PERceptive Spaces prOmoting iNdependent Aging

PERSONA: ambient intelligent distributed platform for the delivery of AAL Services

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OUTLINE

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- PERSONA as a project
- The abstract physical architecture
- The PERSONA middleware
- The PERSONA platform
- Summary of reusable results and obstacles

Summary Data

PERSONA: Perceptive Spaces Promoting Independent Aging – IST 045459

PERSONA is a IP project of the FP6 in the e-Inclusion IST priority

PERSONA addresses the strategic objective 2.6.2: **"Ambient Assisted Living (AAL) for the Ageing Society "**, and it is focused specifically on the **"Development of AAL systems reference architectures allowing for seamless integration of required devices, sub-systems and services onto cost-effective, reliable and trusted solutions".**

Summary Data

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- The total labor effort for full duration is 1.416,62 Person-months
- Total budget: 11.629.000 €
- Funding: 6.750.000 €
- Project Coordinator: Vodafone Omnitel
- Contract: signed December 2006
- Project official Start Date: 1st January 2007
- Duration of the Project: 42 months (extended to 46)
- Project official End Date: June, 30th, 2010 (extended to 31st of October)
- The current Reporting Period correspond to the third year (moths 25-36)

The Project Objectives

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To develop a scalable **open standard Ambient Assisted Living Technological Platform** (AAL-P) ...

... to build a broad range of AAL Services,

... to demonstrate and test the concept in real life implementation

... assessing their social impact

... to establish the initial business strategy for future deployment of the proposed technologies and services.

Scientific and Technological Objectives

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Development of an OPEN and scalable technological AAL Platform:

1- To develop an AAL reference architecture

2- To develop basic enabling AAL technologies: WSN, smart embedded sensors and actuators and user interaction modes

3- To develop the Intelligent Middleware and Algorithms, conetext awareness, service orchestration and adaptation services

4- To integrate external technologies : wearable signal sensors, health care-medical devices, consumer electronics, home automation, ...

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THE FOCUS & RELATED GOALS

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- put the focus on the home environment and AmI technologies
- treat the home environment as an **open distributed self-organizing system**…
- …that **evolves** over time according to individual needs as they arise
  ⇒ keep the platform small & let the user decide what to install
- structure the platform modular enough for improving / substituting parts of it
- users should experience an integrated world easy to interact with based on natural communication
- facilitate development of PERSONA-aware components by limiting the no. of protocol & interface inventions

PLUGGABLE NODES

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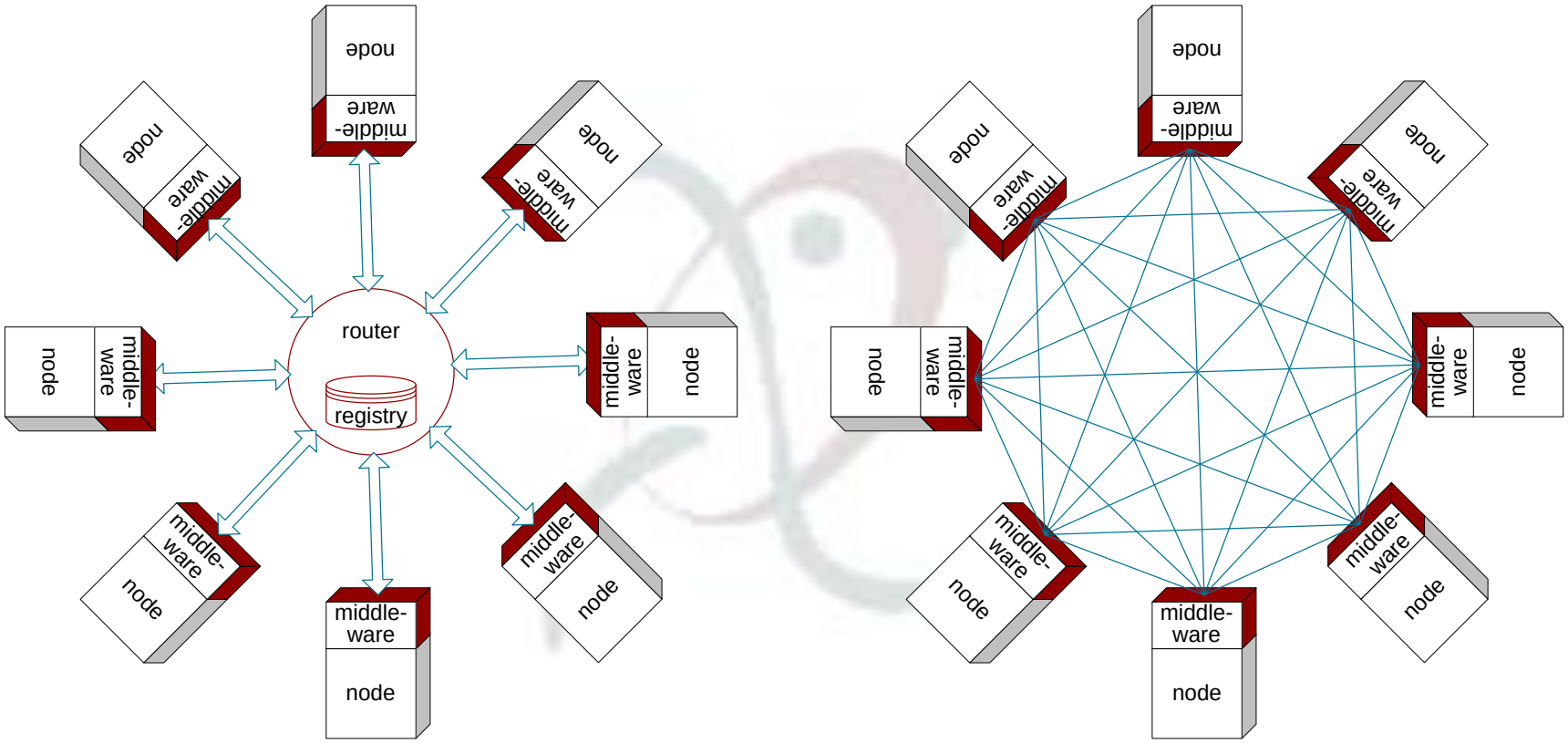
A dynamic ensemble of networked nodes



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DEFINITION MIDDLEWARE

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- The “middleware” is the **intermediate piece of software** allowing the ensemble to take form by defining high-level protocols and providing uniform interfaces for
  - **integrating** components into the system
  - enabling the **communication** between them

  It hides
  - **distribution** of components
  - **heterogeneity** of the various hardware components and their operating systems and networking protocols

⇒ no architectural layer but a piece of software!

THE CHOSEN MODEL

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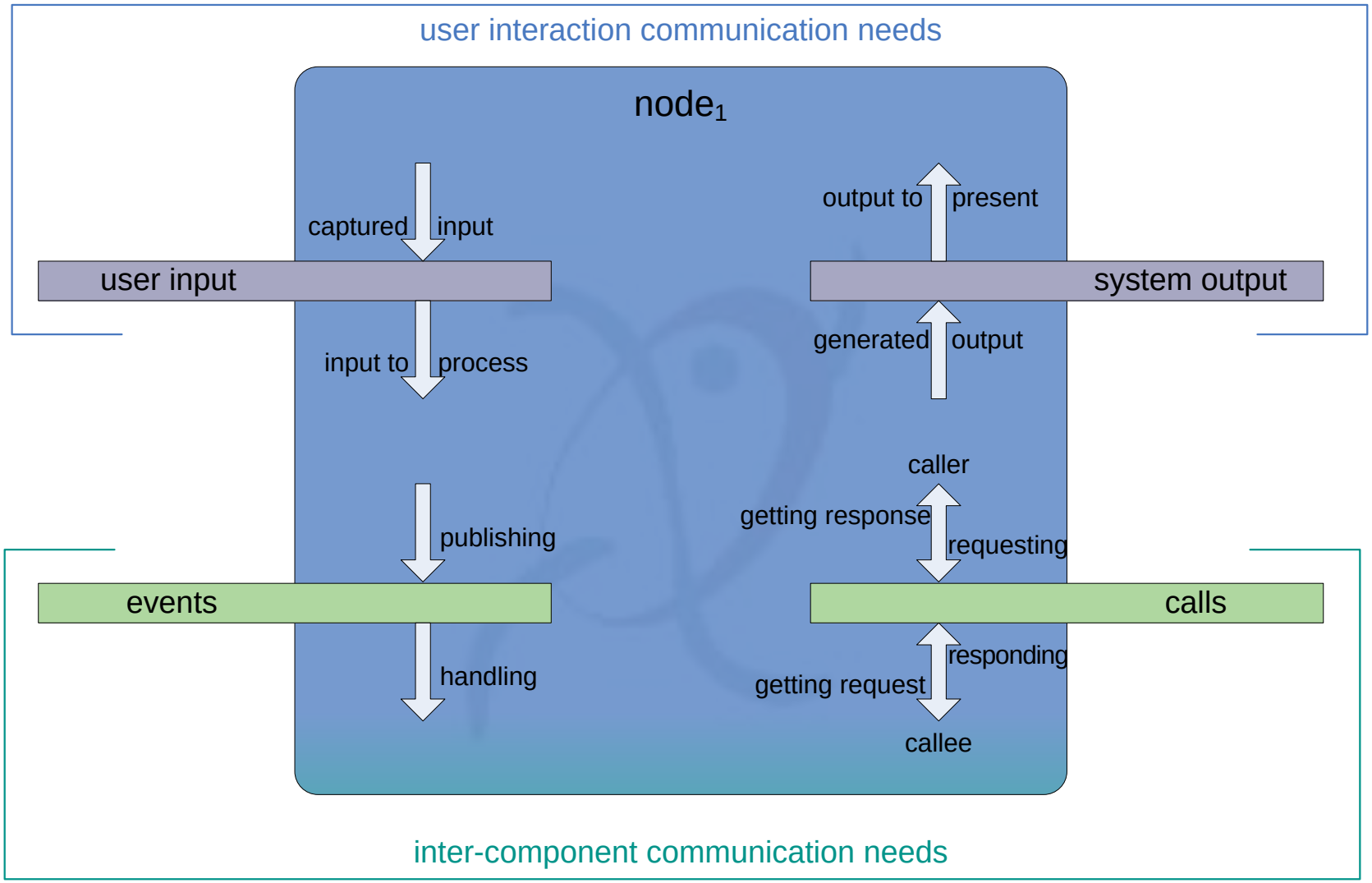
- Derived from Sodapop (Self-Organizing Data-flow Architectures suPporting Onotology-based problem decomPosition) used in the projects EMBASSI & DynAMITE
  - Original spec: http://www.igd.fhg.de/igd-a1/projects/sodapop/sodapop.zip
- Borrowed concepts
  - Brokers called virtual buses & components that connect to them
  - Brokering messages instead of objects
  - Event-based buses (publish/subscribe) vs. call-based buses (request/response)
  - A system is mostly defined by determining its set of buses and specifying their protocols and strategies

NUMBER OF BUSES



MIDDLEWARE DESIGN
HIDING DISTRIBUTION

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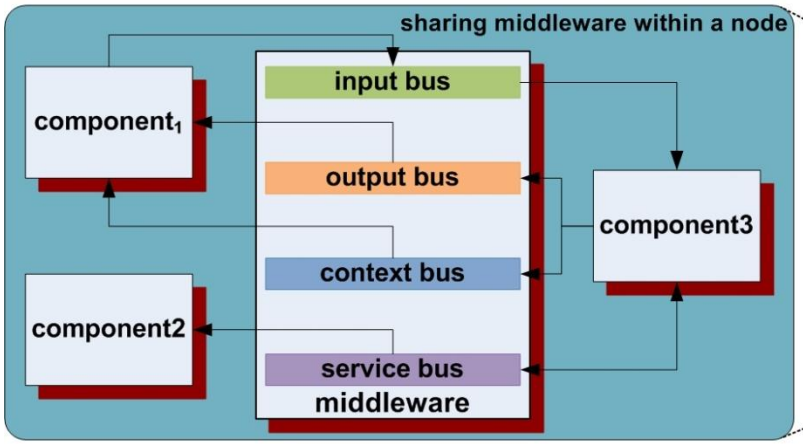

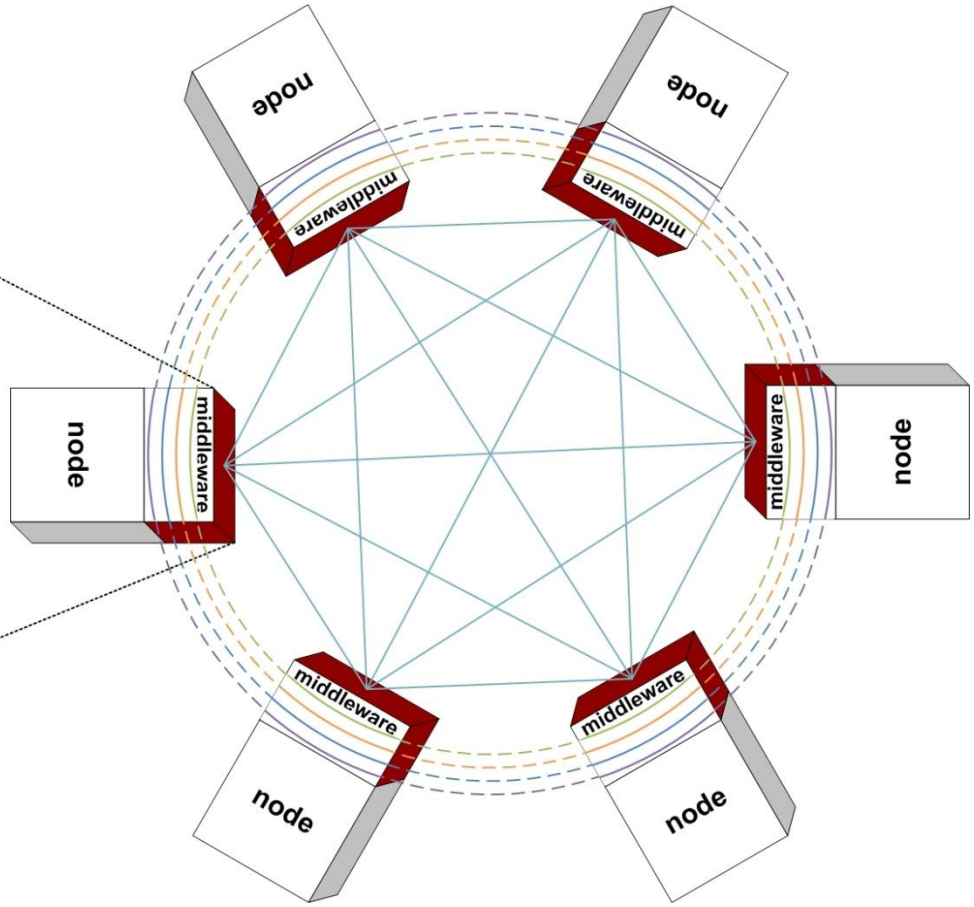

MIDDLEWARE DESIGN
INTERNAL ARCHITECTURE

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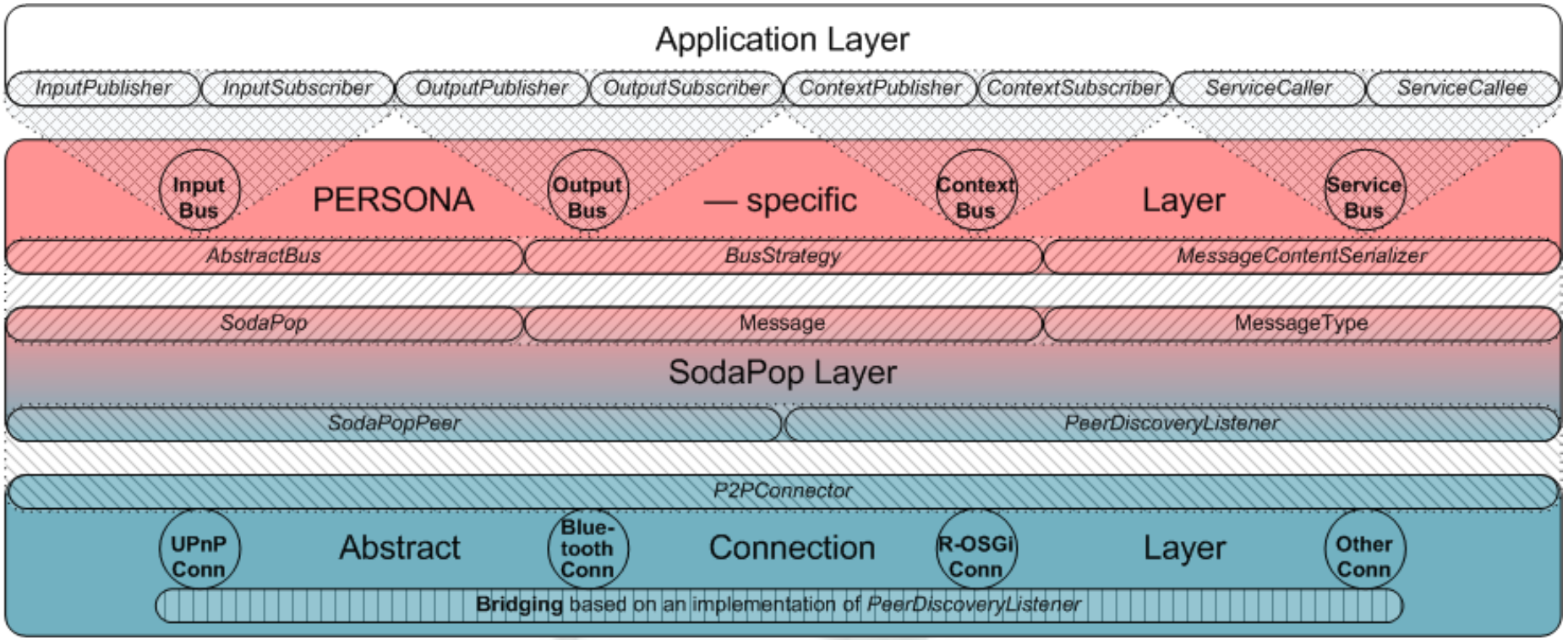

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LOGICAL ARCHITECTURE
THE PERSONA PLATFORM

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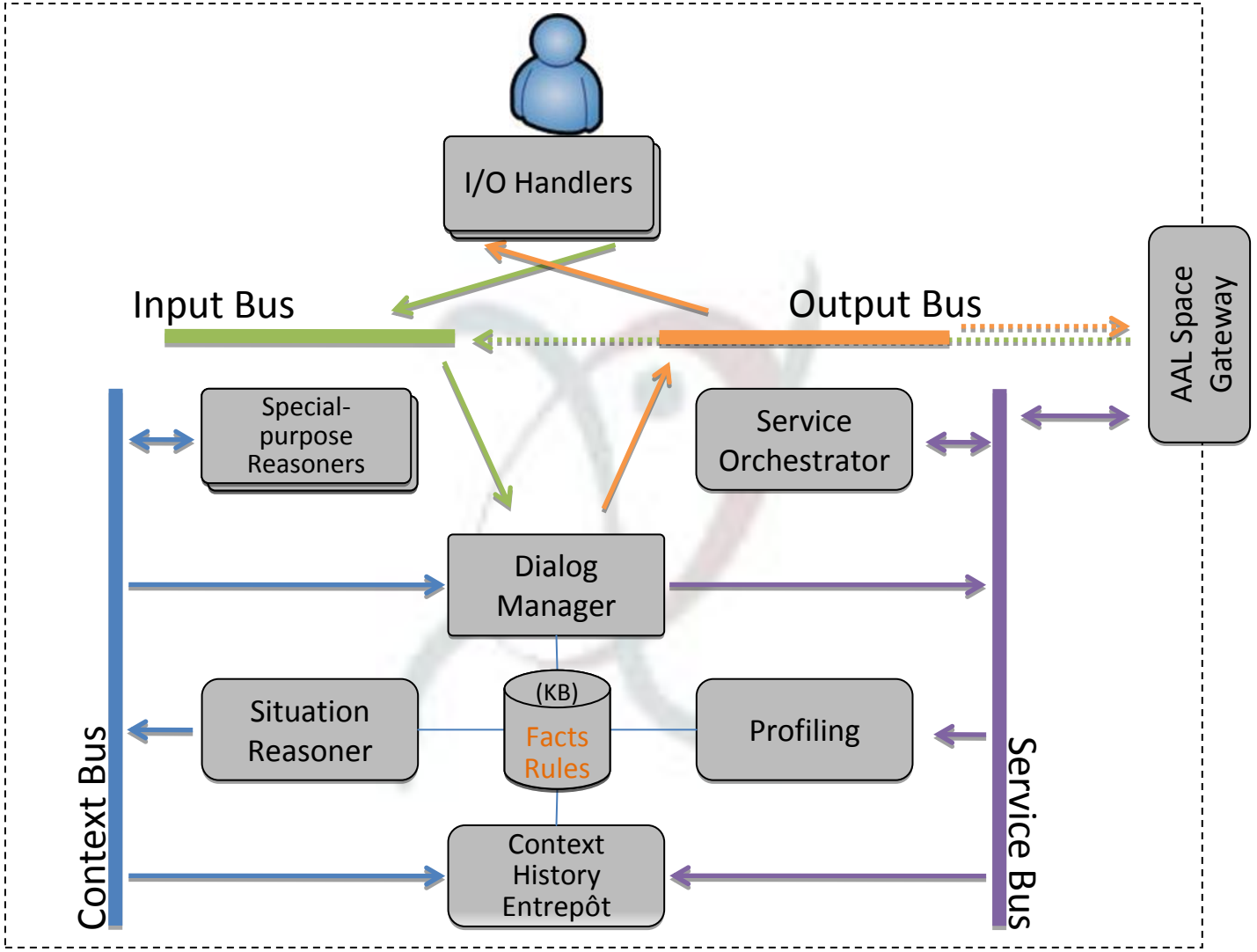

LOGICAL ARCHITECTURE
REPRESENTATION IN WEB

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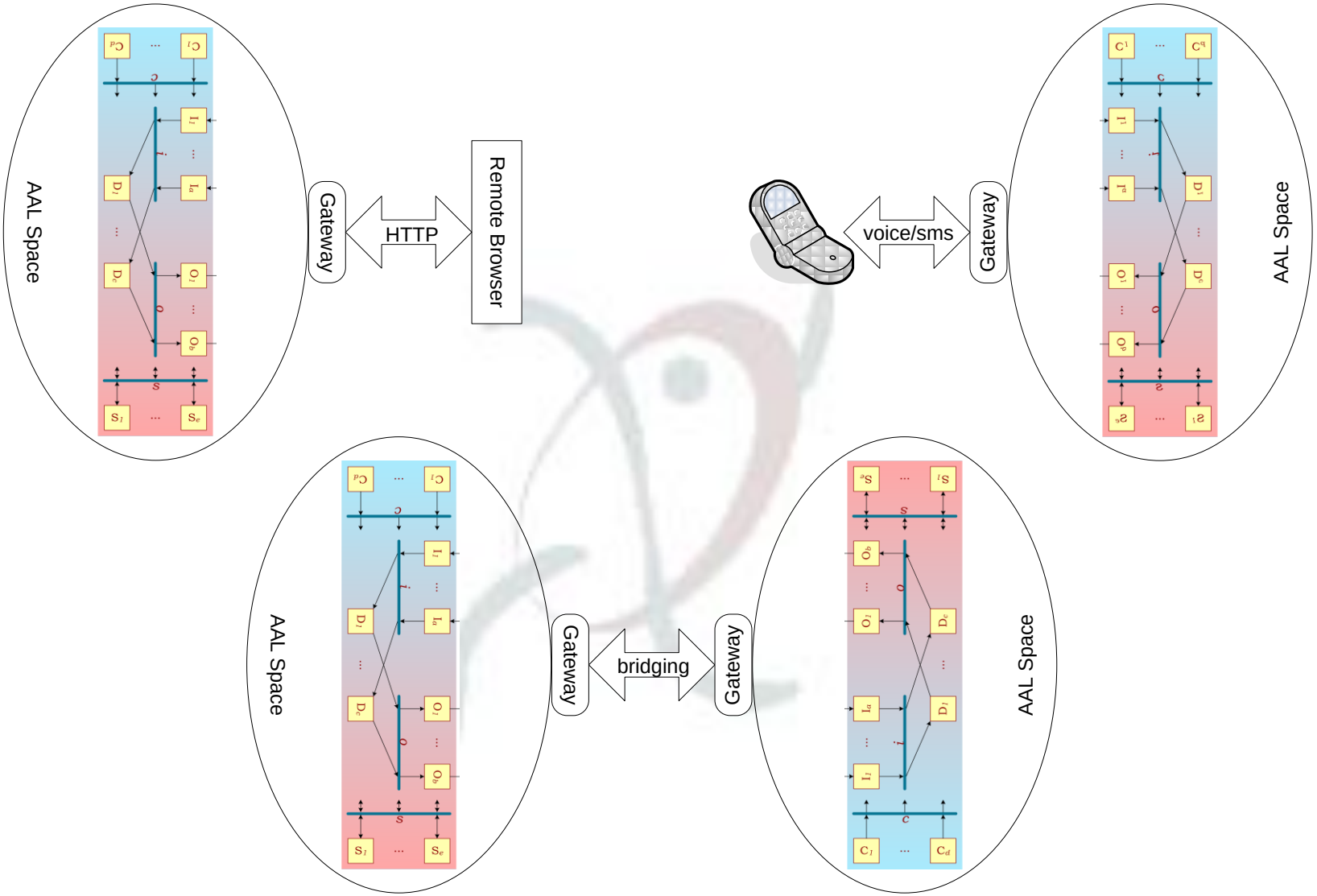
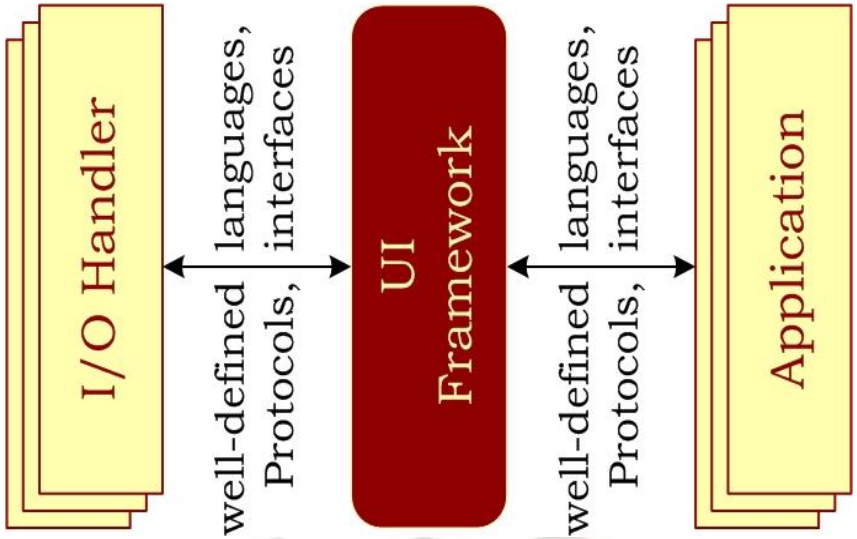


SHARING I/O CHANNELS



- Multimodality is givem when
  - different I/O handlers ssuport different modalities
  - Some I/O handlers support modality fusion & fission

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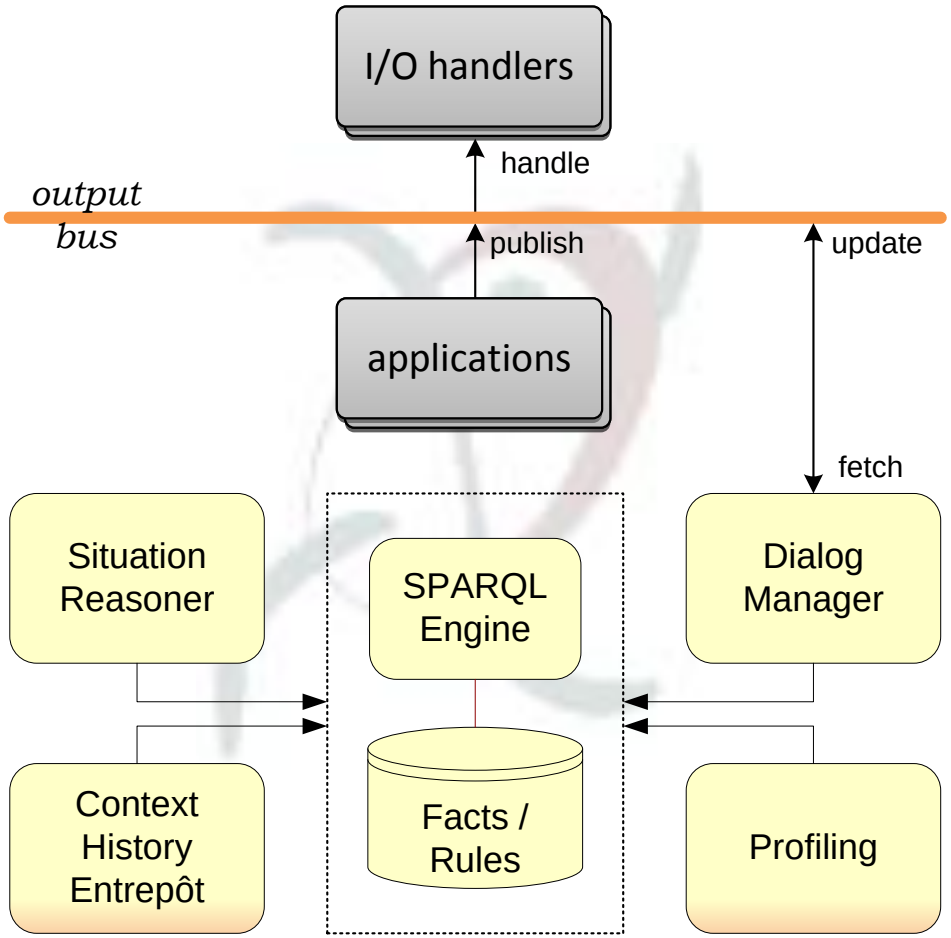
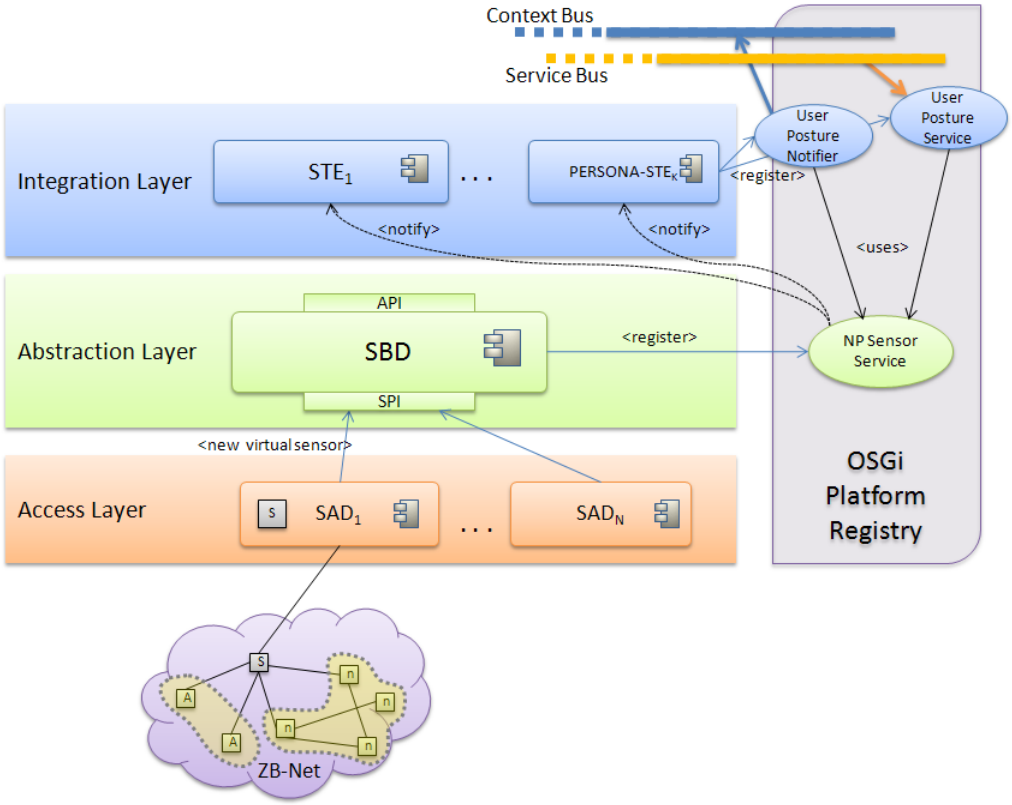
Natural division of adaptation tasks



Binding thin devices SAIL and ZigBee



Access Layer defines a minimal set of functionalities that any WSN application should provide, either on its own or by means of an application adapter.

Abstraction Layer imports the nodes defined by the Access Layer in the OSGi framework. To this purpose it registers the Query and Sensor Nodes as OSGi services.

Integration Layer exports the OSGi services registered by the Abstraction Layer to client applications. This layer can encapsulate different exporters suitable to provide access to the OSGi services using different technologies (e.g. UPnP, Web Services)

Current implementation only in ZigBee. Under last modifications to be delivered as Open Source by CNR-ISTI and ITACA

AAL Service example

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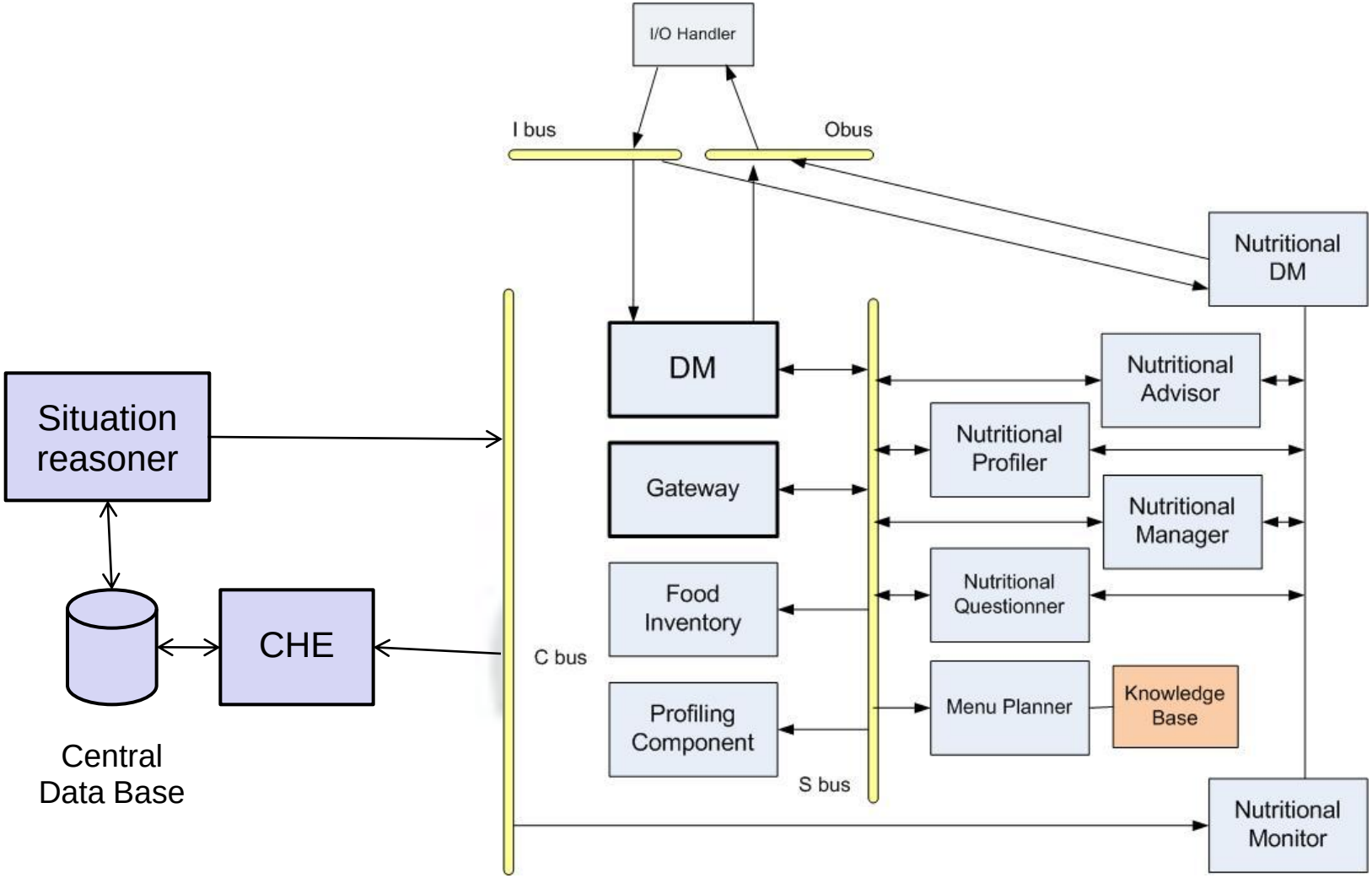
- Ambient Assisted nutritional advisor



AAL Services in PERSONA

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Health Management (P)
Long Term behaviour analyzer (P)
Emergency management (P)

Agenda and Reminders (P)
Nutritional advisor (P)
Shopping assistant (Llab)
Neigbourhood Virtual Community (P)

Help when outdoor (P)
Outdoor information and assistance bubbles (P)
Outdoor Activity Monitor (Llab)

Automatic Management of the environment for comfort and security (P)
Frontdoor controller (Llab)

Intelligence Dressing Advisory System (Llab)
Cooking assistant (Llab)

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Summary of reusable results

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- Open source results:
  - Middleware
  - Domain ontologies in the field of AAL
  - Platform components

    PERSONA Platform = Middleware + Platform components
  - AAL Services as examples
  - Living Lab installation for demonstration and awareness.
- Experience in pilots of AAL Services
  - Real refinement of initial assumptions.
  - Experience in:
    - INSTALLATION and initial configuration
    - MAINTENANCE
    - A report will be written with the main conclussions and made public in project website.

Obstacles

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- Platform related obstacles:
  - Lack of development tools for helping to cope with platform complexity and develop quicker: automatically generation of code, easy definition and use of ontologies…
  - Improvements in the configurability aspects.
  - Especification and implementation about mobility aspects (AAL Services delivered on the move through a mobile device) and interconnection of AAL Spaces can be improved.
  - Difficulty to develop a platform (i.e. like an operative system) leaving things so open that it is is flexible enough to allow any variety of AAL Services. A platform must not be solution oriented, but be wider to allow a variety of solutions happen.

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Obstacles

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- AAL related obstacles:
  - Lack of awareness in potentiality of AAL in:
    - AAL Services Development companies
    - Users, specially relatives and professionals
    - Regional and local policy makers. We need to take them with us.
  - Lack of reference best practices
  - Fragmented market with isolated vertical solutions.
  - Interoperability with existing health systems

Thank you!

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