Amigo in Hindsight
Lessons learned

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Lessons learned

1. Intelligent home environments
2. Vision and timing
3. User-centered approach
4. Complexity at many levels
5. System and application developers needs
6. Creating impact
7. Technology moves on
8. Differences in time to market
Lesson 1
Intelligent Home Environments

Old concept !!!!!!!!

Tati
1958

Amigo
2008
Intelligent Home anno 1958

Products

Context

Agents
Lesson 2
Vision and Timing

huge discrepancy between research and reality
Future Enabling Applications

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

Communicate
Share
Entertain
Amigo Home Network

- Internet
  - Access Control
    - Firewall

- Wired backbone (Ethernet)

- Home Gateway

- Home Control

- Wireless infrastructure (WLAN)

- Home control network (Power line)

- Personal network (Blue tooth)

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Intelligent Home: Reality in 2004
Different Domains - Not Interoperable -

Mobile domain

PC domain

Home automation

CE domain

Blue tooth

Cable or 802.11
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

Not within the home
Not between homes
End-Users

Do not distinguish between the technical Amigo domains

Desire control over the overall comfort and social integrity of their home environment

*Interoperability is obvious and natural for users*
Project Goals

Service oriented architecture for intelligent future home networks,

• use available context information
• use different devices
• provide intelligent and attractive user services
• compose and integrate new devices and services

Enable the development of context-aware applications

• provide users with experience sharing, social presence,
  and responsive home environments
• extend their home to other homes, car, hotel, office, ….
42 Months (Sept04 – Feb08)
2021 Person months
4 Home labs

Philips
VTT, Telematica Instituut
Fraunhofer, Microsoft,
Univ. Paderborn, INRIA,
France Telecom, Italdesign
Fagor, Ikerlan, Telefonica
LogicDis, ICCS
Lesson 3
User-centered Approach

- field studies
- user needs: caring & sharing
- requirements
- scenarios
- storyboards
- personas
Responses
• based on past and current experiences
• questionable fit for the project objectives and context

But
• crucial for project team,
  – to gain end-user insights
• essential for getting
  – user requirements
  – evaluation procedures and criteria
  – design iterations

Keep in mind

• ‘You can’t just ask customers what they want and then try to give that to them. By the time you get it built, they’ll want something new’

• ‘It’s really hard to design products by focus groups. A lot of times, people don’t know what they want until you show it to them’

Steve Jobs
Lesson 4
Complexity at many levels

difference in perception
• user needs & requirements
• system requirements & specs.
• developer visions & implementations

underestimated challenge
• huge number of variables
• causing an exploratory explosion of problems

taming technology

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Complexity for User

### Ambiance settings

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

Home Control

Home control network
84 programs
6 programs

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Complexity for Developers

Building blocks & subsystems
Toolkits
Complexity in Communication

- Internet
- Wired backbone (Ethernet)
- Wireless infrastructure (WLAN)
- Home Gateway
- Home Control
- Personal network (Blue tooth)
- Home control network (Power line)
- Access Control
- Firewall
- Personal network

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Lesson 5
System & application developers needs

Smart homes are dynamic environments

- interoperability framework
- service oriented architecture

Middleware building blocks

context-aware applications
intelligent user services
base middleware
Base Middleware

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

- functionality for networked environment
- Open Source Software

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Intelligent User Services

- context management
  - broker
  - source
  - wrapper
  - reasoner
  - history

- user modeling and profiling

- awareness and notification

- user interface services

- privacy and personal security

- 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
Domotic Service

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

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

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Lesson 6
Create Impact

Must have examples

- timely,
- relevant
- appropriate
- easy to understand

- illustrative for showing technical tour de force
- do-able and achievable
- Customized to your client needs!!!!!!!!!!!!!!!!!!

Exploit applications & services

Trade-off between stakeholders and developers
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
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

**components**
- domotic gateway
- history database
- behavior analyzer
- outlier detector
- controller
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
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
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.
Now, but **not then**

- Sensor network technologies
- Web 2.0
- .NET
- Social networking

Stay up to speed

- Be **adaptable and flexible**
  - to R&D community
  - to future market needs
  - to end-user customers
  - to existing situations
Middleware and application elements have different time to market

Existing infrastructures
• buildings are ‘hard’
• power lines
• different practices

Stakeholders and their needs change over time
• energy consumption
• sustainability concerns
• demographic changes
  • elderly homes
  • home health care
  • nursing homes

Lesson 8
Differences in time to market

• Timing

• No start from ‘scratch’

• Changing application demands

• Take-up of technology is not about technology
Watch it
Iceberg

Intelligent home environments
Vision and concepts
Management

User-centered approach
Complexity at many levels
Developers needs

Timing
Creating impact
Technology moves on
Differences in time to market
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