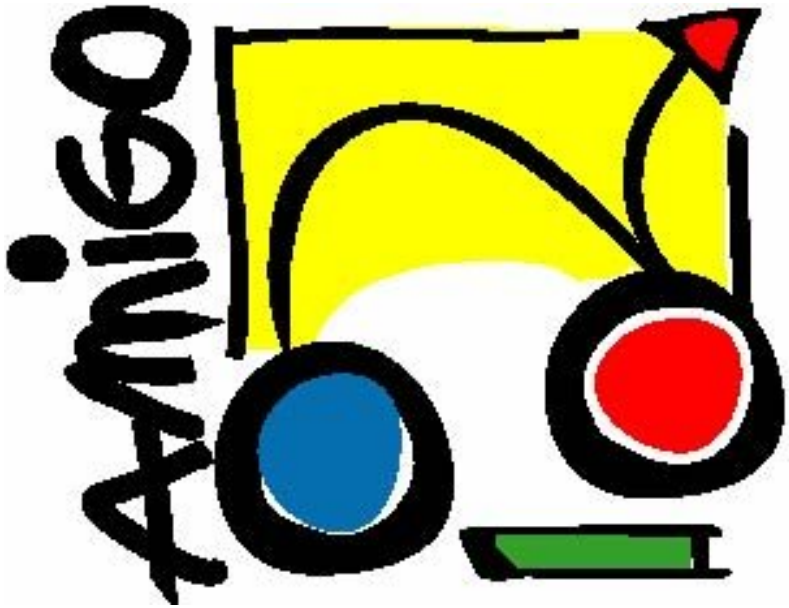
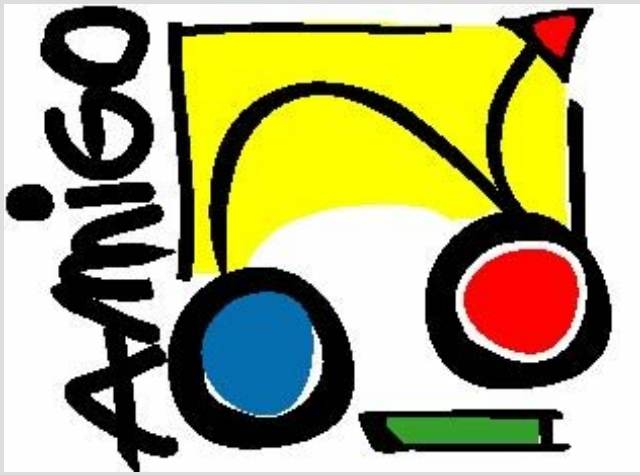


Ambient Intelligence for the networked home environment

Amigo Symposium
28 February 2008

Maddy D. Janse
Philips Research

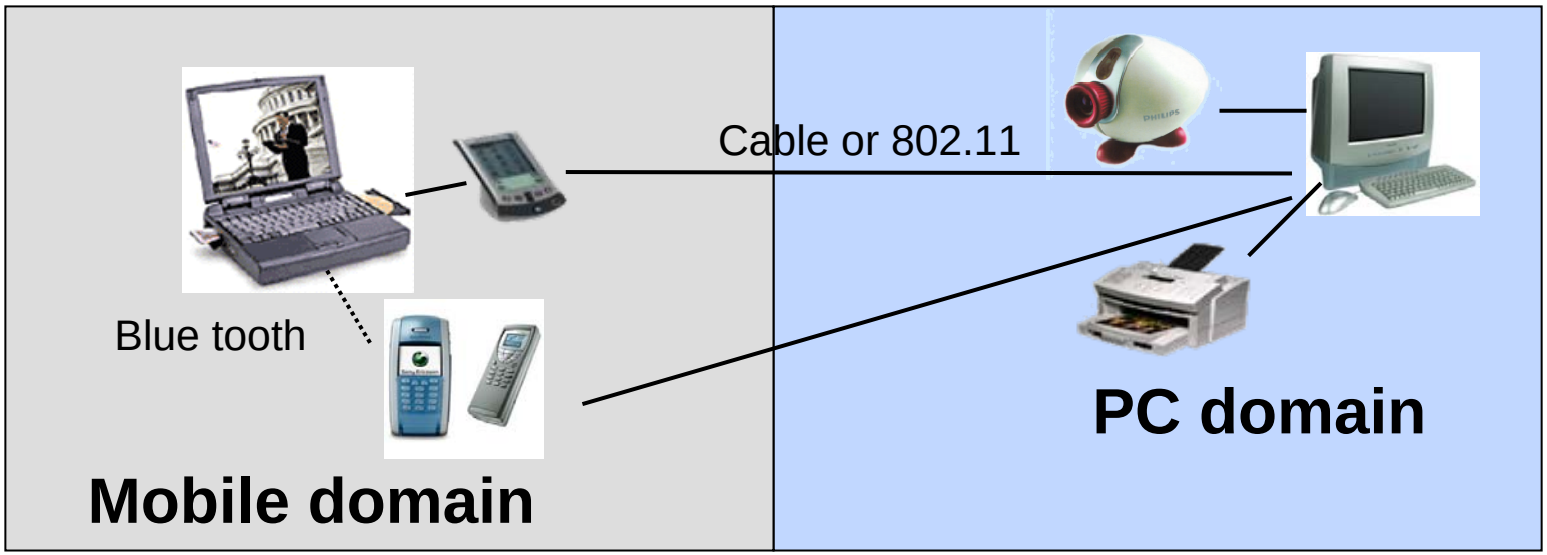
Information Society Technologies

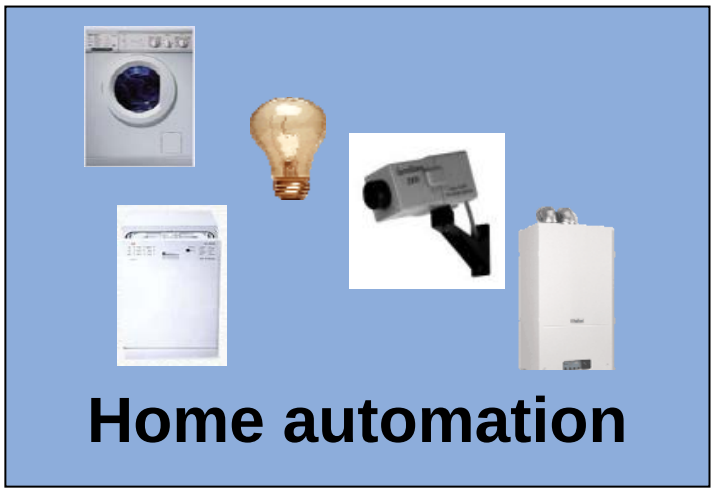


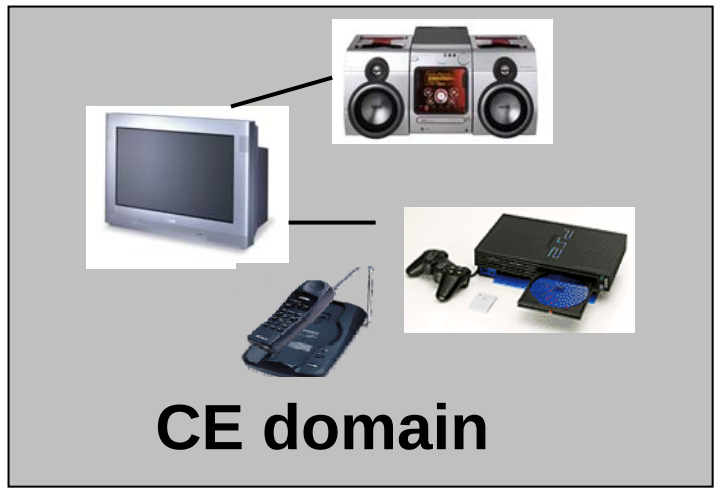
Content

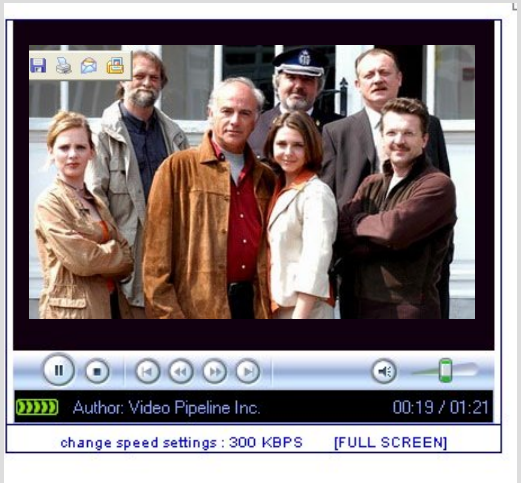
- problem
- Amigo approach
- architecture
- applications and services
- conclusion

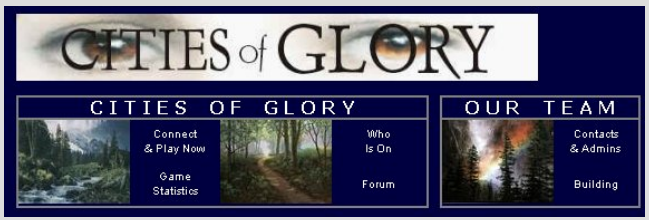
Different Domains - Not Interoperable









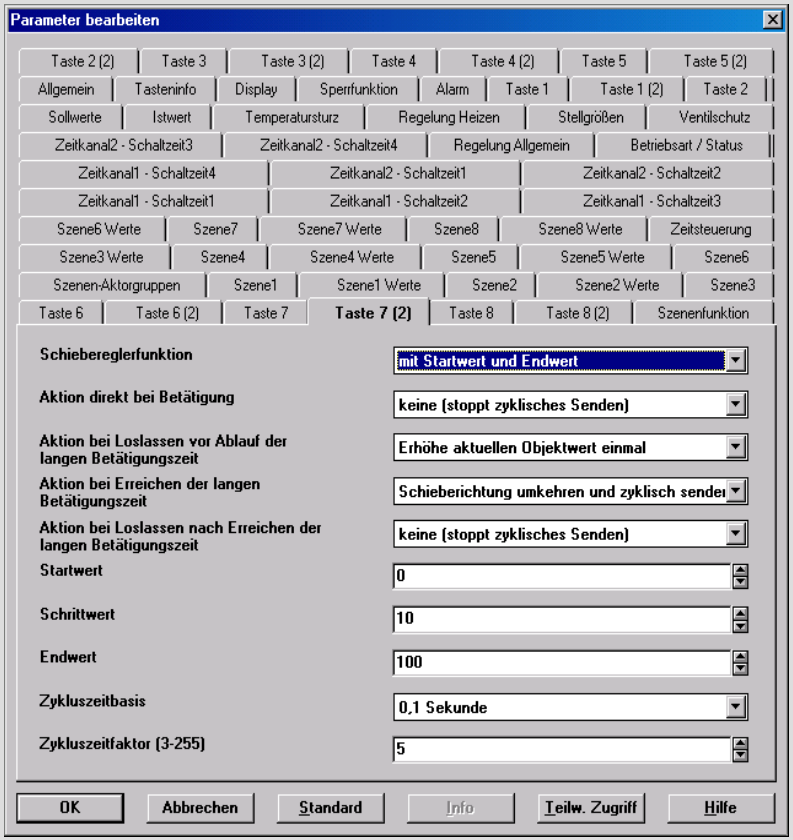


Not within the home

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

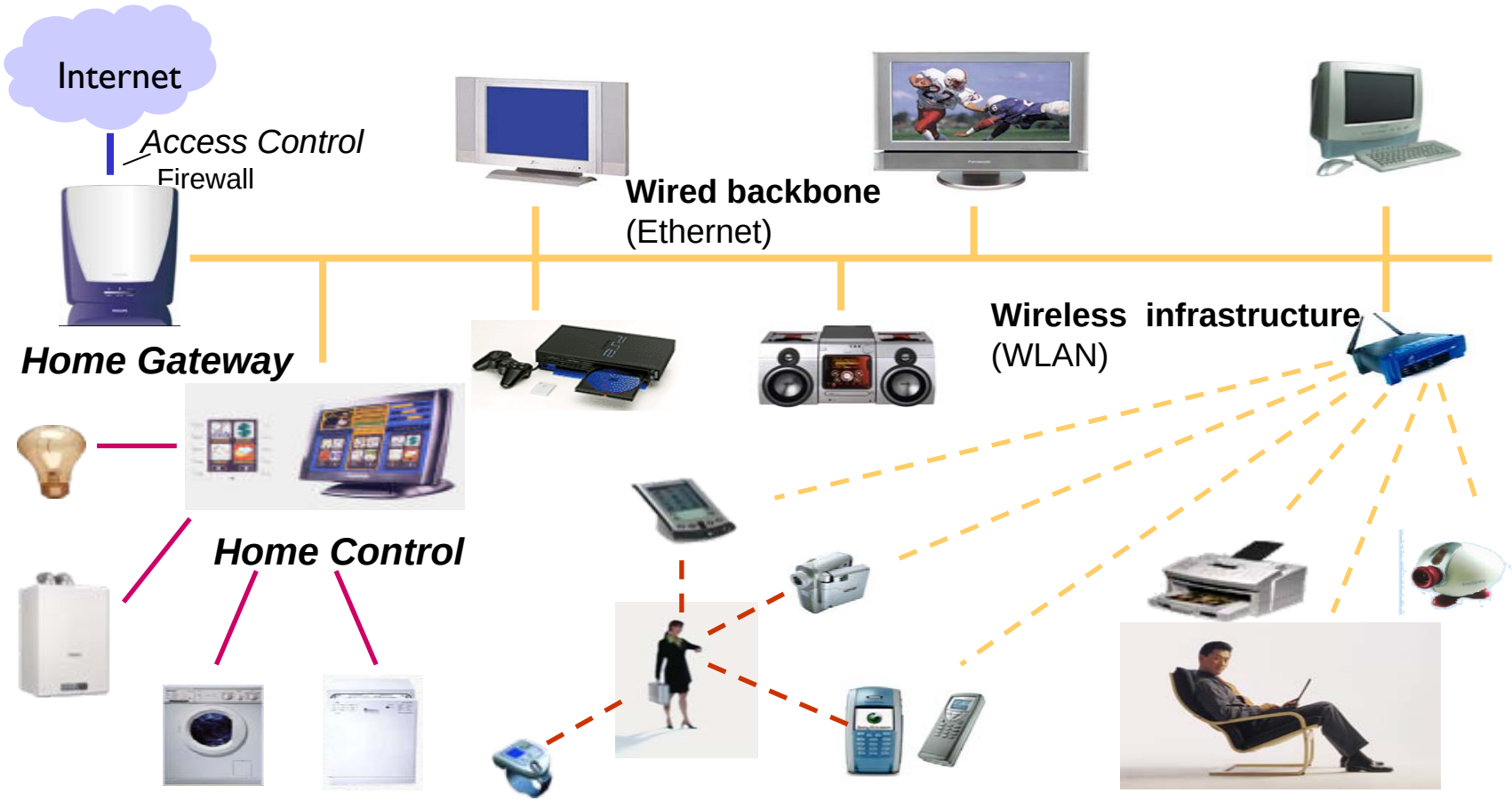


- configure a 4-way switch with build-in temperature control
- 56 folders - 277 parameters

Missing Today

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

Home Network Tomorrow



Future Applications

Social communities

E-infotainment & services

User content

Communicate
Share experiences
Be entertained

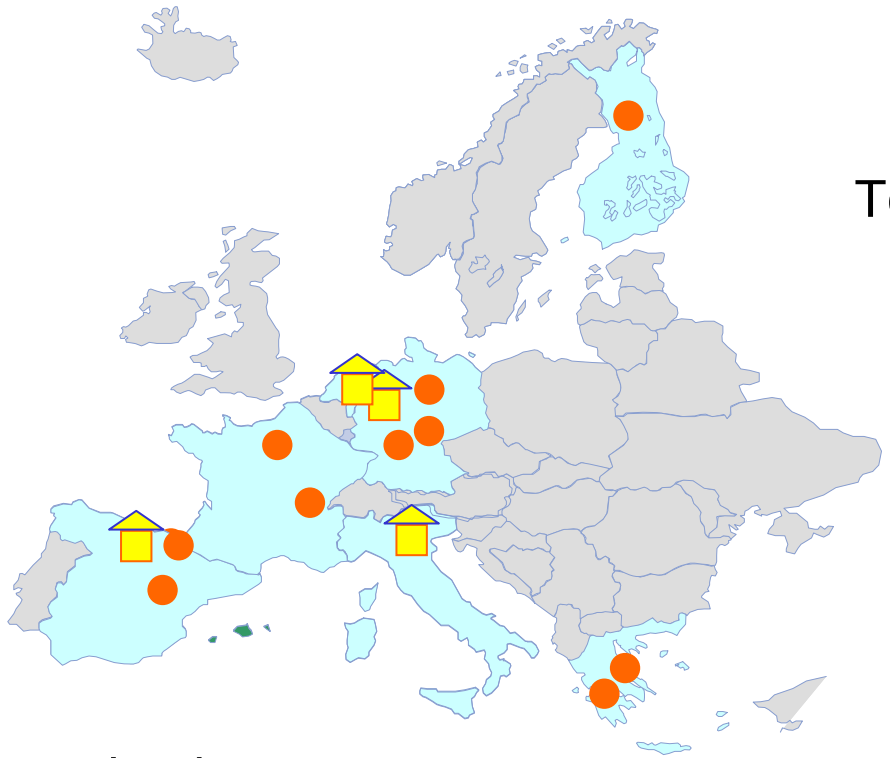
Devices - Functionalities

TV, STB, phone, uWand, AmbX, photo frame,…

Home

Community

Amigo IST Project



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

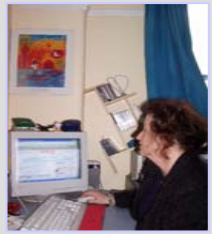
42 Months (Sept04 – Feb08)
Budget: 24 M€; EU funding: 13 M€
2021 Person months
4 Home labs

Amigo Objectives

- 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, ….

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







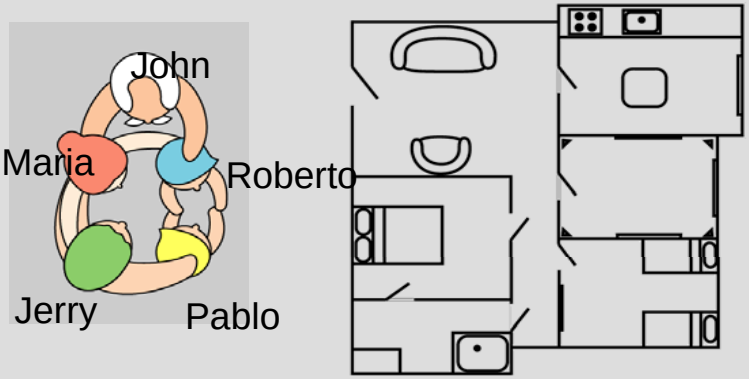


User-centered Approach

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

Amigo Scenario

Setting



Narrative

A day in the life

see Video

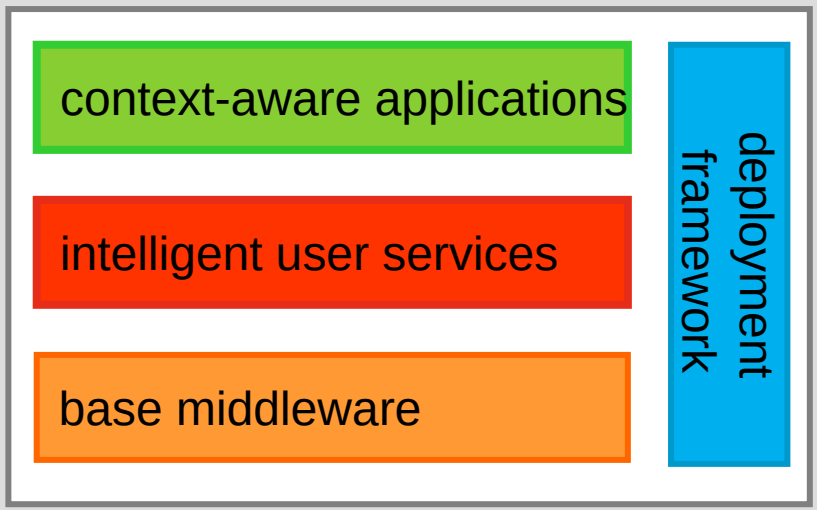
visualizations

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

Contents

INTRODUCTION

MIDDLEWARE & INTELLIGENT USER SERVICES

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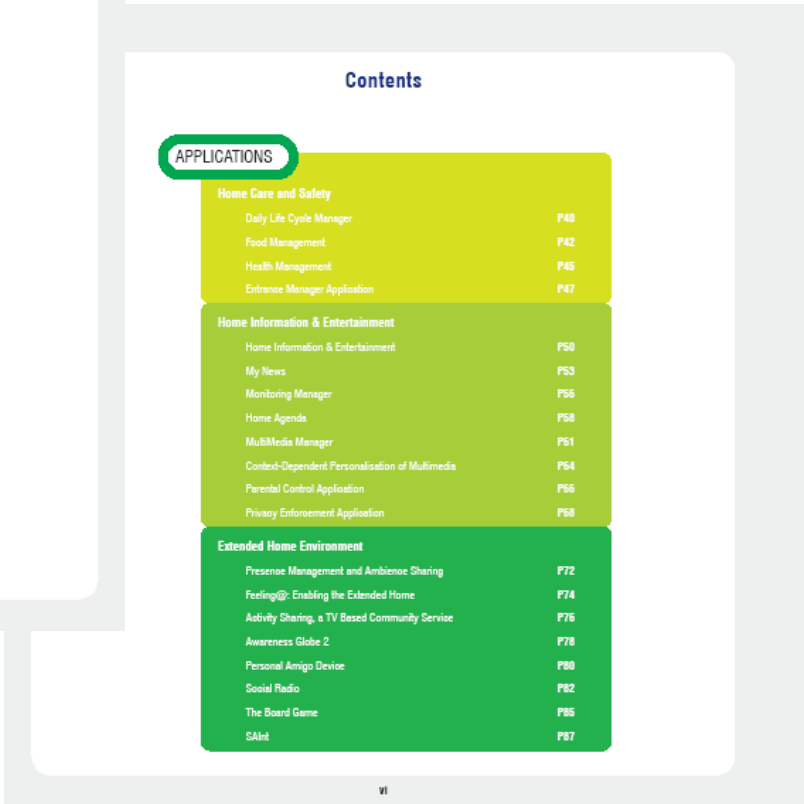

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APPLICATIONS

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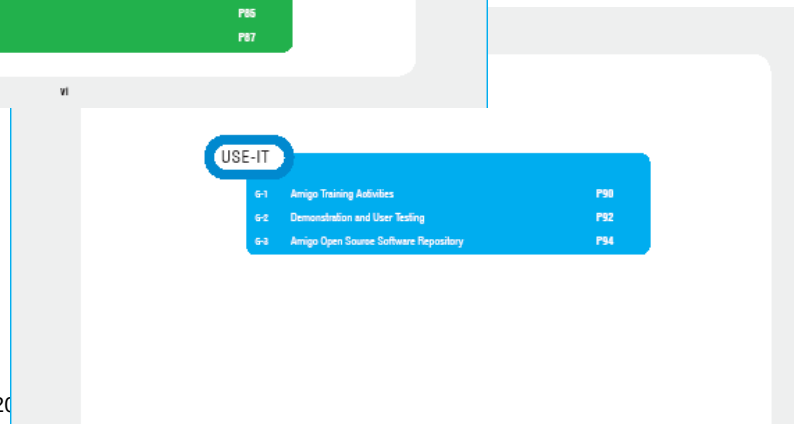


USE-IT

- 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

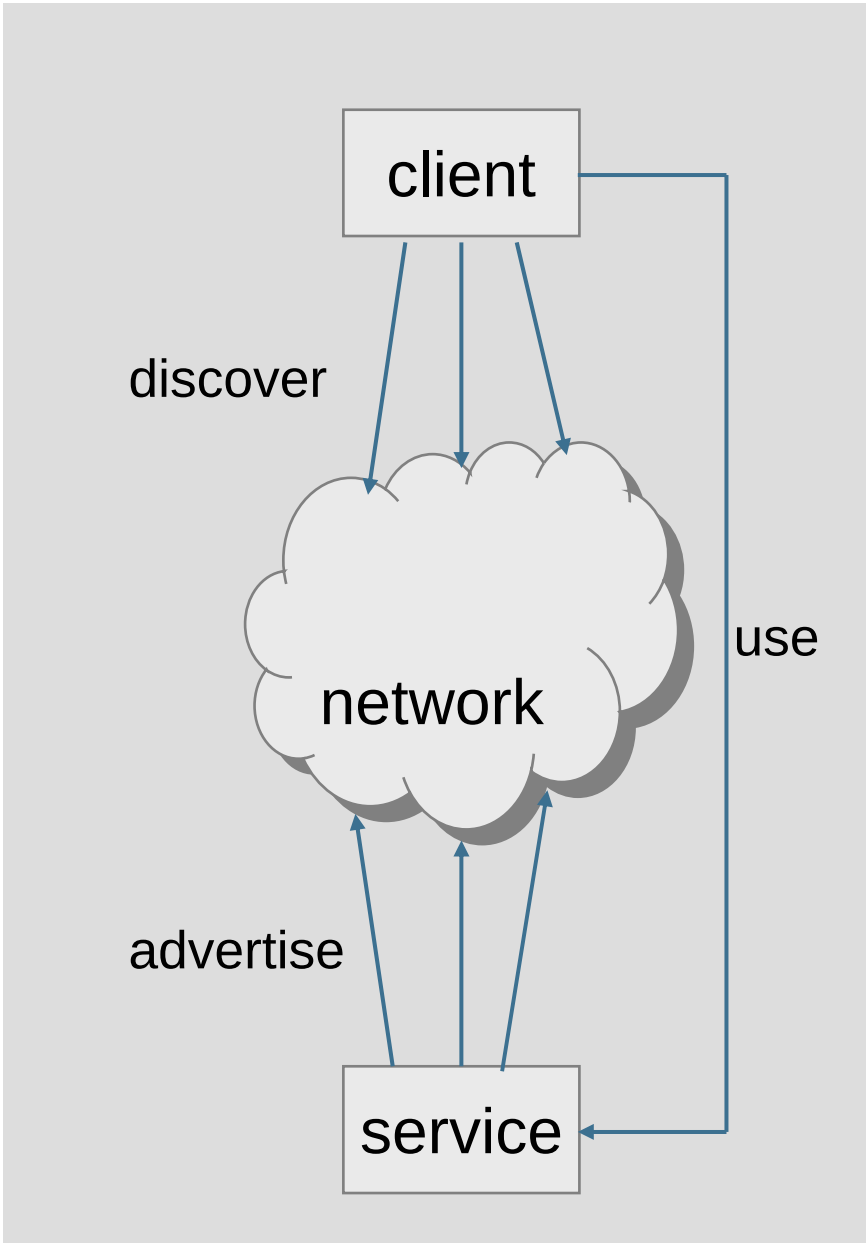
Intelligent User Services

- 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:

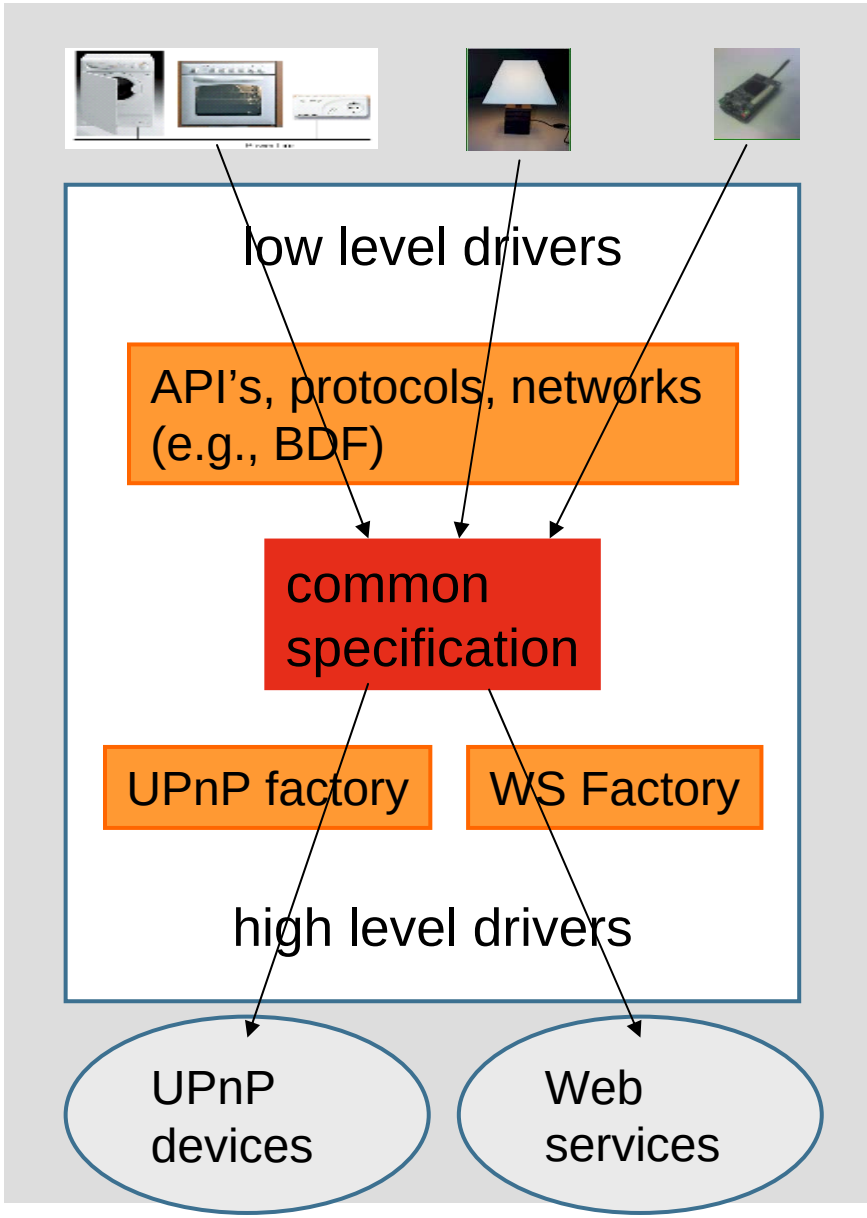
1. deployment framework,
- discovery mechanism & ontologies
- context management service

2. security & enhanced discovery
- user modeling & profiling service
- awareness & notification service

3. user interface service
- community sharing service

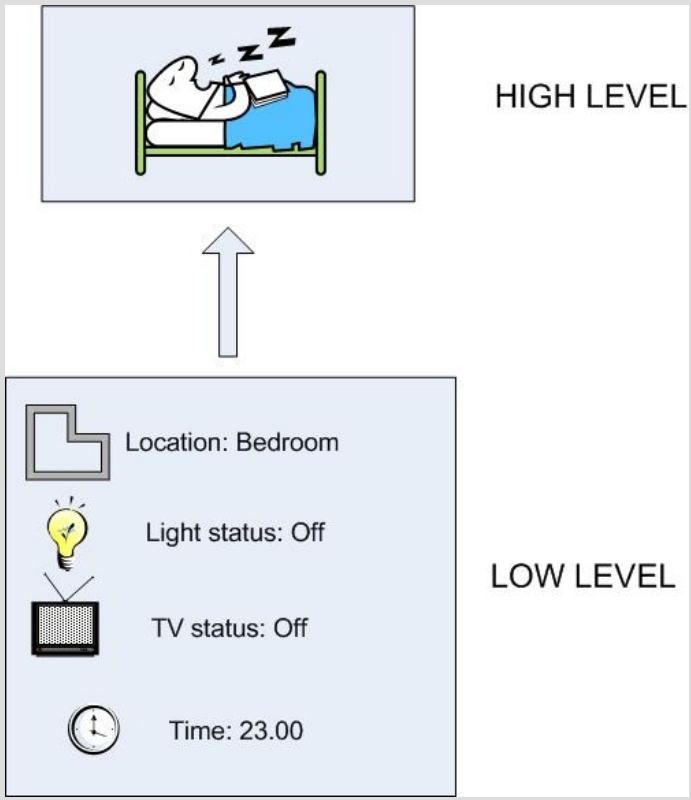
Use-it

- 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



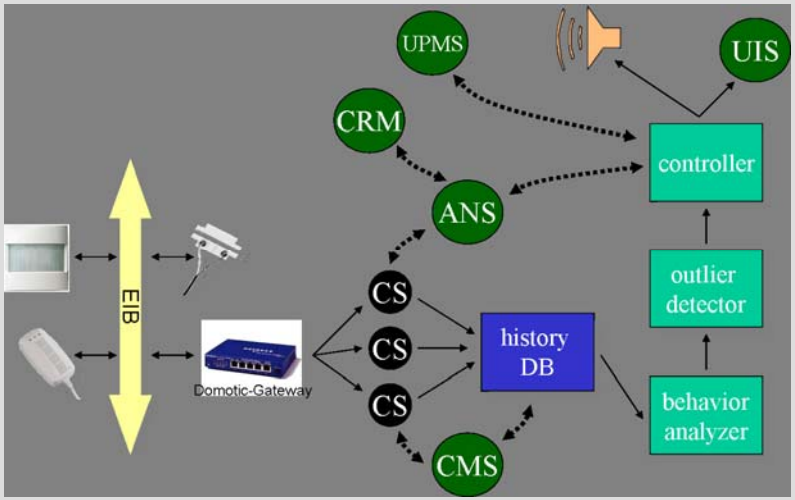
Interpreting low level context to high level context

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

Daily Life Cycle Monitor



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

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

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 Information & Entertainment

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

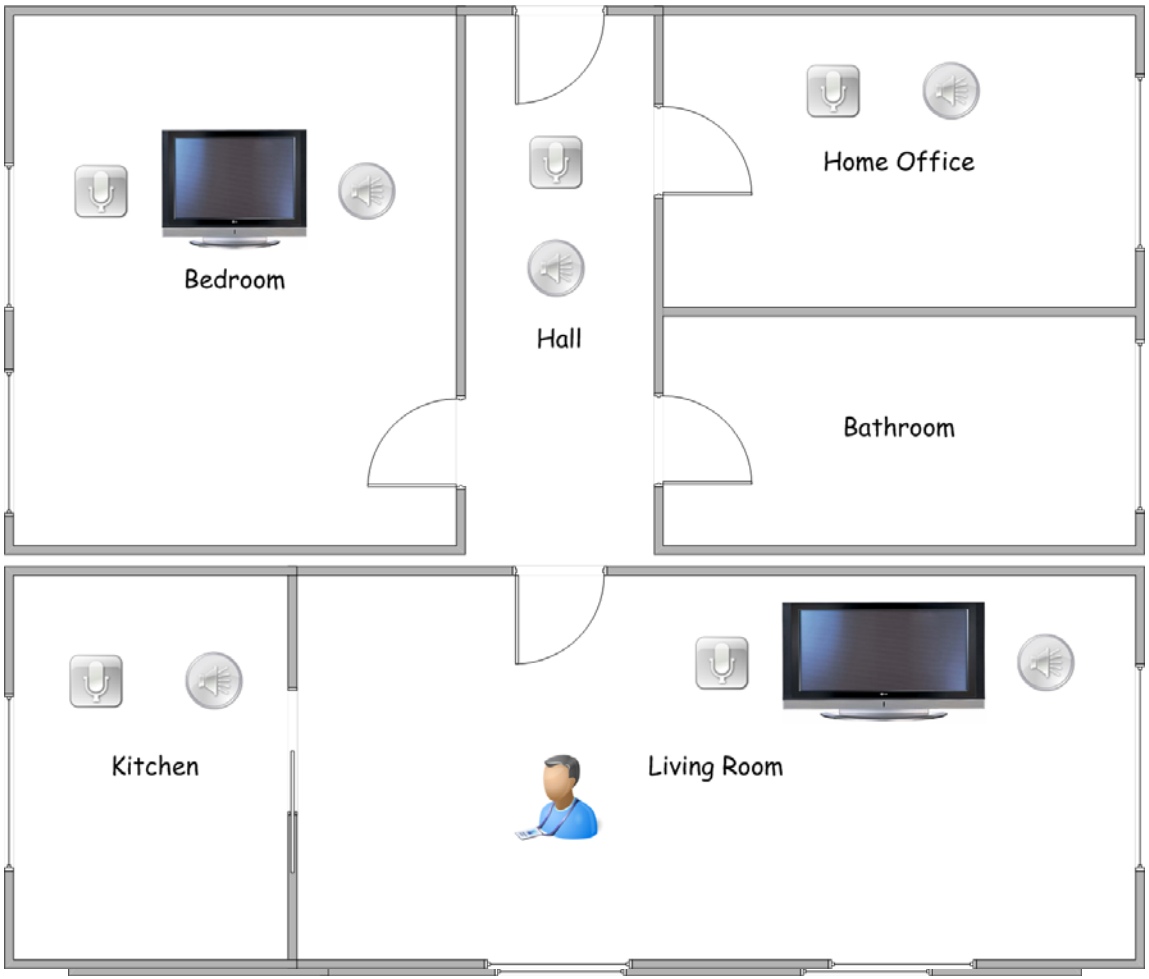
- Amigo Box applications
- Standard protocols: wifi, ethernet, UPnP
- applications are web-based
- no need to buy new devices to connect
- any device with a web browser will do

- 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

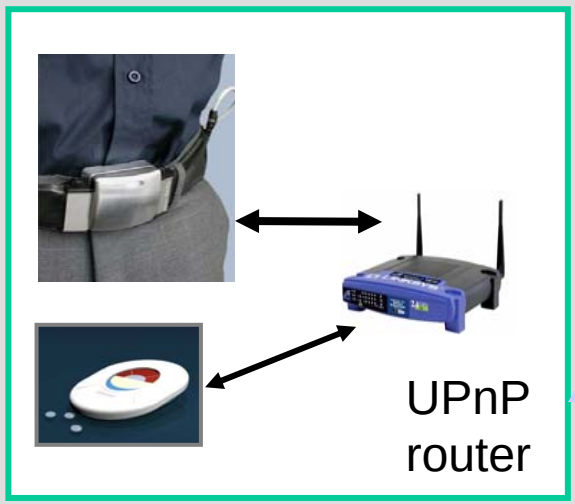
Follow-Me

- 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

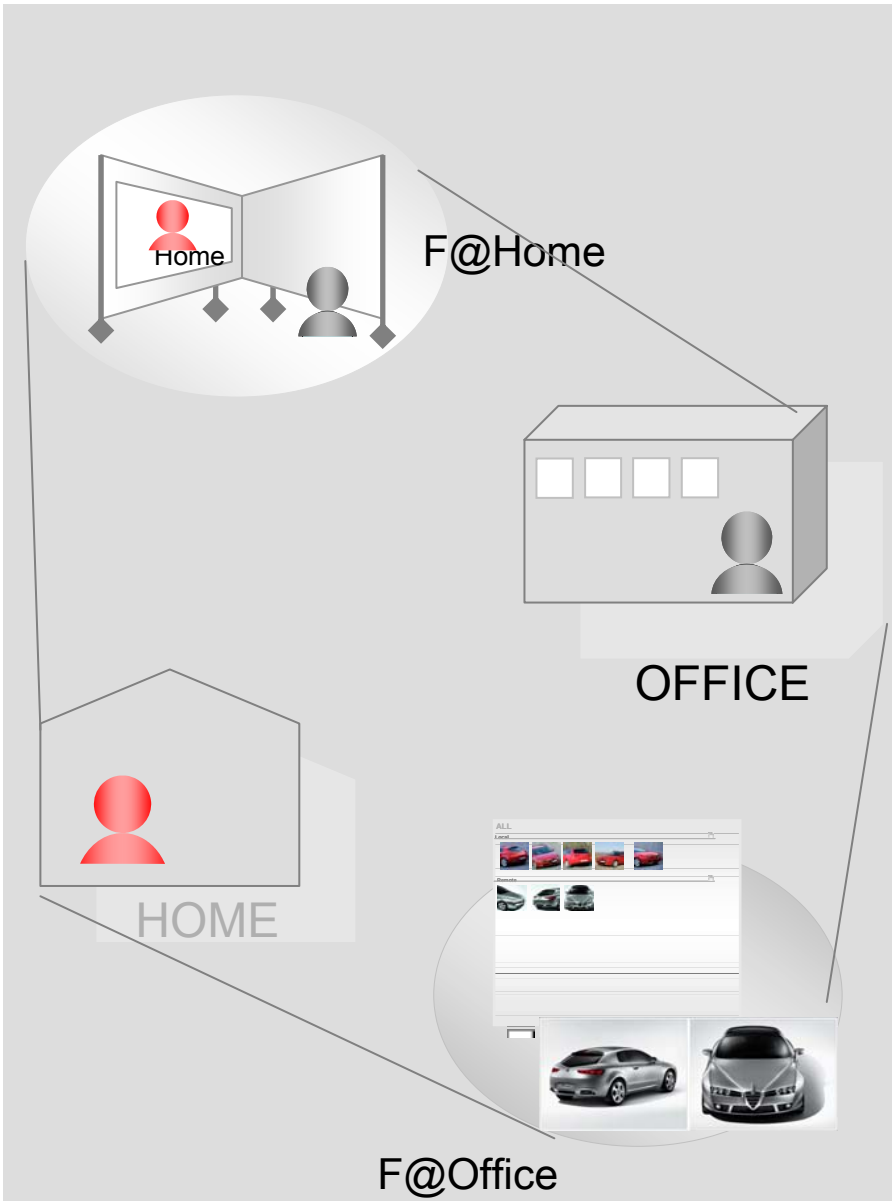
Home-to-Home

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.

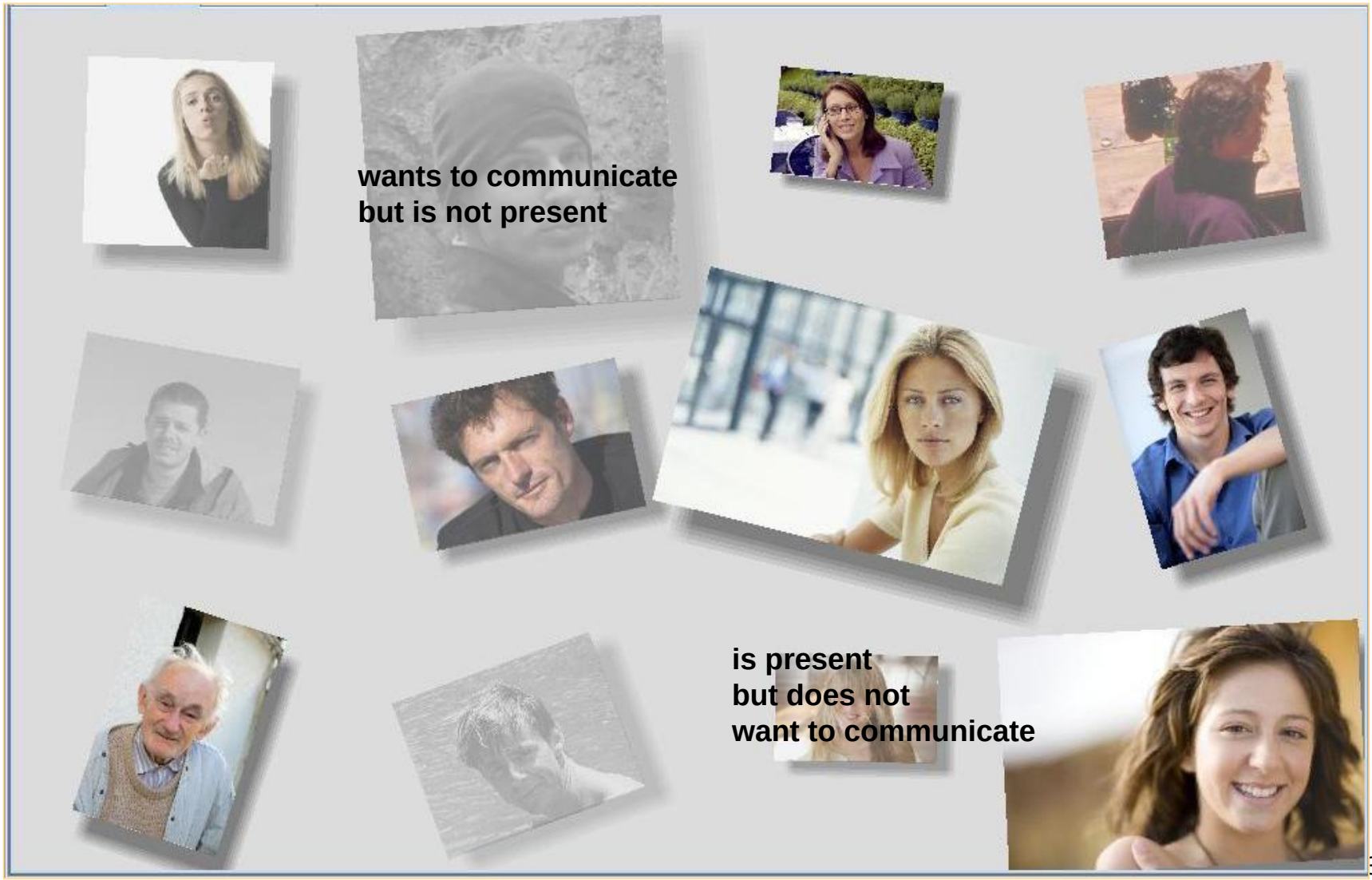


Home-to-Workplace

ambient communication

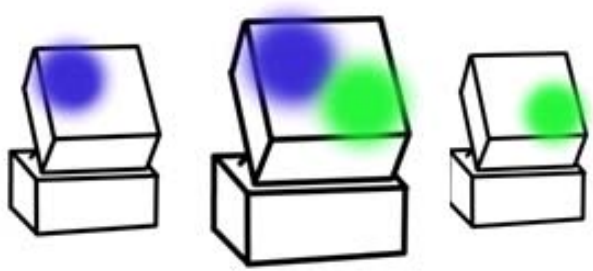
- ambiance and activity sharing

Presence and Availability



Home A

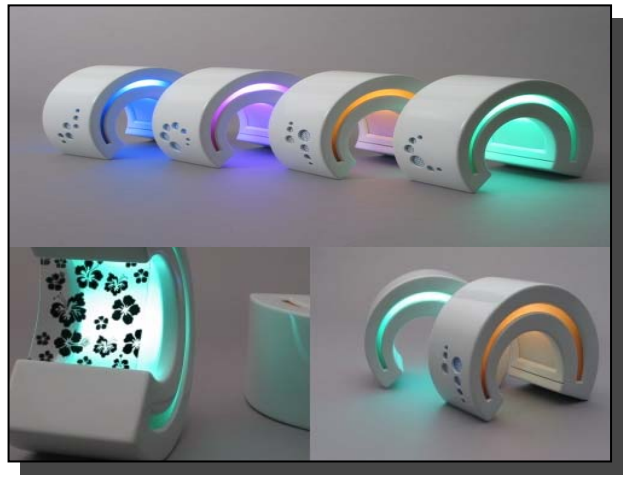
Home B



Perceived Privacy

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

Social Radio



Staying in touch with smart artifacts

Home 1

Maria listens to her music

Home2

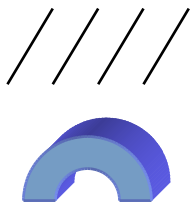
Peter listens to his music

Home 3

John is home

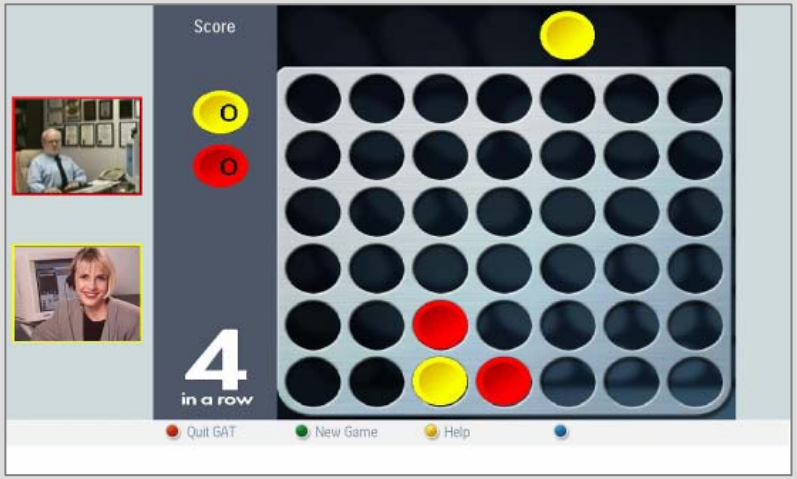
Network

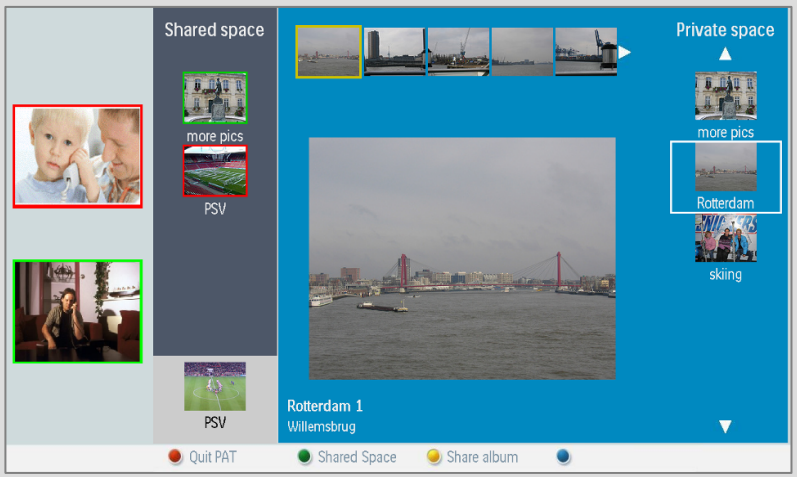
Home 4



John's artefact lights up, Indicating his presence

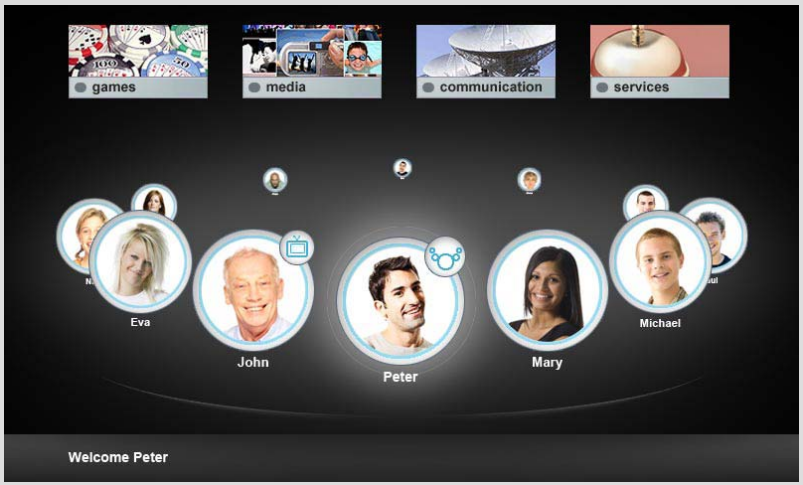
Maria's and Peter's artefacts play their music





Sharing Activities and Experiences

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

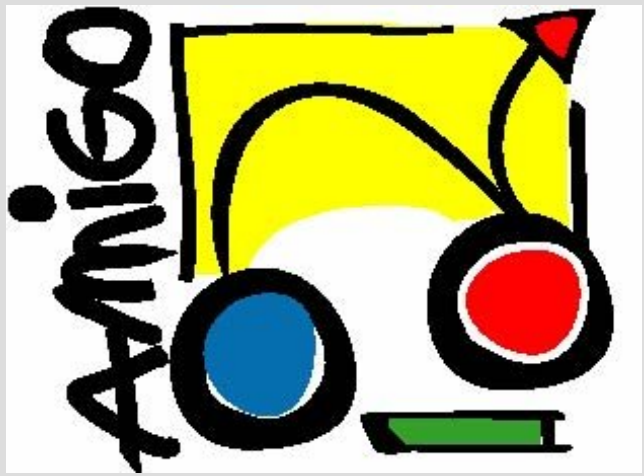


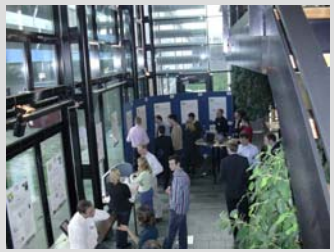
Awareness Globe

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

Key to Amigo

- 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









Acknowledgments

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