

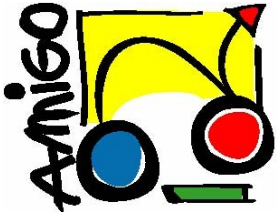
Ambient Intelligence for the networked home environment

User Requirements for Context-Aware Entertainment and Communication Systems

Maddy D. Janse

Philips Research

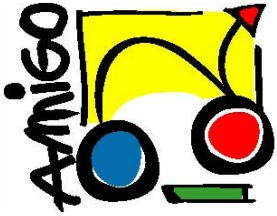




Content



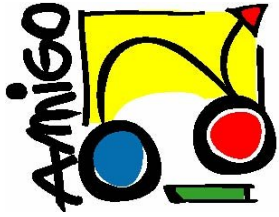
- Introduction
- Field study
- Scenario evaluation
- User and technical requirements
- Conclusions



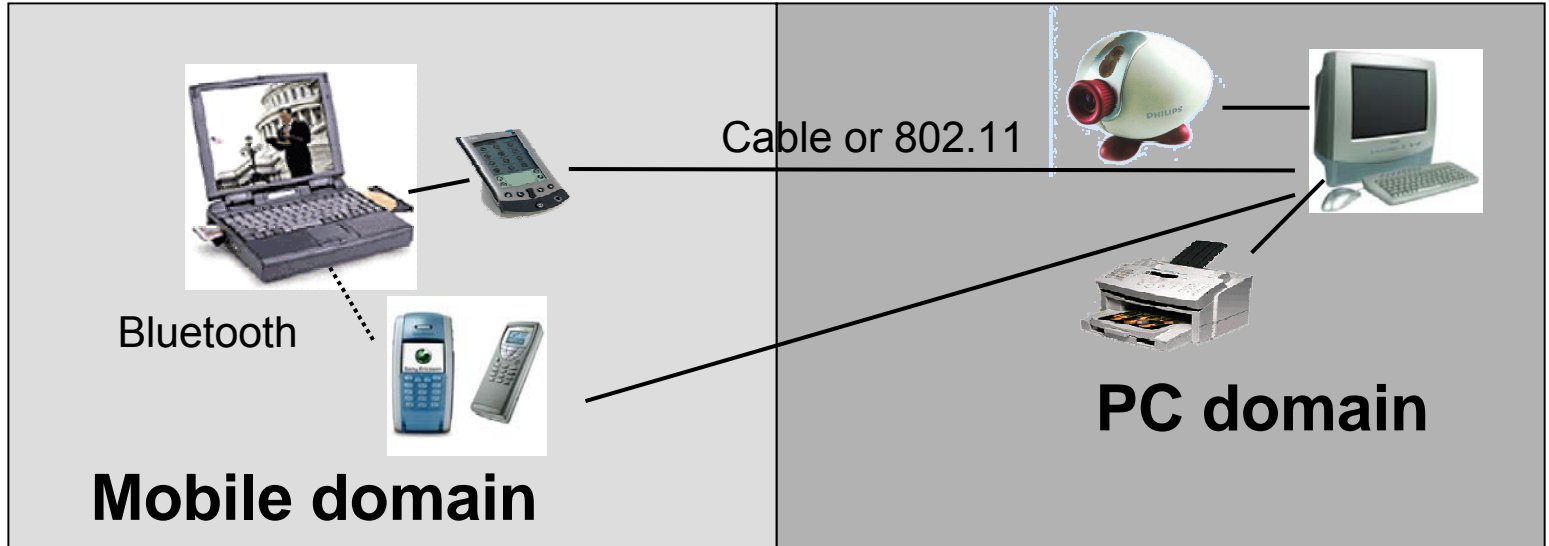
Amigo Project

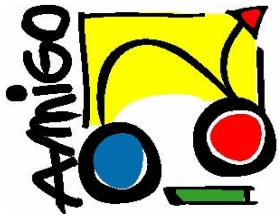


- IST – IP (Integrated Project)
- Start: September 2004
- Duration 42 months
- Budget: 24 MEuro, Subsidy 13 MEuro
- 2021 person months
- 16 partners
- Coordinator: Philips Research
- Project Leader: Harmke de Groot
- <http://www.amigo-project.org>

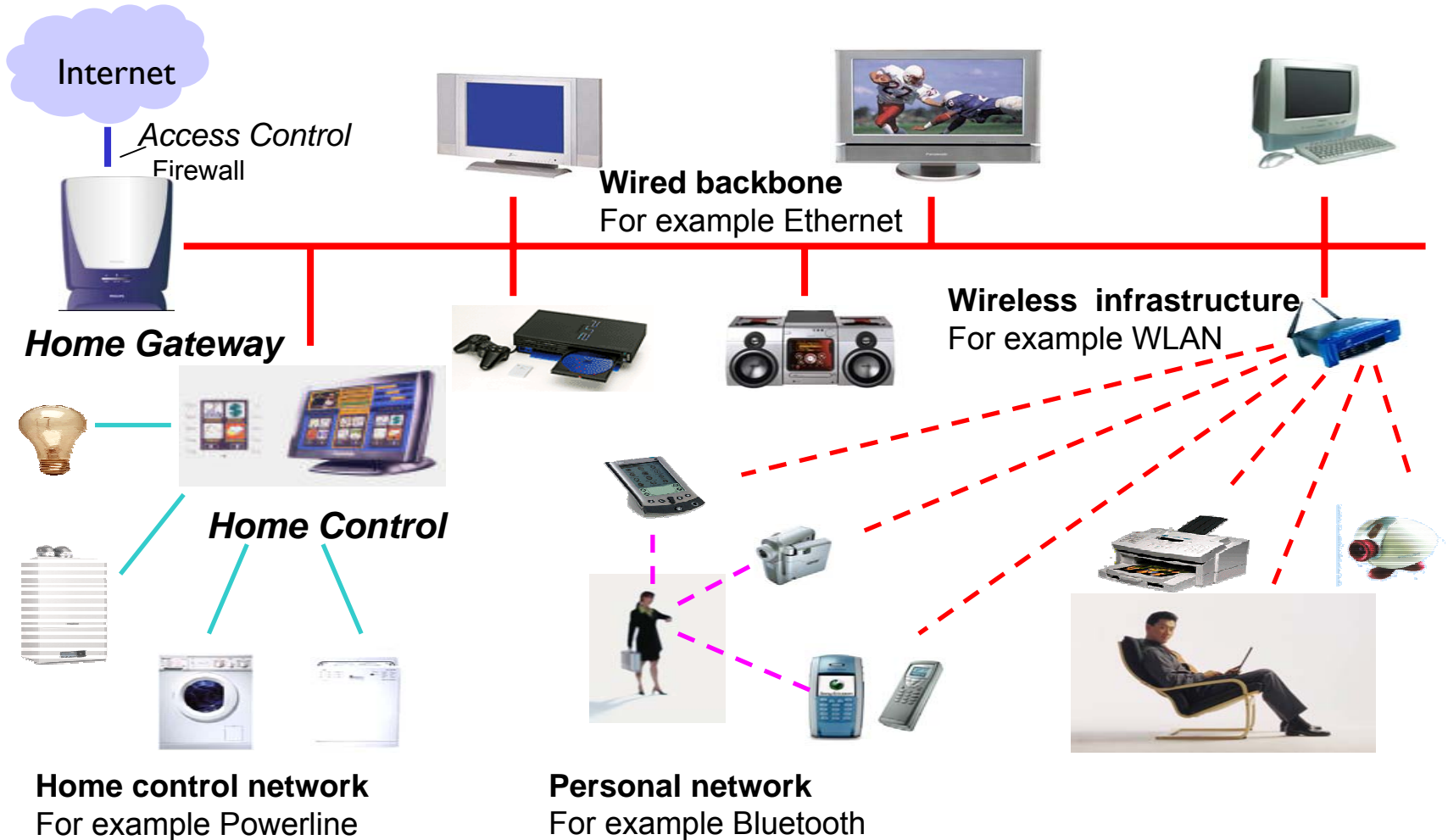


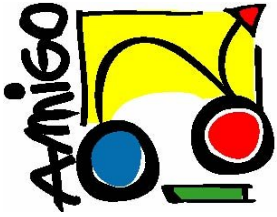
Today





Tomorrow

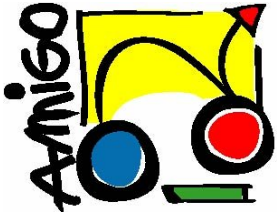




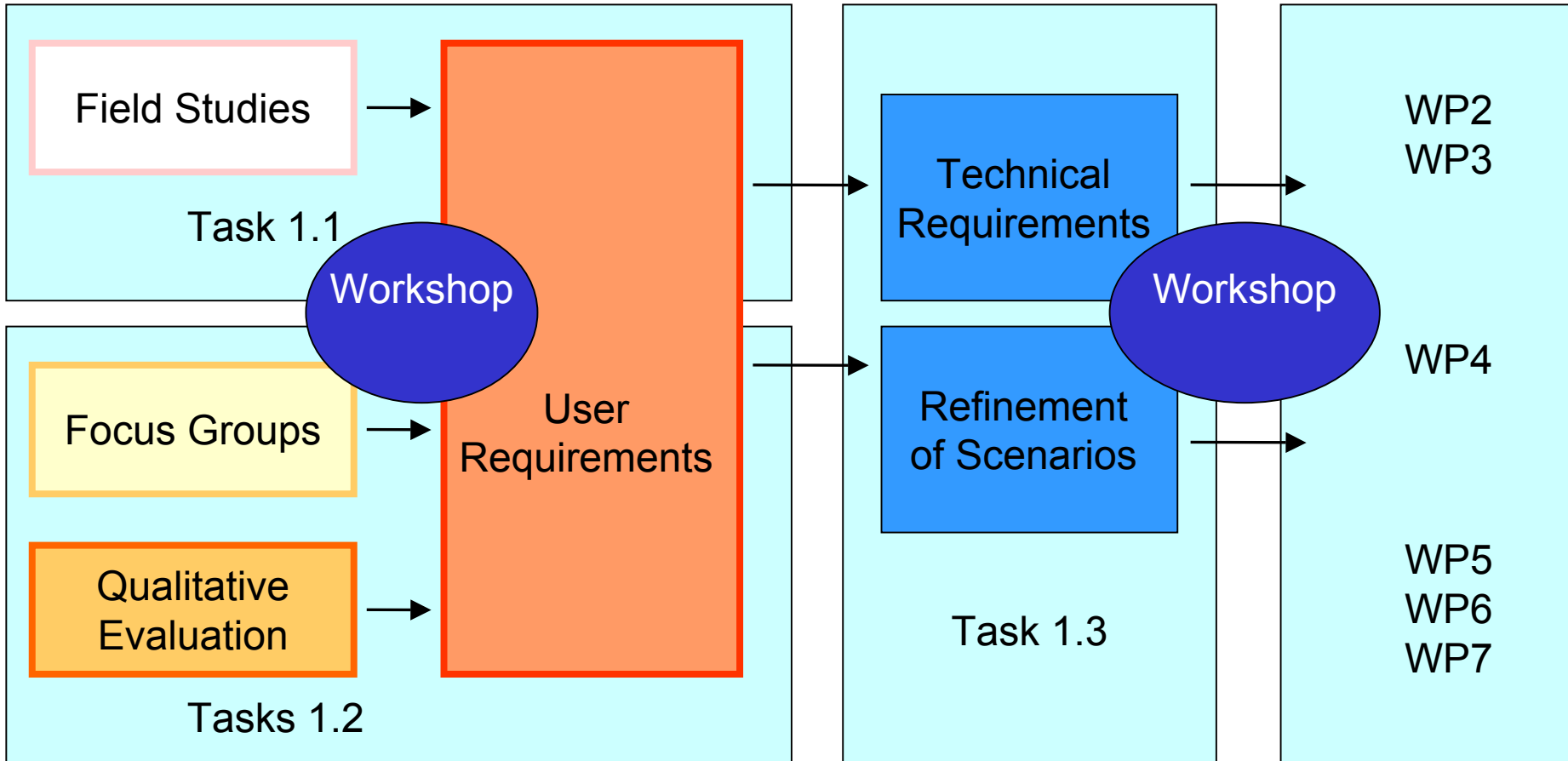
Objectives



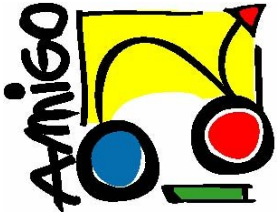
- To define user requirements for
 - System Architecture
 - Open middleware for the networked home
 - Intelligent User Services
 - Context aggregation and prediction service
 - User modeling and profiling service
 - Awareness and notification service
 - Content providing services
 - User interface services
 - Amigo Applications in
 - Home Care and Safety
 - Home Information and Entertainment
 - Extended Home Environment



Process




6 Months, 6.5 fte, 3 tasks, 6 partners

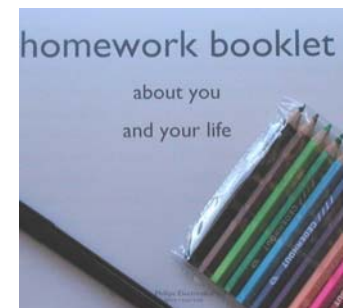


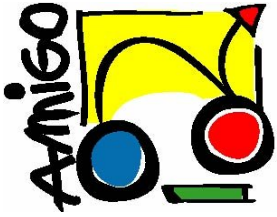
Field Study



Approach

- Find people needs and values
- Ethnographic methodology
 - Study behavior in the daily home context
 - Personal diaries & follow-up interviews at homes 
 - Participants (n=33)
 - Teenagers (15-20 years old)
 - Families (young and older children; 0-10 & 11-15)
 - Families with adult children (independent living)
 - Singles (professionals)
 - Different countries/cultures
 - Italy, France, Spain, England





Results: Needs and Values



Home care and safety

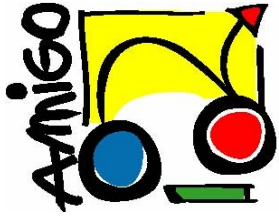
- Provide care and safety to family and home
- Ensure wellness in the domestic environment

Home information and entertainment

- Maintain control by planning and organizing family and personal affairs
- Enjoy leisure time, escape from daily routines

Extended home environment

- Maintaining a feeling of connectedness at all times with family and friends
- Belonging to different social networks



Persona Susan Home Care and Safety



Susan (42 years old), married, 9 year old twins



Susan sees herself as a domestic manager, who makes sure that everything in the home goes well. She has 2 office spaces at home that are multi-functional. Doing the 'right thing' is important for her, e.g. re-use paper, involve kids in cooking, and no gender stereotyping. Personal help (e.g. cleaning or 'ironing' lady) alleviates her home management tasks.





Personas Anne & Peter

Home Information and entertainment



Anne (52 years), 3 children (26, 24, 15 years old) and husband.



For Anne it's important to have things in order. She organizes family social activities, maintains the master diary, the birthday calendar, the year planner, the general address box, the Christmas cards and holiday postcards address books, and keeps letters, cards speeches, family documents, catalogues and files for each family member in the box room in her attic.

Peter (38 years), 2 kids (18 & 16 years) and wife.



The whole family loves to play games on the computer or X-Box. To have dinner together is to get a break from the game playing. Peter plays 1 to 2 hours a day when he comes back home from work to relax. He does it by himself and 'hides from the world'.



Personas Roberto & Diego

Extended Home Environment



Roberto (17 years), parents, 2 siblings (15 & 10 years)

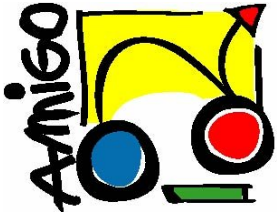


He likes to hang out with his many friends and tries to become more independent. They talk about music, what they have seen on TV, what they have done or will do. They communicate continuously via SMS or chat online. Roberto also likes to spend time with his family. He uses his mobile phone for reassurance and for cases of emergency.

Diego (32 years), living alone, dedicated to his job.



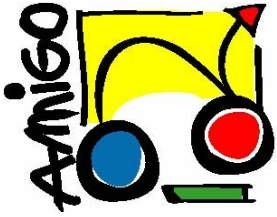
Diego wants to improve his knowledge and understanding of topics related to his work. He studies in the evenings at home. He has expanded his 'personal brain' –PDA- with additional memory to have all the information he needs with him. He enjoys to do things out of the ordinary.



Field Studies: Summary



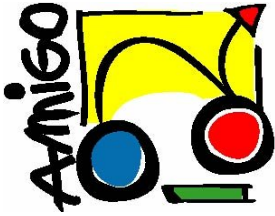
- Information about people's daily life and behavior, expectations, needs and values
 - Recommendations for Amigo application requirements
 - Recommendations for intelligent user services
- Representation of the extremes in variety in people profiles and environments to account for
- Conditions for future evaluation of demonstrators
- Adaptation and enrichment of the Amigo scenario



Scenario Evaluation



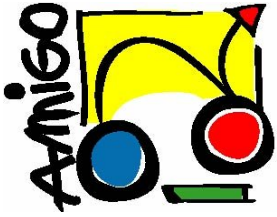
- Survey international research projects for state of the art
- Amigo scenario evaluation
 - Qualitative
 - Quantitative



Previous Research State of the Art



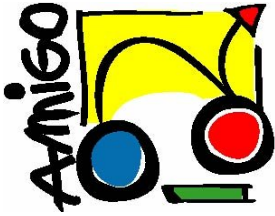
- Analysis of 14 research projects relevant to Amigo
 - E.g., Ozone, Astra, EasyLiving, TeleWorker, HelloWall, MirrorSpace
 - Template developed as comparison tool
 - Identification of common key issues
 - Implications for Amigo
 - Automatic composition of available devices
 - Implicit, multimodal & non-standard interaction
 - Integrate custom devices with standard devices
 - Social awareness/ sharing of experiences
 - Intelligent room/home infrastructures
 - Take system orientation - user interface / user experience related
 - Account for non-positive scenario formulations
 - Account for alternative solutions and realizations



Scenario Evaluation



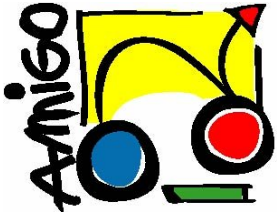
- Quantitative evaluation: preference ratings
 - ‘Gallery’ session
- Qualitative evaluation: focus groups
 - ‘MyPlace’ and ‘IdealHome’ sessions
- Participants:
 - n=45, 6 groups, 5 countries, 5 sites
 - Average population sample: ♂, ♀, 20-55, single, family
- Same methodology, procedures for all sites



Methods




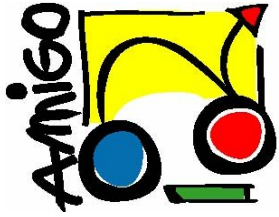
	Gallery	MyPlace	IdealHome
Method	Quantitative	Qualitative	Qualitative
Focus	Intelligent User Services	Application Domains	Generic
Task	Preference ranking assignment for individual participants (45)	Structured groups discussion (6-12 persons)	Open groups discussion (6-12 persons)
Data	Agreement among judges collapsed over all participating sites	Topics and value ratings clustered per application domain per site.	Topics and value ratings for each site
Interpretation of results	Results are based on how individual participants interpret the visualizations of the scenario elements	Results are based on 'chemistry' in the focus group and the interpretation of the facilitator	Results are based on 'chemistry' in the focus group and the interpretation of the facilitator



Amigo Scenario



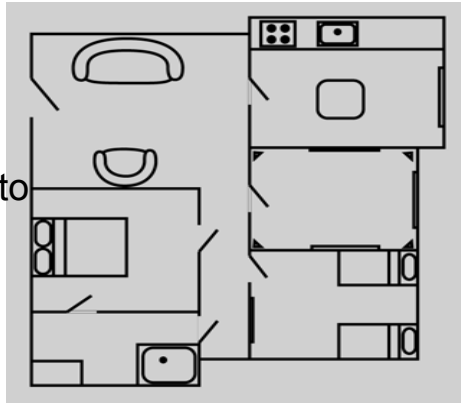
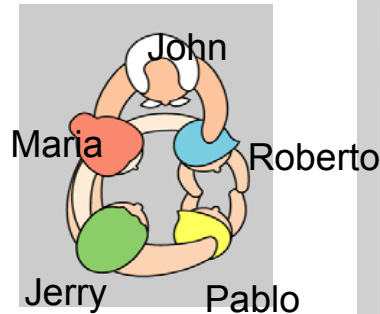
- Narrative illuminating system functionality in layman terms
 - Describes a day in the life of a family 
 - Owners of an Amigo system
 - Using different features throughout the day
 - Visualized as storyboards
- Starting point for the Amigo project
 - Focus and communication tool within the project
 - Tool for acquisition of user requirements



Amigo Scenario Content



Setting



Maria's new home has an information and entertainment system

It plays her favorite song when she wakes up in the morning



Maria's new home has a game playing system

It recognizes friends at the front door and lets them join in the game



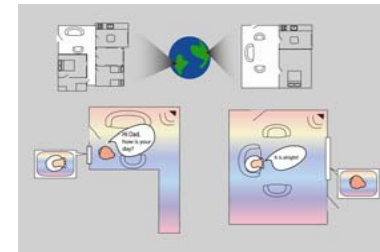
Maria's home has a Home care system

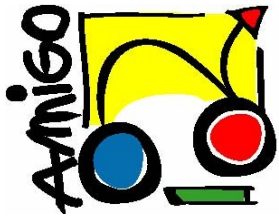
It detects faulty items in the washing machine and warns



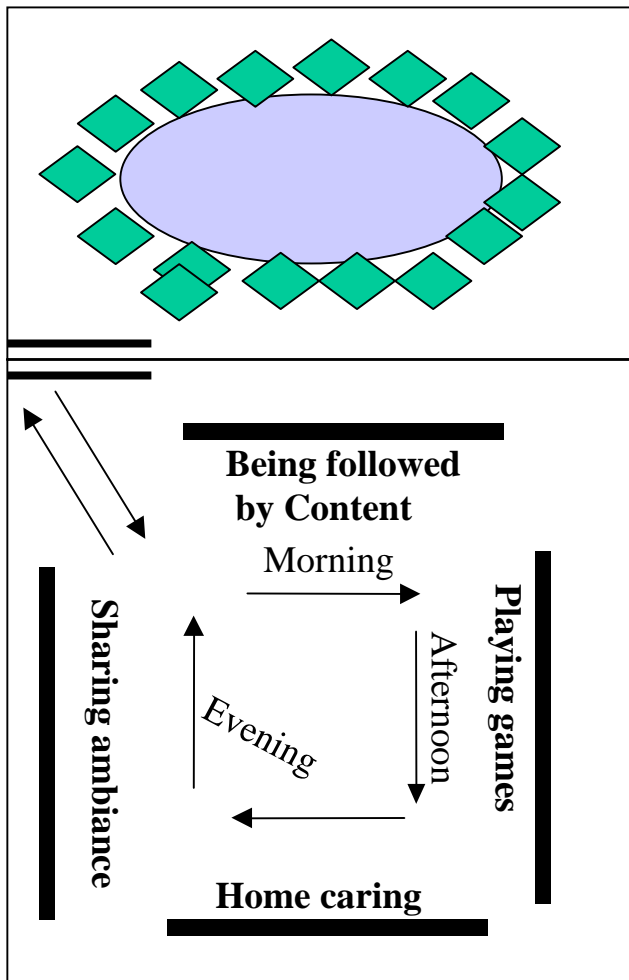
Maria's new home has a new keep-in-touch system

They see each other and it lets them engage in a chat





Setting for Qualitative and Quantitative Evaluation

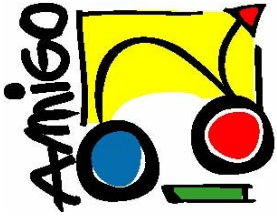


Scenario visualizations



Data booklets

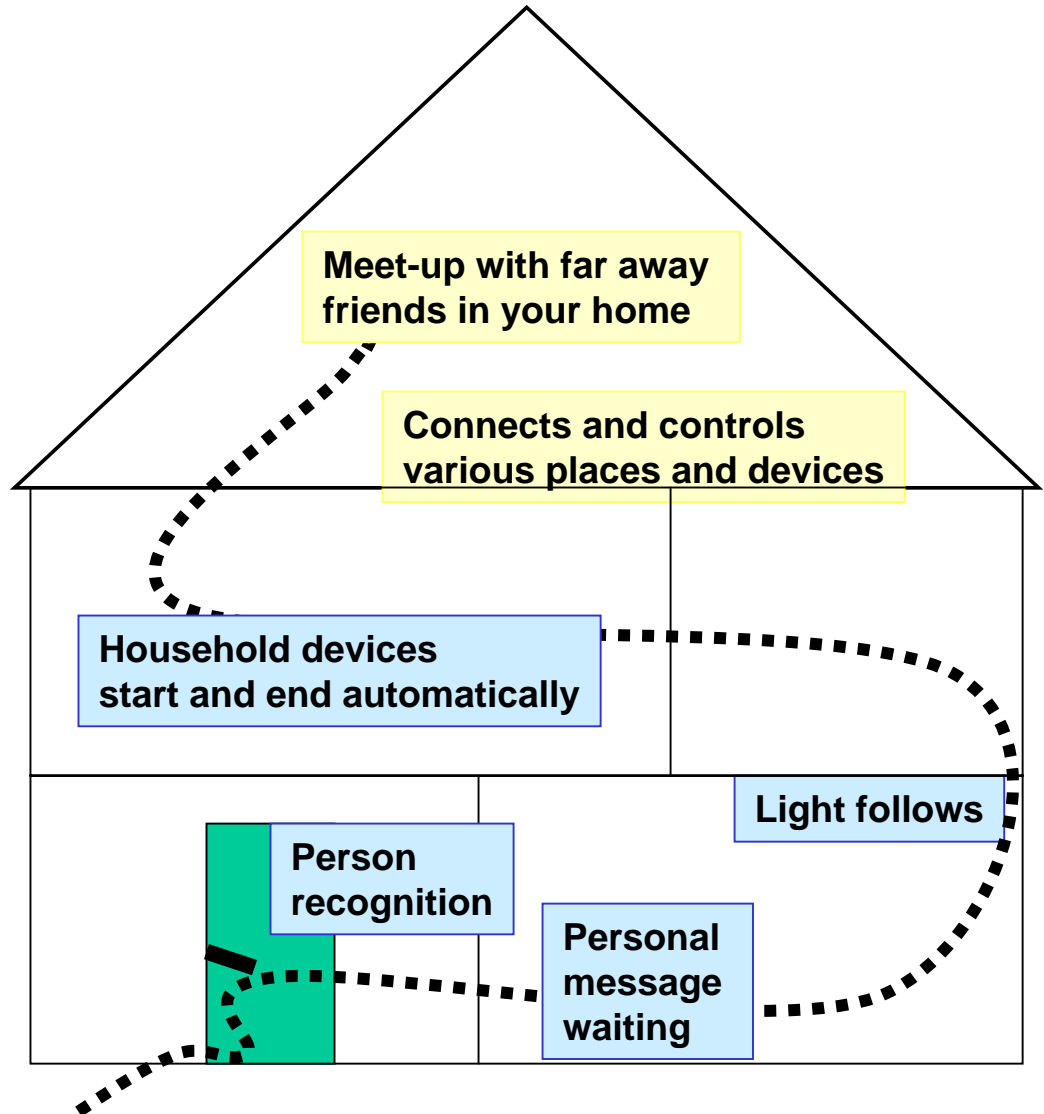
Rating
List likes and dislike

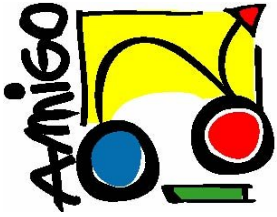


MyPlace – Focus Group



- **Concept explanation**
 - Story
 - Keywords
- **Focus**
 - Application domains
 - Status quo of technology
- **Poster building**
- **Affinity diagrams**

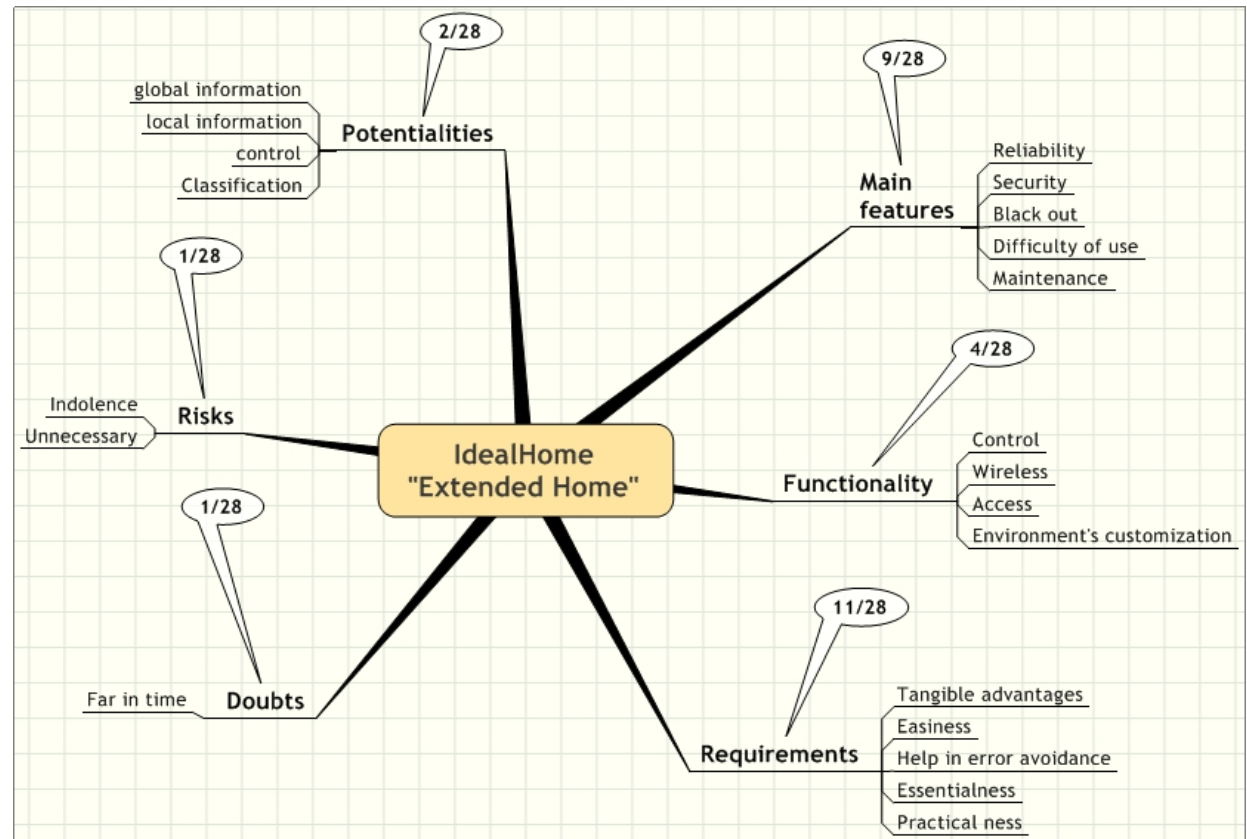


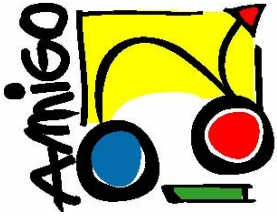


IdealHome – Focus Group



- Gallery material
- Focus
 - Scenario
- Structured questions
- Affinity diagrams

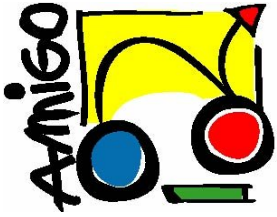




Gallery Results - Example



- Maria's new home has an information and entertainment system (Scene 1)
 - a. It plays her favourite songs when she wakes up in the morning
 - b. The song follows her through the house
 - c. At the same time it shows Jerry's favourite news in another room
 - d. If she starts singing her own song, the system starts playing it
 - e. If she goes to Jerry in another room, the system stops playing
 - f. If Maria or Jerry leave the room, the system starts playing again
 - g. The TV shows summaries of their favourite news
 - h. The news is downloaded on a portable device to take along
- Preference ranking: g, c, [a, b, h]



Gallery Results - Example



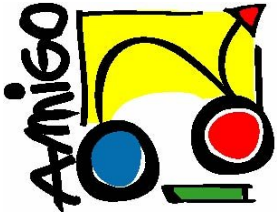
- Maria's new home has an information and entertainment system (Scene 1)

Advantages

- Nice to have
- Less effort
- No interference (conversation, TV)
- Less time consuming
- Personalized

Disadvantages

- Control missing
- Music ends abrupt
- Mood and music have to go together



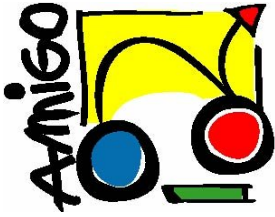
Results: User Requirements



Information Society
Technologies

The Ten Commandments for Middleware

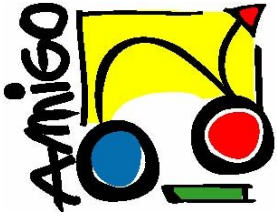
1. Be easy to use and to configure (no user programming)
2. Not being used for surveillance
3. Enable individual settings and preferences
4. Be configurable by the user or service provider
5. Be movable, in case of moving house
6. Be extensible - easy to upgrade
7. Be flexible
8. Enable turning off individual features
9. Be modular
10. Be maintenance free (for the user)



Results: Intelligent User Services Priorities



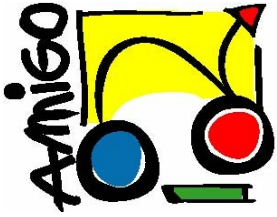
User requirements	Intelligent User Services	
1. Support maintaining control and responsibility	Context management Awareness and notification User modeling and profiling	<div style="writing-mode: vertical-rl; transform: rotate(180deg);">Privacy and personal security</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">User interface services</div>
2. Reduce information overload and search burden	Context management User modeling and profiling	
3. Prevent household accidents and helping with the chorus	Awareness and notification	
4. Assist with organizing the personal home environment – individual focus	Context management User modeling and profiling	
5. Assis with organizing the home environment – group focus	Context management User modeling and profiling	
6. Support caring for others and staying in touch	Context management Awareness and notification User modeling and profiling	



Results: Refined Scenario & Technical Requirements



- Prioritised technical requirements
 - per application domain and intelligent user services
- Amigo scenario refined
 - Input and starting points for WP4, WP5, WP6, WP7
 - Adapted to people perception and activities
 - Divided in use cases
 - Preliminary conditions and settings for evaluation of applications (WP5, WP6, WP7) and demonstrator (WP8)
 - Starting elements for intelligent user services (WP4)
 - Tool to extract, define and align architectural relationships

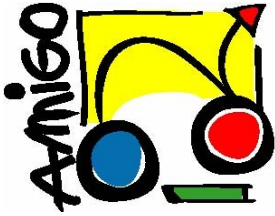


Summary Field Studies



Deliverable D1.1 Report on User Research


- Extensive repository of information about people's current needs and values from different cultures to
 - Attune prototypes and demonstrators to people expectations
 - Enrich the Amigo scenarios
 - Provide conditions for future evaluation of demonstrators
 - Account for variety in user profiles and environments
 - No cultural differences in the middle class suburban population, but differences regarding generation



Summary Scenario Evaluation



Deliverable D1.2 Report on User Requirements

- State of the art inventory of scenarios used in related projects
 - Generic analysis template
 - Extensive set of recommendations
 - Multiple users – multiple devices
 - Intelligent room – home infrastructures
 - System orientation vs. user interaction
- Evaluation methodology and procedures applicable for different countries and sites
 - User assessment of Amigo scenario elements
- Prioritized user and technical requirements for middleware
- Refined Amigo scenario 



Conclusion



- Conducted first step of user-centred design approach to system development
 - Concept – scenario- evaluation- user requirements
- Developed methodologies for user requirement acquisition applicable to complex system development for novel technologies
- Affected the role and relations of the intelligent user services
 - Perceived privacy and security
 - Multiple users, profiles and devices
 - Dynamic modeling
- Support and input for design decisions