



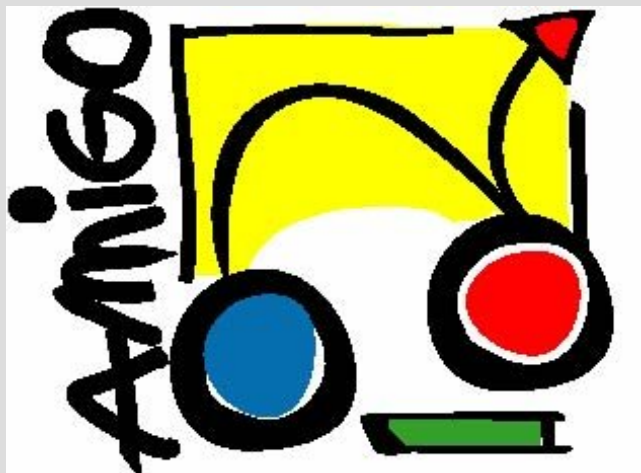
Ambient Intelligence for the networked home environment

# **Amigo Symposium**

## **28 February 2008**

Maddy D. Janse  
Philips Research



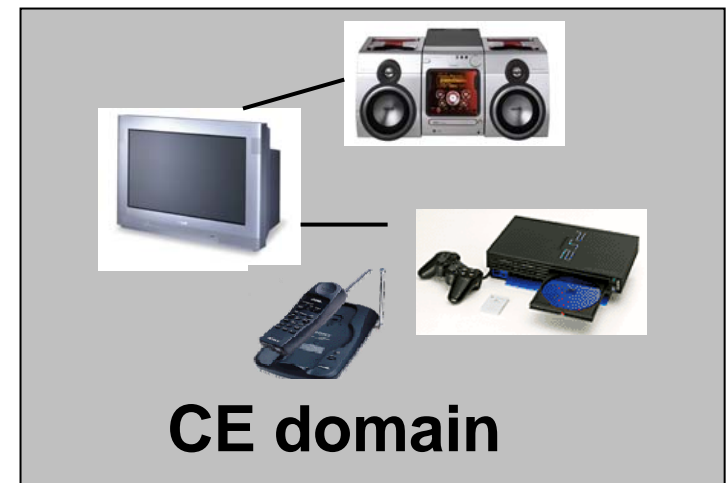
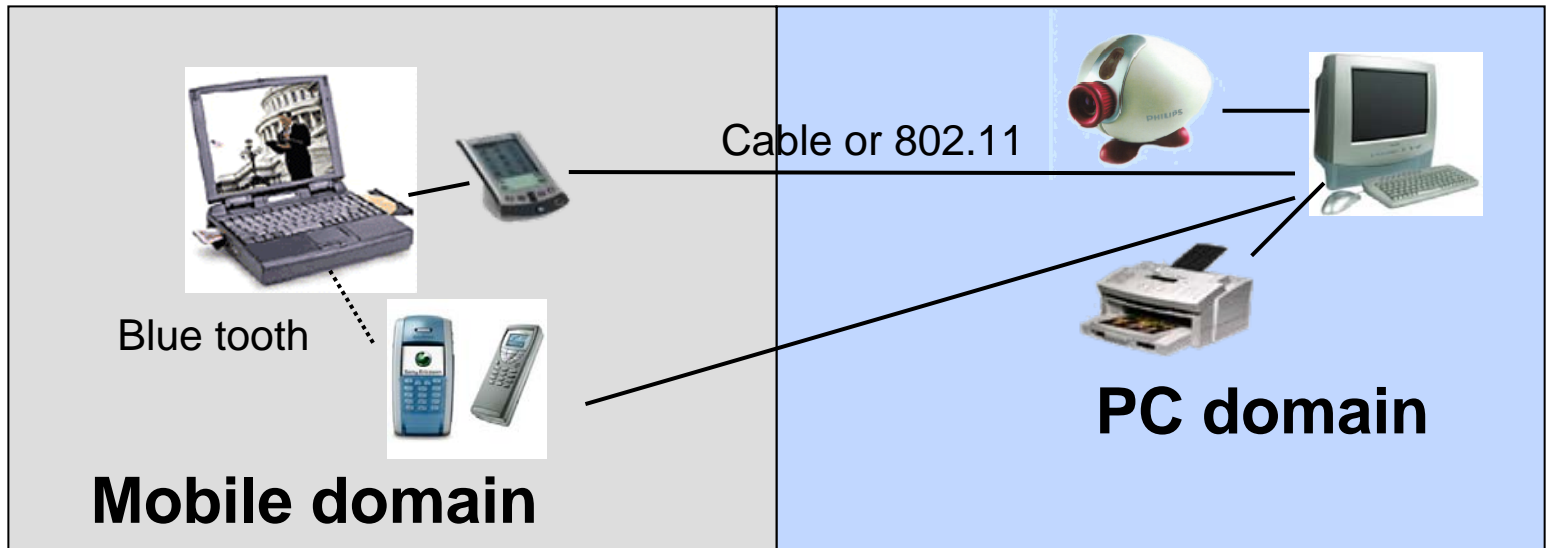


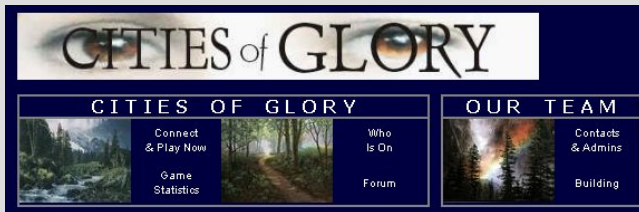
# Content

- problem
- Amigo approach
- architecture
- applications and services
- conclusion



# Different Domains - Not Interoperable





Not within the home  
Not between homes

## Current Services: To the Home

- down/up loading content
- Internet
- communication
  - email, chat, voice-IP, skype
- multi-user gaming
- adaptation of personal content
  - photo, video
- customization
  - ring tones, wallpaper



Parameter bearbeiten

Taste 2 (2)	Taste 3	Taste 3 (2)	Taste 4	Taste 4 (2)	Taste 5	Taste 5 (2)
Allgemein	Tasterinfo	Display	Sperfunktion	Alarm	Taste 1	Taste 1 (2)
Sollwerte	Istwert	Temperatursturz	Regelung Heizen	Stellgrößen	Ventilschutz	
Zeitkanal2 - Schaltzeit3	Zeitkanal2 - Schaltzeit4	Regelung Allgemein	Betriebsart / Status			
Zeitkanal1 - Schaltzeit4	Zeitkanal2 - Schaltzeit1	Zeitkanal2 - Schaltzeit2				
Zeitkanal1 - Schaltzeit1	Zeitkanal1 - Schaltzeit2	Zeitkanal1 - Schaltzeit3				
Szene6 Werte	Szene7	Szene7 Werte	Szene8	Szene8 Werte	Zeitsteuerung	
Szene3 Werte	Szene4	Szene4 Werte	Szene5	Szene5 Werte	Szene6	
Szenen-Aktorguppen	Szene1	Szene1 Werte	Szene2	Szene2 Werte	Szene3	
Taste 6	Taste 6 (2)	Taste 7	Taste 7 (2)	Taste 8	Taste 8 (2)	Szenenfunktion

Schiebereglerfunktion: **mit Startwert und Endwert**

Aktion direkt bei Betätigung: **keine (stoppt zyklisches Senden)**

Aktion bei Loslassen vor Ablauf der langen Betätigungszeit: **Erhöhe aktuellen Objektwert einmal**

Aktion bei Erreichen der langen Betätigungszeit: **Schieberichtung umkehren und zyklisch senden**

Aktion bei Loslassen nach Erreichen der langen Betätigungszeit: **keine (stoppt zyklisches Senden)**

Startwert: **0**

Schrittwert: **10**

Endwert: **100**

Zykluszeitbasis: **0,1 Sekunde**

Zykluszeitfaktor (3-255): **5**

OK Abbrechen Standard Info Teilw. Zugriff Hilfe

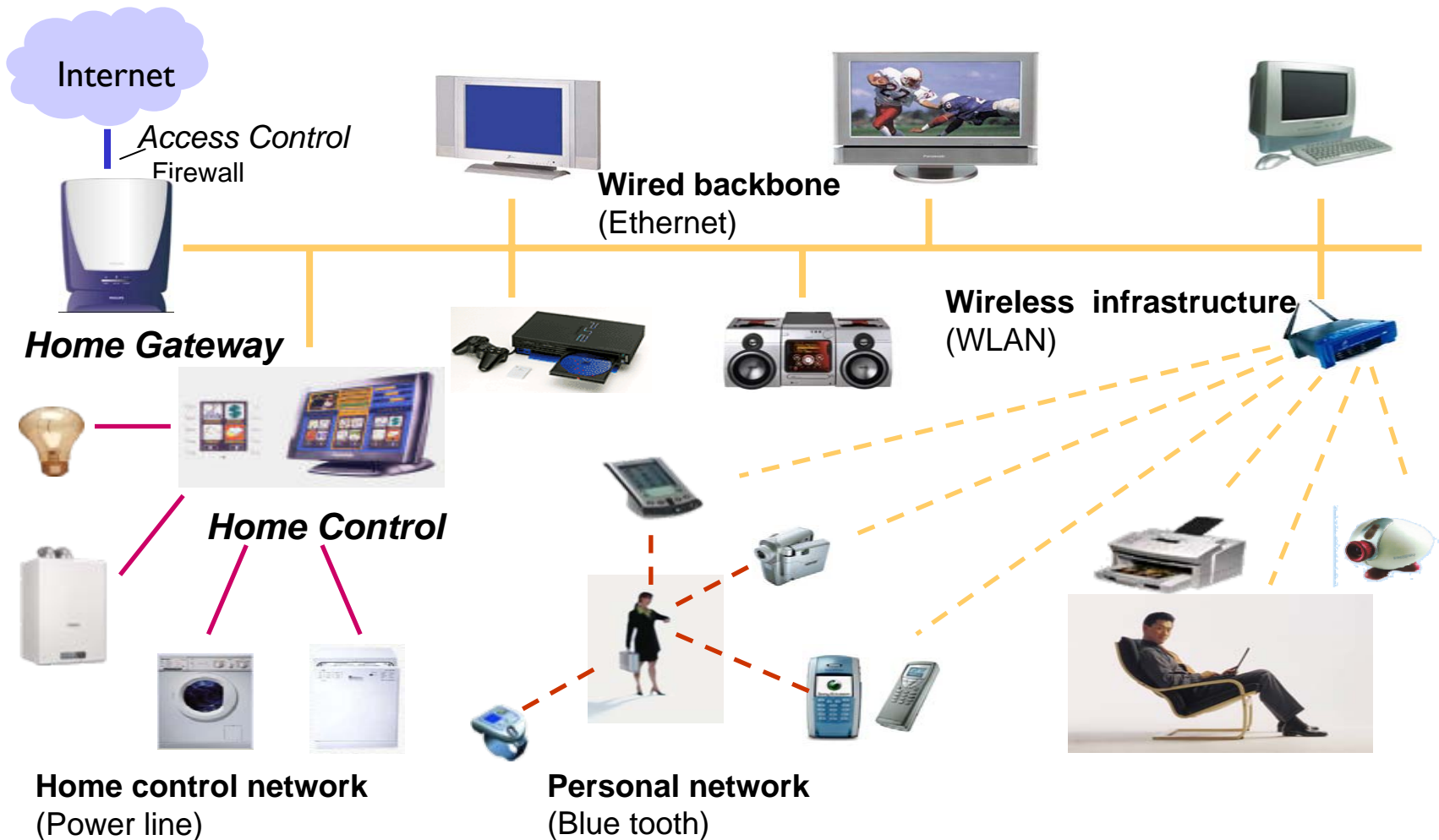
- configure a 4-way switch with build-in temperature control
- 56 folders - 277 parameters

## Missing Today

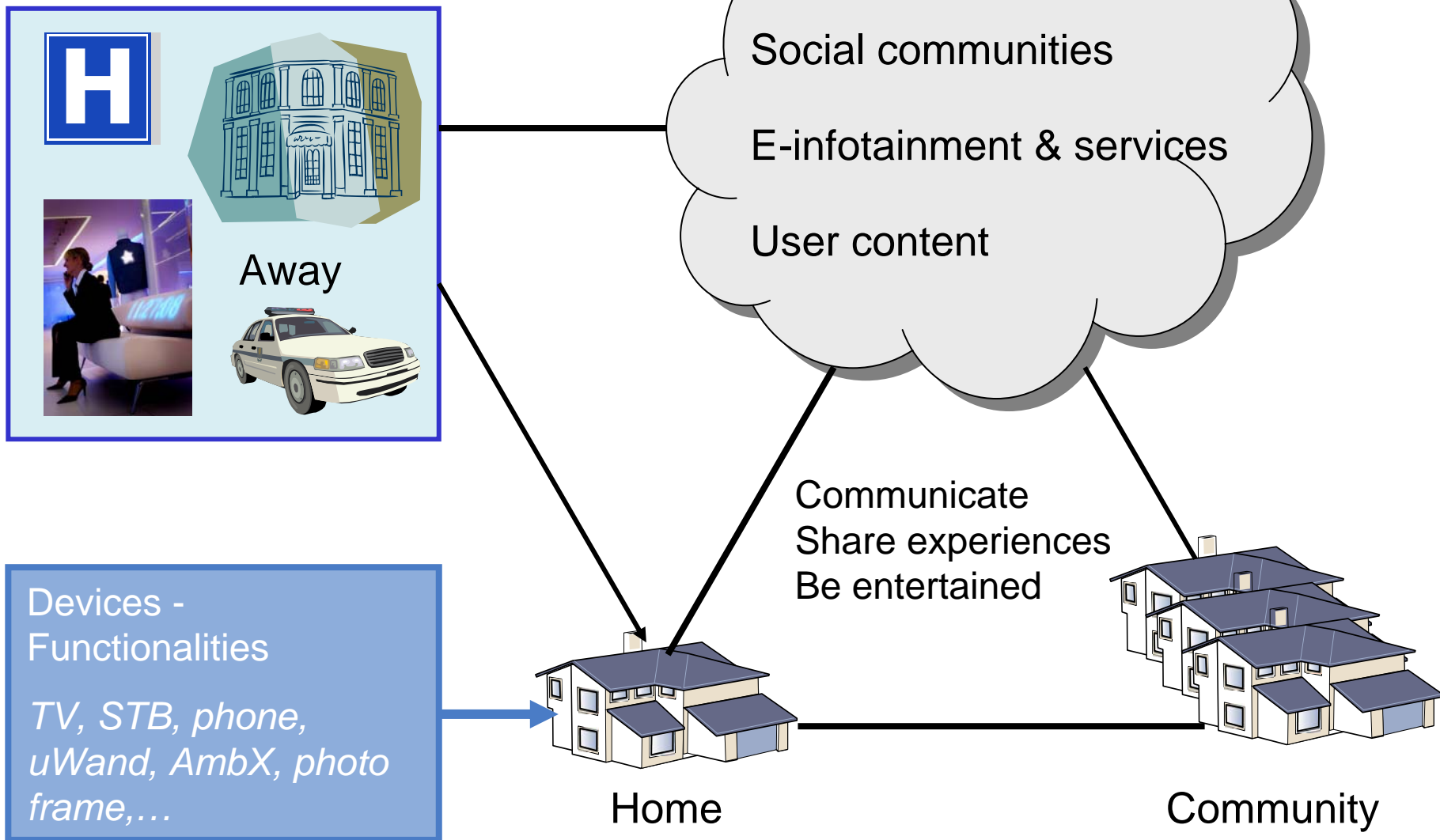
- compelling services
- ease of use
- benefits for end-users
- interoperability between devices and functionalities



# Home Network Tomorrow

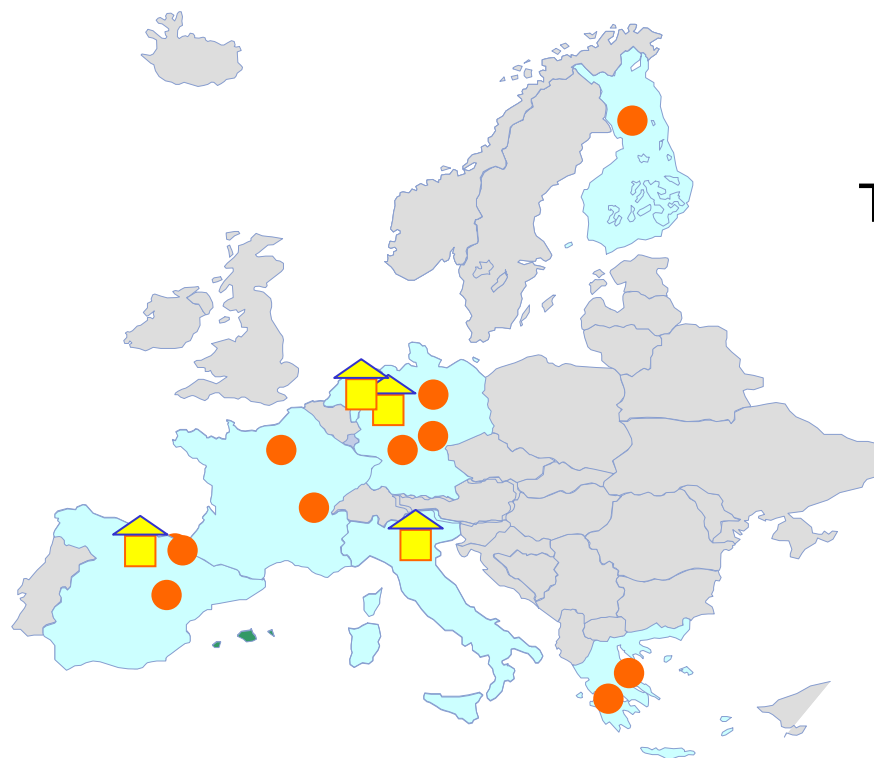


# Future Applications





# Amigo IST Project



## Consortium

Philips  
VTT  
Telematica Instituut  
Fraunhofer  
Microsoft  
Univ. Paderborn  
INRIA  
France Telecom  
Italdesign  
Fagor  
Ikerlan  
Telefonica  
SingularLogic  
ICCS -NTUA

42 Months (Sept04 – Feb08)

Budget: 24 M€; EU funding: 13 M€

2021 Person months

4 Home labs 



- use available context information
- use different devices
- provide intelligent and attractive user services
- compose and integrate new devices and services
- provide users with experience sharing, social presence, and responsive home environments
- extend their home to other homes, car, hotel, office, ....

## Amigo Objectives

- to develop a service oriented architecture for intelligent future home networks
- to enable development of context-aware applications

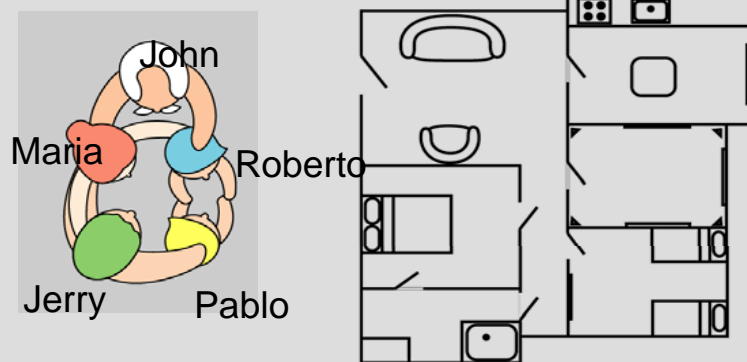


# User-centered Approach

- field studies
- user needs: caring & sharing
- requirements
- scenarios
- storyboards
- personas



## Setting



## Amigo Scenario

### Narrative

A day in the life

see Video



visualizations

data booklets  
rate & list  
like and dislike

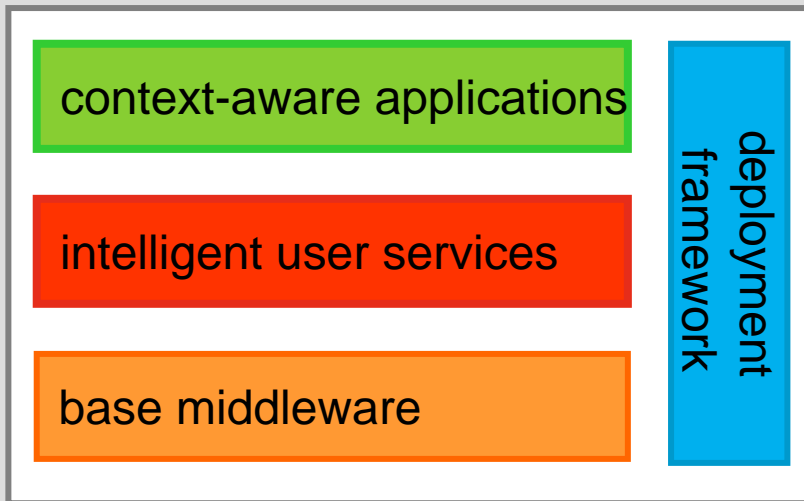


## Scenario Evaluation

- user & technical requirements
- refined scenario
- adapted to people perception and activities
- use cases
- conditions and settings for evaluation of applications



building blocks



# Middleware

- interoperability framework
- service oriented architecture
- smart home = dynamic environment



# In a Nutshell

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### USE-IT

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- service discovery and interaction interoperability
- enhanced discovery and service composition
- domotic infrastructure
- security and privacy
- content distribution / data store / QoS

## Base Middleware

- functionality for networked environment
- open Source Software



- context management
  - broker
  - source
  - wrapper
  - reasoner
  - history
- user modeling and profiling
- awareness and notification
- user interface services
- privacy and personal security

# Intelligent User Services

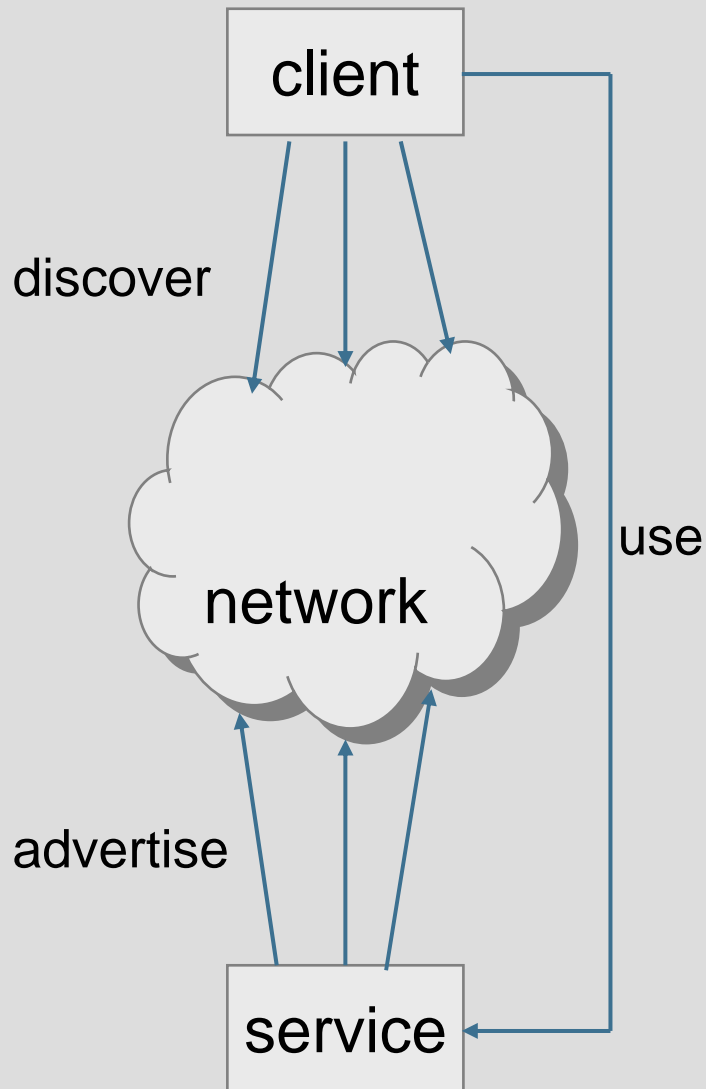
- functionality for ambient environment



- reduction of programming effort
- enforcing interoperability
- common set of protocols
  - discovery
  - remote procedure calls
  - asynchronous event delivery

# Programming & Deployment Framework

- no care about underlying protocols



# Service Oriented Architecture

- on demand
  - development
  - delivery
  - use
- loosely coupled components
- dynamic configuring of services and devices
- multiple protocols
  - discovery: UPnP, SLP, WebServices
  - interaction: RMI, SOAP

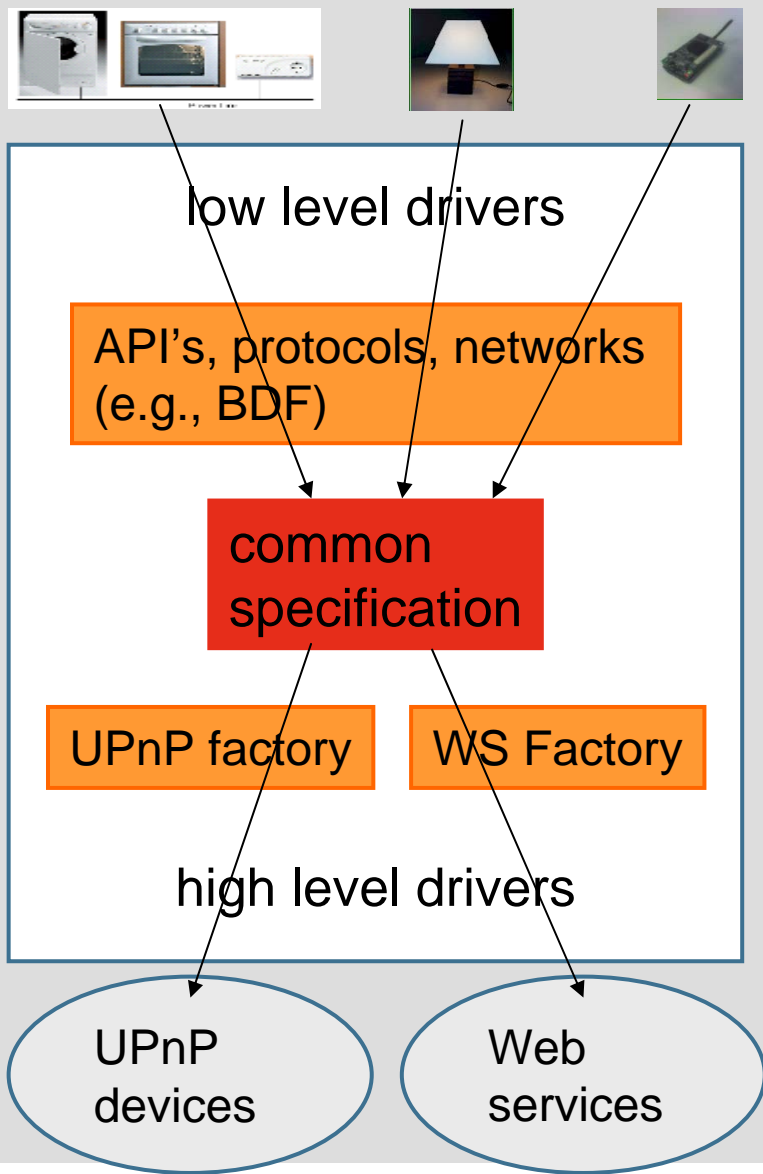


Example of how to start building an application:

1. deployment framework,
  - discovery mechanism & ontologies
  - context management service
2. security & enhanced discovery
  - user modeling & profiling service
  - awareness & notification service
3. user interface service
  - community sharing service

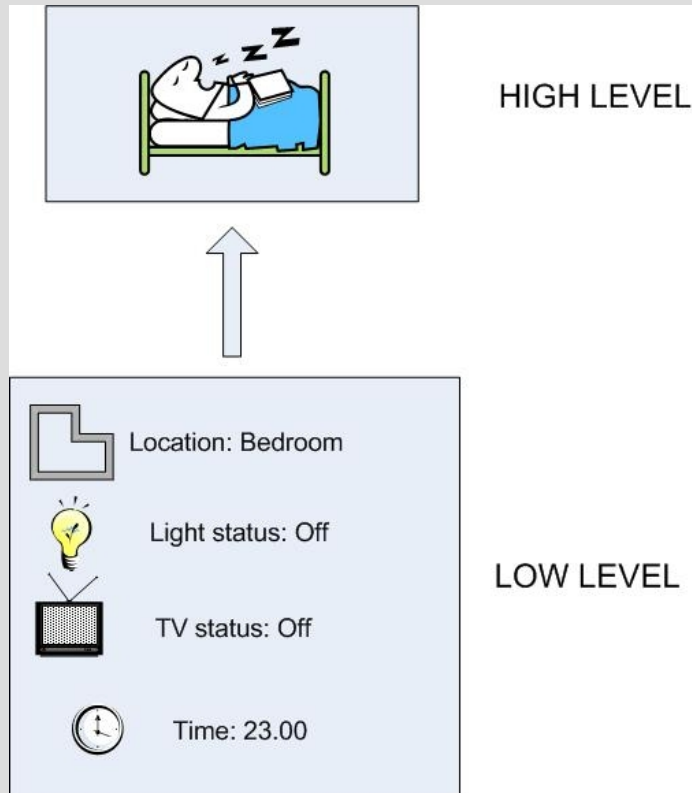
## Use-it

- training modules and tutorials for all SW modules
- available on the Amigo website
- easy to build an Amigo service
  - ~ 1 day
- understanding the concepts takes longer
  - ~ weeks



# Domotic Service

- expose devices as UPnP or Web services
- low-level and high-level drivers are completely decoupled
  - depend only on common specification



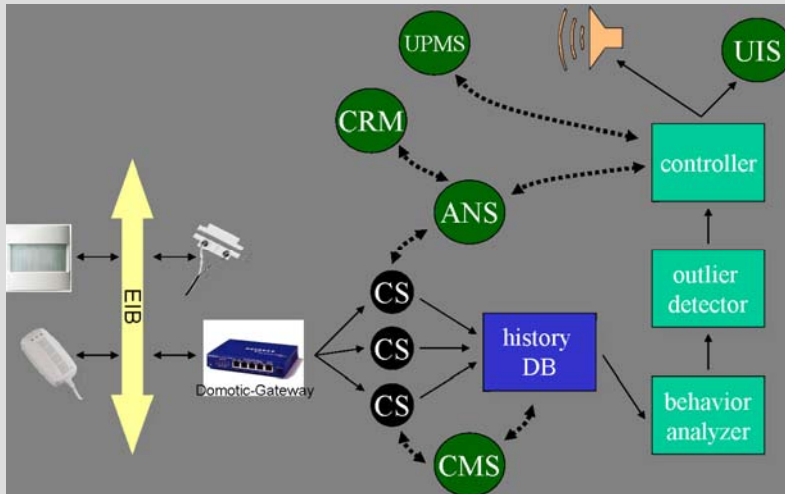
Interpreting low level context  
to high level context

# Context Management Service

- open infrastructure
- acquires information from various sources
  - physical sensors,
  - user activities,
  - applications
- abstracts into "context information"
- provides to context aware services



# Applications & Services



- components
  - domotic gateway
  - history database
  - behavior analyzer
  - outlier detector
  - controler

# Daily Life Cycle Monitor

- monitors the behavior of inhabitants
- data from different sensors and information from Amigo middleware services
- detects deviations from normal behavior and takes appropriate action



**cooking**

planning | users | shopping lists

name: Mammy

age: 20

gender: Female

stature: 20 cm

weight: 20 Kg

personal planning

edit profile

**Ingredients**

apple

add

**Medical Advices**

Cholesterol

add

**Diets**

Hipocaloric

Hipocaloric

Mediterranean

Vegetarian

**Preferences**

anchovies

apple

remove

**Recommendations**

remove

**Restrictions**

remove

**Medical Advices**

Cholesterol

remove

**Diets**

remove

cancel save



**food management**

planning | users | shopping lists

Feb 2

**gazpacho**

Difficulty 1

Yield

Prep. Time

Cook Time

**Ingredients**

olive\_oil

0.5 onion

1.0 kilogram tomatoes

1.0 garlic\_pepper

2.0 onion vinegar

200.0 gram bread crumbs

1.0 cucumber

**preparation**

Soak the bread in water. Put the tomatoes, onion, pepper, cucumber, vinegar, oil and bread into a liquidizer. If you want to dilute it, add a glass of water. Tip: if you want to go for a large garlic taste, add a small amount of fresh garlic to the mixture before liquidizing. Put the mixture into a bowl, add salt and pepper and leave the gazpacho to chill for at least an hour. If you want to eat it straight away, you can put some ice cubes in to cool it down. Gazpacho is a Summer dish which is meant to hydrate and cool down your body. So the colder the better! Serve the gazpacho in soup bowls, with the portions of diced tomatoes, pepper, cucumber, onion, croutons etc. on the table, so that everyone can add them to their bowl as they prefer. Tip: you

print

back to planning

Recipe Unlocked

Ingredient

apple

Search

Ingredient

Unlocked

Family

Soups

Search

Family

Unlocked

Replace current recipe

# Food Management

- each user's
  - personal preferences
  - health diets
  - burned calories
  - weight evolution
- how many people are going to eat and who they are
- available goods in the fridge.
- expiration date of the products



# Appliances Management

- appliances exchange information and communicate via existing power lines
- use case examples:
  - programming appliances from mobile devices
  - creating scenes like wake-up in the morning and setting the toaster and coffee machine
  - holidays settings at home



- Home agenda
- MyNews
- Media Manager Core
- Multimedia manager
- Context-dependent personalization

# Home Information & Entertainment

- Amigo Box applications
- Standard protocols: wifi, ethernet, UPnP
- applications are web-based
- no need to buy new devices to connect
- any device with a web browser will do



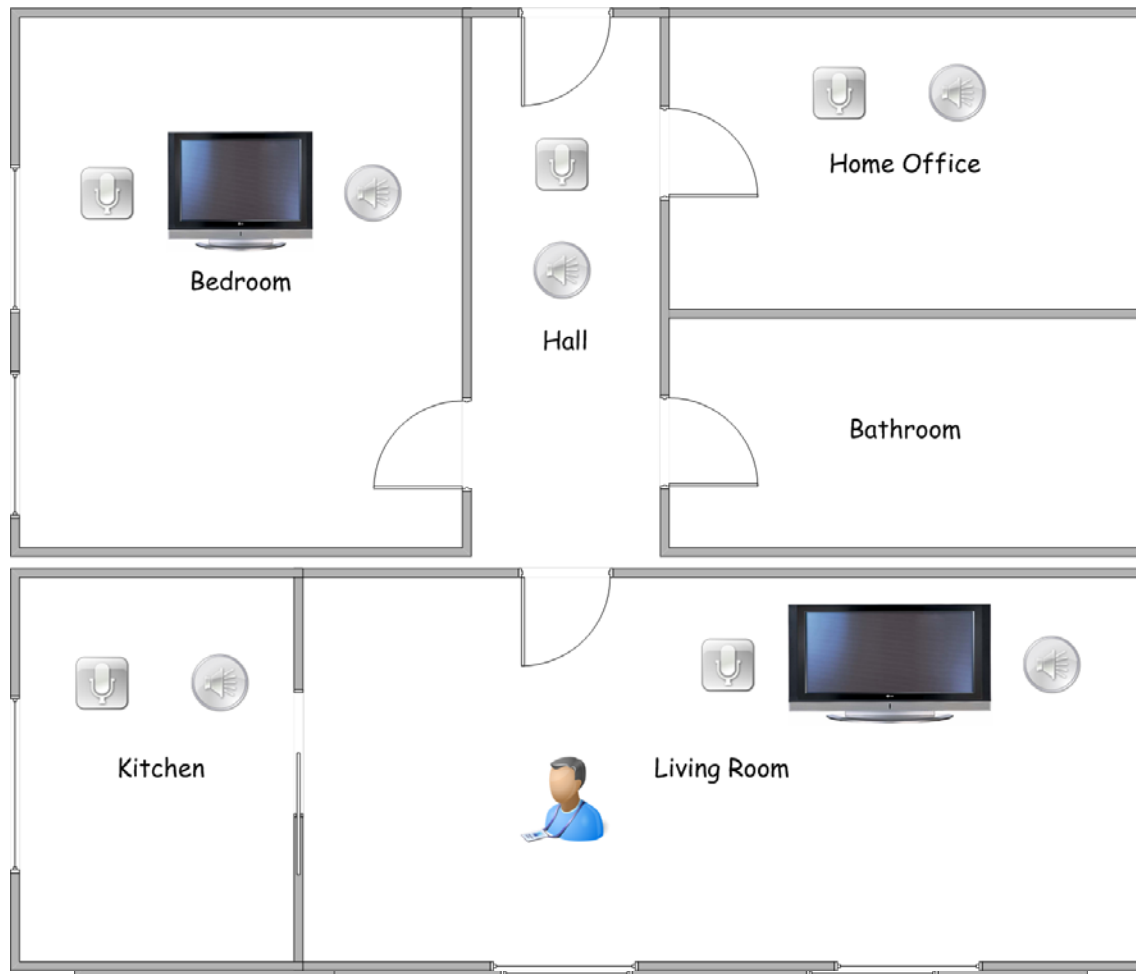
- real-time, audio capturing and streaming solution for hands-free communication
- multi-channel audio processing
  - adaptive beam forming
  - acoustic echo cancellation
  - noise reduction
- can handle multiple users

## Follow-Me

- user location information to redirect an audio connection to the user's current location
- seamless ambient audio communication

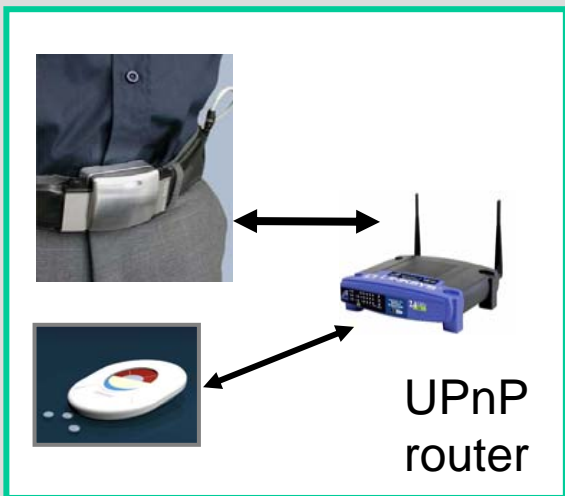


# Seamless Audio Interface Follow-Me Scenario





## My Home



## Your Home

# Home-to-Home

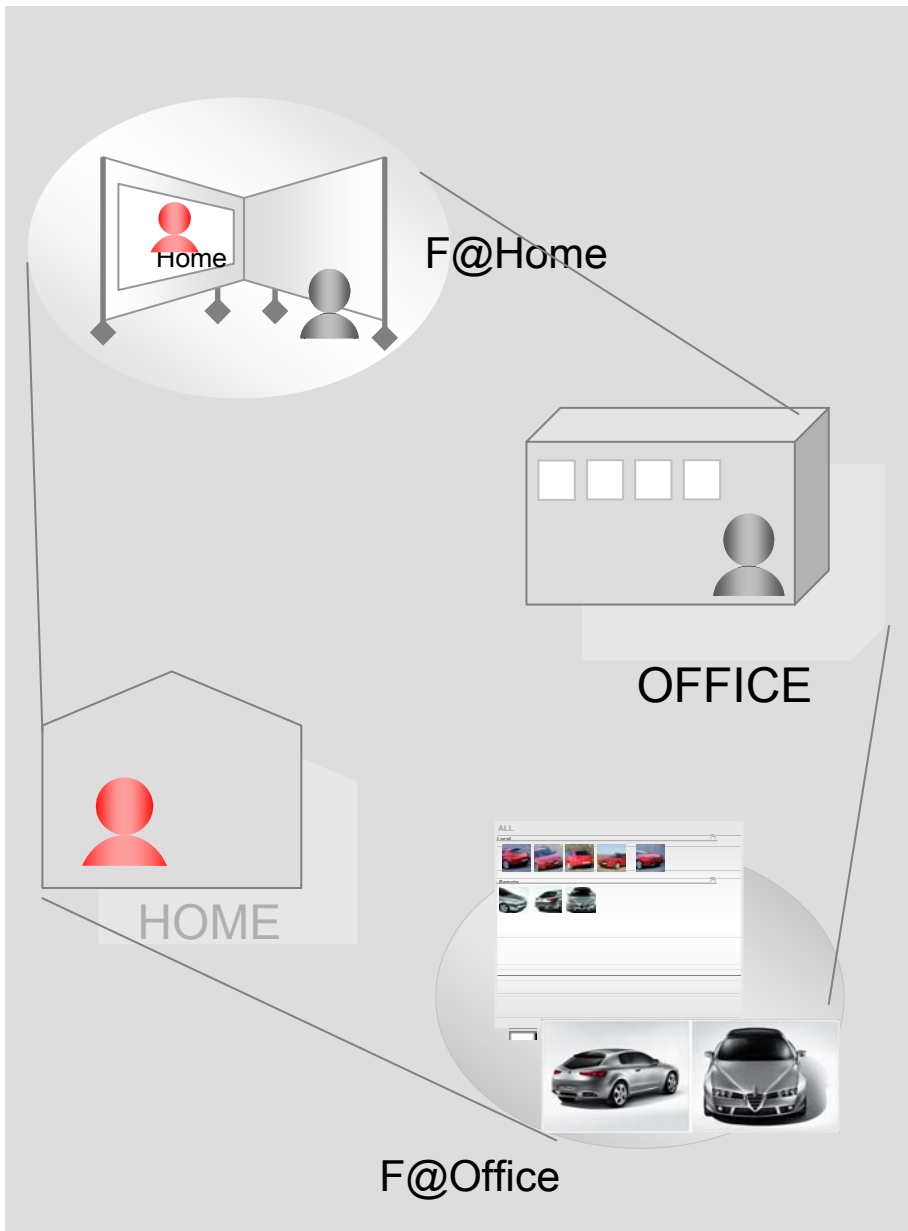
feel at home

- have access to your services
  - applications can use exported services just like local services



# Away-not-Away

- sharing presence and activities
- independent of location and devices
  - using TV with PC, TV with hotel-TV, or mobile with TV, etc.

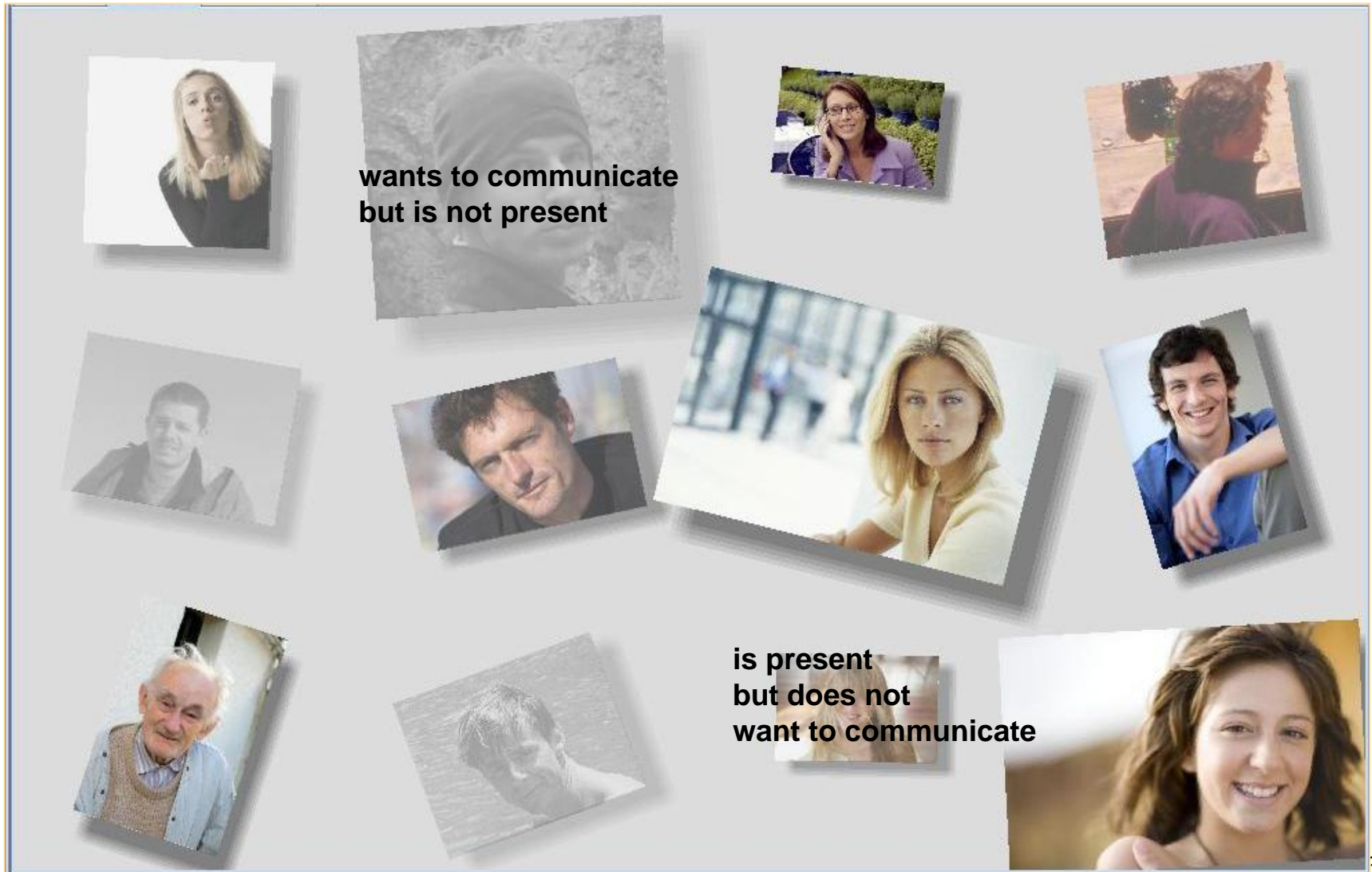


# Home-to-Workplace

ambient communication

- ambiance and activity sharing

# Presence and Availability

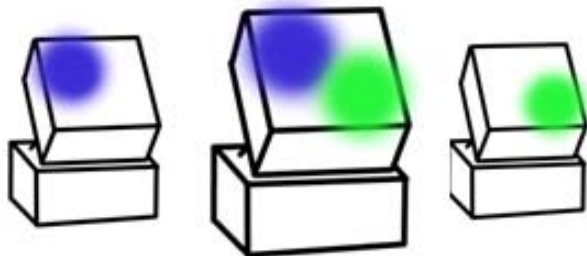




Home A



Home B



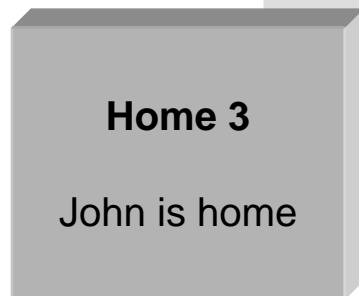
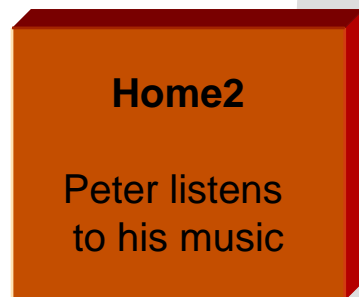
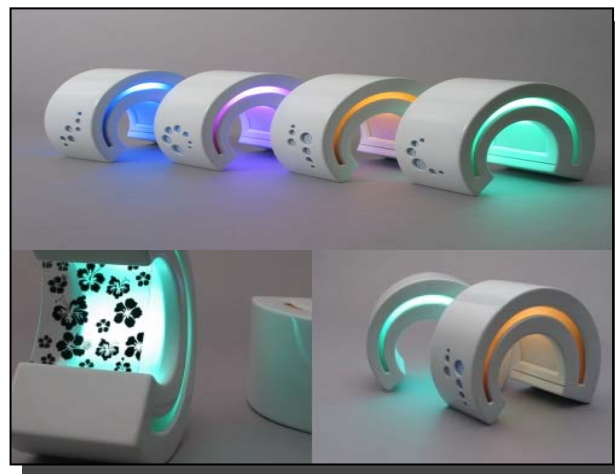
# Perceived Privacy

- field and concept studies
- different masking methods
- feel connected
- application dependent



# Social Radio

Staying in touch with smart artifacts



Network

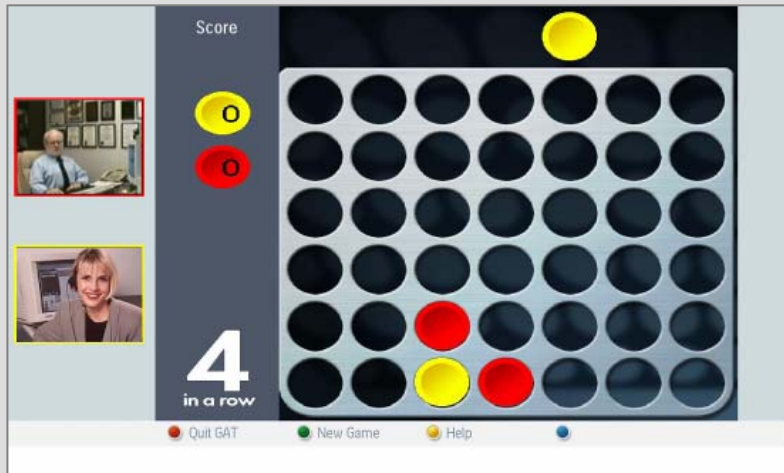
Home 4



John's artefact lights up,  
Indicating his presence

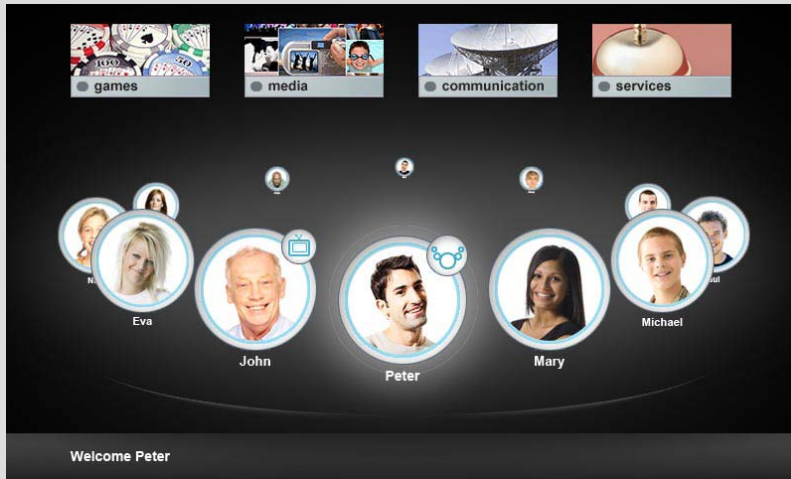


Maria's and Peter's artefacts  
play their music



# Sharing Activities and Experiences

- presentation technology based on CE-html
- synchronization mechanism
- community services
- adaptable at each site
- support individual interaction modalities



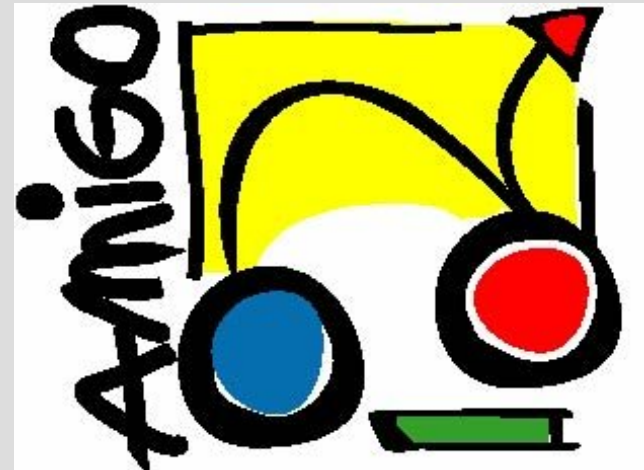
# Awareness Globe

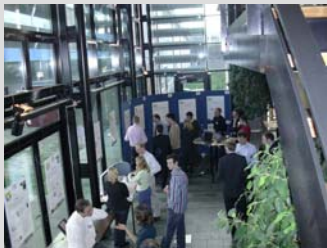
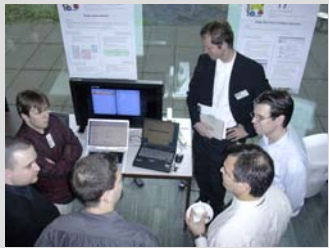
- tangible interface
- to stay aware of activities and presence of contacts
- to initiate ambient or explicit shared applications



- unified middleware
- across application domains
- across homes and environments
- connects other networks (e.g., sensors)
- interoperable – existing technologies
- intelligence in the middleware
- reusable by thin applications
- generalized use of semantics
- Open Source Software infrastructure

## Key to Amigo





# Acknowledgments

- European Commission Sixth Framework Programme IST-004182
- Amigo Project Partners

