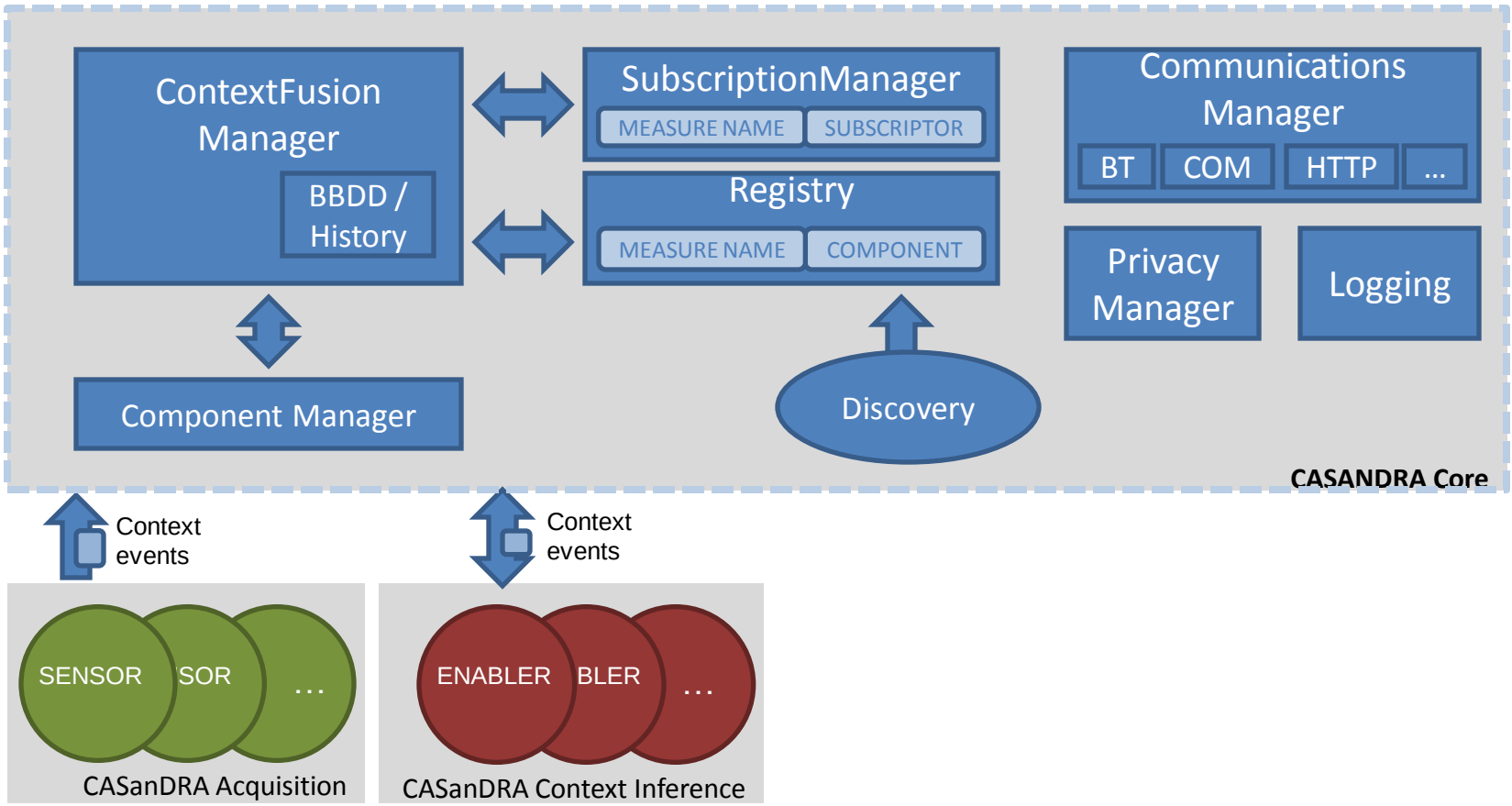
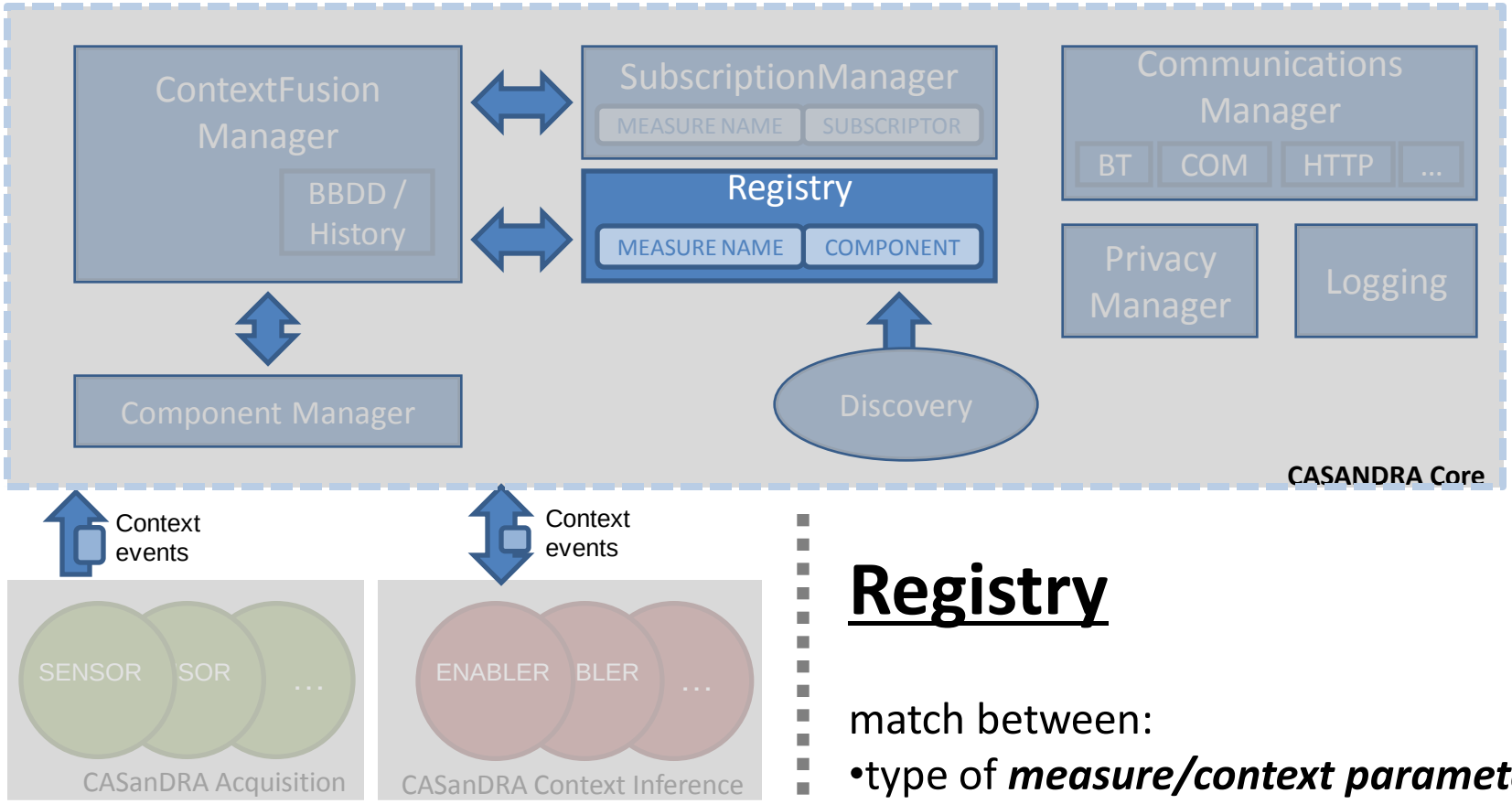
core system


ContextFusion Manager
BBDD / History
SubscriptionManager
MEASURE NAME
SUBSCRIPTOR
Registry
MEASURE NAME
COMPONENT
Communications Manager
BT
COM
HTTP
...
Privacy Manager
Logging
Component Manager
Discovery
CASANDRA Core
Context events
Context events
SENSOR
SOR
...
CASanDRA Acquisition
ENABLER
BLER
...
CASanDRA Context Inference

core system



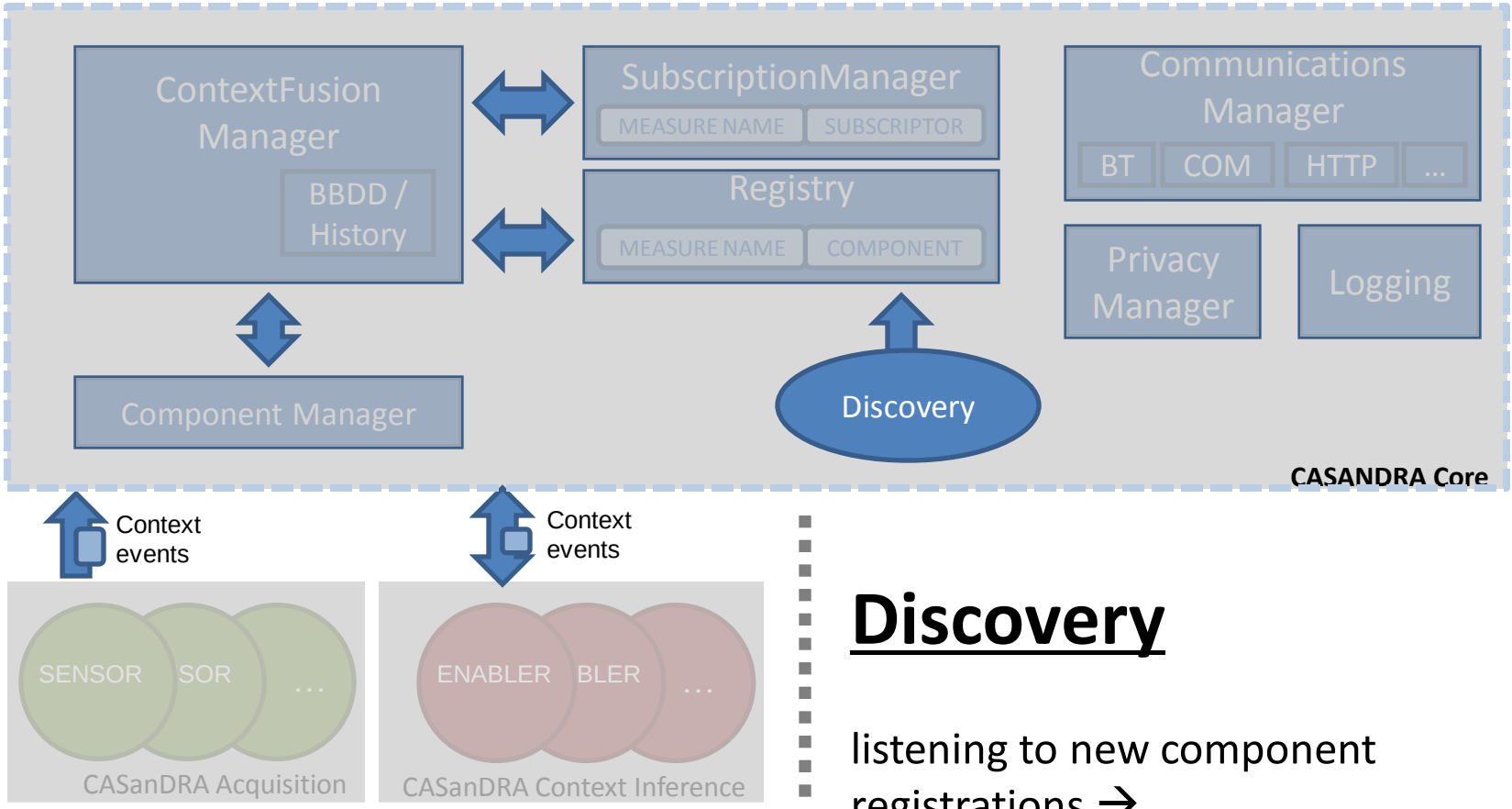
Registry

match between:

- type of ***measure/context parameter***
- publisher ***component***

→ list of available context parameters

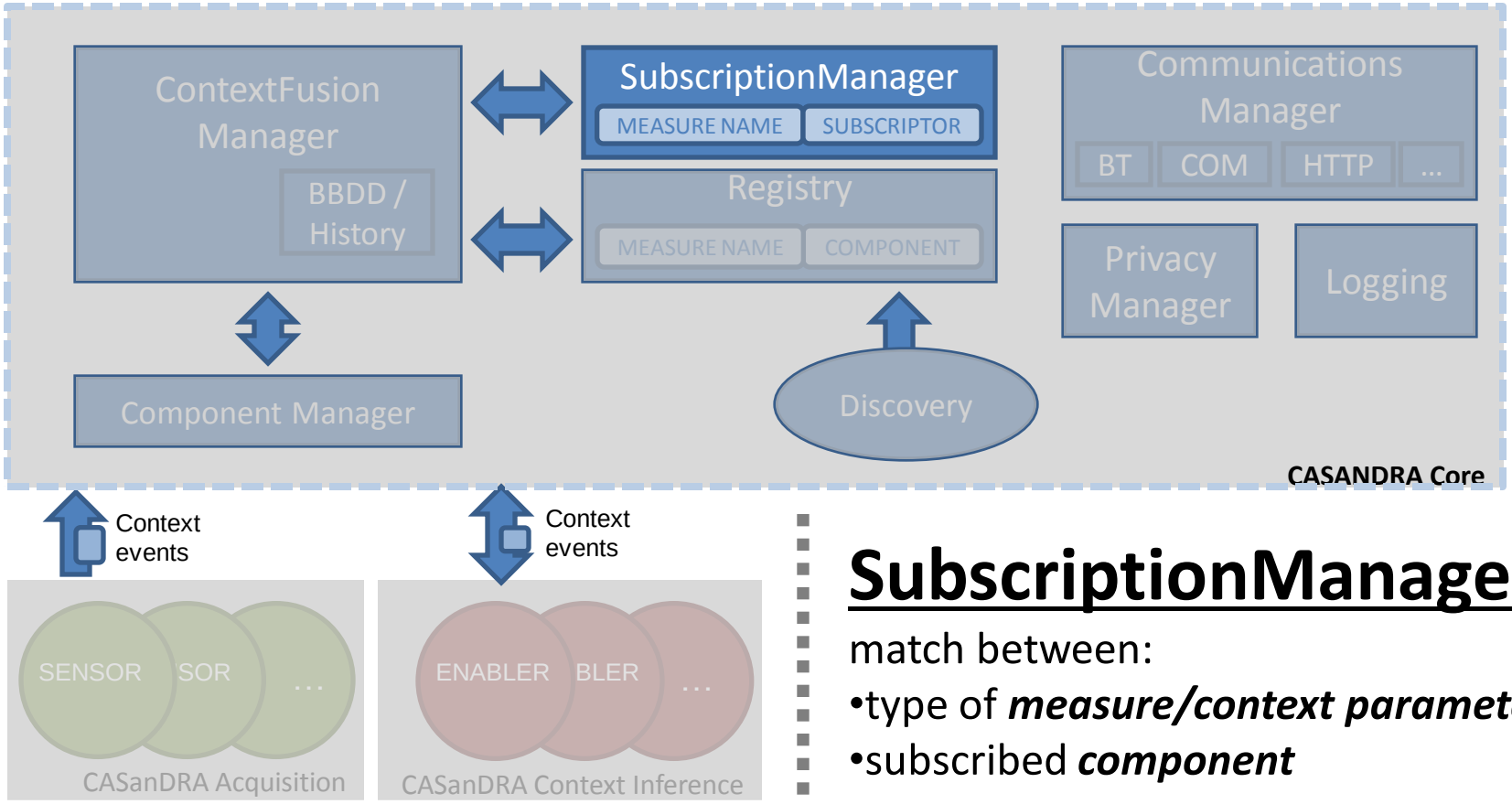
core system



Discovery

listening to new component registrations →
adding ***measure*** + ***component*** to the *Registry*

core system



SubscriptionManager

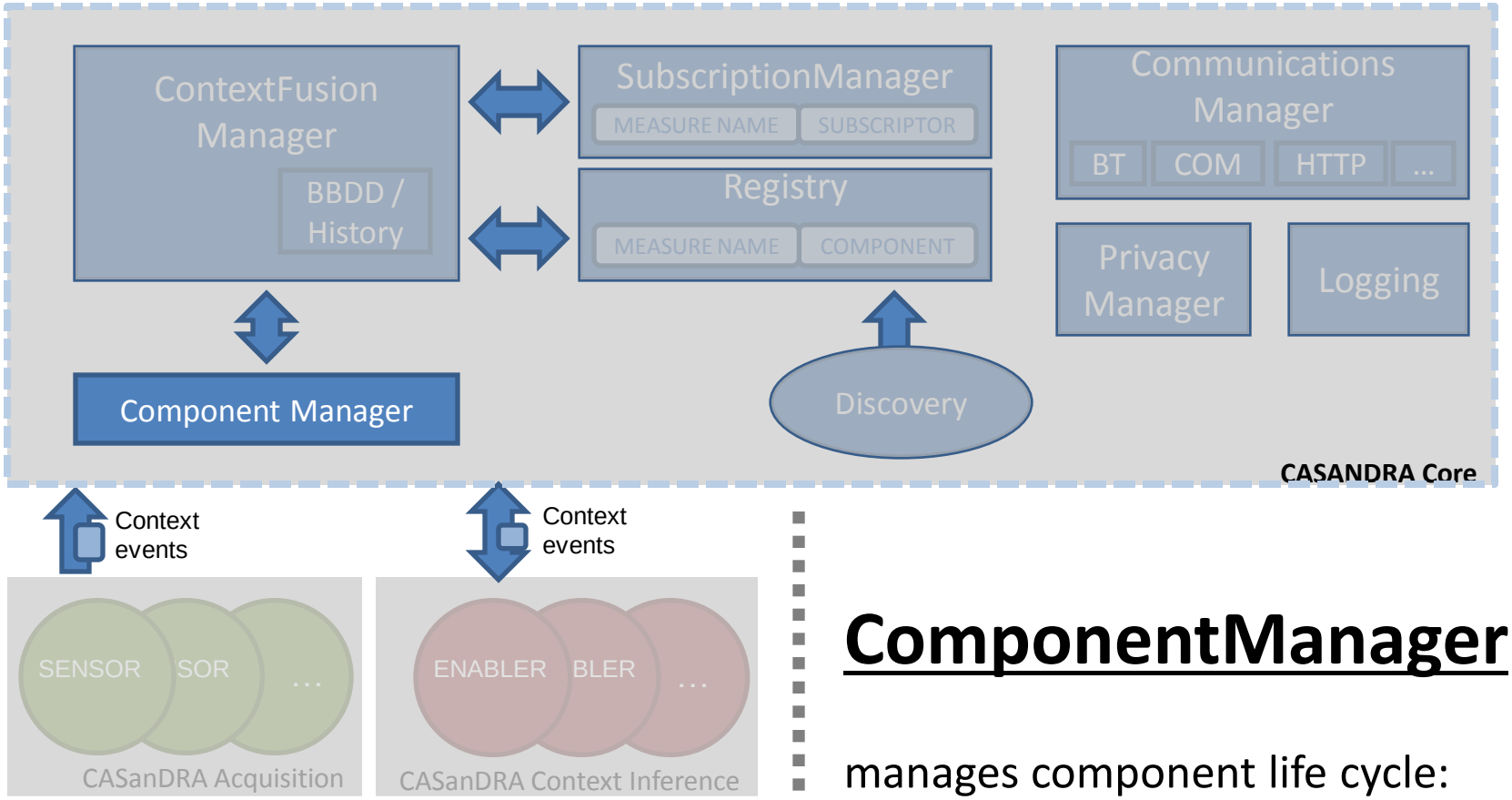
match between:

- type of ***measure/context parameter***
- subscribed ***component***

\+ *Registry*

→ list of required components to get measure/context parameter

core system

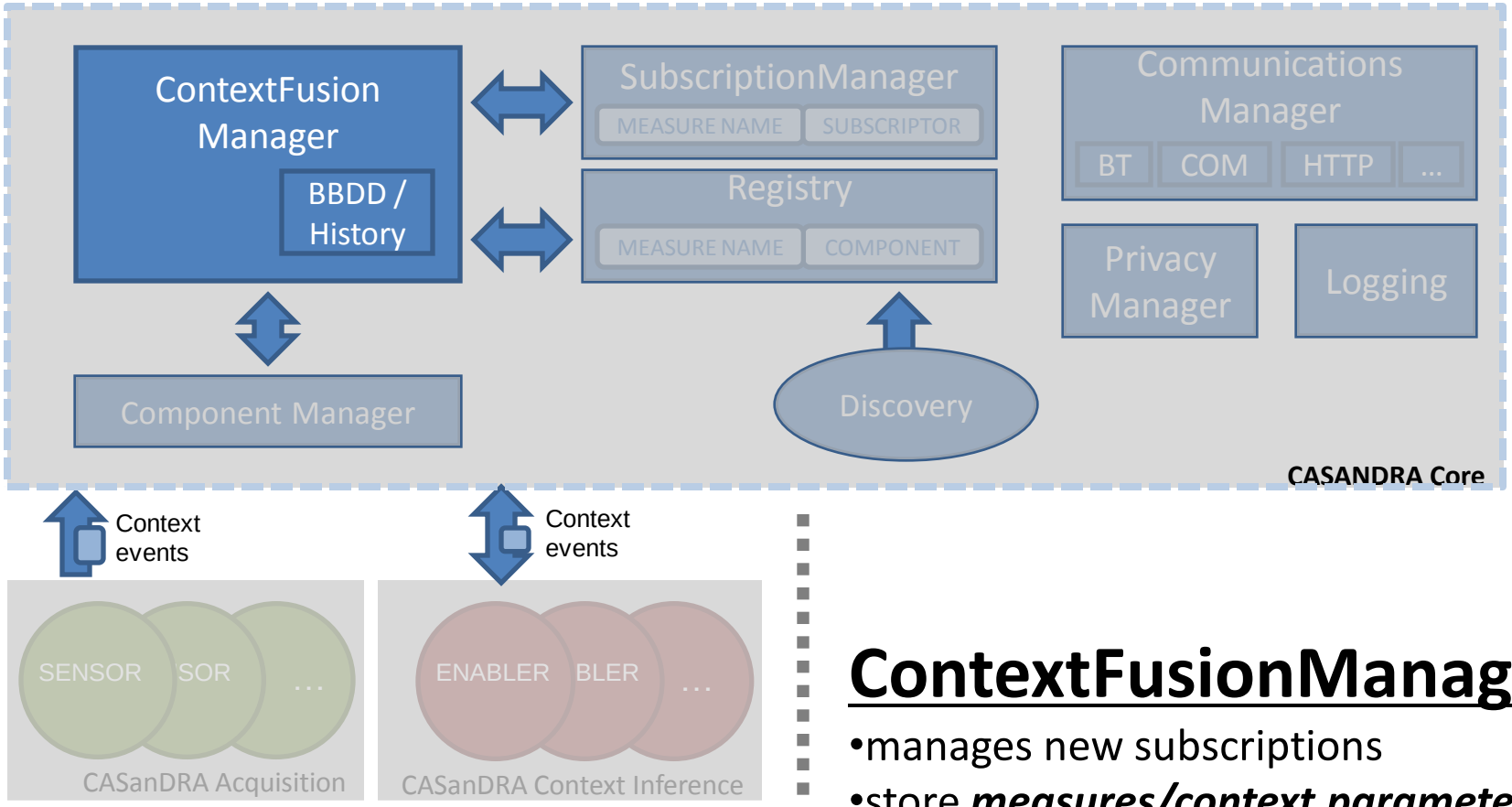


ComponentManager

manages component life cycle:

- *SubscriptionManager* + *Registry* → START/STOP components

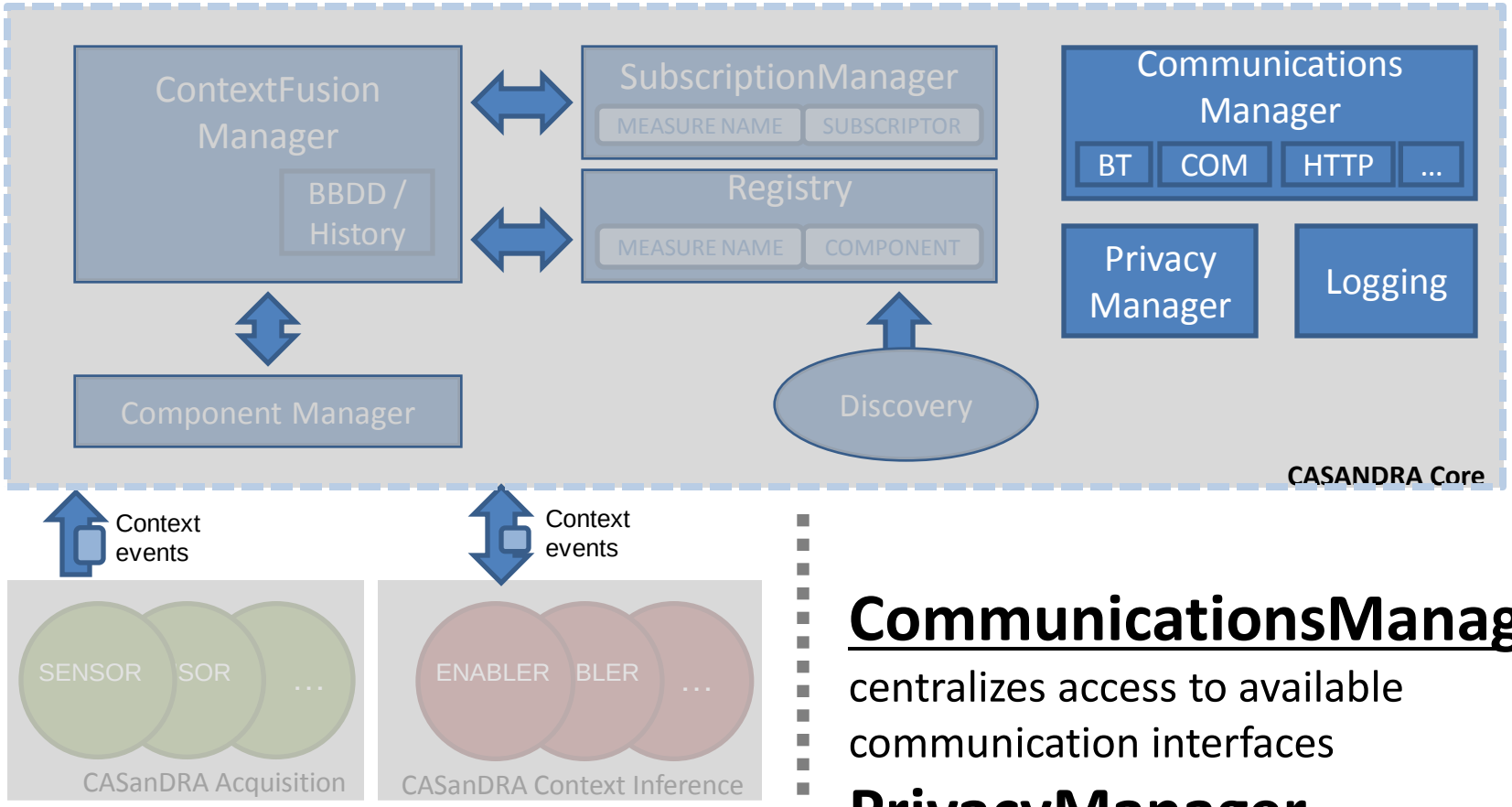
core system



ContextFusionManager

- manages new subscriptions
- store ***measures/context parameters***
- menages ***events*** from/to ***components***

core system



CommunicationsManager

centralizes access to available communication interfaces

PrivacyManager

Loggin

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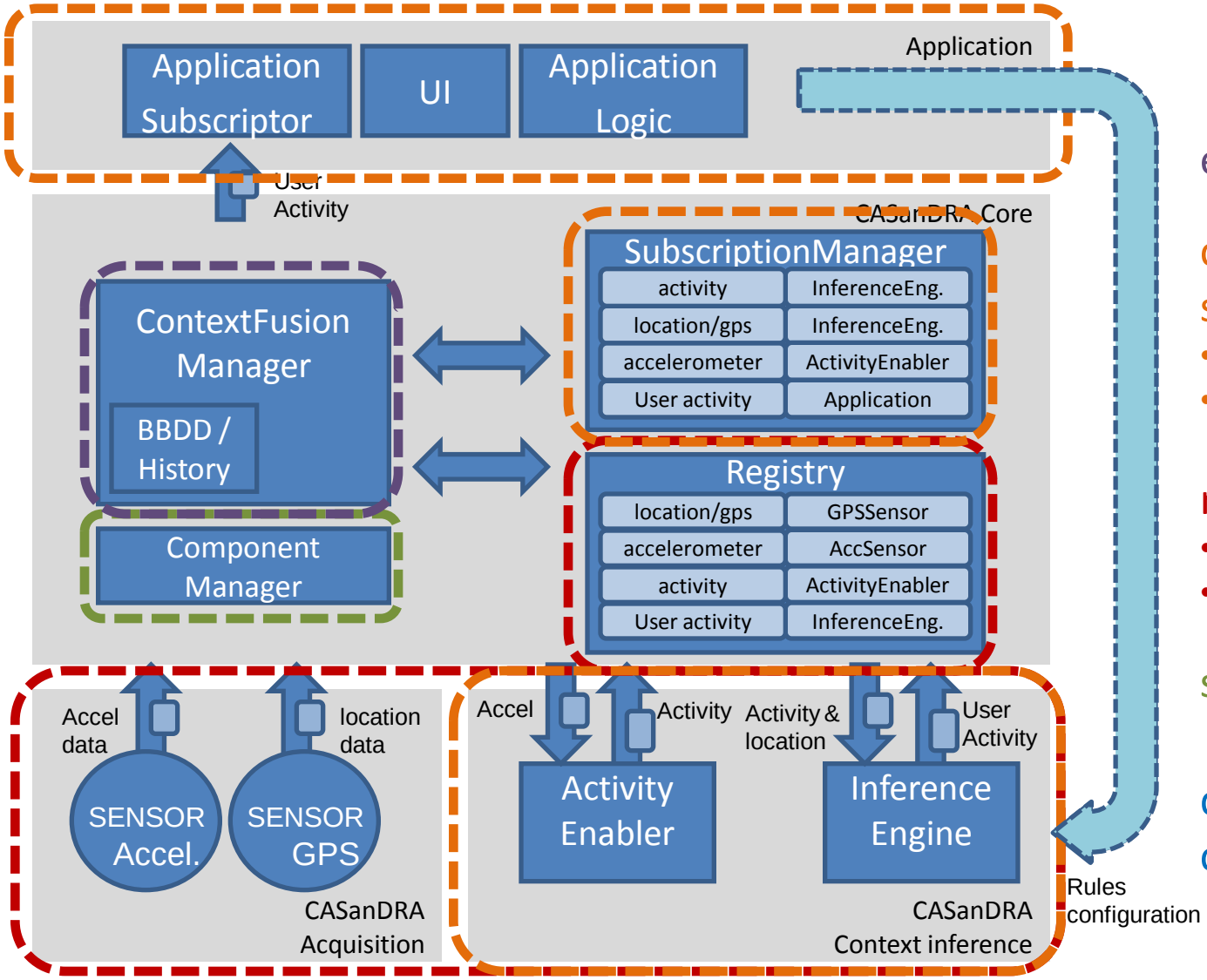
application example



events management

component subscription
- enablers
- applications

register components
- sensors
- enablers

start components

dynamic rules configuration

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conclusions and future work

- this first version of CASanDRA demostrates the feasibility and convenience of building the framework on the service oriented architecture implemented through mOSGi

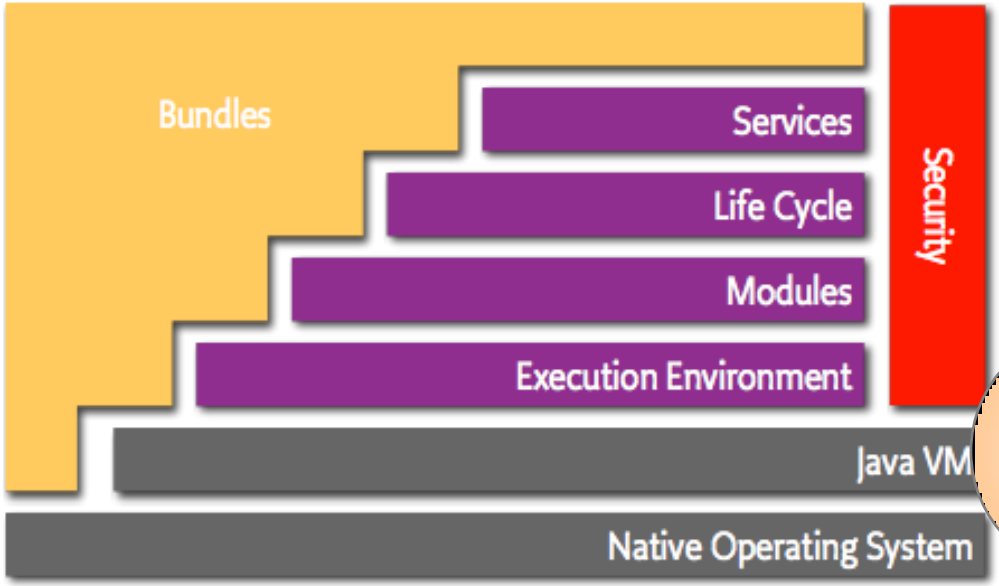
future work we are already working on:

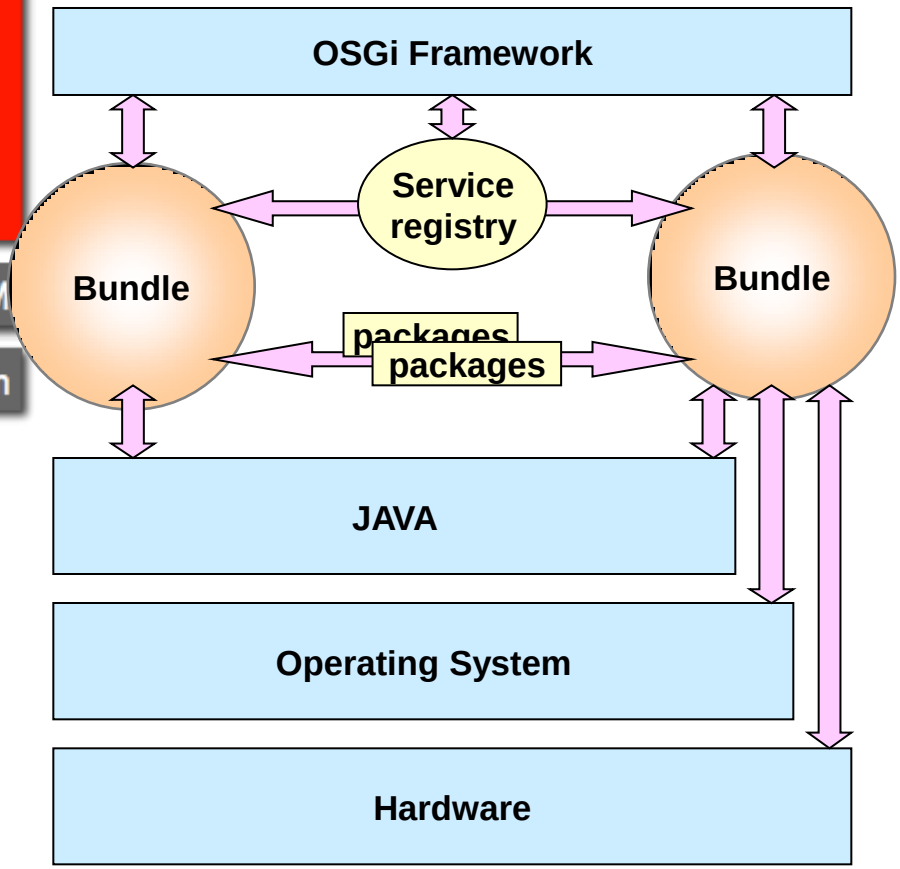
- ❑ a light strategy for '**quality of context**' control during all the fusion process
- ❑ a **fusion** module to manage **position** estimation in a seamless manner
- ❑ an stable **activity inference** system which uses Bayesian logic
- ❑ a model for **context sharing** among different devices with the objective of improving context estimation and
- ❑ a reasoning service including **ontology proce**ssing

performance tests

any question?

mobile OSGi


Bundles
Services
Life Cycle
Modules
Execution Environment
Java VM
Native Operating System
Security


OSGi Framework
Service registry
Bundle
Bundle
packages
JAVA
Operating System
Hardware