

# Mobile Interaction with Embedded Systems

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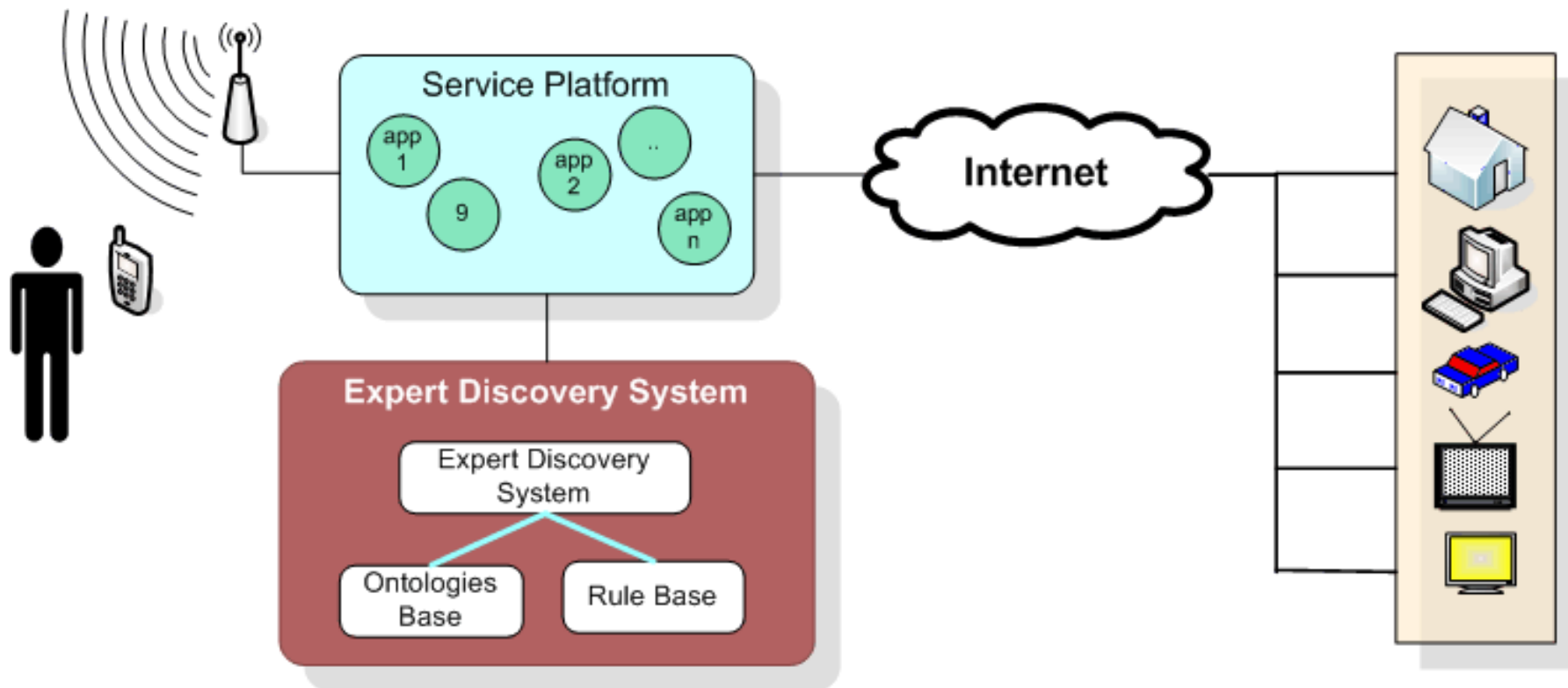
# MIWES (Mobile Interaction with Embedded Systems)

- Permit mobile customer to interact with the environment.
- Objective:
  - \_ Provide of an intelligent framework and features by which mobile customers will be able to interact with remote and close systems, discovered on an intelligent manner based on environment studies, in the same way.
- Achievements:
  - \_ Mobile as controller: Interaction with close and remote ES of the environment.
  - \_ New trend of services.
  - \_ Intelligent mechanisms of discovery.



# MIWES Architecture

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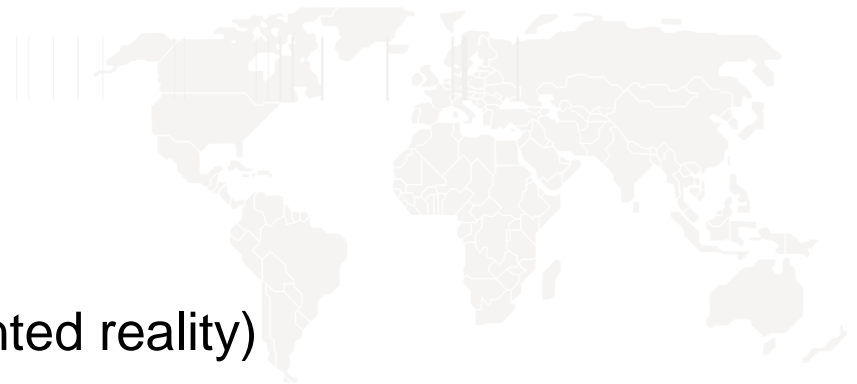


- Mobile Devices
- Service Platform.
- Expert Discovery System
- Embedded System Ecosystem.



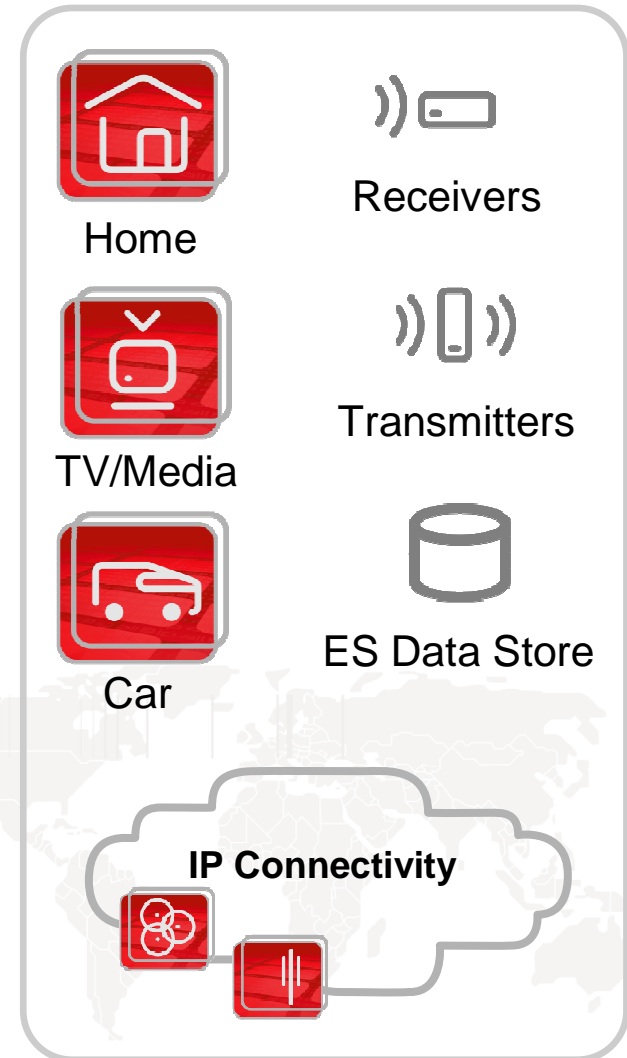
## MIWES Objectives: Mobile

- Mobile service platform:
  - \_ Multi-service execution
  - \_ Command sending
  - \_ Notifications reception
- Terminal Remote Device Management
  - \_ Download and install services
  - \_ Uninstall and delete services
  - \_ Configurations on the device
- Mechanisms of user identification
- Mechanisms of visualization (augmented reality)



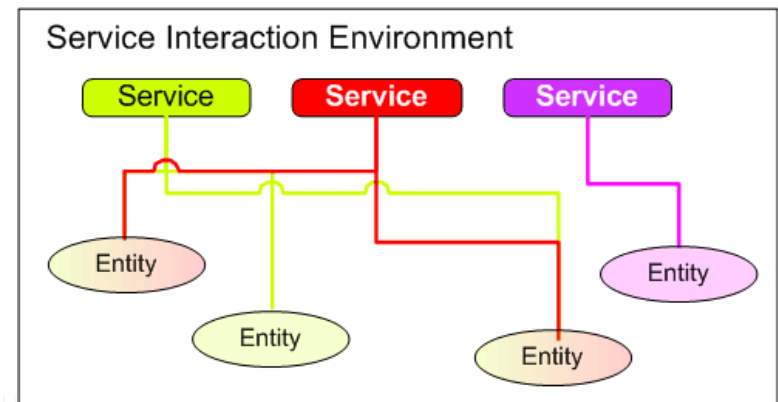
## MIWES Objectives: Embedded Systems

- Communication of ES with network:
  - \_ To understand and receive commands from services.
  - \_ To send sensor reactions to services.
- Internal architecture of ES
  - \_ Identify sensor reactions into transform them into notifications
  - \_ To execute commands as sensor actions
- ES Data Storage:
  - \_ Must store self information i.e. State, properties (url, vendor, trademark...)
  - \_ Must store its state.



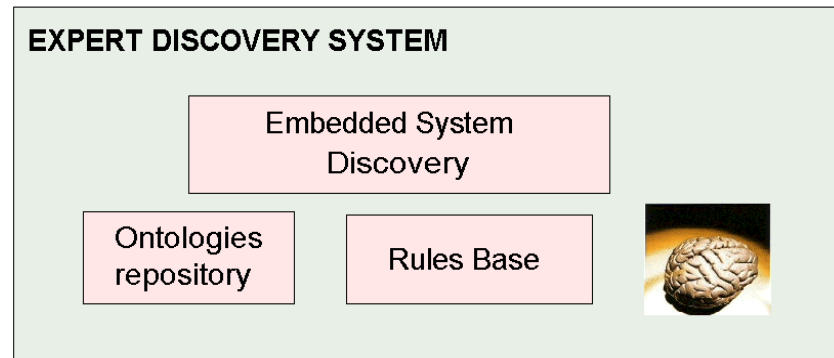
# MIWES Objectives: Service Interaction Environment (SIREN)

- New Paradigm of service creation:
  - \_ Services aimed to interact with ambient elements
- Proactive vs Reactive Services
- Services more complexes:
  - \_ Composition of small services
  - \_ Choreography and orquestration
- Intelligent mechanism of service discovery
- Distributed / Federated architecture



# MIWES Objectives: Expert Discovery System (EDS)

- Open interface to services:
  - \_ Define an I/O data flow
  - \_ Input data limitation
- Data Structure:
  - \_ DB, ontologies, web-semantic...
- Searching process
  - \_ Decision and inference rules
  - \_ Self-learning system
  - \_ Facts learnt by decisions made in the past
  - \_ Provide response
- Organize the ES on families
  - \_ A family → An ontology
  - \_ Every ES on a family
  - \_ Number of families may grow



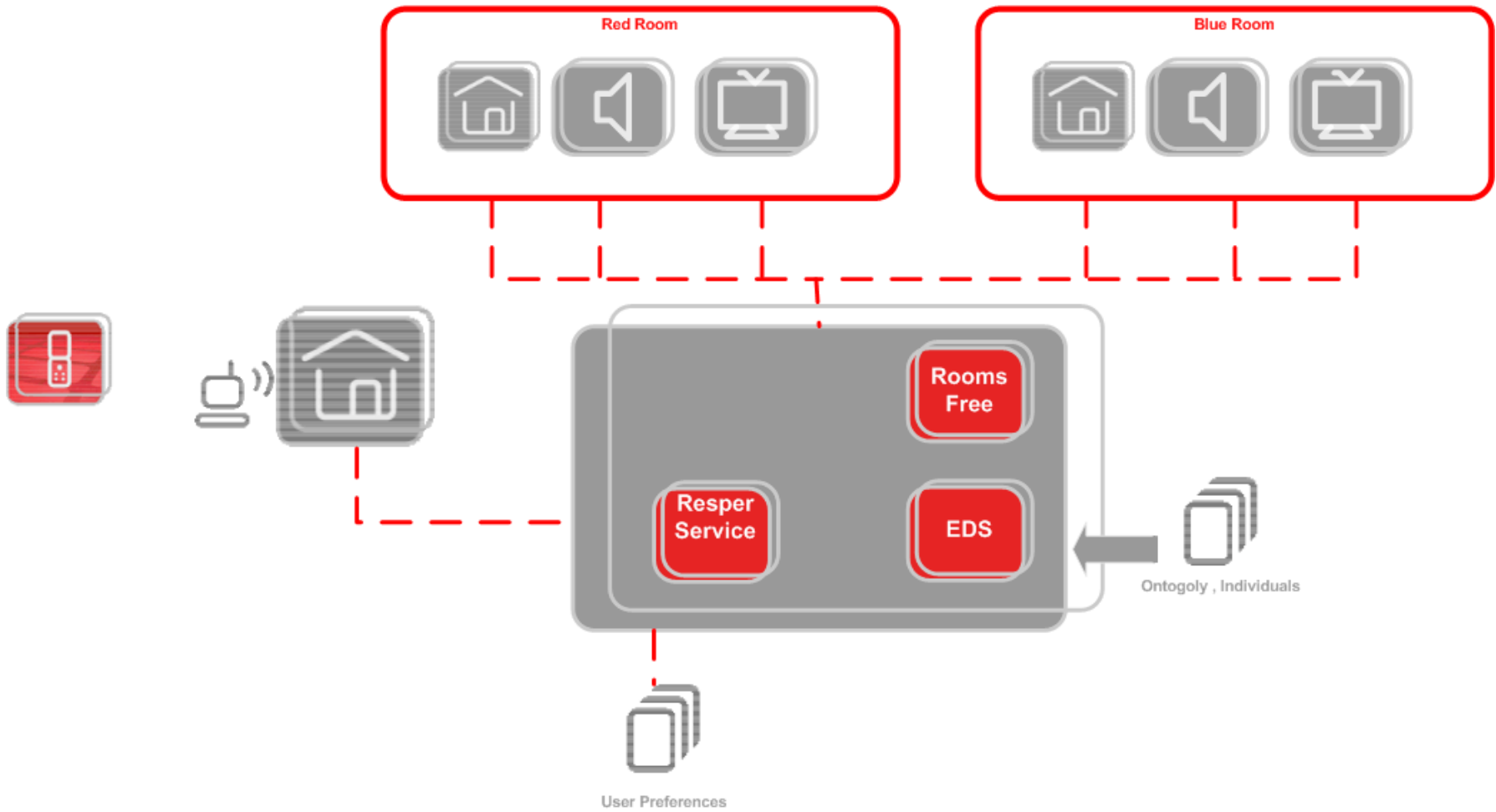
## Proof of Concept: Restaurant Personalization

- Restaurant's Room Personalization upon detection of a new customer arrival.
  - \_ Restaurant front door detects the presence of a customer.
  - \_ The restaurant "virtual maître" identifies the customer and asks for service confirmation.
  - \_ A private room is assigned to the user, and it is personalized with the customer's music and film preferences.



# Restaurant Personalization: Architecture

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## Restaurant Personalization: Use Case

- A customer goes into the restaurant.
- Presence sensor of the front door is activated. (customer\_detection)
- The door notifies the restaurant of the presence of the customer.
- The system starts the customer identification (user\_identification)
- A welcome wap-push is sent to the user asking him to confirm that he wants to be sited on the restaurant.
- An empty room is assigned in the restaurant (room\_assignment)
- A search is performed in order to look for the user music and film preferences (search\_preferences)
- The front door is opened to let the customer in.
- Room's speaker and screen are "discovered". (search\_ES)
- Preferred music sounds on the assigned room's speaker (execute\_action)
- Preferred film plays on the assigned room's screen.



# Conclusions

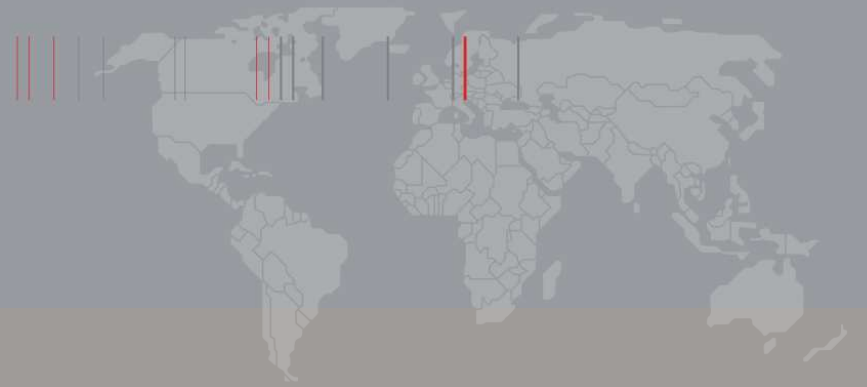


- Mobile user can control the environment through the mobile device.
- EDS → It allows dynamic discovery of existing services.



- But there are limitations...
  - \_ Usability in limited environments. Difficult to model complex *worlds*.
  - \_ ES are currently focused on domotics...
  - \_ It is necessary to take into account two key requirements:
    - IP connectivity
    - Storage.





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