



## The HYDRA project



A middleware platform for  
personal health monitoring

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IST-2005-034891



## Personal health monitoring

- Patient has some medical condition that requires regular clinical checks to measure vital signs (blood pressure, pulse, glucose levels).
- Patient is at home and does the measuring either manually or through automatic monitoring.
- Data needs to be transferred through a network to centralised database or decision support system.

## Monitoring solutions

Home-based  
eHealth client

Medical care

Solution provider



## Important developments

- Standardisation of medical device communication through IEEE11073 standards and the Continua Alliance
  - Bluetooth and Zigbee Health Profiles
  - IEEE11073-20601 for data exchange between device agent and hosting server
  - IEEE11073 device specialisations for individual device types (BPM:s, weight scales, glucometers, ...)
- Standardisation of medical data exchange formats
  - IHE-PCD01
  - CCR
- Emerging new cloud-based health services
  - Google Health
  - MS HealthVault.

# Hydra Open Source Developments

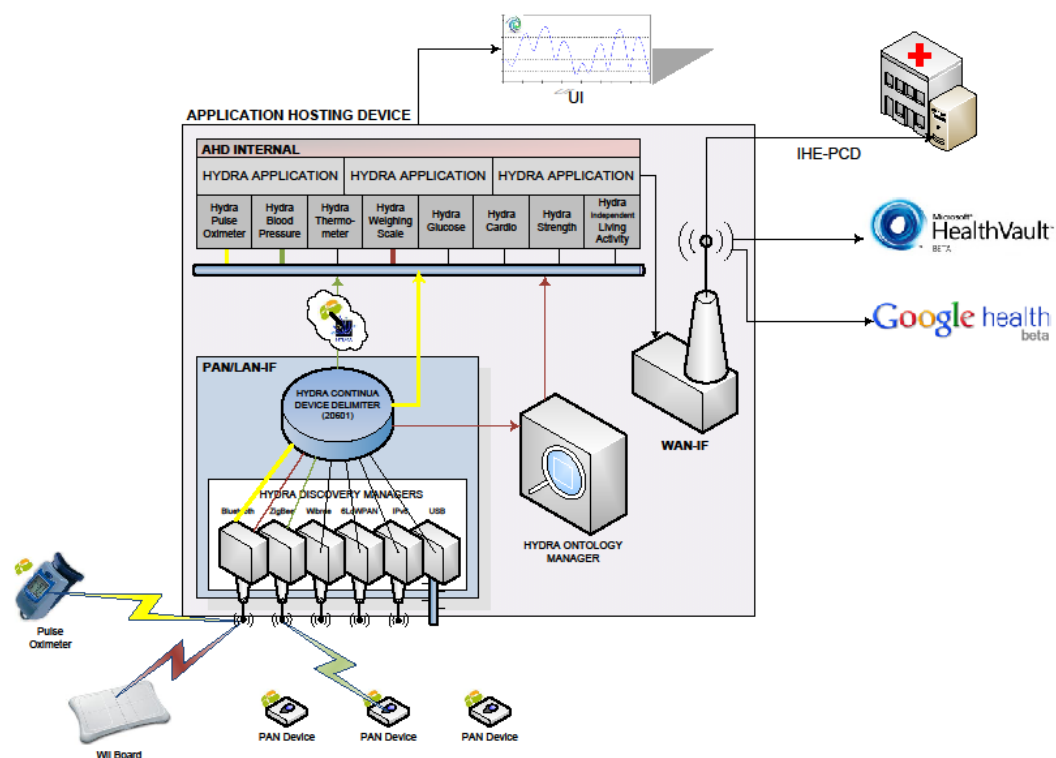
- Adding support for Continua devices
- Adding support for different types of data export formats
- Defines a Personal Health Monitoring Architecture based on the Hydra Middleware.

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# Hydra Personal Health Monitoring Architecture



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# Personal health monitoring: Hydra Follow Up projects

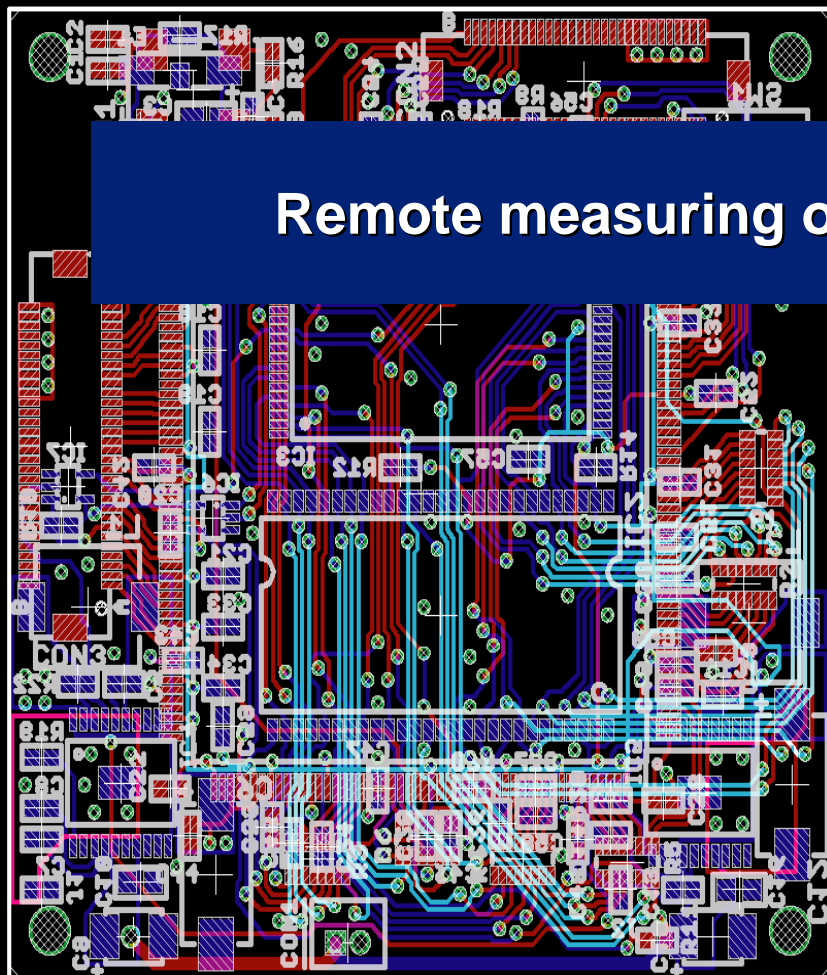
- InCasa - Monitoring of elderly people at home
  - Using wireless sensors to automatically monitor patients and report to service centers.
- Reaction - Chronic disease management
  - Using advanced networked devices to manually measure vital signs and transfer data.
  - Using advanced networked devices and sensors to measure and automatically treat patients.

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## Remote measuring of vital signs



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# Remote health signs measuring

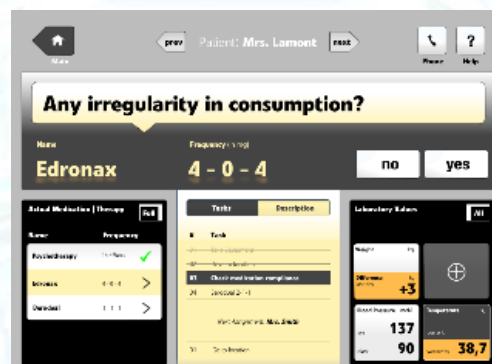
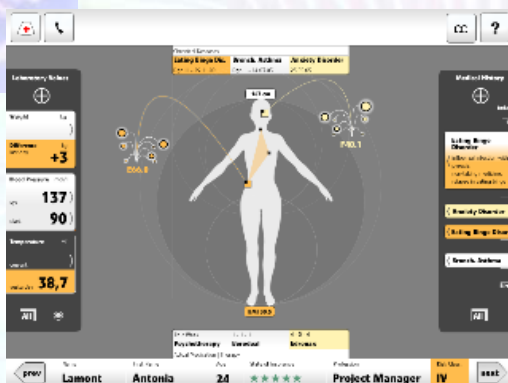
- Patient has some condition that requires regular visits to hospital to measure vital signs (blood pressure, pulse, glucose levels).
- Patient is at home and connects to hospital system and does the measuring and supervision of nurse/doctor
- Data is transferred through the network to hospital to be analysed.

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# Doctor's interface



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# Components

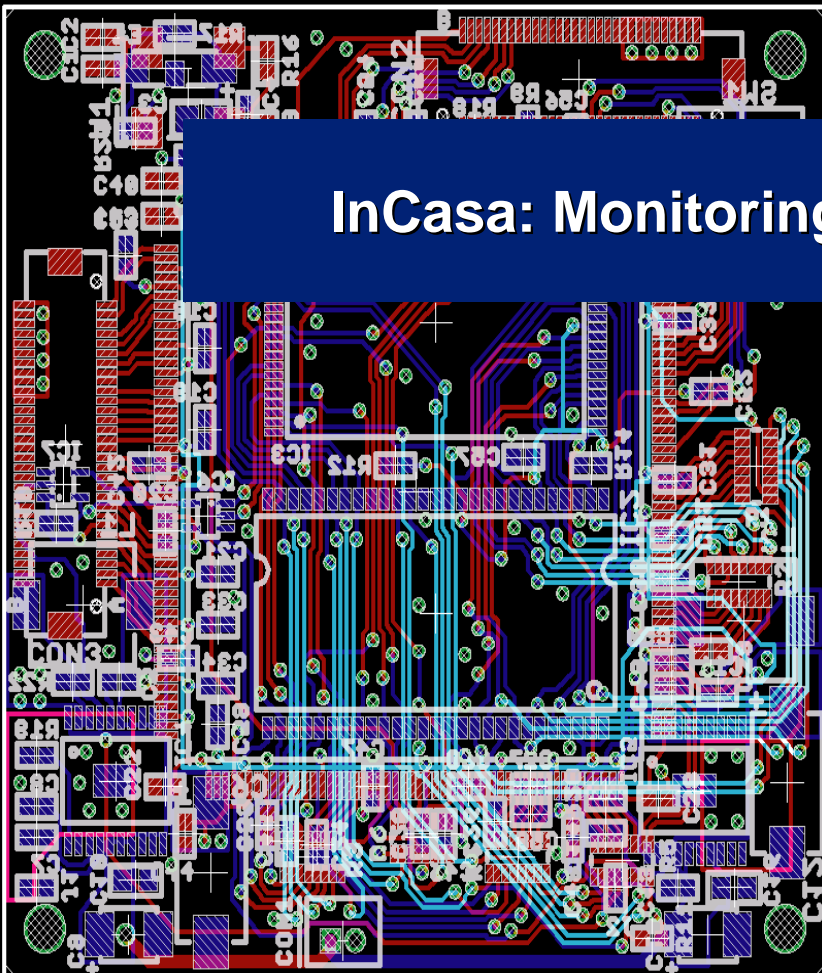
- Hydra middleware installed at gateway in patient home
- Medical devices at home are Hydra-enabled and connects to network
- Hospital has Hydra middleware installed.
- Data transferred securely through P2P architecture.

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## InCasa: Monitoring elderly at home



**Integrated Network for  
Completely Assisted  
Senior Citizen's  
Autonomy**

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# Monitoring elderly at home

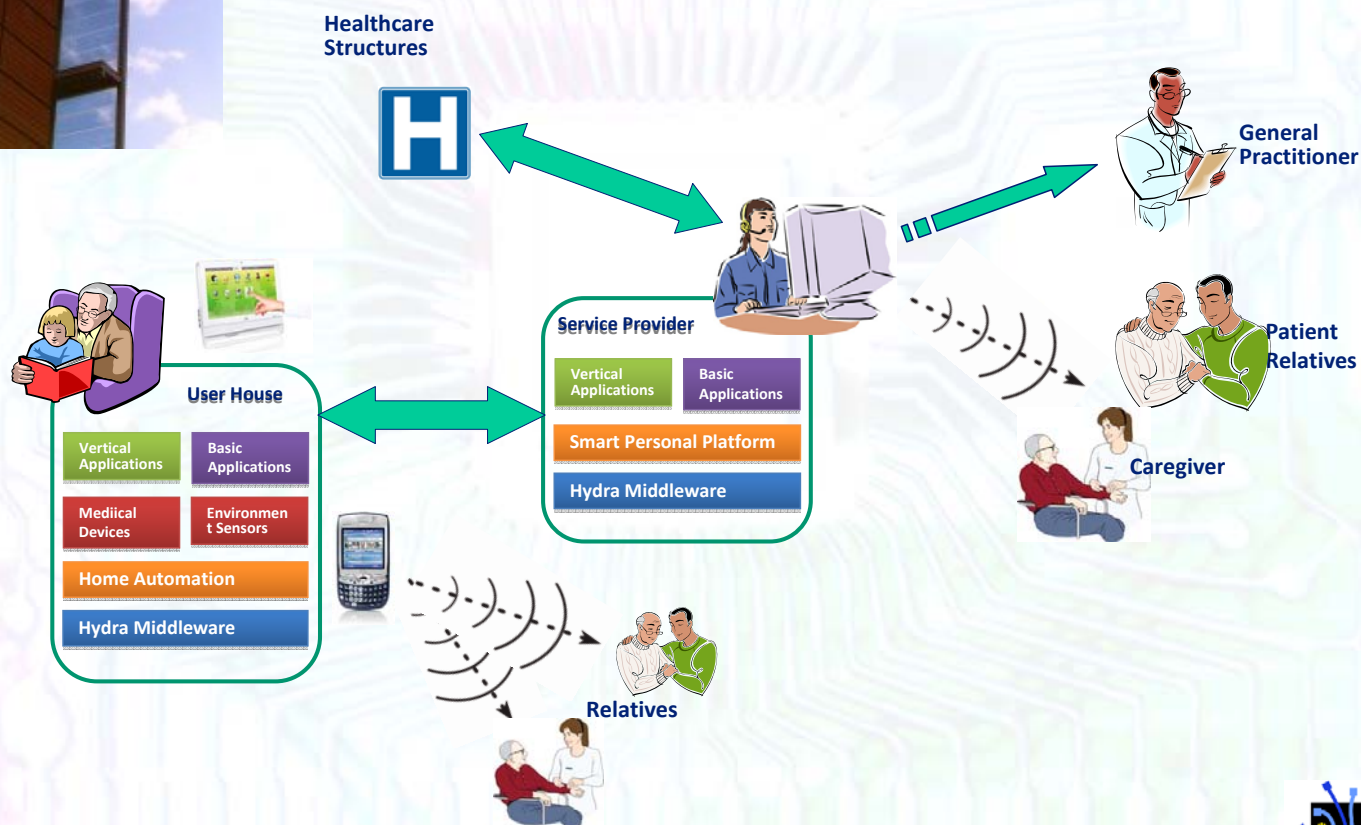
- Allowing elderly people to stay at home longer
- Monitoring elderly people in approx. 200 homes using sensors and intelligent devices
  - Movement, light, contact pressure
- Analysing data and creating a habits model
- Monitoring health conditions
- Detecting deviations from habits and alarming health conditions
- Alerts to service centers

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# Remote monitoring architecture



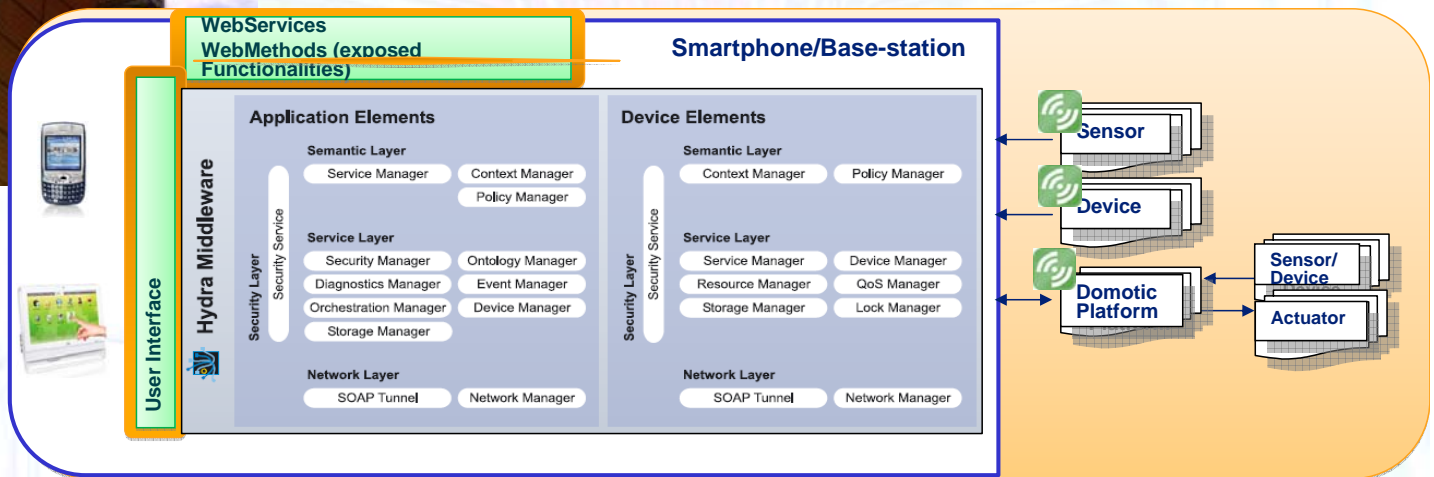
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# Home Infrastructure

HOME



## Main Components

- A gateway/smart phone equipped with Hydra middleware and home applications
- A user habit monitoring system
- Health monitoring system
- Home automation system

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## Reaction: Disease management

Remote Accessibility to  
Diabetes Management and  
Therapy in Operational  
healthcare Networks

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## Reaction Objective

Improve long-term management of diabetes by developing wearable, continuous glucose monitoring sensors that connect to an intelligent service platform for doctors, carers and patients

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## Background: Diabetes I+II

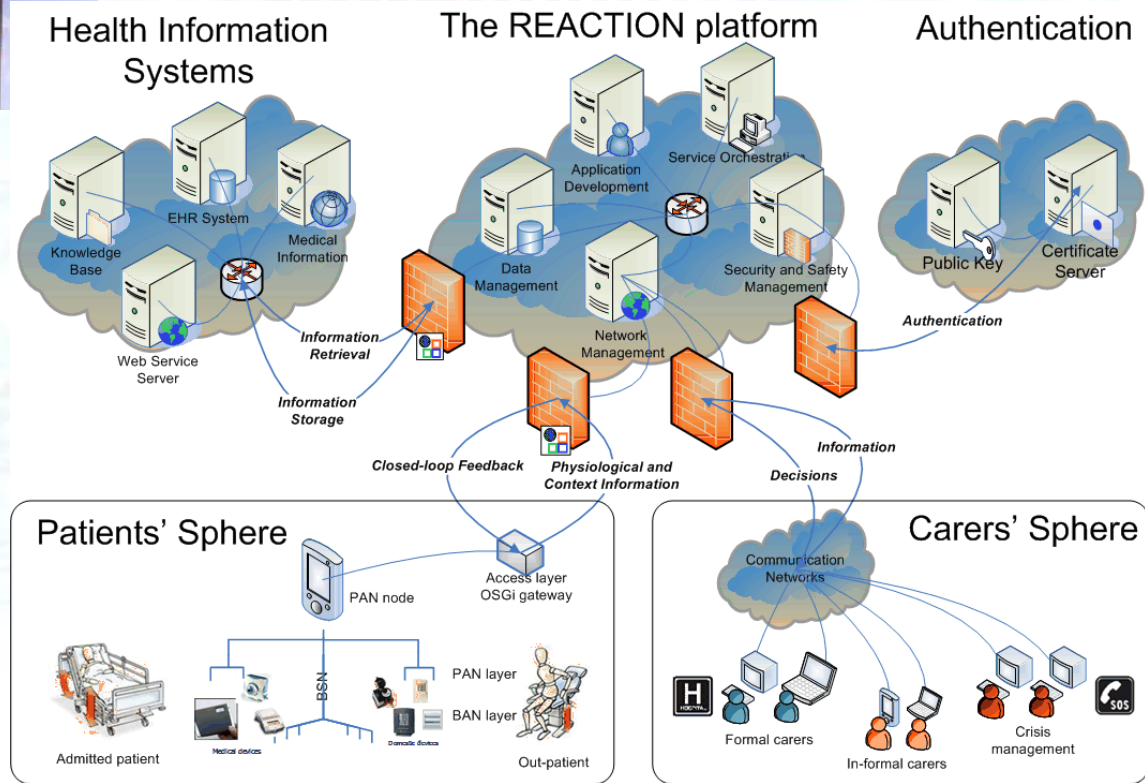
- Diabetes has reached epidemic proportions in western countries
- 2-3% of the population have diagnosed diabetes. An additional 2% of the population may have undiagnosed diabetes.
- The associated morbidity and mortality of diabetes represents a major healthcare burden in terms of resources and cost.
- In 1997, diabetes was present in 9.5 percent of all patients discharged from hospitals and in 29 percent of patients undergoing cardiac surgery.
- Diabetes is associated with a two- to four-fold increase in hospitalization rates; its presence increases the length of hospital stays by one to three days.

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# Reaction Platform overview



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## Technical objectives

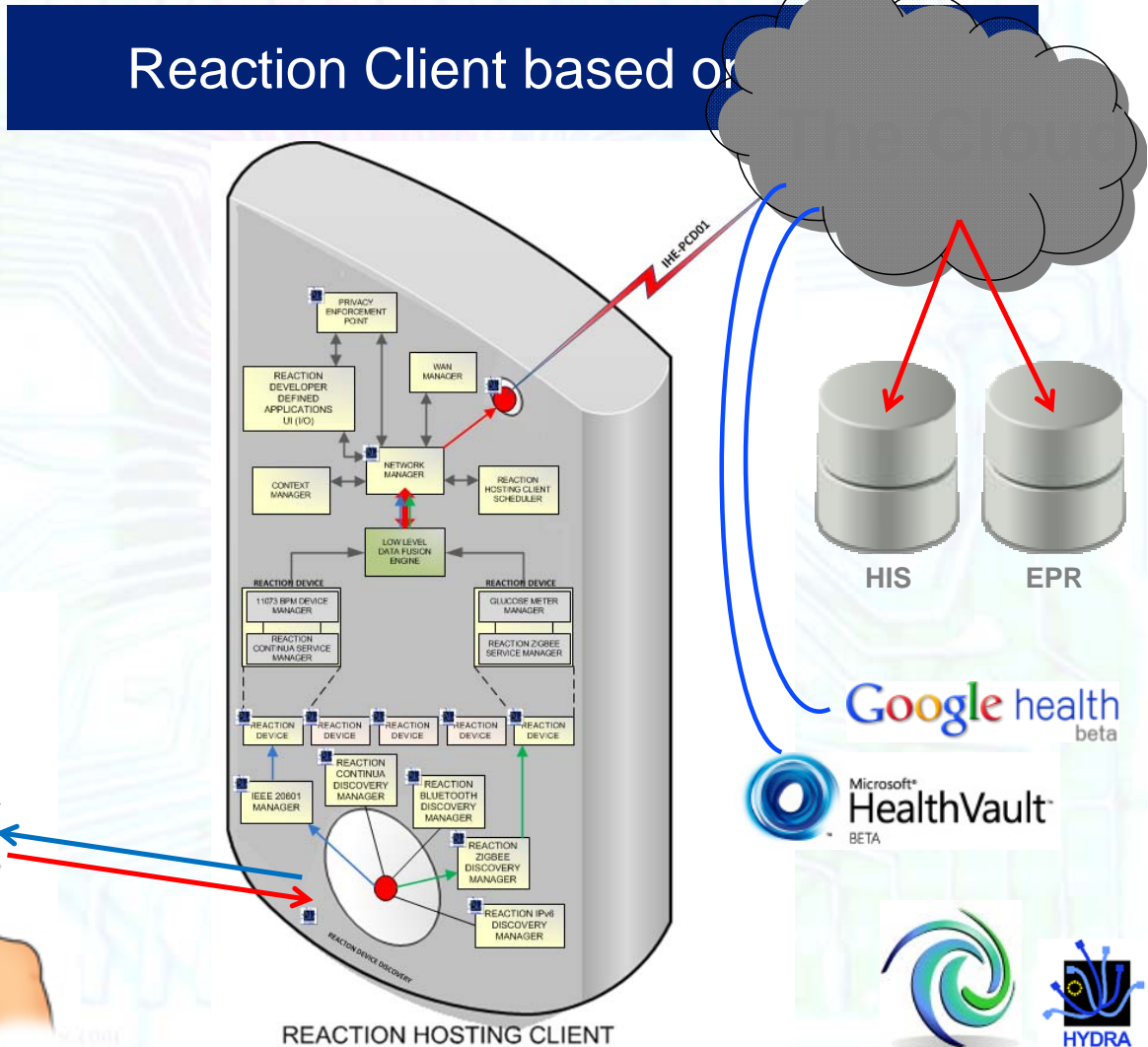
- Innovative wearable, minimally invasive sensors for physiological data such as blood sugar, skin temperature, pulse, activity, diet, etc. connected via wireless Body Area Networks
- Interoperability and data management based on semantic capabilities across heterogeneous platforms
- Data Fusion from medical as well as environmental sensors to allow context aware data management
- Secure and trusted communication and storage of data
- Automated feedback to insulin device
- Application development tools that hide the device and network complexity
- Easy-to-use tools for clinicians to express workflows and service orchestration

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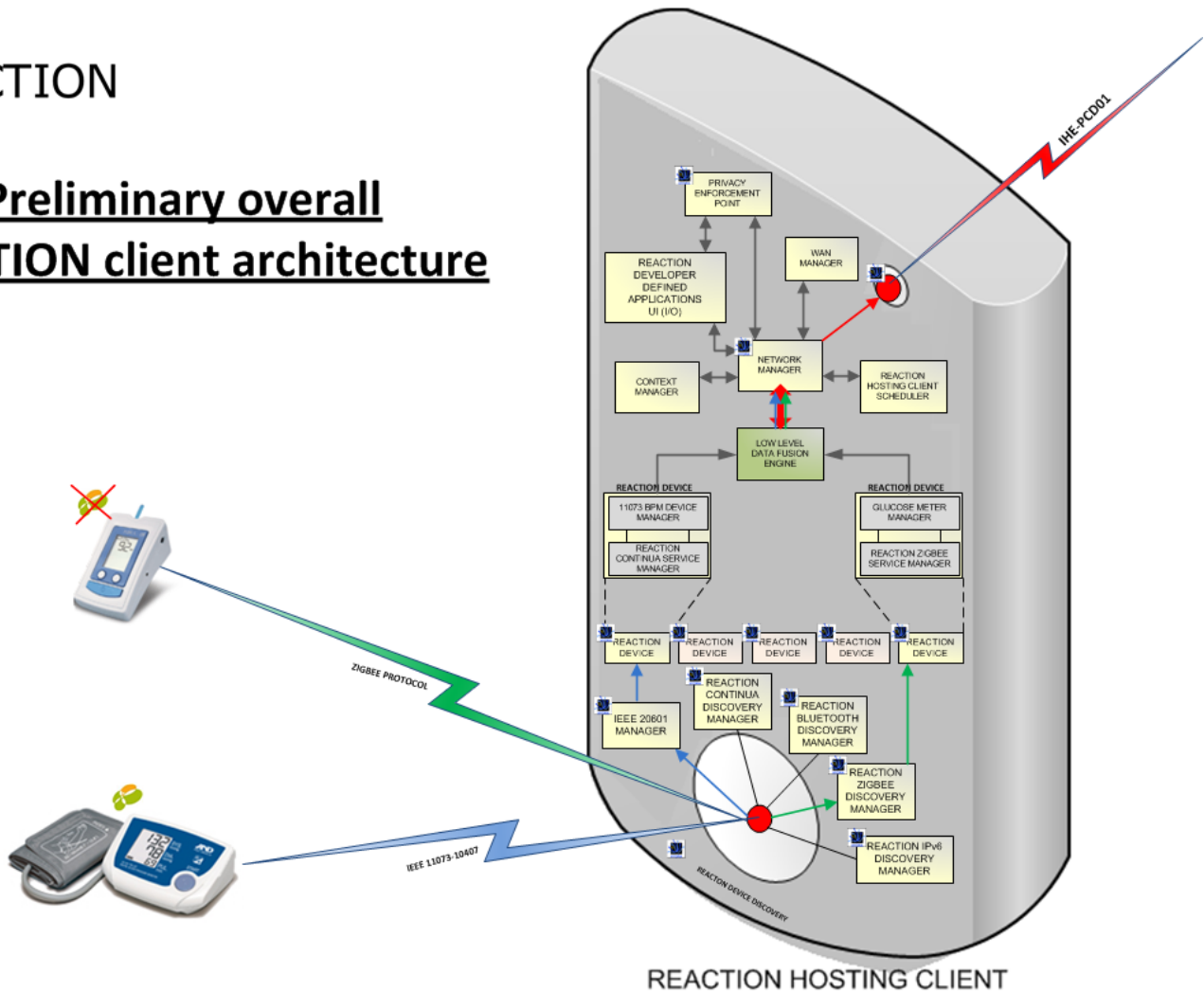
# Reaction Client based on



REACTION HOSTING CLIENT



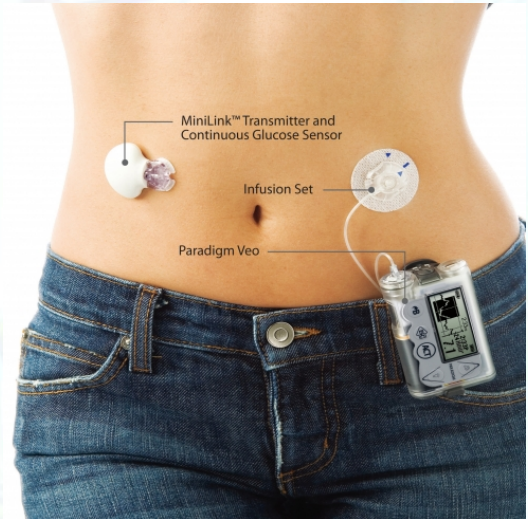
## Preliminary overall REACTION client architecture



REACTION HOSTING CLIENT

# Components for automatic monitoring

- Hydra-enabled wireless patch with built-in sensors for glucose measurement
- Patch reports data to intelligent network node
- Data processed and analysed and algorithms for insulin dosage is applied
- Hydra-enabled Insulin Pump is instructed to inject right amount.



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## More info

[www.hydramiddleware.eu](http://www.hydramiddleware.eu)

<http://www.incasa-project.eu>

[www.reactionproject.eu](http://www.reactionproject.eu)

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