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Abstract: This document represents the deliverable D2.1 – State-of-the-art and Requirements Analysis. The aim of this deliverable is to gather the requirements from user perspectives, to define the functional and technical requirements of the HOMEdotOLD platform and its components, to define a set of use cases following the captured requirements and to perform a state-of-the-art analysis related to Ambient Assisted Living, focused on the technological area of HOMEdotOLD.

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GLOSSARY

A	
AAL	Ambient Assisted Living
ACL	Access Control List (user authentication/authorization context)
ADSL	Asymmetric Digital Subscriber Line
AJAX	Asynchronous JavaScript and XML
AmI	Ambient Intelligence
API	Application Programming Interface
D	
DTD	Document Type Definition
DVB	Digital Video Broadcasting
DVB-S	Digital Video Broadcasting forward error coding and modulation standard for Satellite television
DVB-T	Digital Video Broadcasting–Terrestrial
E	
EJB	Enterprise Java Beans
G	
GUI	Graphical User Interface
H	
HDMI	High-Definition Multimedia Interface
HMI	Human-Machine Interface
HTML	Hyper Text Markup Language
HTTP	Hyper-Text Transfer Protocol
HTTPS	Hyper-Text Transfer Protocol Secure
I	
IST	Information Society Technologies
IP	Internet Protocol
M	
MHP	Multimedia Home Platform
N	
NFC	Near Field Communication
P	
PC	Personal Computer
PDA	Personal Digital Assistant
R	
RFID	Radio Frequency IDentification
S	
SMS	Short Message Service
SoA	Service-oriented Architecture
SOAP	Simple Object Access Protocol
STB	Set-Top-Box

T	
TCP	Transmission Control Protocol, one of the core protocols of the Internet Protocol
U	
USB	Universal Serial Bus
W	
Wi-Fi	Wireless network technology
WSDL	Web Services Description Language
X	
XML	eXtensible Mark-up Language
XSD	XML Schema Document

1. INTRODUCTION

The HOMEdotOLD project aims to provide a TV-based platform with cost-effective services that will be delivered in a highly personalised and intuitive way and will advance the social interaction of elderly people, aiming at improving the quality and joy of their home life, bridging distances and reinforcing social voluntariness and activation, thus preventing isolation and loneliness.

HOMEdotOLD will deliver and open platform for services advancing the social interaction of elderly people and within the project the focus will be on the development of the following 2 main categories of services:

- **Personal motivation services, i.e. services for staying socially active, preventing loneliness and isolation, enabling voluntariness, motivation and activation:** This service category will include services allowing the elderly to perform meaningful activities that are useful and satisfactory for the society and themselves and create new living experiences. This category of services includes:
  - **a "social voluntary work"** service; this service will run in cooperation and under the supervision of social care organisations and will notify registered elderly volunteers about several areas of social voluntary work in which they can be involved, thus encouraging elderly people to actively contribute to solving societal problems and to perform meaningful activities that create self-satisfaction.
  - **"personalised news headlines"** service, which will provide easy access to news headlines at regional, national, European, worldwide levels, with special emphasis on news that inform the elderly user about the activities of interest (the order and way of presentation of the news headlines will be made in a highly personalised way).
- **Social networking services:** i.e. **services for bridging distances and supporting existing roles**: This service category will include services allowing elderly living far away from their families and close friends to keep in touch with them and support existing roles. This category of services includes:
  - **"intelligent calendar"** service, which will allow synchronisation of the elderly's agenda with the agendas of friends and family, receiving notifications about possible common activities that can be performed remotely (such as the three types of activities that follow hereafter) or physically, etc.
  - **"videoconference"** service, which will enable –among others– communication with / story telling to grand children.
  - **"remote dining"** service, which will enable virtual eating together with friends and families.
  - **"photos, videos, experience sharing"** service, which will allow keeping in touch with friends and families and share experiences.

HOMEdotOLD will be based on the innovative service platform developed in the context of the **INHOME (IST-45061) R&D project**, which is already used for the provision of services for people suffering from the **Alzheimer Disease in the context of AAL,** and on the **Philips NET TV platform.** INHOME has designed, developed and successfully demonstrated a generic platform allowing the provision of home services for the elderly people; the robustness and efficiency of the platform have been successfully tested through a number of telecare applications. The Net TV platform that is used in Philips TV sets offers an integrated solution with a built-in Internet connection possibility, so no supplementary device is needed.

This document represents the deliverable D2.1 – State-of-the-art and Requirements Analysis, which is the result of Task 2.1 "*Review of state-of-the-art and identification of technological requirements*" and Task 2.2 "*Definition of the requirements from the elderly perspectives*" in WP2. The aim of this deliverable is to gather the requirements from user perspectives, to define the functional and technical requirements of the HOMEdotOLD platform and its components, to define a set of use cases following the captured requirements and to perform a state-of-the-art

analysis related to Ambient Assisted Living, focused on the technological area of HOMEdotOLD.

1.1 SCOPE

The general scope of this deliverable is to gather and analyze the user requirements, primarily originating from the user groups, as well as, AAL practices consolidated in other research or commercial activities, with the aim to conclude in a comprehensive set of requirements addressing all HOMEdotOLD components.

Regarding user requirements capturing, this deliverable is concerned with the needs, wants and preferences of elderly people.

Further to user requirements, information regarding issues related with the functional requirements of the HOMEdotOLD system is collected in a structured manner (i.e. that of template-based use cases description).

The deliverable is also concerned with issues related to the technical requirements of the HOMEdotOLD AAL platform, such as:

- *System architecture*, what components typically constitute such a system, how are they interconnected, what do elderly people need for interacting with a platform such that of HOMEdotOLD, what standards exist in this application domain.
- *Services*, what services are available in the market, what requirements exist for such services.
- *Equipment*, what kinds of devices are currently available in the market.

This deliverable serves to outline the future work in the HOMEdotOLD project by:

- Identifying and analysing available state-of-the-art technologies and devices, with a view to select and exploit some them in the specification of the overall HOMEdotOLD architecture.
- Defining the functional and non-functional requirements for the HOMEdotOLD architecture as the basis for future work in the project.
- Defining the candidate services to be deployed in the trials phase of the project.

1.2 DELIVERABLE STRUCTURE

The deliverable is structured in six chapters:

- Chapter 1 is the introduction of the document.
- Chapter 2 documents the user requirements along with the methodology for capturing them. Firstly, the HOMEdotOLD user groups are identified and then the results of the user requirements collection process in all 3 pilot sites of the project regarding the use of the HOMEdotOLD system, but also with regard to the importance of the different HOMEdotOLD services for each user group, are presented.
- Chapter 3 documents the information regarding issues related with the functional requirements of the HOMEdotOLD system. This information has been derived from the interaction of the user organisations of the Consortium with end users and is presented in the form of use cases that have been discussed and enriched or modified together with end users.
- Chapter 4 reports the technological state-of-the-art in the area of HOMEdotOLD. The architectural approaches include issues such as available social networking, communication and content sharing services, emphasizing in areas such as technology acceptance, available public APIs and security issues.

  It also provides a set of candidate devices for use in HOMEdotOLD. Two important hardware categories, i.e. the set-top-box and the internet enabled televisions are surveyed and the most important candidate products for HOMEdotOLD are discussed in detail.

Moreover it provides a survey in relative technologies and standards, relevant to the HOMEdotOLD objectives.

- Chapter 5 presents the technical requirements emphasizing in the following sub-categories:
  - General architecture and equipment
  - Connectivity and communication
  - User interfaces
  - Security issues
  - Technology and development issues
- Chapter 6 draws conclusions.

A set of annexes includes information such as equipment and technological issues as well as the set of questionnaires used during requirements capturing.

1.3 METHODOLOGY

To end up with a set of HOMEdotOLD requirements covering both end user and technical aspects, a specific methodology has been followed. A diagram presenting the methodology is depicted below.

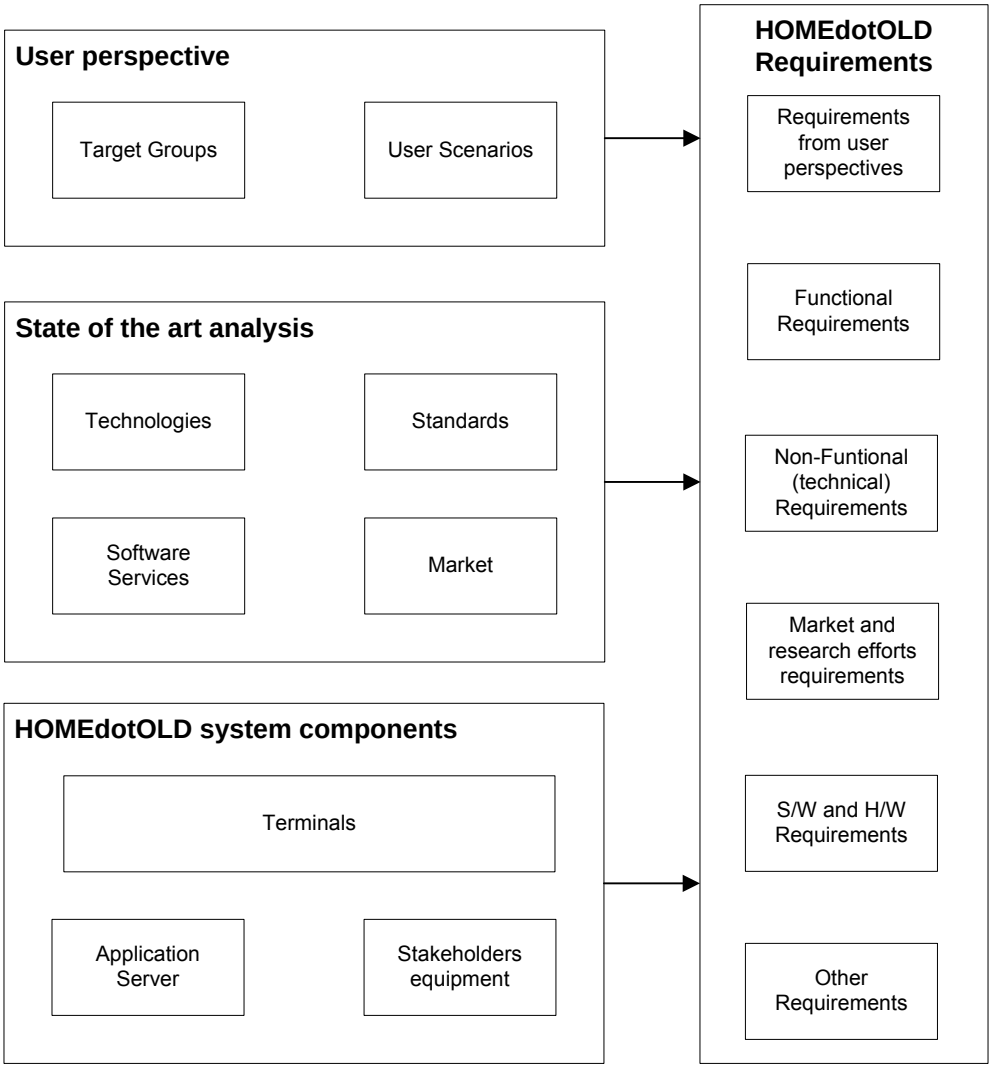


Figure 1: Methodology followed for requirements capturing

Firstly, the target user groups of the HOMEdotOLD system were identified, as well as a number

of initial use cases and usage scenarios illustrating the possible use of the HOMEdotOLD services. Then, the user organisations of the Consortium proceeded to interacting with end users through questionnaires, discussions, etc. The results of this process are documented within chapter 2. Finally, information regarding issues related with the functional requirements of the HOMEdotOLD system were documented by the user organisations of the Consortium in the form of use cases.

The state-of-the-art analysis in AAL technological approaches in the area of HOMEdotOLD includes surveys in the relevant literature as well as market surveys focused on technologies, standards and available software services and hardware products. These include terminals, the Application Server and its communication and interfacing capabilities with other stakeholders' equipment of the HOMEdotOLD system. This way generic architectural requirements, as well as market and requirements from other research efforts have been derived.

2. USER REQUIREMENTS ANALYSIS

2.1 USER GROUPS AND REQUIREMENTS CAPTURE METHODOLOGY

This section establishes the methodology for collecting user requirements (UR) in the HOMEdotOLD project. User requirements collection and analysis aims at providing insights on user needs, as well as on the nature of the HOMEdotOLD services. The requirements process targets the following groups:

- **Group A:** elderly people aged 54+ with no identified impairments including their caregivers, friends and/or relatives;
- **Group B:** elderly people aged 54+ with age related cognitive and/or physical health diseases

The UR methodology that is followed in HOMEdotOLD (in the scope of the present deliverable), from all the user sites involved in the project, includes the definition of a number of draft use cases for the HOMEdotOLD services by the pilot organizations of the Consortium, in order to enable end users to understand what the project services' potential is. The final step in the HOMEdotOLD Use Cases process, was the formulation of some condense application (usage) scenarios, on the basis of the Use Cases, which will orient the evaluation activities of the project. The major application scenarios are provided in the chapters below, whereas the relevant user profile is also described in each case.

It should be noted that, similarly to the Use Cases, the usage scenarios are subject to revisions throughout the project progress and could be seen as indicative, although sufficiently robust scenarios.

Then, on the basis of these use cases and usage scenarios, free discussions as well as qualitative and quantitative face-to-face interviews were conducted which were based on pre-defined guideline questionnaires (see Appendix of this document). This interaction with the end users helped the Consortium to refine the use cases and derive a number of user requirements as well as functional requirements for the HOMEdotOLD services.

For the interviews it was attempted to involve users with different education and disabilities in the age of 54-90. Results were reported in the form of an essay.

Some minimal quantitative indicators were set for the various sites, mainly in terms of the number of the participating users. Hence, it was agreed that each sites would involve 7-15 users in qualitative discussions, as well as questionnaires.

User requirements are identified by unique identifiers that shall remain constant during the full development process. The pattern is HOMEdotOLD-<User Site>-<Category>-<Number>, where <User Site> is a letter identifying the Country, <Category> is a letter identifying the category of the requirement and <Number> a unique number for the category. The categories include:

S……..Service Usage requirements

C……..Security Requirements

I……...User Interface Requirements

2.1.1 PARTICIPATING SITES AND USERS

The HOMEdotOLD user requirements process was initiated upon the project's commencement and led to the production of this deliverable. The following table illustrates the number of users and the sites involved in the results that are presented later in this document.

HOMEdotOLD site	Number of Users	Remarks
LFTL (Austrian)	12	in the age of 62-90
KRP (Greek)	7	in the age of 54-71
NFE (Dutch)	12	in the age of 69-85

Table 1: Participating Sites and Users

The Consortium acknowledges that the numbers above are by no means representative of the user population at a national or even less at an EU level. This was never the purpose of this exercise since it would not have been possible or feasible within the existing time framework and resources available for Task 2.2. The purpose of the exercise was to provide a mere indication of end users' initial reaction and thoughts related to the HOMEdotOLD services that, in combination with the expertise available to the user organizations of the Consortium and the extensive desktop survey conducted by all project teams, would lead to the definition of the initial set of user requirements for the HOMEdotOLD services.

The following chapters report the results from the interaction with end users per pilot site.

2.2 GREEK USERS REQUIREMENTS

2.2.1 PERSONAL-GUIDELINE-BASED INTERVIEW RESULTS OF THE GREEK PILOT SITE

2.2.1.1 PERSONAL QUESTIONS

For the definition of the user-requirements seven elderly people have been interviewed. Most of them are women (6 out of 7). The dispersion of ages falls between 54 and 71 years old, but the majority of them is between 60 and 65 years old. The sample suggests that almost all of them live with their partners, what is important for the assessment of services they need the most. Only two of them are still working (one of them is offering voluntary work) while the others seem to be already retired. Only one of them suffers from health problems while this doesn't seem to create any problem to her/his daily activities. All the other interviewees enjoy a healthy life and they don't need any support to their movements.

2.2.1.2 QUESTIONS CONCERNING HOME ENTERTAINMENT AND COMMUNICATION DEVICES

It comes to no surprise that most of the interviewees are very familiar with electronic devices that can be partly justified by the fact that they are no more than 75 years old.

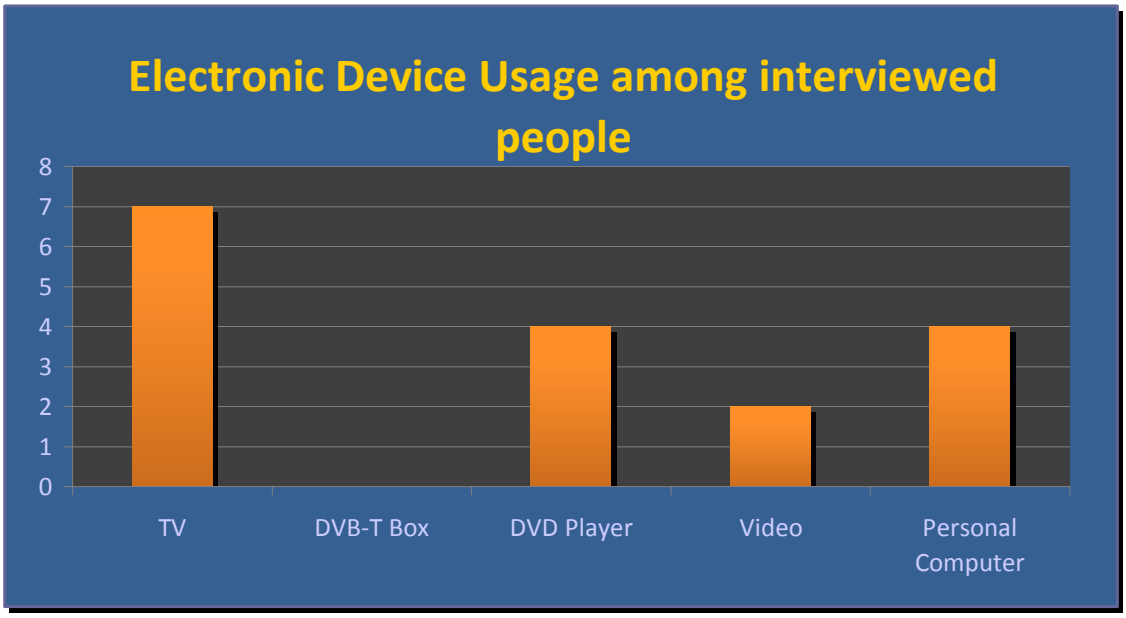


Figure 2: Electronic Device Usage (KRP)

As it can be clearly shown in the Figure 2 most of interviewees are familiar with the TV platform and the DVD Player while around half of them use a personal computer. In addition none of the interviewees have ever used a DVB-T box, what exemplifies its rare usage in Greek households. Concerning the frequency of usage of the aforementioned devices, all of the interviewees have mentioned that they use them very regularly. As far as the usage of remote-control is concerned, all of them answered that they make use of it without any problem.

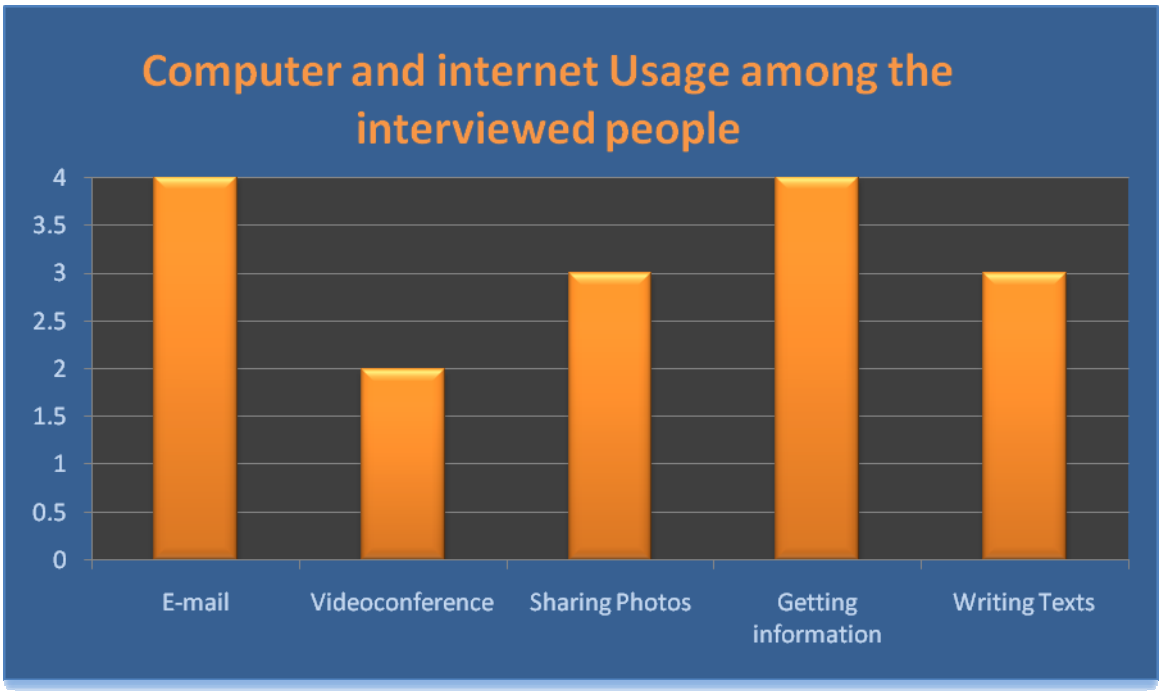


Figure 3: Computer and Internet Usage among interviewed people (KRP)

As it is shown in Figure 3 the elderly who use a personal computer are familiar with most of its services with e-mail and web browsing functions being the most prominent ones. Nevertheless, only two of them use videoconference resulting in potential difficulties to videoconference related services, when taking into consideration interviewees who do not use a pc at all.

In addition, the interviews indicated that teletext has been used by only two people. Concerning the question of the preferred use of HOMEdotOLD through remote control, speech or keyboard/mouse, the interviewees showed a preference to the remote control (4 selections) and the mouse (3 selections), while two of those preferring the remote control stated that they would equally use a keyboard/mouse as well.

2.2.1.3 QUESTIONS RELATED TO HOMEDOTOLD SERVICES

What can be seen in Figure 4 is that the Greek interviewees seem quite enthusiastic concerning the perspective of using HOMEdotOLD services.

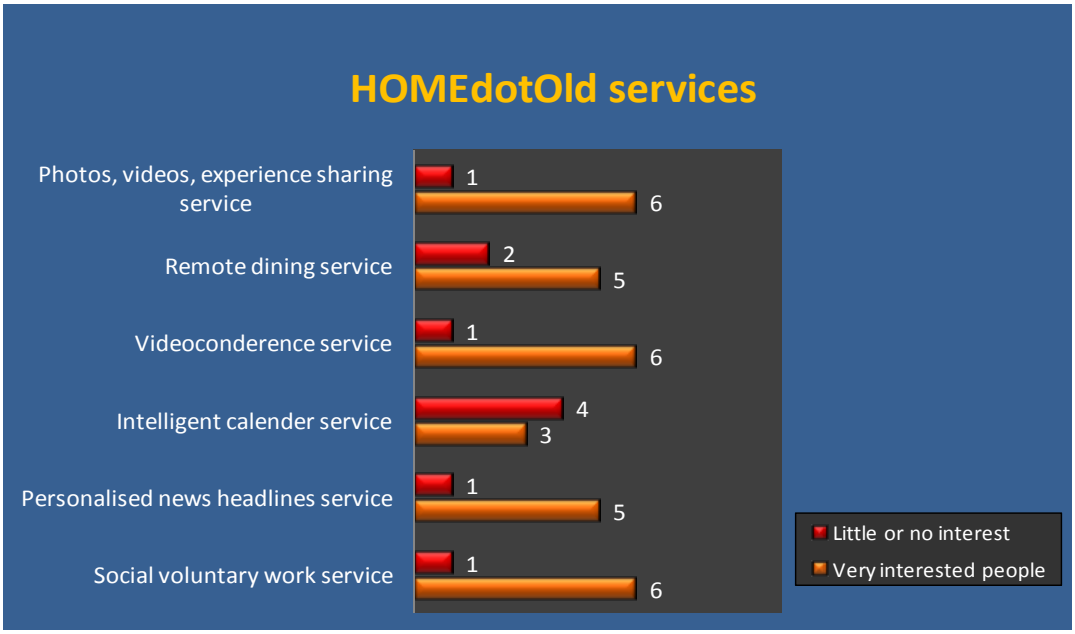


Figure 4: HOMEdotOLD Services Related Questions (KRP)

With the only exception of intelligent calendar service, for which only half of the interviewees expressed an interest, most of them stated that a Web-TV platform, with the specified services, could open new horizons in their communication and home entertainment. They had no problems in understanding the basic content of the services and only two couldn't point out what we mean exactly by the intelligent calendar services. We should note that even the people which do not use a pc, were very positive towards the HOMEdotOLD services. It is also important that no elderly rejected the services as a whole, with only one out of seven being sceptical on the offered services.

Based on the questionnaires and the free discussions that took place with the Greek end users, stimulated with the use of usage scenarios and use cases, the following requirements were found to be important for the Greek users.

2.2.2 REQUIREMENTS LIST

HOMEdotOLD-GR-S-1	HOMEdotOLD manual
	Careful design of the accompanying manual of HOMEdotOLD services (not so much complicated and in the language of targeted users)

HOMEdotOLD-GR-S-2	Voice message notification
	Some users stated that they would prefer a voice message notification when they make a selection of an individual HOMEdotOLD service

HOMEdotOLD-GR-S-3	Remote control should allow for service activation/de-activation
	The remote control has been considered as a tool of great significance. As a result, every service would be proper to be turned on/off by the remote control

HOMEdotOLD-GR-S-4	Complementary input devices
	Some users stated the need of having a mouse / keyboard as a complementary device to the remote control

HOMEdotOLD-GR-S-5	Easy interchangeable buttons
	Provision of easy interchangeable button with classic TV so that they switch easily between HOMEdotOLD platform services and classic TV

HOMEdotOLD-GR-S-6	Adjustable TV font size
	Ability to adjust the font of the texts shown in the TV platform, especially when it comes to personalised news headlines service

HOMEdotOLD-GR-S-7	Notifications should be self-explanatory
	When it comes to notifications (i.e. social voluntary work) the users requested that it should be as detailed as possible. They wouldn't bother to engage only when a general and abstract information is shown

HOMEdotOLD-GR-S-8	Training on Set-Top-Box functionality
	Some of potential users mentioned the need of training if they were to use HOMEdotOLD services especially in view of how a set-top-box works.

HOMEdotOLD-GR-S-9	PC connectivity to *HOMEdotOLD* platform
	Users familiar with the use of PC asked how they could connect their PC to the HOMEdotOLD platform in order to upload material related to the videos and photos sharing service.

2.3 AUSTRIAN USERS REQUIREMENTS

2.3.1 PERSONAL-GUIDELINE-BASED INTERVIEW RESULTS OF THE AUSTRIAN PILOT SITE

For the definition of the user-requirements twelve elderly people have been interviewed. All of them are in the age of 62-90 living in assisted accommodations and in private households. As far as the use cases are concerned it was difficult to explain to the elderly because they could hardly imagine the HOMEdotOLD system as well as the interfaces. Three of them have substantial health restrictions with seeing and walking. However all of them use on a daily basis a TV-Set and a radio. Seven of them are using a PC. When it comes to computer and internet usage among the elderly, it was indicated that six people are using it for sending and writing E-Mails, seven people for getting information, three people for sharing their photos, two people for writing texts and only one person uses it for doing videoconferences and playing games. These figures are illustrated in Figure 5.

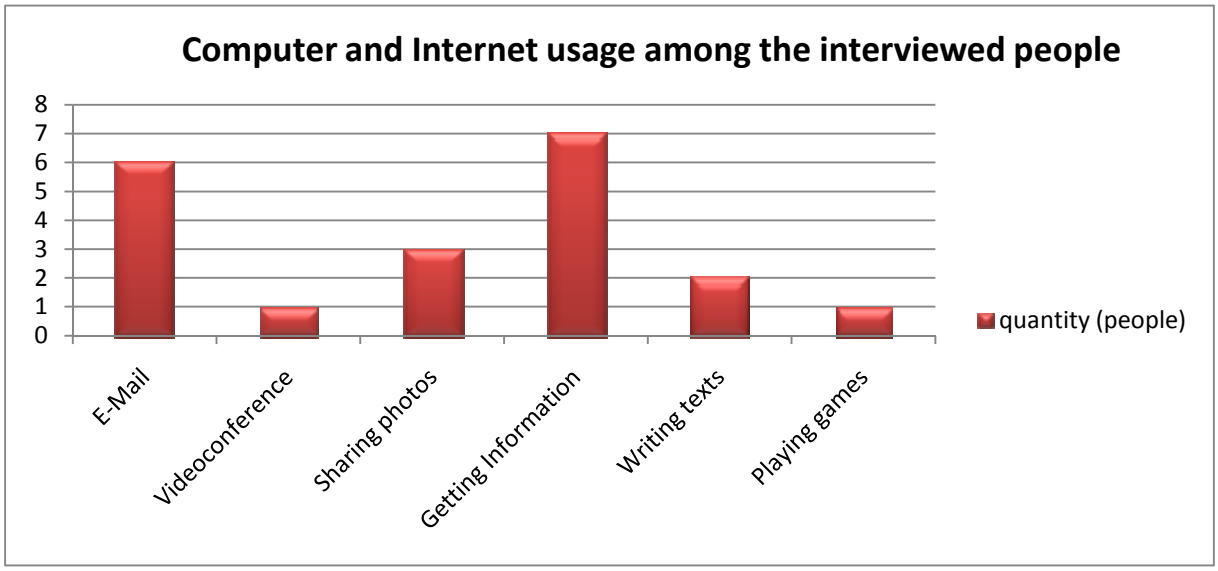


Figure 5: Computer and Internet Usage among the Interviewed People (LFTL)

Apart from that seven of them have a DVD-Player, six of them have a video-player and only two of them have a set-top box for satellite television. Moreover all of them are using these devices and the TV-Set through the remote control, and they do not have any problems with that. Six of the elderly people indicated that they use teletext frequently. As a consequence the usage of the HOMEdotOLD system through the remote control should not raise any problems.

Four people pointed that they turn on the TV because it prevents them from feeling lonely. The others indicate that they are mainly watching TV because they like to see the news, films and documentations.

When it comes to social activities as illustrated in Figure 6 eleven out of twelve people attend a social event e.g. going to a concert or doing sports frequently. Additionally seven of them indicated that they often talk with a friend or a relative on the phone and nine of them pointed that they have frequent face-to-face contact with friends and relatives. Furthermore five interviewees participate regularly in social voluntary work.

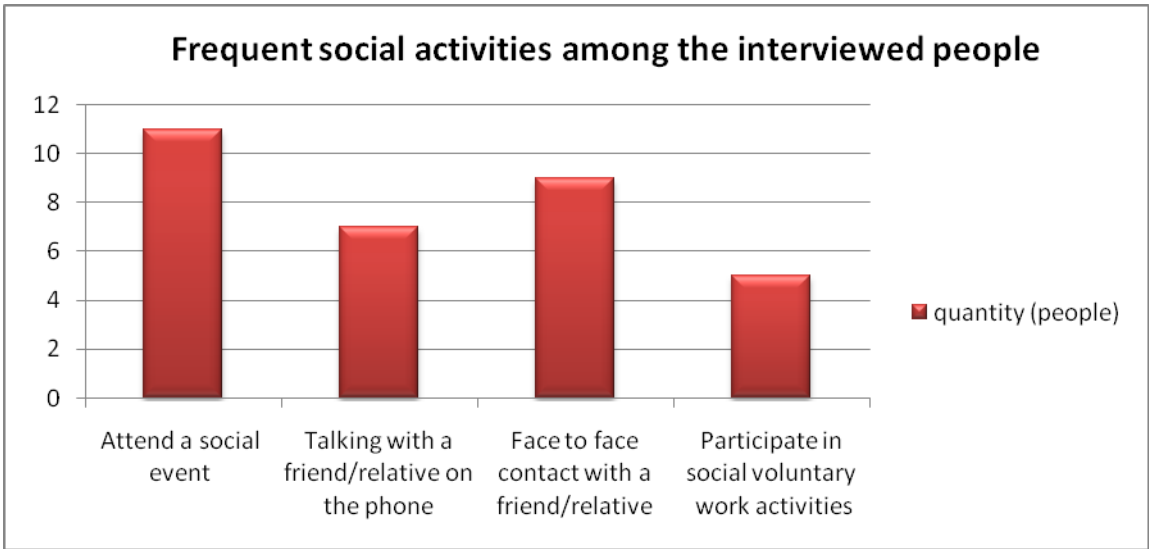


Figure 6: Frequent Social Activities among the Interviewed People (LFTL)

After these questionnaires the contents of the HOMEdotOLD services as well as the use-cases and scenarios were discussed with the elderly people. As can be seen in Figure 7, it turned out that there are only two groups:

a. Either they are rejecting the services or
b. they are very interested in them

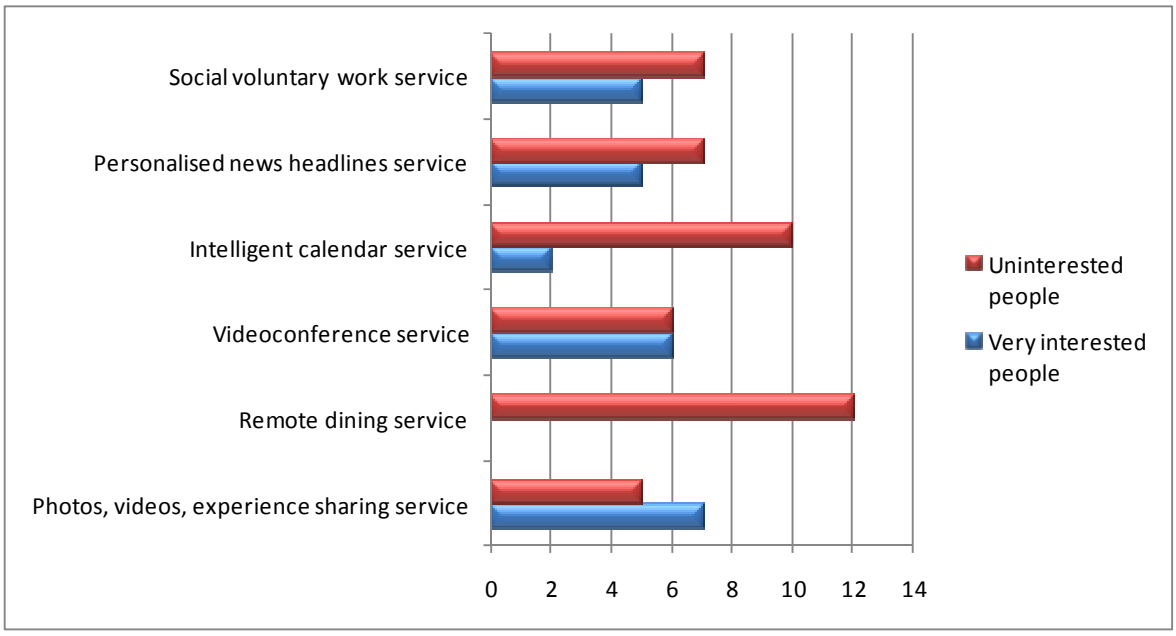


Figure 7: HOMEdotOLD Services Appeal (LFTL)

2.3.2 Comments Of The Elderly Who Rejected The Services

The following comments were made by the interviewees that were not so interested in the HOMEdotOLD services:

- **Social voluntary work service:** The elderly people who already participate in social voluntary work do not want to be informed about more possible work because they already have enough to do. Moreover those who had to work hard physically in their lives do not want and/or cannot work anymore due to their state of health.
- **Personalized news headlines service:** Those who are able to read and to watch TV

do not need/want such service they prefer reading the newspapers and watching the news on TV.

- **Intelligent calendar service:** This service is principally rejected because the elderly people do not want to be even more monitored by family and relatives. If there is a date to fix they like to do it on the phone.
- **Videoconference service:** Those who rejected this service indicated that they do not want to be seen e.g. wearing a pajama while talking. They prefer talking on the phone because of their privacy.
- **Remote dining service:** This service was rejected by all interviewed people. They find it useless. Additionally a few thought that this service could increase isolation, because the people could even feel more excluded from the family life when they see them sitting around the table dining.
- **Photos, videos, experience sharing service:** The elderly people who rejected this service were already sharing their photos and videos on their computer, so they do not need this service through the TV.

Age didn't seem a factor in the level of interest in HOMEdotOLD services.

Based on the questionnaires and the free discussions that took place with the Austrian end users, stimulated with the use of usage scenarios and use cases, the following requirements were found to be important for the Austrian users. Note that a number of the concerns of those users who rejected some of the envisaged services could be addressed by meeting some of the following requirements (e.g. option of turning on or off the video facility of the video-conferencing service).

2.3.3 REQUIREMENTS LIST

HOMEdotOLD-AUT-S-1	The user should be able to turn every service on or off
	The user should be able to turn every service on or off. As a consequence users are able to decide which service they want to use and which service they don't.

HOMEdotOLD-AUT-S-2	User customized personalised news headlines
	News headlines should be as much as possible personalized to the elderly needs. These include news that relate to the elderly everyday life. Shopping, cooking and gardening are prominent topics/areas for creating such personalised news headlines.

HOMEdotOLD-AUT-S-3	The user should be able to turn the camera on or off while videoconferencing
	This led to more privacy and the free choice if the user wants to be seen while talking or not.

HOMEdotOLD-AUT-S-4	The HOMEdotOLD system should provide support for social contacts and facilitation of communication with family and friends
	The HOMEdotOLD User Requirements process has also underpinned the importance of communication with family and friends.

HOMEdotOLD-AUT-C-1	Security and privacy settings for intelligent calendar and the photos, videos, experience sharing services
	There should be security settings (like in Facebook) for the intelligent calendar service and the photos, videos, experience sharing service, so that the user has the free choice which dates, photos or videos he is presenting who.

HOMEdotOLD-AUT-I-1	The user-interface should contain big buttons and pictures
	The user-interface should contain big buttons and pictures because a lot of elderly people suffer from hardness of seeing consequently they cannot easily read small font sizes.

HOMEdotOLD-AUT-I-2	The HOMEdotOLD system should be simple, intuitive and easy to use.
	Simplicity and ease of use is a prerequisite for the penetration of HOMEdotOLD services in a community of computer illiterate elderly users.

HOMEdotOLD-AUT-I-3	Training of Elderly users is required
	The planning of training activities should take into account the elderly cognitive status. Since elderly end-users are not very familiar with TV value added services, it is essential that they are appropriately trained to use the HOMEdotOLD platform and services. The goal of the training must also be to alleviate the distrust of the elderly against technology.

2.4 DUTCH USERS REQUIREMENTS

2.4.1 PERSONAL-GUIDELINE-BASED INTERVIEW RESULTS OF THE DUTCH PILOT SITE

In total 12 respondents participated. The quantitative data is based on 7 respondents. The qualitative data is based on all 12 respondents.

Average age of the respondents was 74 (range 69 to 82). Among the respondents were 5 men and 7 women. Of the respondents 7 lived alone, 5 lived with a partner. Most respondents did volunteer work at a local meeting place.

2.4.1.1 ELECTRONIC DEVICE USAGE

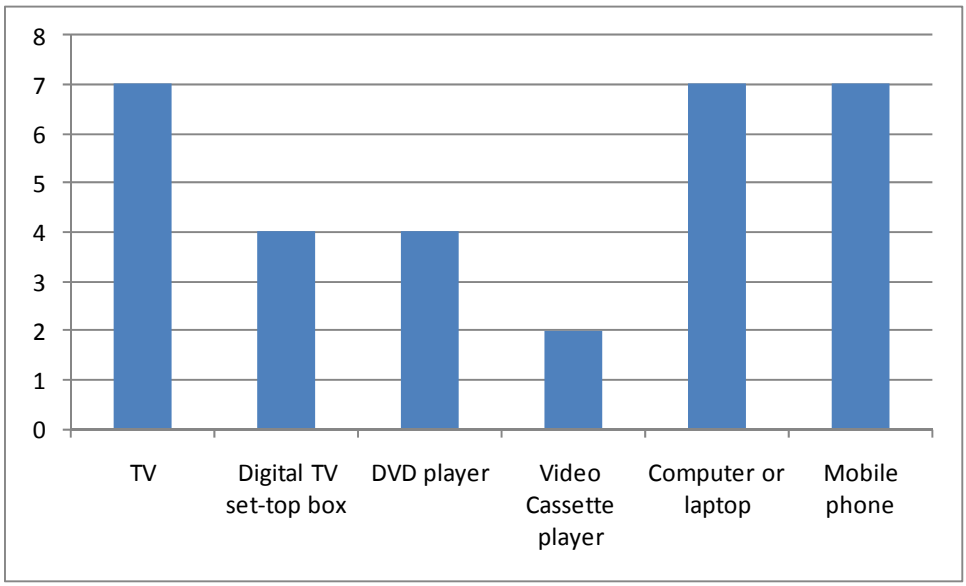


Figure 8: Electronic Device Usage (NFE)

For one respondent it was unclear whether this person uses a Digital TV set-top box, DVD player, and/or Video Cassette player. This person had been interviewed before, the second time the question was ommitted to avoid repetition. In the end it turned out that this data was not clear yet.

As apparent in Figure 8 all respondents had a television, a computer or laptop and a mobile phone. Some had a DVD player or an old video cassette player. Some respondents had a digital TV set-top box. Two people commented that they also have a radio. One respondent was exceptional in that he owns two PCs and three laptops. In addition to this, this respondent owns a PDA and a navigational device. Furthermore, most respondents had a conventional mobile phone, one person had a smartphone.

2.4.1.2 COMPUTER AND INTERNET USAGE

As can be seen in Figure 9 all respondents reported to use e-mail and search for information online. Most respondents reported to do text editing. One respondent even created posters and other promotional material on a PC. Sharing photo's and videos was usually done via USB and in addition was usually one-way, meaning that family and friends shared files with them via USB. Some would send photos by e-mail, but this was reported hard by others. Videoconferencing had been used by some once or twice. One respondent did use teleconferencing, but had not tried videoconferencing yet.

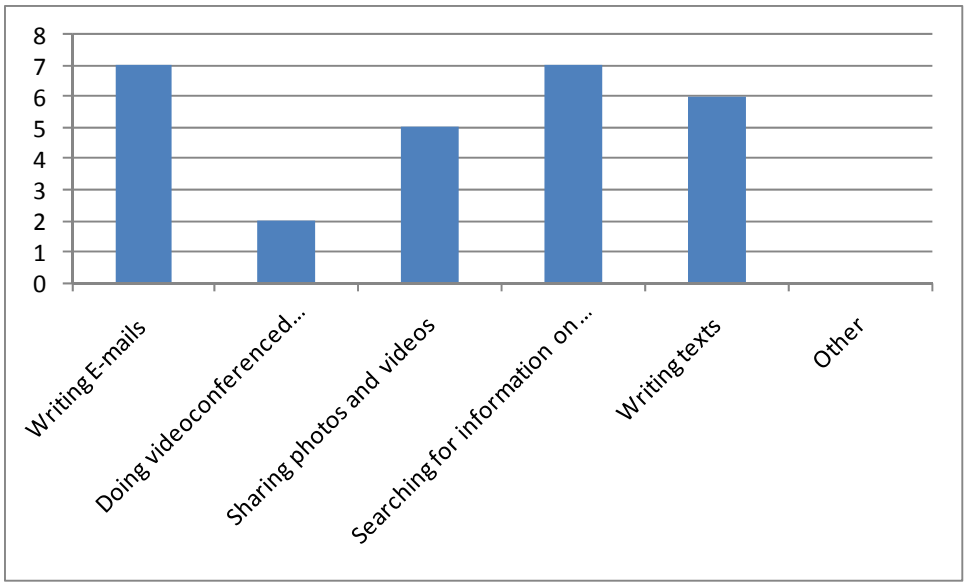


Figure 9: Computer and Internet Usage (NFE)

2.4.1.3 SOCIAL ACTIVITY PREFERENCES

As can be seen in Figure 10 the user group was socially very active and in that sense not the tyical isolated user group that can benefit the most from the HOMEdotOLD social networking services. Spending time in a leisure centre and participating in social volunteer work were rated the highest.

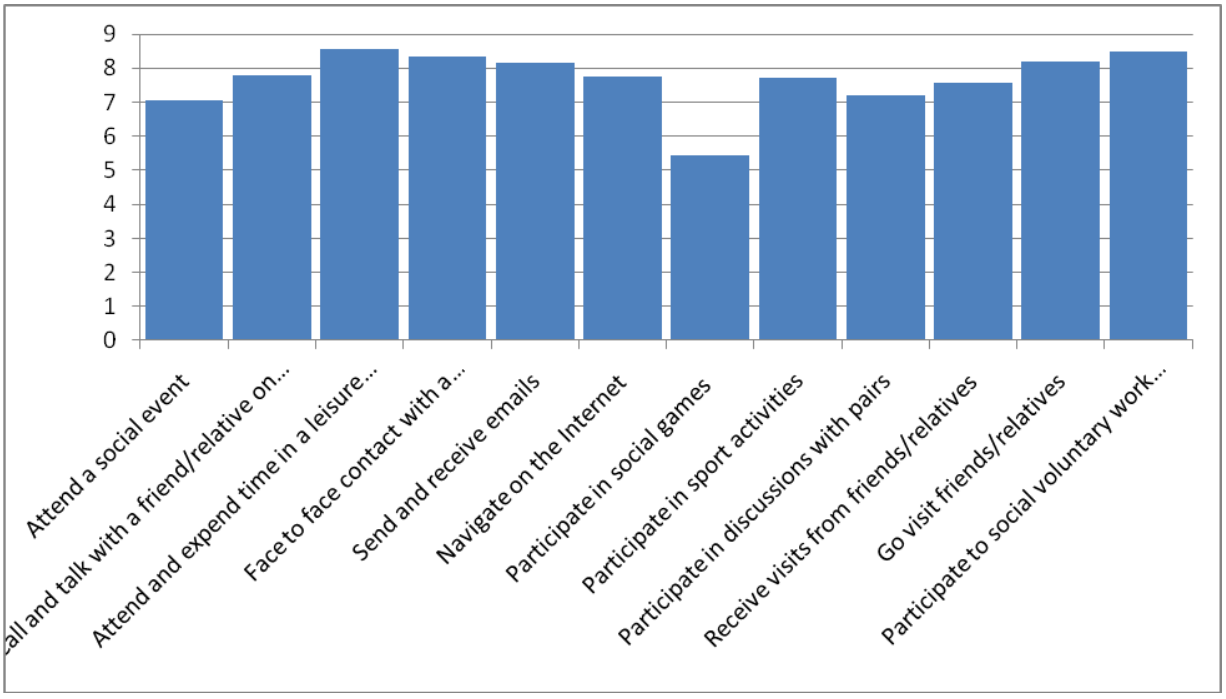


Figure 10: Social Activities Preference (NFE)

2.4.1.4 RATING OF HOMEDOTOLD SERVICES

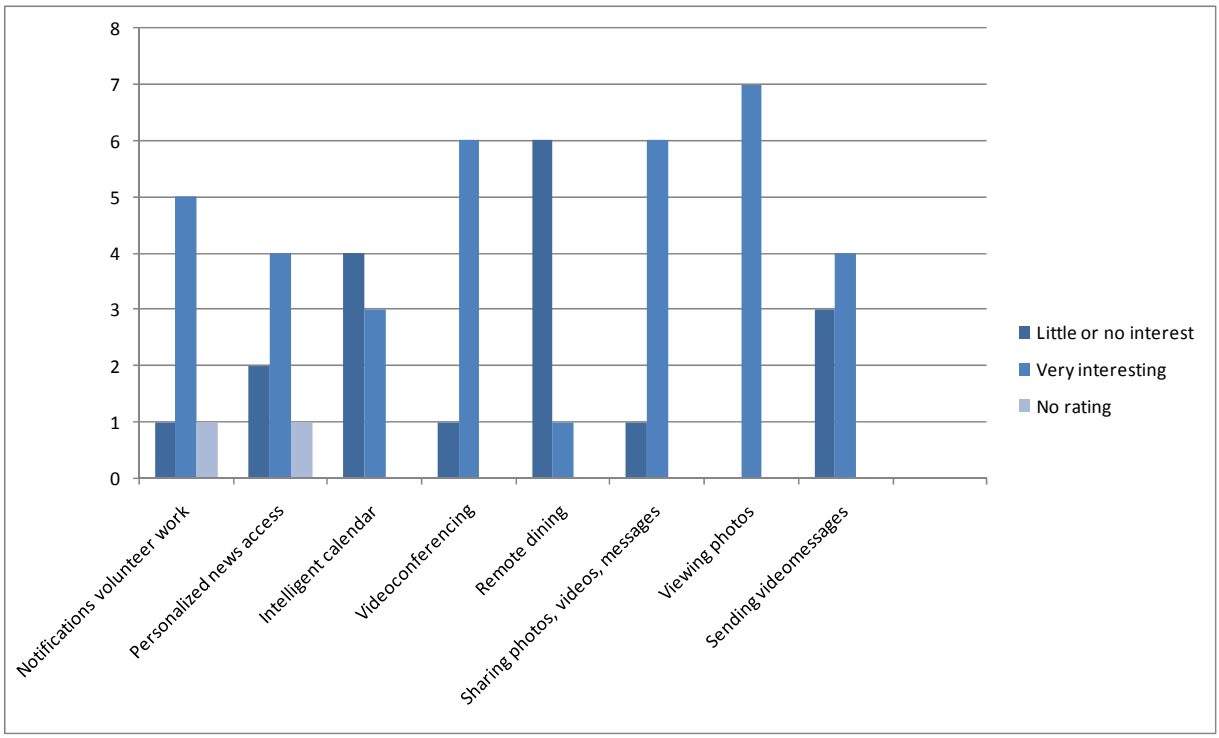


Figure 11: Rating of HOMEdotOLD Services (NFE)

As can be seen in Figure 11 *viewing photos* was rated as very interesting by all respondents. Additional comments here were:

- "It would be great to view photos together on a big screen"
- "It should not be too complicated"

Sharing photos, videos and messages was also indicated as an interesting service by almost all (i.e., 6) respondents. Additional comments here were:

- "This is very hard to do on a PC, would be nice if it is easier on the TV"

Videoconferencing was also found interesting by almost all respondents. Additional comments here were:

- "Would be nice on a TV/big screen"
- "That would be great with the grandchildren"
- "This would save costs; however it should complement personal face to face contact and not substitute it"
- "Depends on the contacts"
- "It has to be generally accepted by contacts for it to be useful"

Remote dining was not found interesting by most respondents. Some comments/concerns that explain this lack of interest were:

- "Dinner will take too long, will run out of things to talk about"
- "Would rather have dinner in person"
- "Impersonal"

On a positive note, one of the respondents who lived alone and had least social activities responded as follows:

- "This would be completely new. Most people eat together so it would be interesting"

Notifications of social volunteer work was found interesting by 5 respondents. This makes sense given that most of the respondents were active as volunteers.

The *intelligent calendar* was found interesting by some, not so interesting by others. Proponents said that they could have it now on a mobile phone or PC, but that the screen is too small, or that this is difficult respectively. Opponents mentioned that they would call to make an appointment, since they found this more personal. One respondent said that he likes the aspect of scheduling and planning, but only with whom it concerns.

Regarding the sending of *video messages*, one respondent mentioned that this was something she currently did "offline". She records video messages, uploads them to her computer and then sends them.

2.4.1.5 IMPLEMENTATION OF HOMEDOTOLD SERVICES

For some it was considered an option to have a subscription for the HOMEdotOLD services. Similar to a subscription you have for the newspaper, internet access, phone, or television reception. For one respondent the services could even replace a newspaper subscription. Either way, it would depend on the price. Others would consider these services being no more than that of free services, like you get teletext on your TV. Their perception is that you can get the same services for free over the internet and therefore one should get them for free on the television as well.

An advantage of the services on a television platform was for some that they would have all services in the living room. Not having to move between rooms for every little action and not having to have a PC in the living room was an interesting option. In fact, this is why some respondents got a laptop. In this sense the laptop is more of a competitor to the proposed solutions than a PC.

A frequent comment was that respondents would need to see the services before they can judge them. It was hard to imagine how they would work and how they could be controlled. Most took into account only the remote control. Some who already had interactive television at home would opt for a wireless keyboard for text input. In line with this, one participant made the following comment: "If I say I don't think the services are interesting, I will never get the chance to find out". This shows how the difficulty in imagining the services can influence the results.

Furthermore, respondents who already had interactive television at home complained that a manual was missing. It is often unclear how to use the remote control.

Based on the questionnaires and the free discussions that took place with the Dutch end users, stimulated with the use of usage scenarios and use cases, the following requirements were found to be important for the Dutch users.

2.4.2 REQUIREMENTS LIST

HOMEdotOLD-NL-I-1	High level of contrast in onscreen objects
	Elderly people have difficulties distinguishing objects with low contrast
	Objects should be for example black on white background

HOMEdotOLD-NL-I-2	Big font size
	Elderly participants complained about small font size for example with sport game scores displayed on the TV
	All text should be large enough

HOMEdotOLD-NL-I-3	Only one remote control
	Local channels are only broadcasted via analogue signal while for other channels a digital receiver is used. Thus users currently require a RC for both signals
	The services should not require an extra remote control

HOMEdotOLD-NL-I-4	Remote control with big buttons
	Participants said to have trouble with the small buttons on the remote control
	Only small buttons on the RC should be used

HOMEdotOLD-NL-I-5	Remote control with sufficient spacing between buttons
	Participants said to have trouble with distance between buttons on the remote control
	Only use buttons with sufficient spacing between them

HOMEdotOLD-NL-I-6	Clear mapping between screen and RC objects
	People used to a PC look for a confirmation button. It should be clear which buttons can be used and cannot be used
	Arrow right to show that arrow right on RC will lead to new menu

HOMEdotOLD-NL-I-7	Physical keyboard for text input
	Wireless keyboard next to onscreen keyboard. RC is hard enough to control, especially for text input.

HOMEdotOLD-NL-I-8	Onscreen cues
	Show onscreen cues on possible control options.
	"Press down to go to next contact"

HOMEdotOLD-NL-I-9	Fewer options → fewer buttons
	Too many options on TV that are not used. These options shouldn't be on remote control

HOMEdotOLD-NL-I-10	Follow metaphor
	Interface must follow an existing metaphor to clarify the structure
	For example a contact list that looks like an address book

HOMEdotOLD-NL-I-11	Ease of use
	Ease of use is an essential condition that needs to be fulfilled
	User must be able to call a contact in maximally three steps

HOMEdotOLD-NL-I-12	Easy control
	Up down left right control, no or few additional buttons
	No use of option button etcetera required

HOMEdotOLD-NL-S-1	Communication with formal institutes
	Governmental institutes and banks. Arrange administrative work

	via TV. Users who already use a computer use online banking.
	No use of option button etcetera required

HOMEdotOLD-NL-S-2	Opportunity to always get in touch with someone
	Make sure always someone is online, decrease the feeling of being the only one who is alone.
	Always show a buddy from a care organization online

HOMEdotOLD-NL-S-3	Added profile descriptions to contacts
	Description of who the person is, what they like, when they have last been in touch
	"Tim likes to play football, last contact one week ago by phone"

HOMEdotOLD-NL-S-4	Movies, photos from the past
	Reminiscence. Show old footage
	Old photos related to where a person lived, what was on TV when they were growing up

HOMEdotOLD-NL-S-5	Multiple user video call
	Connect to multiple people, family or colleagues to discuss volunteer work. No need for travel and face to face meeting which can be tiring.
	User can connect to two children to discuss a joint visit

HOMEdotOLD-NL-S-6	Photo viewing
	View photos that have been send by others. Only few upload pictures themselves, the computer literate users.
	View photos that were uploaded by family members to a photo sharing website

HOMEdotOLD-NL-S-7	Voicemail functionality
	Like an answering machine, what if someone is not there
	Leave a video message

HOMEdotOLD-NL-S-8	Motivational experience when switched on
	Zero point benefit, initial reinforcement of use without interaction required.
	Show photos, videos, messages on first screen

HOMEdotOLD-NL-M-1	Provide physical manuals and support
	Boost confidence by providing physical manuals.

2.5 USER REQUIREMENTS CONSOLIDATION MATRIX

The requirement consolidated tables are presented bellow. Similar requirements from different

pilot sites have been merged.

HOMEdotOLD-GR-S-1	Voice message notification
	Some users stated that they would prefer a voice message notification when they make a selection of an individual HOMEdotOLD service

HOMEdotOLD-GR-S-2	Remote control should allow for service activation/de-activation
	The remote control has been considered as a tool of great significance. As a result, every service would be proper to be turned on/off by the remote control

HOMEdotOLD-GR-S-3	Complementary input devices
	Some users stated the need of having a mouse / keyboard as a complementary device to the remote control

HOMEdotOLD-GR-S-4	Easy interchangeable buttons
	Provision of easy interchangeable button with classic TV so that they switch easily between HOMEdotOLD platform services and classic TV

HOMEdotOLD-GR-S-5	Adjustable TV font size
	Ability to adjust the font of the texts shown in the TV platform, especially when it comes to personalised news headlines service

HOMEdotOLD-GR-S-6	Notifications should be self-explanatory
	When it comes to notifications (i.e. social voluntary work) the users requested that it should be as detailed as possible. They wouldn't bother to engage only when a general and abstract information is shown

HOMEdotOLD-GR-S-7	PC connectivity to *HOMEdotOLD* platform
	Users familiar with the use of PC asked how they could connect their PC to the HOMEdotOLD platform in order to upload material related to the videos and photos sharing service.

HOMEdotOLD-AUT-S-1	*The user should be able to turn every service on or off*

	The user should be able to turn every service on or off. As a consequence users are able to decide which service they want to use and which service they don't.

HOMEdotOLD-AUT-S-2	User customized personalised news headlines
	News headlines should be as much as possible personalized to the elderly needs. These include news that relate to the elderly everyday life.

HOMEdotOLD-AUT-S-3	The user should be able to turn the camera on or off while videoconferencing
	This led to more privacy and the free choice if the user wants to be seen while talking or not.

HOMEdotOLD-AUT-I-1	The user-interface should contain big buttons and pictures
	The user-interface should contain big buttons and pictures because a lot of elderly people suffer from hardness of seeing consequently they cannot easily read small font sizes.

HOMEdotOLD-AUT-I-2	The HOMEdotOLD system should be simple, intuitive and easy to use.
	Simplicity and ease of use is a prerequisite for the penetration of HOMEdotOLD services in a community of computer illiterate elderly users.

HOMEdotOLD-AUT-I-3	Training of Elderly users is required
	The planning of training activities should take into account the elderly ICT background and cognitive status. Since elderly end-users are not very familiar with TV-based services functionality, it is essential that they are appropriately trained to use the HOMEdotOLD platform and services. The goal of the training must also be to alleviate the distrust of the elderly against technology.

HOMEdotOLD-NL-I-1	High level of contrast in onscreen objects
	Elderly people have difficulties distinguishing objects with low contrast
	Objects should be for example black on white background

HOMEdotOLD-NL-I-2	Only one remote control
	The services should not require an extra remote control

HOMEdotOLD-NL-I-3	Remote control with big buttons
	Participants said to have trouble with the small buttons on the remote control
	Only small buttons on the RC should be used

HOMEdotOLD-NL-I-4	Remote control with sufficient spacing between buttons
	Participants said to have trouble with distance between buttons on the remote control
	Only use buttons with sufficient spacing between them

HOMEdotOLD-NL-I-5	Clear mapping between screen and RC objects
	People used to a PC look for a confirmation button. It should be clear which buttons can be used and cannot be used
	Arrow right to show that arrow right on RC will lead to new menu

HOMEdotOLD-NL-I-6	Fewer options → fewer buttons
	Too many options on TV that are not used. These options shouldn't be on remote control
	"Press down to go to next contact"

HOMEdotOLD-NL-I-7	Follow metaphor
	Interface must follow an existing metaphor to clarify the structure
	For example a contact list that looks like an address book

HOMEdotOLD-NL-S-1	Opportunity to always get in touch with someone
	Make sure always someone is online, decrease the feeling of being the only one who is alone.
	Always show a buddy from a care organization online

HOMEdotOLD-NL-S-2	Added profile descriptions to contacts
	Description of who the person is, what they like, when they have last been in touch
	"Tim likes to play football, last contact one week ago by phone"

3. USE CASES AND USAGE SCENARIOS PER SERVICE

3.1 ACTORS OF USE CASES AND USAGE SCENARIOS

The following table summarizes the primary actors of the use cases and usage scenarios. A more detailed description of each primary actor is provided below right before the relevant usage scenario(s), for the reader's convenience

Primary Actor:	**Use Cases:**
12 year old grandson (Kevin)	1.1, 1.2, 1.3
65 year old grandmother (retired mathematician) (Susan)	1.2, 1.1, 1.3, 5.3
70 year old retired cook (John)	2.1, 2.2, 2.3, 4.3, 6.1
35 year old son	3.1, 3.2
58 year old retired mechanic (Mario)	3.1, 3.2, 5.1, 5.2
Ada 76 years old	3.3,
Amy (15) and Adam (13) grandchildren of Ada	3.3, 6.1
Mary, 84 year old retired librarian	4.1, 4.2, 4.4, 4.5
Kevin, 12 year old, goes to school in Sydney	4.1, 4.2
Pavlos 70 year old retired cook	6.1
George 15 year old grandson	6.1
Maria 47 year old daughter	6.1
Marios, a 58 year old retired miner	5.1, 5.2, 5.3
Helena 65 year old retired journalist	5.1, 5.2, 5.3

Table 2: Use Case List

3.2 VIDEOCONFERENCING

3.2.1 USE CASES

Use Case ID:	4.1		
Use Case Name:	User initiating a video call		
Created By:	Hester Bruikman	***Last Updated By:***	
Date Created:	02-08-2010	***Date Last Updated:***	11-08-2010
Actors:	1. Mary, 84 year old retired librarian 2. Kevin, 12 year old, goes to school in Sydney		
Description:	Mary calls her grandson Kevin. She knows he had an important math exam today.		

Trigger:	Mary is watching TV and decides to call Kevin
Pre- conditions:	1. Mary's TV is on, she is watching the news channel
Post-conditions:	1. Mary watches a documentary on Discovery channel
Normal Flow:	**4.1.0** 1. Mary activates her HOMEdotOLD services channel using her remote control. 2. In her services menu Mary selects 'Video contact' using her remote control. 3. Here she can select 'Preferences' and 'Contacts', using her remote control. She navigates to Contacts and presses 'OK'. 4. The systems shows her all contacts that are either capable of video calling and/or are capable of receiving video messages. 5. Mary browses her contacts using her remote control. 6. When going through her contacts, which are organized alphabetically, the system generates views (without activating a contact) with information. Recent 'Twitter-like' messages, last shared photos, and profile information (name, age, likes and dislikes). This information refreshes her memory and can provide her with topics to discuss when calling. 7. When Mary arrives at Kevin she presses 'OK' to initiate a call 8. The system verifies if Mary wants to call Kevin. It asks Mary e.g.: *"Do you want to call Kevin? For 'yes' select 'OK' again, for 'no', select 'return'".* 9. Mary presses OK. 10. System initiates call. 11. Kevin answers the call, using a TV or computer that supports the communication service. 12. The system activates a light on top of the TV, next to the camera to indicate that the camera is on. 13. During the call, Mary can see video feed of Kevin and a message *"select 'OK' to hang up".* 14. After five minutes, Mary presses 'OK' to hang up. 15. The system verifies her action by asking e.g.: *"Do you want to hang up? For 'yes' select 'OK' again, for 'no', select 'return'".* 16. Mary presses OK. 17. The system shows her video contacts again. 18. Using her remote control she switches back to her television channel. 19. Mary selects the Discovery channel and watches a documentary.
Alternative Flows:	**4.1.1** 6a Mary sees that Kevin is not available See 3.4.0 **4.1.2** 14a Kevin hangs up. Continue at 3.1.0 action 16

Exceptions:	
Includes:	
Priority:	
Frequency of Use:	2 times a day (any contact)
Business Rules:	
Special Requirements:	Essential is the accessibility of the videoconferencing client while using the HOMEdotOLD services.
Assumptions:	Camera privacy issues are not a deal-breaker for technology acceptance. We assume that users cover the camera if they don't want to be recorded. Implementing a 'camera-off' functionality would clutter the ease of use.
Notes and Issues:	Note to browsing on the TV: Contacts are organized sequentially in a 'slide show' to avoid visual information overload. The system gives her clear cues that direct her in browsing her contacts. It is visually indicated whether contacts are available for a call or not. Interface design should follow an existing mental model such as a telephone book being organized alphabetically.

Use Case ID:	4.2		
Use Case Name:	User receiving and answering a video call		
Created By:	Hester Bruikman	***Last Updated By:***	
Date Created:	02-08-2010	***Date Last Updated:***	11-08-2010
Actors:	1. Mary, 84 year old retired librarian 2. Kevin, 12 year old, goes to school in Sydney		
Description:	Mary is watching TV when she receives a call from her grandson Kevin		
Trigger:	Incoming call		
Pre- conditions:	The caller is in the users contact list Mary is watching TV		
Post- conditions:	Mary is watching TV		
Normal Flow:	**4.2.0** 1. A pop-up message appears notifying Mary that Kevin is calling her saying e.g.: To answer select 'OK'. 2. Mary presses 'OK'. 3. Continue step 11 of 3.1.0.		
Alternative Flows:	**4.2.1** 2a Mary doesn't respond 2b The system sends notification to initiator that user is not answering 2c System prompts Mary that she can change her availability status by going to HOMEdotOLD services		
Exceptions:			
Includes:	3.1.0		

Priority:	
Frequency of Use:	4 times a day (any contact)
Business Rules:	
Special Requirements:	Communication service needs to be able to activate pop-ups within television platform
Assumptions:	
Notes and Issues:	Remote control buttons might be mapped to different actions in the television viewing mode than in the HOMEdotOLD services mode. For example pressing return while watching a channel can therefore mean 'return to previous channel' or 'do not accept this call'. The system should recognize that a notification is active and interpret remote control activity that responds to this notification differently than how it would otherwise.

Use Case ID:	4.3		
Use Case Name:	Setting availability status		
Created By:	Hester Bruikman	***Last Updated By:***	
Date Created:	02-08-2010	***Date Last Updated:***	11-08-2010
Actors:	John, 70 year old retired cook		
Description:	John sets his availability status for video contact, John uses speech input to do this		
Trigger:	John wants others to see that he is not available		
Pre- conditions:	John is browsing his HOMEdotOLD services channel John status is set to 'Available' because his intelligent calendar shows not appointments		
Post- conditions:	John is browsing his HOMEdotOLD services channel		
Normal Flow:	**4.3.0** 1. John navigates to the Video contact service, using speech input by saying the command 'Video contact' or by using navigational commands 'Next', 'Previous', 'OK'. 2. Here he can select 'Settings', 'Messages', and 'Contacts', he selects preferences by saying 'Settings' which is recognized as a command. 3. The system verifies his command using text to speech on the original text for remote control input. E.g.: "You have selected 'Settings' to continue select 'OK', to return select 'return'. 4. In settings John selects the first option in the list, 'Availability' 5. The system shows two options 'Available' and 'Not available' 6. John selects 'Not available'. 7. System acknowledges that John is not available and updates his status for his contacts to see. 8. John selects return to go to his 'Video contact' menu		

	9. John selects return to go to his HOMEdotOLD services
Alternative Flows:	
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	4 times a week
Business Rules:	
Special Requirements:	The system should have speech recognition software, text to speech and a high standard dialogue manager.
Assumptions:	Ease of use increase when output and input modalities are the same. Using speech input comes more natural for John when the system uses speech output as well. The most relevant setting category for users is availability
Notes and Issues:	Availability should by default be mapped to the intelligent calendar. Unclear how to show one's own availability during television viewing or while using other services

Use Case ID:	4.4		
Use Case Name:	User records a video message		
Created By:	Hester Bruikman	***Last Updated By:***	
Date Created:	02-08-2010	***Date Last Updated:***	11-08-2010
Actors:	Mary, 84 year old retired librarian		
Description:	Mary records a video message for her grandson Kevin		
Trigger:	Kevin is not available for real-time video contact		
Pre- conditions:	System shows that Kevin is not available for real-time video contact		
Post- conditions:	Mary continues watching TV		
Normal Flow:	**4.4.0** 1. Mary presses 'OK' when she comes across the contact card of her grandson a message appears, e.g.: *"Kevin is not available, do you want to leave him a video message? For 'Yes' select 'OK', for 'No' select 'return'"* 2 Mary selects 'OK' 3 The system activates a light on top of the TV, next to the camera to indicate that the camera is on. The video feed of Mary is shown to her on the TV in combination with the message, e.g.: *"To stop recording select 'OK'"*. 4 After recording her message Mary selects 'OK' 5 The system gives her several options she can select using her remote control 'view', 'send', 'record new message'. 6 Using her remote control, Mary navigates to 'Send' and selects 'OK'. 7 The system verifies her action. 8 The system stores the video on a server and sends an e-mail to Kevin with a url of where the video is located.		

	9 The system goes back to her contact list adding to the contact profile description of Kevin that Mary's last contact with him was 'video message send on ../../....' 10 Using her remote control Mary switches back to her television channel.
Alternative Flows:	**4.4.1** 6a Using her remote control Mary selects 'view' 6b The system verifies her action 6c The system shows the video that was just recorded Continue at 5 **4.4.2** 6a Using her remote control Mary selects 'record new message' Continue at 3
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	3 times a week (any contact)
Business Rules:	
Special Requirements:	E-mail addresses need to be part of the contact meta data System needs to connect to a server where the videos can be stored
Assumptions:	Mary knows to press OK, also when it is indicated that Kevin is not available
Notes and Issues:	

Use Case ID:	4.5		
Use Case Name:	User viewing a video message		
Created By:	Hester Bruikman	***Last Updated By:***	
Date Created:	02-08-2010	***Date Last Updated:***	11-08-2010
Actors:	Mary, 84 year old retired librarian		
Description:	Mary receives and views a video message send by her son		
Trigger:	System receives a video message		
Pre- conditions:	TV is switched on		
Post- conditions:	Mary has seen video message and notified her son of this		
Normal Flow:	**4.5.0** 1. A pop-up message appears notifying Mary that she has received a new video message. The notifications includes the instruction e.g.: "Select 'OK' to view message". 2. Mary selects 'OK' using her remote control. 3. System automatically switches to HOMEdotOLD services channel and shows the video message. 4. When it is finished the system prompts Mary e.g.: "to view again		

	select ‘OK’, to return select ‘return’. 5. Mary selects ‘return’. 6 System asks for a response. Mary can select ‘No response’, or she can select from a series of emoticons and earcons. 7 Mary navigates to one of the emoticons that is shown. 8 Mary selects ‘OK’. 9 System verifies the selection. 10 Mary presses ‘OK’ to send the emoticon to David. 11 System goes back to Video contact-->Messages menu
Alternative Flows:	**4.5.1** 2a Mary does not select ‘OK’ when prompted 2b System saves video message in her Video contact --> Messages menu for later viewing **4.5.2** 5a Mary presses ‘OK’ Return to 3 **4.5.3** 7a Mary navigates to an earcon that is described 7b The highlighted earcon is played 7c Mary selects ‘OK’ Continue at 11
Exceptions:	
Includes:	
Priority:	
Frequency of Use:	3 times a week
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

3.2.2 USAGE SCENARIOS

Relevant use cases:

- User initiating a video call
- User receiving and answering a video call
- User records a video message
- Setting availability status
- User viewing a video message

Combined usage:

- ***User-Profile 1:*** Mary is 84 years old. She worked as a librarian when she was younger and was very socially active. Mary has three sisters but they live spread around over the country. She has a daughter who moved to Australia for studies and never returned

home. Mary has a grandson of 12 years old, Kevin. She stays in touch with her daughter and grandson using Skype. Mary always enjoyed learning new things on the most diverse topics, including new technologies. Mary is afraid that as she gets older her excellent memory will become less and less. She enjoys different kinds of puzzles to keep her mind active and alert. Unfortunately, her physical condition isn't what it used to be; therefore she doesn't go out much. Still, she gets a lot of visitors to help her out with daily tasks like getting dressed, preparing meals, and etcetera. Once a week someone comes to pick her up to go to a course on brain training. Here she assists the teacher.

- ***User-Profile 2:*** Kevin is Mary's 12 year old grandson. He is living in Sydney with his father David and his mother Karen, Mary's daughter. Kevin goes to school. Lately he got problems in mathematics.
- ***Combined sub-scenario:*** Mary sees on her calendar that Kevin had an important mathematics test today. Knowing that he has difficulties with math, she decides to call him to ask how it went. She uses her television to set up a conference call. There is no answer and Mary figures he must still be at school.

  Mary decides to surprise him by leaving a video message. She planned on going for grocery shopping, however now she decides that it can wait till tomorrow and that she'd rather wait and be home in case Kevin calls her. She changes her status to available.

  About twenty minutes later, Kevin arrives home from school. Both his parents are still at work and he switches on the TV. He notices a popup on the screen saying that he has a video message from his grandmother. He watches the message and sees that it was left only twenty minutes ago. He checks to see if she is still available and decides to return her call immediately.

  In the mean time Mary is watching TV. She sees a pop-up message saying the Kevin is calling her. She's accepts his call and they chat for some time about Kevin's test that day and other stuff he has going on at school. Kevin proudly shows his grandmother a work he made during art class.

3.3 PHOTO, VIDEO AND EXPERIENCE SHARING

3.3.1 USE CASES

Use Case ID:	3.1		
Use Case Name:	Sharing of photos		
Created By:	Stefan Schürz	***Last Updated By:***	
Date Created:	20/07/2010	***Date Last Updated:***	
Actors:	1. 35 year old son (in the following denoted by user) 2. 58 year old retired mechanic		
Description:	A 35 year old son shares his vacation photos with his 58 year old father who lives far away		
Trigger:	Vacation photos need to be shared with an elderly family member		
Pre- conditions:	1. The user is at home using the HOMEdotOLD system through a TV, a set-top box (if necessary) and a remote-control related to the Wii Remote 2. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The user has already added his father as a contact to his system		

	4. The user uses the remote-control like he was playing on the Wii, for the interaction with the HOMEdotOLD system
Post- conditions:	-
Normal Flow:	The user enters the “photos, videos, experience sharing” service by navigating to the button and pressing “OK” The “photos, videos, experience sharing” service screen is presented The user clicks on the “photos” button and afterwards on the “new folder” button A text-entry-box and a virtual keyboard pops up The user types in the name of the folder (e.g. vacation in spain 2010) The user plugs in a USB-stick in the set-top box which contains the photos The screen shows now the empty new folder and the folder on the USB-stick The user simply copies the pictures through drag and drop from the USB-stick to the new folder The user is confirming by pressing a “save” button
Alternative Flows:	-
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	1 time per week
Business Rules:	-
Special Requirements:	A remote-control which is acting like the Wii Remote
Assumptions:	-
Notes and Issues:	-

Use Case ID:	3.2		
Use Case Name:	Looking at photos		
Created By:	Stefan Schürz	***Last Updated By:***	
Date Created:	20/07/2010	***Date Last Updated:***	
Actors:	1. 58 year old retired mechanic (in the following denoted by user) 2. 35 year old son		
Description:	A 58 year old father takes a look at the vacation photos of his 35 year old son who lives far away.		
Trigger:	Vacation photos need to be looked at		
Pre- conditions:	1. The user is at home using the HOMEdotOLD system through a TV, a set-top box (if necessary) and a remote-control related to the Wii Remote 2. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown		

	3. The user has already added his son as a contact to his system 4. The user uses the remote-control like he was playing on the Wii, for the interaction with the HOMEdotOLD system
Post- conditions:	-
Normal Flow:	1. A notification is shown on the HOMEdotOLD home-screen that a new folder was added to the “photos, videos, experience sharing” service 2. The user enters the “photos, videos, experience sharing” service by navigating to the button and pressing “OK” 3. The “photos, videos, experience sharing” service screen is presented 4. The user clicks on the “photos” button and afterwards on the (e.g. vacation in Spain 2010) button 5. The user can look at the vacation pictures of his son
Alternative Flows:	-
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	1 time per week
Business Rules:	-
Special Requirements:	A remote-control which is acting like the Wii Remote
Assumptions:	-
Notes and Issues:	-

Use Case ID:	3.3		
Use Case Name:	User viewing photo’s		
Created By:	Hester Bruikman	***Last Updated By:***	
Date Created:	11-08-2010	***Date Last Updated:***	
Actors:	Ada 76 years old Amy (15) and Adam (13) grandchildren of Ada		
Description:	Ada went to the zoo with Amy and Adam. They made some pictures with a digital camera that Amy got for her birthday. Amy uploaded the pictures to a photosharing website and wants to share them with her grandmother		
Trigger:	Amy uploads pictures that are relevant for her grandmother		
Pre- conditions:	Amy has an account with a photosharing website like Flickr, Picasa or a social networking service like Facebook The system selects photo’s using a search algorithm from a social networking site or photo sharing website. The pictures are shared if		

	they comply with one or more of the following conditions: • include Ada • include one or more of her contacts following the condition that they were taken during an activity where Ada was present • where uploaded to a folder that Ada explicitly received viewing rights to
Post- conditions:	Ada has seen the pictures and send a reply
Normal Flow:	**3.3.0** 1. Ada activates her HOMEdotOLD services channel using her remote control. 2. Ada navigates to her 'Photos' in the services menu 3. Ada navigates through various recent events, it is indicated if she was personally present or if the event did not include her 4. Ada selects 'trip to the zoo' 5. Ada browses through the pictures one by one using her remote control 6. For each picture she can see when and where it was taken (to remind her of the album she is viewing), and who were present during the activity. 7. Ada gets prompted to leave a response. Ada can select 'No response', or she can select from a series of emoticons and earcons. 8. Ada selects an emoticon for the pictures she likes 9. The response is added as a comment to the picture on the photosharing site
Alternative Flows:	**3.3.1** 8b Ada wants to forward a picture to her partner Charles 8c She presses OK on her remote control when viewing one of the pictures. 8d The system gives her the option to 'respond' or to 'forward' the photo. 8e Using here remote control Ada selects 'forward' 8f The system shows her all her contacts in a pop-up screen below the photo, she can select Charles by navigating through her contacts while still remaining clearly in the photo viewing service 8g Ada selects Charles 8h The system verifies "Do you want to send this photo to Charles" 8i Ada selects yes 8j The system sends the picture by email to Charles and goes back to the photo Ada was viewing
Exceptions:	
Includes:	
Priority:	

Frequency of Use:	Once every two weeks
Business Rules:	
Special Requirements:	
Assumptions:	
Notes and Issues:	

3.3.2 USAGE SCENARIOS

Relevant use cases:

- Sharing of photos
- Looking at photos

Combined usage:

- ***User-Profile 1:*** Mario is a 58 year old retired mechanic who lives in Hamburg. He is mentally fit but he suffers from age-related hearing loss and he also got problems with his knee since he had an accident 4 years ago. In general, Mario is a bit negative, not interested in modern technology. Moreover he is not able to see his son and his grandson very often because they live in Munich. For the use of the HOMEdotOLD system he needs, whenever hearing is necessary, to turn the TV loud.
- ***Beside-User-Profile 2:*** Bernd is Mario's 35 year old son who lives with his wife and his daughter in Munich.
- ***Combined sub-scenario:*** Bernd was on vacation in Italy with his wife and his daughter. He took a lot of nice pictures. Back at home he wants to share these photos with his dad. He uploads the photos from a USB-stick to the HOMEdotOLD "photos, videos, experience" sharing service. When Mario starts his system he gets the information that there have been new photos uploaded from his son. He is now able to take a look at the photos and is thereby more integrated in family life.

3.4 SOCIAL VOLUNTARY WORK

3.4.1 USE CASES

Use Case ID:	2.1		
Use Case Name:	Confirming a date for participating in social work		
Created By:	Stefan Schürz	***Last Updated By:***	
Date Created:	20/07/2010	***Date Last Updated:***	
Actors:	1. 70 year old retired cook (in the following denoted by user)		
Description:	A 70 year old retired cook confirms a date for participating in cooking meals for homeless people		
Trigger:	A social event where the user could participate was added to the user's "social voluntary work" service		
Pre- conditions:	1. The user is at home using the HOMEdotOLD system through a TV, a set-top box (if necessary) and a normal remote-control 2. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The user is already registered to the "social voluntary work" service and has declared his/her interest in the type of activity that is suggested to him 4. The user uses the arrow-keys, the "OK" button of the remote-control and also oral speech for the interaction with the HOMEdotOLD system		
Post- conditions:	-		
Normal Flow:	1. A notification is shown on the HOMEdotOLD home-screen that a social event was added to the "social voluntary work" service 2. The user enters the "social voluntary work" service by saying loud and clearly "social voluntary work" 3. The "social voluntary work" service screen is presented 4. The user gets told by the system with the assistance of the text to speech functionality that there is an upcoming social event on the (e.g. 25th of August 2010 at 5 o'clock pm) and if he wants to participate in cooking meals for homeless people 5. The user answers and confirms by saying loud and clearly "Yes" The social care organisation which organizes the social event receives a message that the user will participate in the upcoming event		
Alternative Flows:	It is possible that the above flow is performed via the "intelligent calendar service", namely the social work service is accessed through the intelligent calendar.		
Exceptions:	-		
Includes:	-		
Priority:	1		

Frequency of Use:	1 time per week
Business Rules:	-
Special Requirements:	Oral speech for interaction (microphone is needed)
Assumptions:	-
Notes and Issues:	-

Use Case ID:	2.2		
Use Case Name:	Register for participating in social voluntary work		
Created By:	Stefan Schürz	***Last Updated By:***	
Date Created:	28/07/2010	***Date Last Updated:***	
Actors:	• 70 year old retired cook		
Description:	A 70 year old retired cook registers himself for participating in cooking meals for homeless people		
Trigger:	-		
Pre- conditions:	1. The user is at home using the HOMEdotOLD system through a TV, a set-top box (if necessary) and a normal remote-control 2. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The users only use the arrow-keys and the “OK” button of the remote-control for the interaction with the HOMEdotOLD system		
Post- conditions:	-		
Normal Flow:	1. The user has chosen the “social voluntary work” button and confirmed by pressing the “OK” button on the remote-control 2. The “social voluntary work” screen is shown 3. The user chooses the “register” button and presses “OK” 4. A virtual keyboard and a register form pops up 5. The user registers himself (name, age, address, profession...) and presses “OK” 6. A list of on going social voluntary activities are presented to the user 7. The user selects those social voluntary activities in which he is interested to contribute to 8. A notification is shown on the HOMEdotOLD home-screen that the user is successfully registered to the service		
Alternative Flows:	-		
Exceptions:	-		
Includes:	-		
Priority:	1		
Frequency of Use:	Only 1 time		
Business Rules:	-		

Special Requirements:	-
Assumptions:	-
Notes and Issues:	This use case is also relevant to all other services to which a user is interested to register

Use Case ID:	2.3		
Use Case Name:	Automatically matching preferences of users with upcoming social voluntary work activities and suggesting possible participation of user(s)		
Created By:	Gianna Tsakou	***Last Updated By:***	
Date Created:	11/08/2010	***Date Last Updated:***	
Actors:	1. 70 year old retired cook		
Description:	The “social voluntary work” service, based on profile information about the users, infers their possible interest in an upcoming (newly organised) social work activity and notifies them about this and their possible contribution		
Trigger:	A new social work activity is being organised by the relevant local authority to which the user has the competency to contribute but which he was not aware of when registering to the service		
Pre- conditions:	1. The users are at home using the HOMEdotOLD system through a TV, a set-top box (if necessary) and a normal remote-control 2. The users have turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The users have already filled in their profile when registering to the HOMEdotOLD social work service, declaring their competencies, interests, etc. 4. The users have declared their location in their profile 5. The user uses the arrow-keys, the “OK” button of the remote-control and also oral speech for the interaction with the HOMEdotOLD system		
Post- conditions:	A notification is shown on the HOMEdotOLD home-screen that a new social work activity is being organised by XYZ charity organisation and that the activity was added to the “intelligent calendar” service, marked as “activities you may be interested in”		
Normal Flow:	1. A notification is shown on the HOMEdotOLD home-screen that a new item has been added in the social voluntary work service of the user marked as “activities you may be interested in” 2. The user enters the “social voluntary work” service by saying loud and clearly “social voluntary work” 3. The “social voluntary work” service screen is presented on the user’s screen. 4. The user gets told by the system with the assistance of the text to speech functionality that there is an upcoming social event on the (e.g. 25th of August 2010 at 5 o’clock pm) and if he wants to		

	participate in cooking meals for homeless people 5. The user notices the dates during which the activity is being held, the type of activity (e.g. cooking for the homeless) and a short description, if applicable 6. The user is interested in contributing to the activity and confirms his/her availability. 7. The user answers and confirms by saying loud and clearly "Yes" 8. The social care organisation which organizes the social event receives a message that the user will participate in the upcoming event
Alternative Flows:	It is possible that the above flow is performed via the "intelligent calendar service", namely the social work service is accessed through the intelligent calendar.
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	Every time a new social activity that matches users' profile is organised
Business Rules:	-
Special Requirements:	Oral speech for interaction (microphone is needed)
Assumptions:	-
Notes and Issues:	-

3.4.2 USAGE SCENARIOS

Relevant use cases:

- Register for participating in social voluntary work
- Confirming a date for participating in social work
- Automatically matching preferences of users with upcoming social voluntary work activities and suggesting possible participation of user(s)

Combined usage:

- ***User-Profile:*** John is a 70 year old retired cook who lives on his own in London. He does not have kids and his wife died 3 years ago. A part from that he got some friends who live around his place and some who live in Spain and Portugal. He loved his work and travelled a lot. Since he retired he feels a bit useless and lonely. His typical daily routine involves reading newspapers and watching football on TV. He is mentally fit but he needs a cane for walking and he suffers from mild sight loss. For the interaction with the HOMEdotOLD system he uses oral speech commands and the remote-control. When trying to control his television it is very hard for John to see the numbers on his remote control due to his farsightedness.
- ***Combined sub-scenario 1****:* John is already using the HOMEdotOLD system for staying in contact with his friends. But he would like to feel more useful and needed by doing something meaningful for people who are in need. So he registered himself to the "social voluntary work" service of the system. The Municipality in which John lives frequently organises cooking of meals for the homeless, usually every Saturday; moreover, the church close to John's house, once a month, places a stand in the square

where people can drop off clothes and food for the homeless. Both these activities are described in detail in the HOMEdotOLD "social voluntary work" service that John has access to, so when registering, John declares his interest in both activities, and does not forget to mention his vast cooking experience. 2 weeks later he gets told by the system, with the assistance of the text to speech functionality, that there is an upcoming social event around his block where he could participate. John will have to cook some meals for homeless people at the event together with his fellow citizens participating in the event. He confirms that he wants to participate by oral speech commands. John is now part of a meaningful activity and therefore feels more self-confident and self-satisfied.

- ***Combined sub-scenario 2****:* When registering to the "social voluntary work" service of the HOMEdotOLD system, only one possibility of voluntary work is available based on the current activities of the local authorities: the church close to John's house, once a month, places a stand in the square where people can drop off clothes and food for the homeless. So when registering, John declares his interest in this activity, however, he does not forget to mention his vast cooking experience when asked about his past profession. 2 months later, the Municipality where John lives decides to organise cooking of meals for the homeless every Saturday. They would love to recruit as many volunteers for this as possible both for cooking meals and serving them to the homeless. Given his cooking experience, John is notified about this upcoming activity and is asked, through the HOMEdotOLD system if he would like to contribute to this activity. He is thrilled that he can practice his cooking skills again, even if his sight does not help him much anymore. His fellow citizens, who have volunteered, like him, will be there to help, if needed, and this gives him a lot of confidence. He gladly volunteers.

3.5 INTELLIGENT CALENDAR

3.5.1 USE CASES

Use Case ID:	1.1		
Use Case Name:	Arranging a date for a remote tutoring		
Created By:	Stefan Schürz	***Last Updated By:***	
Date Created:	20/07/2010	***Date Last Updated:***	
Actors:	3. 65 year old grandmother (retired mathematician) 4. 12 year old grandson (in the following denoted by user)		
Description:	A grandson arranges a date for a remote tutorial in mathematics with his grandmother		
Trigger:	A scheduled activity needs to be added to the user's "intelligent calendar" service		
Pre- conditions:	2. The user is at home using the HOMEdotOLD system through a TV, a set-top box (if necessary) and a normal remote-control 3. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 4. The user has already added his grandmother as a contact to his system 5. The user only uses the arrow-keys and the "OK" button of the remote-control for the interaction with the HOMEdotOLD system		
Post- conditions:	10. The user has chosen the "intelligent calendar" button and confirmed		

	by pressing the “OK” button on the remote-control
Normal Flow:	20. A virtual calendar is presented on the user’s screen. 21. The user chooses a date (e.g. 30th of July 2010) and presses “OK” 22. A text-entry-box and a virtual keyboard pops up 23. The user enters the subject matter (remote mathematic tutorial) and the time (e.g. 6 o’clock pm) and presses “OK” 24. The user presses a “synchronisation” button 25. The agenda of the user is now synchronized with the agenda of his grandmother
Alternative Flows:	-
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	1 to 2 times per day
Business Rules:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	1.2		
Use Case Name:	Confirming a date for a remote tutoring		
Created By:	Stefan Schürz	***Last Updated By:***	
Date Created:	20/07/2010	***Date Last Updated:***	
Actors:	1. 12 year old grandson 2. 65 year old grandmother (retired mathematician) (in the following denoted by user)		
Description:	A grandmother confirms a date for a remote tutorial in mathematics with his grandson		
Trigger:	A scheduled activity was added to the user’s “intelligent calendar” service		
Pre- conditions:	1. The user is at home using the HOMEdotOLD system through a TV, a set-top box (if necessary) and a normal remote-control 2. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The user has already added his grandson as a contact to his system 4. The user only uses the arrow-keys and the “OK” button of the remote-control for the interaction with the HOMEdotOLD system		
Post- conditions:	-		
Normal Flow:	1. A notification is shown on the HOMEdotOLD home-screen that a		

	date was added to the “intelligent calendar” service 2. The user chooses the “intelligent calendar” button and confirms by pressing the “OK” button 3. A virtual calendar is presented on the user’s screen 4. The user notices the date for the remote tutorial in mathematics on the (e.g. 30th of July 2010 at 6 o’clock pm) which is deposited in colour 5. The user confirms by pressing the “OK” button 6. The grandson receives a message on the HOMEdotOLD home-screen that the date was accepted by his grandmother
Alternative Flows:	-
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	1 to 2 times per day
Business Rules:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	1.3		
Use Case Name:	Automatically matching preferences of users and suggesting possible common activities between relatives or friends		
Created By:	Stefan Schürz	***Last Updated By:***	Gianna Tsakou
Date Created:	28/07/2010	***Date Last Updated:***	11/08/2010
Actors:	1. 65 year old grandmother (in the following denoted by user) 2. 12 year old grandson (in the following denoted by user)		
Description:	The “intelligent calendar”, based on profile information about the users, infers their possible interest in a movie being played currently and notifies them about this possible common activity		
Trigger:	A film, the type of which both users like, is going to be played in the cinema next to them		
Pre- conditions:	1. The users are at home using the HOMEdotOLD system through a TV, a set-top box (if necessary) and a normal remote-control 2. The users have turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The users have already added each other as a contact to their system 4. The users have already defined the types of films they like in their profile 5. The users have declared their location in their profile		

	6. The users only use the arrow-keys and the "OK" button of the remote-control for the interaction with the HOMEdotOLD system
Post- conditions:	A notification is shown on the HOMEdotOLD home-screen that a new date for going to the movies was added to the "intelligent calendar" service, marked as "activities you may be interested in"
Normal Flow:	1. A notification is shown on the HOMEdotOLD home-screen that a new item has been added in the intelligent calendar of the user marked as "activities you may be interested in" 2. The users have chosen the "intelligent calendar" button and confirmed by pressing the "OK" button on the remote-control 3. A virtual calendar is presented on the user's screen. 3. The users both notice the dates during which the movie is being played, the type of movie and a short description 4. The users are interested in watching the movie together and arrange a date for this activity, as described in use cases 1 and 2 above.
Alternative Flows:	-
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	1 time per week
Business Rules:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

3.5.2 USAGE SCENARIOS

Relevant use cases:

- Arranging a date for a remote tutoring
- Confirming a date for a remote tutoring
- Automatically matching preferences of users and suggesting possible common activities between relatives or friends

Combined usage:

- ***User-Profile 1:*** Susan is a 65 year old grandmother who is a retired mathematician. She is living alone in an assisted living home in Bristol. Her son David had to move to Australia because he got a well paid job there. Susan is mentally and physically fit for her age. Her daily routines involve shopping, walking the dog, cleaning, watching TV and reading books. Her relationship with technology is weak. Since her husband died, she has not used her DVD player anymore. Despite the fact that she has no computer, she is aware of the internet and would like to learn more about it. She is conservative and does not like changes. Moreover she misses her son and her grandson a lot.
- ***Beside User-Profile 2:*** Kevin is Susan's 12 year old grandson. He is living in Sydney with his father David and goes to school. Lately he got problems in mathematics.
- ***Combined sub-scenario 1:*** For some time Susan and her son David are staying in

contact with each other through the HOMEdotOLD system. They usually do a videoconference weekly. David told his mother Susan that Kevin got some problems in mathematics. Because private lessons in mathematics are quite expensive, Susan decided to give Kevin a Remote Tutorial with the assistance of the HOMEdotOLD system. They arrange a date for the tutorial through the "intelligent calendar" service. First Kevin suggests a date for the tutorial (e.g. 30th of July 2010 at 6 o'clock pm). Afterwards Susan confirms the date and so it is fixed. Both start the "videoconference" service on the 30th of July 2010 at 6 o'clock and hold the remote tutorial.

- ***Combined sub-scenario 2:*** David lost his job in Sydney so he moved with his son back to Bristol. Susan is happy about that because now she sees her son and her grandson more often. They both had defined in their HOMEdotOLD-profile that they like watching comedy-movies, and that Robert de Niro is one of their favorite actors, so the "intelligent calendar" service automatically suggests possible comedies, or other films with Robert de Niro, being played around their location, in which both Susan and David might be interested. When they enter the "intelligent calendar" service they see the date and the place of the movie which is deposited in colour. They both confirm the date and so it is fixed.

3.6 REMOTE DINING

3.6.1 USE CASES

Use Case ID:	6.1		
Use Case Name:	Remote dining		
Created By:	Harilaos Sofronis	***Last Updated By:***	
Date Created:	20/07/2010	***Date Last Updated:***	
Actors:	1. 70 year old retired cook (Pavlos) 2. 15 year old grandson (George) 3. 47 year old daughter (Maria)		
Description:	A 70 year old is having videoconference with his 15 year old grandson while dining in front of TV		
Trigger:	To communicate with family and friends while eating		
Pre- conditions:	1. The users are at their home using the HOMEdotOLD system through a TV, a set-top box and a normal remote-control. 2. The users have turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The users only use the arrow-keys and the “OK” button of the remote-control for the interaction with the HOMEdotOLD system.		
Post- conditions:			
Normal Flow:	The ‘’remote dining service’’ is presented at the user’s screen. The user apply the ‘’OK’’ button and the videoconference starts. The users see each other on the TV while they are dining. The users discuss with each other using the microphone and share experiences while they are eating. The users has the opportunity to ‘’freeze’’ the image and then information appears about products shown in the picture (optional). Each user may select the option ‘’end’’ to terminate the service		
Alternative Flows:	-		
Exceptions:	-		
Includes:	Videoconferencing service		
Priority:	2		
Frequency of Use:	1 time per week		
Business Rules:	-		
Special Requirements:	Oral speech for interaction (microphone is needed)		
Assumptions:	-		
Notes and Issues:	-		

3.6.2 USAGE SCENARIOS

Relevant use cases:

- Remote dining

Combined usage:

- ***User-Profile 1:*** Pavlos is a 70 year old retired cook. He is living in the country, in a village around 300 km from Athens. After his retirement he decided to live in his old family home. He barely sees his family as they reside in Koropi, a city neighbouring Athens and due to distance and time issues they hardly come to visit him.
- ***Beside User-Profile 2:*** Maria is a 47 year old divorced mother. She is working and residing in Koropi and she has a 15 year old son, George.
- ***Beside User-Profile 3:*** George is a 15 year old boy living with his mother Maria, in Koropi, Greece.
- ***Combined sub-scenario 1:*** Pavlos seeks more communication with its family members in Koropi, his daughter Maria and his grandson George. Most of all, he would like to share some everyday life moments that due to the distance between them, it becomes increasingly difficult to experience. The three users use the HOMEdotOLD remote dining service not only to see each other through videoconference, but to have a taste of what everyday life could be if they lived together. At least two times in the week, the users turn on remote dining service when they are ready for lunch or dinner, and they start videoconferencing while they are eating. They discuss with each other using the microphone and share the experiences of the day, having that way a sense that they are living together. HOMEdotOLD remote dining service makes Pavlos feel less lonely and to have a more vivid contact with his beloved ones.

3.7 NEWS HEADLINES

3.7.1 USE CASES

Use Case ID:	5.1		
Use Case Name:	Customizing access to personalized news service		
Created By:	Harilaos Sofronis	***Last Updated By:***	
Date Created:	20/08/2010	***Date Last Updated:***	
Actors:	58 year old retired miner (Mario) Helena 65 year old retired journalist		
Description:	A 58 year old father customizes the personalised news service.		
Trigger:	To set-up preferences in accessing news headlines		
Pre- conditions:	1. The user is at home using the HOMEdotOLD system through a TV, a set-top box and a normal remote-control 2. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The user only uses the arrow-keys and the “OK” button of the remote-control for the interaction with the HOMEdotOLD system		
Post- conditions:	1. The user has chosen the “access to news headlines” button and confirmed by pressing the “OK” button on the remote-control		
Normal Flow:	1. The ‘’personalised news service’’ is presented on the user’s screen. 2. A choice of ‘’customization’’ and ‘’proceed’’ button is appearing.		

	3. The user chooses the selection ‘’customization’’ and presses “OK”. 4. Some predefined categories (i.e health, politics, culture, sports, and economics,) of interests show up. 5. A text-entry-box and a virtual keyboard pops up. 6. The user types the topic of its interests along with a short description in each category (i.e health, osteoporosis). 7. The user presses a “confirm” button. 8. The personalised news service is now ready to be used.
Alternative Flows:	1. The ‘’personalised news service’’ is presented on the user’s screen. 2. The user chooses the selection ‘’customization’’ and presses “OK”. 3. Since a customization is already saved an update option will be Shown. The user presses ‘’OK’’ 4. A text-entry-box and a virtual keyboard pops up. 5. The user oversees its former selections and makes changes to the interests of each predefined category. 6. The user presses a ‘’confirm’’ button. 7. The updated personalised news service is now ready to be used.
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	1 times per week
Business Rules:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	5.2		
Use Case Name:	Using the personalized news service.		
Created By:	Harilaos Sofronis	***Last Updated By:***	
Date Created:	20/08/2010	***Date Last Updated:***	
Actors:	58 year old retired miner (Mario) Helena 65 year old retired journalist		
Description:	A 58 year old father uses the personalised news service		
Trigger:	To be informed from the personalised news service		
Pre- conditions:	1. The user is at home using the HOMEdotOLD system through a TV, a set-top box and a normal remote-control. 2. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown. 3. The user has already customized the service to its preferences. 4. The user only uses the arrow-keys and the “OK” button of the		

	remote-control for the interaction with the HOMEdotOLD system
Post- conditions:	-
Normal Flow:	7. The ‘’personalised news service’’ is presented on the user’s screen. 8. A choice of ‘’customization’’ and ‘’proceed’’ button is appearing. 9. The user presses the ‘’proceed button’’. 10. A selection of categories show up, each one with a summary of proposed topics based on the preferences of the user. 11. The user selects a category and a topic using the arrow keys and confirms by pressing the “OK” button. 12. The user sees the content of the selected topic.
Alternative Flows:	-
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	2 to 3 times per day
Business Rules:	-
Special Requirements:	-
Assumptions:	-
Notes and Issues:	-

Use Case ID:	5.3		
Use Case Name:	Easy access to headline news.		
Created By:	Harilaos Sofronis	***Last Updated By:***	
Date Created:	20/08/2010	***Date Last Updated:***	
Actors:	58 year old retired miner (Mario) Helena 65 year old retired journalist		
Description:	Easy access to news headlines at regional, national, European of worldwide levels		
Trigger:	To access easily the news at different local levels.		
Pre- conditions:	1. The user is at home using the HOMEdotOLD system through a TV, a set-top box and a normal remote-control 2. The user has turned on the TV, the set-top box and the HOMEdotOLD home-screen is shown 3. The user uses the arrow-keys, the “OK” button of the remote-control and also oral speech for the interaction with the HOMEdotOLD system		
Post- conditions:	-		
Normal Flow:	1. The ‘’personalised news service’’ is presented on the user’s screen. 2. A choice of four main categories (regional, national, European, worldwide level) to choose from is presented. A summary of major headlines appears next to each level.		

	3. The user chooses the desired level through the arrow keys of the remote control, and presses ok. 4. A new screen opens with the main topics from the level selected. 5. The user selects the topic using the arrows keys and presses OK 6. The user sees the content of the selected content.
Alternative Flows:	-
Exceptions:	-
Includes:	-
Priority:	1
Frequency of Use:	1 time per week
Business Rules:	-
Special Requirements:	Oral speech for interaction (microphone is needed)
Assumptions:	-
Notes and Issues:	-

3.7.2 USAGE SCENARIOS

Relevant use cases:

- Customizing access to personalized news service
- Using the personalized news service.
- Easy access to headline news.

Combined usage:

- ***User-Profile 1:*** Marios is a 59 year old retired miner. He is living alone in an assisted living home in Koropi. Three years ago, he had a serious accident at work and he was obliged to retire. He has some kinetic problems and he cannot walk for long distances. He spends most of his day in the house and he finds enjoyment in watching TV, for entertainment and information. Once before the accident he used to get a lot of newspapers and to read the news from various sources. Getting informed about the news is of great importance to him, as he feels that he is staying in tune with what happens in the society and seeks for the widest information possible.
- ***Beside User-Profile 2:*** Helena is a 65 year old retired journalist. She is healthy and lives alone in a rural area near Koropi. After her husband died two years ago, she has decided to leave behind the noisy life of Athens and settle down to a more relaxed kind of life. As she has quite plenty of free time, she is leading a newly formed social enterprise in Koropi which organizes information campaigns about excluded people from the job market, and issues a weekly newspaper on local, regional and national developments about social economy.
- ***Combined sub-scenario 1:*** Marios wants at a glance to be informed about the most prominent features of everyday life, from economic matters to health issues. He uses the personalized news service of HOMEdotOLD that he has already customized to fit his individual interests. Once he starts the service the categories he is most interested in, show up. He reads the headlines and selects the topics of his particular choice. He open the links provided to each topic to get further details. Then, he is able now to obtain again the variety of information he wants and in the most personalised way.

Combined sub-scenario 2: HOMEdotOLD service ‘’personalized news headlines’’ is very

essential for Helena. Not only it helps her to keep in touch with the latest news, but it also consists an invaluable tool for her social venture and the newspaper she issues. HOMEdotOLD flexibility to provide personalized news at different levels (local, regional, national, European) contribute to keep her informed about a (pre) selected topic with the most easy and efficient manner instead of searching to a vast pool of information provided in conventional means such as newspapers and the internet.

3.8 CONSOLIDATED USE CASES / USAGE SCENARIOS RANKING

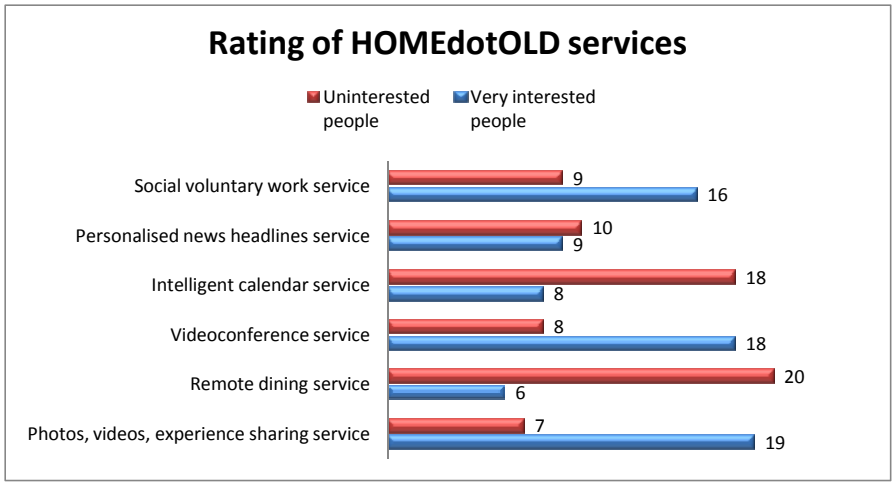


Figure 12: Consolidated Use Cases / Usage Scenarios Ranking

Figure 12 presents the consolidated services and scenario ranking. Regarding the "Intelligent Calendar" service, although it seems that it presents limited interest by the users, it is expected that addressing of privacy and personalization issues, it will increase the users' confidence and interest for that service.

4. STATE-OF-THE-ART ANALYSIS

4.1 SOCIAL NETWORKING SERVICES, COMMUNICATION AND CONTENT SHARING SERVICES

4.1.1 INTRODUCTION

All the internet users during the past few years observe with interest the development of the "classic" internet into what commonly know as WEB 2.0. This is due to the fact that its usage concerns more "daily" human activities, thus shaping at some way its further development.

The main characteristic of WEB 2.0 is that we pass from the initial static way of presenting information to the user into a dynamic way of presentation, which allows interactiveness with the user while at the same time invoking his contribution in the configuration of the content of information.

Thus we see continuous growth of various applications with interactive user interfaces, that allow direct and continuous renewal of information to the user, with possibility of categorisation of content (tagging) for easier search, but most importantly the creation of information from the user itself.

Web 2.0 assembles the possibilities of client- and server-side software, content synchronization and the usage of network protocols. Browsers can use plugins and software extensions for content management and interaction with the user. Web 2.0 sites provide to the users storage of information, possibilities for creation and diffusion of information that was not possible in the environment that now is known as "Web 1.0".

Many of the interactive commands that characterize the operation of Web 2.0 are already know to us from various web pages, such as Facebook or YouTube for example. Such expressions are the search, tag, links positioning or authoring, as it functions in many wiki, where users can create articles but they can also renew or erase already existing articles.

The client-side technologies that are formally used in the development of Web 2.0 are Ajax (Asynchronous JavaScript and XML), Adobe Flash, and the JavaScript/Ajax development frames, as Yahoo! UI Library, Dojo Toolkit, MooTools, and jQuery. Developing in Ajax uses JavaScript to upload and download new data from the web server without being necessary to reload the entire web page.

Examples of Web 2.0 include social-networking sites, blogs, wikis, video-sharing sites, hosted services, web applications, mashups and folksonomies.

In the following subsections the most popular social networking and communication services are presented focusing in their main features, functionality, security and public APIs. Moreover, an analysis on age distribution will illustrate the penetration of each social networking site to specific age groups, as well as which age group dominates the social media sphere.

4.1.2 SOCIAL NETWORKING SERVICES

A **social network service** is an online service, platform, or site that focuses on building and reflecting of social networks or social relations among people, e.g., who share interests and/or activities. A social network service essentially consists of a representation of each user (often a profile), his/her social links, and a variety of additional services. Most social network services are web based and provide means for users to interact over the internet, such as e-mail and instant messaging. Social network service usually means an individual-centered service whereas online community services are group-centered. Social networking sites allow users to share ideas, activities, events, and interests within their individual networks.

The main types of social networking services are those which contain category places (such as former school-year or classmates), means to connect with friends (usually with self-description

pages) and a recommendation system linked to trust.

There have been some attempts to standardize these services to avoid the need to duplicate entries of friends and interests.

Although some of the largest social networks were founded on the notion of digitizing real world connections, many networks focus on categories from books and music to non-profit business to motherhood as ways to provide both services and community to individuals with shared interests.

4.1.2.1 POPULAR SOCIAL NETWORKING SERVICES

Bellow the top ten social networking sites are listed, according to *Royal Pingdom*:

1. **Facebook** started out strictly for college students and was available by invitation only. Now, it is a cultural phenomenon stretching across the globe. With more worldwide users than **MySpace**, Facebook has taken hold as undisputable leader amongst social networking sites.
2. **MySpace** is extremely popular and receives a lot of traffic, but is not for the serious blogger. The advantages to MySpace include the ability to upload and share video, audio and image files as well as a blog. But blogging is not the main business of MySpace, MySpace's central focus is social networking.
3. **Bebo** Bought by AOL, has been gaining ground in the United States, it's been nothing but good news and consistent growth. Extraordinarily popular in the UK, is beginning to give some of the other social networking sites a real run for their money.
4. **Frienster** is one of the most popular social networking sites in Asia. Friendster provides plenty of networking features, the ability to customize your personal profile and to get you on your way to establishing a large network of friends.
5. **Hi5** is completely advertisement free. A few of the things keeping hi5 out of our top three is the difficult search options, their sad help and support section and dependency on apps.
6. **Orkut** Google's attempt at social networking. Already popular in Brazil and India. In order to register for an Orkut account you must have a Gmail account.
7. **PerfSpot** is relatively new kid on the block. A unique feature to PerfSpot is the ability to set up an Internet store using PerfSpot at your host
8. **Yahoo! 360** To join you must have a Yahoo! account. Since Yahoo! 360 works within the typical Yahoo! community they do not include the usual social networking features like videos and groups, additionally Yahoo! does not host any photos on their servers. All photos you post to your 360 page are hosted by Flickr.
9. **Zorpia** is the largest social network you've never heard of.
10. **Netlog** is a European social networking site with more than 35 million user and is relatively unknown in the United States. Completely advertisement free. Netlog is not an advocate of meeting and networking with people you don't already know.

In our survey we looked on aspects such as:

1. Demographics, with particular interest on the minimum age the social network requires users to be in order to create an account or profile, if the social network site has users from all over the world, if the social network allows users to change the language their profiles are displayed.
2. Profile customization and overview, such as
    a. Profile background colour or text,
    b. Custom decorative profile skins,
    c. Custom URL, allowing for easier profile discovery. A common example is *http://myspace.com/yourname*,
    d. Profile photo,

   e. Profile comments,
   f. Overview of friends on user profile,
   g. Overview of used applications on user profile.
3. Privacy issues, focusing on the ability to set how public or private a profile can be.
4. Security with respect to the ability on reporting and blocking users and messages.
5. Additional features, such as:
   a. Ability to host chat rooms,
   b. Instant messaging function for users to chat with each other,
   c. Tagging of photos and videos,
   d. Creation of own groups,
   e. E-mail like communication,
   f. Mobile version of the social network designed specifically for mobile phones,
   g. Hosted music, professional videos (such as television programs or movies available online to watch) and amateur/personal videos,
   h. Online games and classifieds.
6. Search ability, allowing members to search for other members in a safe and easy to use environment.
7. Legitimate Friend Focus, meaning that social network sites keep profiles and search options private enough

Result of this survey is presented in the following table.

	Facebook	MySpace	Bebo	Friendster	Hi5	Orkut	PerfSpot	Yahoo! 360	Zorpia	Netlog
Demographics										
Minimum Age to Join	13	14	13	16	13	18	13	18	16	13
International Community	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Multilingual	✓	✓		✓	✓	✓	✓			✓
Advertisement Free					✓	✓		✓		
Profiles										
Profile Editor (WYSIWYG)	✓	✓		✓	✓		✓	✓	✓	✓
Custom Skins		✓	✓	✓	✓		✓	✓	✓	✓
Customize Code (HTML or CSS)		✓		✓						
Personalized URL		✓	✓	✓	✓			✓	✓	✓
Photos	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Max. Photo Size	4MB	5MB	2MB	2MB	2MB	10MB	3MB	5 MB	16 MB	3 MB
Post Comments	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Friends	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Blog/Journal		✓	✓	✓	✓		✓	✓	✓	✓
Applications	✓	✓	✓	✓	✓	✓	✓			
Security										
Privacy Settings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Block Users	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Report Spam	✓	✓	✓	✓	✓	✓				✓
Report Abuse	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Safety Tips	✓	✓	✓		✓	✓	✓	✓		
Networking Features										
ChatRooms		✓						✓		
Instant Messaging	✓	✓	✓				✓	✓	✓	✓
Tags	✓	✓	✓	✓	✓				✓	✓
Bulletins	✓	✓		✓			✓		✓	

Groups	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Groups (Number of Categories)	23	34			22	28	100	17	11	13
Create a Group	✓	✓	✓		✓	✓	✓	✓	✓	✓
Forums	✓	✓		✓					✓	
Mail	✓	✓	✓		✓	✓	✓	✓	✓	✓
Grab/Copy/Share Photos	✓	✓	✓		✓		✓		✓	
Mobile	✓	✓	✓							
Music	✓	✓	✓				✓		✓	✓
Music Videos	✓	✓	✓	✓						
Commercial Videos		✓	✓				✓			
Personal Videos	✓	✓	✓	✓		✓			✓	✓
Games		✓	✓				✓			
Classifieds	✓	✓		✓			✓			
Events	✓	✓							✓	
Books	✓	✓								
Search										
By Name	✓	✓	✓				✓		✓	✓
By Email Address	✓	✓	✓	✓	✓				✓	
By School	✓	✓		✓					✓	
By City/ Zip Code		✓		✓	✓		✓		✓	✓
By Interests	✓	✓		✓					✓	
By Keyword		✓		✓	✓	✓		✓	✓	✓
Browse Without Membership		✓					✓		✓	
Technical Help/Support										
eMail Support	✓	✓	✓	✓			✓		✓	✓
FAQ	✓	✓	✓	✓	✓	✓		✓	✓	✓
User Forums						✓		✓		

Table 3: Social Networking Websites Review Comparison

4.1.2.2 SOCIAL NETWORK AGE DISTRIBUTION

The age distribution in the social media sphere is presented in Figure 13

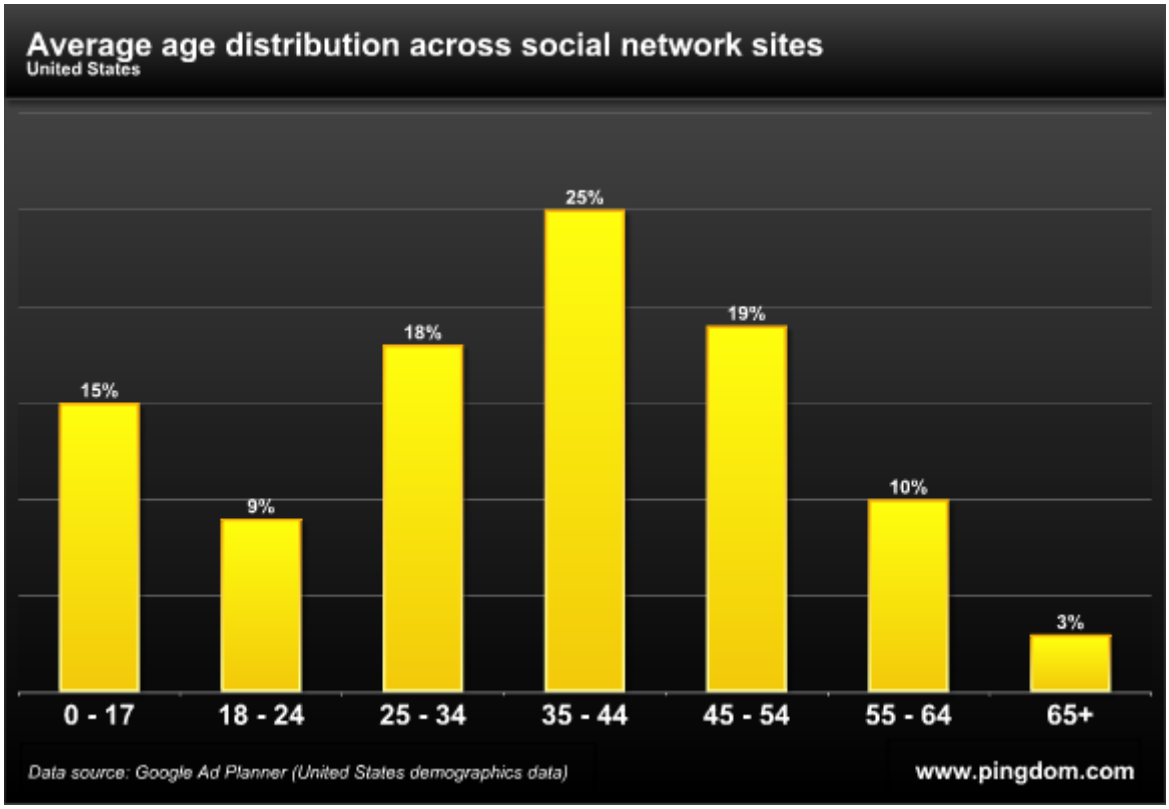


Figure 13: Average age distribution across social network sites

A full **25% of the users** on social networking sites are aged 35 to 44, which in other words is the age group that dominates the social media sphere. Only 3% are aged 65 or older.

When looking at individual social network sites, the differences are significant, as shown below. The list has been sorted by the average user age per site, with the "youngest" site showing at the top and the "oldest" at the bottom.

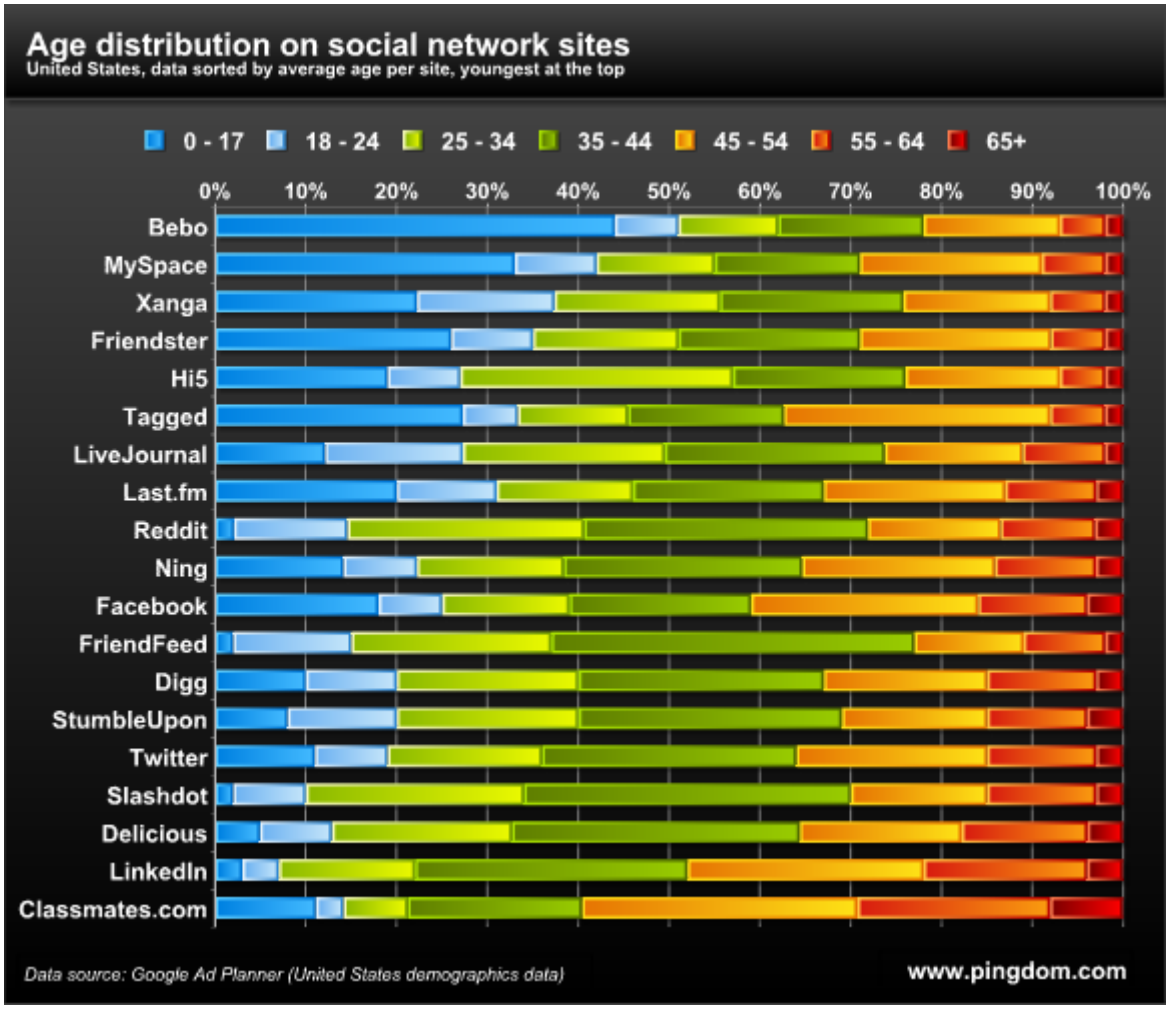


Figure 14: Age distribution of social network sites

What can be seen from the above figure is that:

- **MySpace** appeals to a much younger audience than the other sites with 33% of its users being aged 17 or less,
- 64% of **Twitter's** users are aged 35 or older,
- 61% of **FaceBook's** users are aged 35 or older.

4.1.2.3 DOMINANT AGE GROUPS

As shown in Figure 13 most of the social networks are dominated by users in the age group 35-44. This is the generation of people who were in their 20s as the Web took off in the mid '90s.

If we look at which age groups are the largest for each site, we get the following distribution:

- 0 – 17: Tops **4 out of 19 sites** (21%)
- 18 – 24: Tops no site
- 25 – 34: Tops **1 out of 19 sites** (5%)
- 35 – 44: Tops **11 out of 19 sites** (58%)
- 45 – 54: Tops **3 out of 19 sites** (16%)
- 55 – 64: Tops no site
- 65 or older: Tops no site

What can be seen here is that the age group 18 – 24 does not appear to be at its largest for none of the social networking sites. This can be explained by this interval being a bit smaller

than the other ones, since it spans seven years, compared to 10 for most of the others. Similarly the two oldest age groups don't top any of the sites.

4.1.2.4 AVERAGE USER AGE PER SITE

An estimate of the average age for each of the social network sites is illustrated bellow.

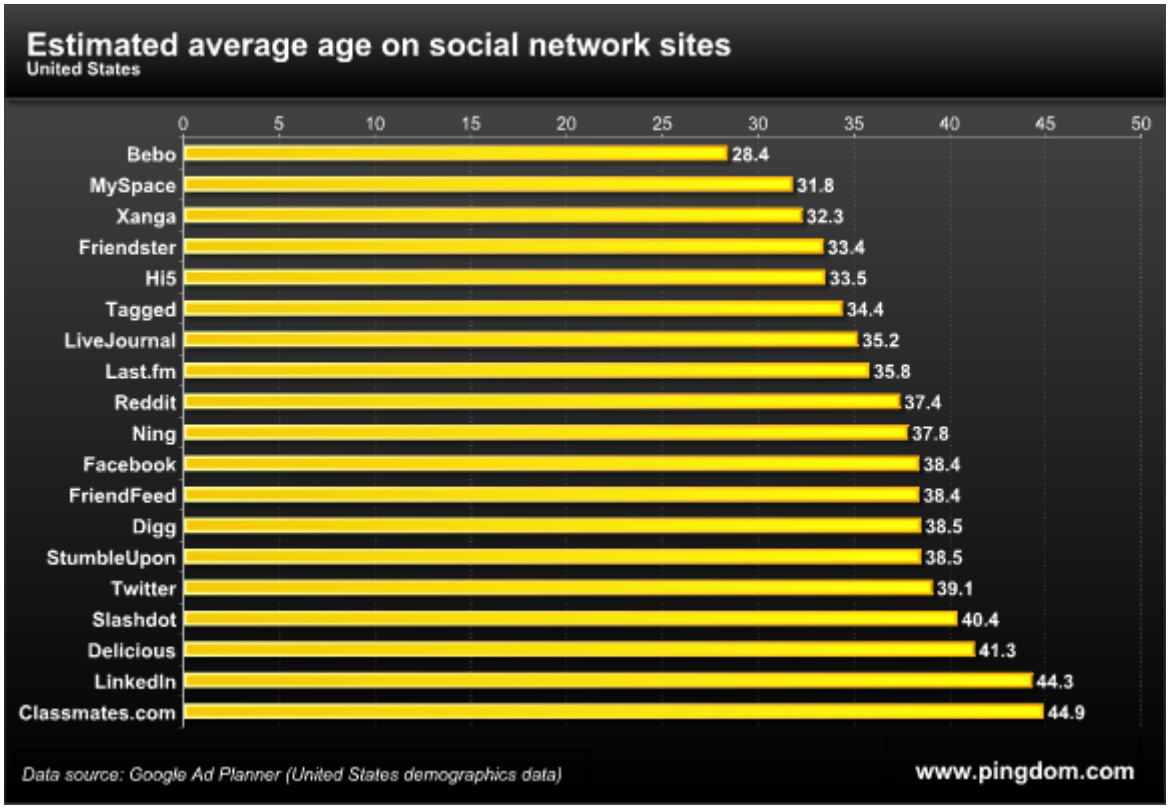


Figure 15: Estimated average age on social network sites

Looking at Figure 15 we can see that the average social network user is 37 years old. LinkedIn has a 44 years old average user age, which can be explained due to its business focus. Twitter, has a 39 years old average user age, while Facebook and MySpace have a 38 and 31 years old average user age respectively. Finally Bebo has by far the youngest users, with an average age of 28 years old, which is also illustrated in Figure 14 with 44% of its users being aged 17 or less.

4.1.2.5 POPULAR SOCIAL NETWORKING SERVICES DETAILS

In this section the most popular social networking sites are presented. Their main features in terms of profile customization, privacy and security as well as additional features, including music sections, video uploads, groups and more are also presented, followed by a description of how these social networking sites work. Finally, known security issues and threats per social networking site are presented, together with their public API's enabling 3rd party services/applications to read and write to these sites.

4.1.2.5.1 FACEBOOK.COM

Overview & Main Features

Facebook started out strictly for college students and was available by invitation only. Now, it is a cultural phenomenon stretching across the globe. With more worldwide users than **MySpace**, Facebook has taken hold as undisputable leader amongst social networking sites.

Profiles allow users to post pictures, comments, blogs and apps. Additionally, it has some of the best privacy options on the Internet. Facebook encourages members to use the site in order to foster relationships with people they already know, or friends, relatives and acquaintances.

Facebook's website design is straightforward. Its limited graphics and decoration create a uniform utilitarian interface. Although it's not possible to customize skins or change the colour scheme, it's possible to rearrange the position of some of the information boxes of the user profile by simply dragging and dropping them to other spots on the screen.

Its main features are:

- **Chat**. Users are able to chat with their Facebook friends and on a one-to-one basis, although a user may chat with multiple friends simultaneously through separate chat interfaces.
- **Messages and Inbox**. Possibility to send e-mail like messages to each other.
- **Networks, Groups, and Like Pages**. Facebook allows different networks and groups to which many users can join. Groups are used for discussions and events etc., enabling a number of people to come together online sharing information and discussing specific subjects. Individuals or companies can create "Like Pages" which allows users to "like" the individual, product, service, or concept. Like Pages look and behave much like a user's personal private profile.
- **News Feed**. Highlights information that includes profile changes, upcoming events, and birthdays, among other updates.
- **Notifications** of the more important events, e.g. someone sharing a link on the user's wall or commenting on a post the user previously commented on, appear in the bottom left. When a user is online, new notifications appear on their screen, keeping the user up to speed with events as they are occurring.
- **Status Updates**. Allows users to post messages for all their friends to read, informing them of their current "status" (i.e. their current feelings, whereabouts or actions).
- **Wall**. The Wall is a space on each user's profile page that allows friends to post messages for the user to see while displaying the time and date the message was written.
- **Events**. A way for members to let friends know about upcoming events in their community and to organize social gatherings. Events require an event name, network, host name, event type, start time, location, and a guest list of friends invited. Events can be Public or Private. Private events cannot be found in searches and are by invitation only.
- **Marketplace**. Allow users to post free classified ads within the following categories: For Sale, Housing, Jobs, and Other.

- **Places**. Let users “check in” to Facebook using a mobile device to let a user's friends know where they are at the moment.
- **Photos**. One of the most popular applications, where users can upload an unlimited number of photos, tag friends, and comment on photos.
- **Videos**. Users can add their videos with the service by uploading video, adding video through Facebook Mobile, and using a webcam recording feature. Additionally, users can “tag” their friends in videos they add much like the way users can tag their friends in photos. Users also have the option of video messaging. Videos cannot be placed in categories, whereas photos are sorted by albums.
- **Search**, lets users search the contacts list of e-mail accounts, looking for other users who have profiles in Facebook

Functionality

Facebook functions on a relationship model, based on “friends” and network membership. When users register, they select a category of network, such as workplace or college, and then choose from a list of available networks in that category. Users can be members of multiple networks and, with some restrictions, can change networks. Based on mutual agreement, users can become “friends” and this designation dictates how certain functions work.

Once a member that we want to connect with, is found, we can send them a message, see a list of their friends and invite them into our network of friends.

As presented before Facebook users have a wide range of tools and features at their disposal. In addition to that users have the ability to decide who has access to specific information and who is permitted to take certain actions. Beginning with the profile page, users can decide which of the elements are displayed and to whom. A phone number, for example, can either be included or not in a profile, and, if so, can be restricted so that only friends can see it. Another setting lets users specify who is allowed to see their profile in search results—profiles can be open to anyone, to users in some or all of the user’s networks, or only to friends. When users take specific actions, such as updating their profile picture or adding someone as a friend, these changes—depending on the privacy settings—can be fed to other users’ profiles as News Feeds. At the same time, users can decide how many and what kinds of News Feeds their home page will display.

Security

Users must be at least 13 years old to register with Facebook. In their Terms of Service agreement, Facebook states that they do not allow offensive content such as sexually charged language and explicit photos. However, they also state that it is not their responsibility to closely monitor the content on their website. They encourage members to report content they find offensive, providing a “report this person” link on all profile pages.

Facebook has some of the most specific and custom privacy setting of all the services we reviewed. In addition to making the entire profile private we can select which section of the profile we would like displayed and to whom. For example, the Wall can be open to everyone, but photographs can be set to only display to friends or friends of friends. Similarly personal information, education, work and contact information can be customized.

Facebook also allows blocking of individual users, reporting of spam and profile abuse.

Security Threats

Facebook has some additional features that make it easier to expose the profile information. Since, it’s more likely to include personal information on the web site this can be used by burglars be helping them know when we are going to be away from home ("I'm leaving tomorrow to XXXX for a whole three weeks!").

Depending on how much information we put into the profile, we might be at risk for identity theft. All that is needed to identify a person is their birthday, their sex, and their zip code. If our birthday, address, and phone number, are publicly available it’s easy for somebody to steal our

identity. With that information, people can search various on-line databases to uniquely identify a person. Since most people on Facebook use their actual names that makes identity theft even easier.

A solution to these could be simply not displaying birth year and our actual address. Instead our city name could be used. Finally we should be careful what we post on our wall, avoiding cases such as actual address, cell phone number, periods that we will be away from home, etc.

Another serious problem is acceptance of any friend request received, whether it's a known person or not. The problem here lies in the fact that whoever we accept will be able to see both all of our personal information, as well as personal information of our friends. What this implies is that even if we only accept friend requests from people we know, if in our network of friends there is one that accepts anybody's request, then our personal information might be exposed.

A solution to this would be to make sure that our personal settings are restricted to "friends only", not "friends of friends". Another solution is to create several different friends lists, and then assign different permissions to each list. This will allow us to accept a friend request and still restrict what they can see. With this arrangement, close friends can see everything on our profile, but business or casual friends will only see some basic information.

Another serious danger on Facebook is all of the applications. Any application that asks to access profile information puts that information at risk. As described before, even if any of our friends use those applications, then they also put our information at risk, even if we never run an application. Since Facebook doesn't provide any rating system, because they don't check any of these applications, it's impossible for users to know whether the application is safe or malicious.

The ACLU has highlighted these dangers recently by creating their own quiz (http://www.aclu.org/2009/06/11/quiz-what-do-facebook-quizzes-know-about-you/), which displays all the information that is available to the quiz. When we run a quiz, we give the application permission to do anything it wants to any and all of our information, and any information we can see about our friends. No virus or malware scan will detect it, because applications aren't affected by what browser we run or what anti-virus or anti-malware software we run.

Public APIs

The **Graph API** is the core of Facebook Platform, enabling applications and 3rd party services to read and write data to Facebook. It provides a simple and consistent view of the social graph, uniformly representing objects (like people, photos, events, and pages) and the connections between them (like friendships, likes, and photo tags).

Facebook **authentication** enables 3rd party applications to interact with the Graph API on behalf of Facebook users, and it provides a powerful single-sign on mechanism across Web, mobile, and desktop applications.

Social plugins enable social networking sites to provide engaging social experiences to their users with just a line of HTML. Because the plugins are served by Facebook, the content is personalized to the viewer whether or not they have signed into that service site.

The **Open Graph protocol** enables social networking services to integrate their pages into the social graph. These pages gain the functionality of other graph objects including profile links and stream updates for connected users.

4.1.2.5.2 MYSPACE.COM

Overview & Main Features

MySpace is extremely popular and receives a lot of traffic. Its main features include the ability to upload and share video, audio and image files as well as a blog. However MySpace's central focus is social networking, as illustrated by the list of features presented below:

- **Bulletins**. Similar to posts that are posted on to a "bulletin board" for everyone on a MySpace user's friends list to see. Bulletins can be useful for contacting an entire friends list without resorting to messaging users individually.
- **Groups**. This feature allows a group of users to share a common page and message board.
- **MySpaceIM**. It's a stand-alone software for Microsoft Windows. Users who use MySpaceIM get instant notification of new MySpace messages, friend requests, and comments.
- **MySpaceTV (video)**. A service similar to the YouTube video sharing website.
- **Applications**. Similar to the Facebook applications. Many applications that are popular on MySpace had spin off versions on Facebook. Users can create applications for other users to post on their profiles, using the MySpace API.
- **MySpace Mobile**. There are a variety of environments in which users can access MySpace content on their mobile phone.
- **MySpace News**. A news service, which displays news from RSS feeds that users submit. It also allows users to rank each news story by voting for it. The more votes a story gets, the higher the story moves up the page.
- **MySpace Classifieds**. Full service classifieds listing.
- **MySpace Karaoke**. Is a combination of MySpace and kSolo, which allows users to upload audio recordings of themselves singing onto their profile page.
- **MySpace Polls**. Enable users to post polls on their profile and share them with other users.

Functionality

After a quick registration, a user profile page is established with background information such as where they are from, what they look like and where they attend(ed) school. Additional information describes a user personality, likes, dislikes and interests. Profiles also include the usuals like photo albums, the ability to send and receive comments upload dozens of photos and add music and videos to profile page.

Users can customize their profile page to reflect their personality with customized skins. Moreover users can choose to use MySpace's profile editor in order to change colors and fonts or write their own HTML or CSS code for doing that.

Upon login, members can see who is online and strike up a conversation or browse through members' profiles. When users click on a member's photo or name, they can view their profile, post comments and invite them into their circle of friends. When new members are added to the circle of friends their network of friends is accessible.

MySpace offers videos, music videos, member-generated videos and network and cable television programs. Its joined forces with video site Hulu offers full episodes of many popular television programs and movie clips.

In keeping with the times, MySpace has introduced MySpace mobile, allowing members' reception of free text alerts when someone posts comments or sends them a message and also download mobile apps.

The music section is often used by new artists to promote their music. Users can search for

music by artist, album or genre and access the artist's profile page.

MySpace has a large selection of groups (10,000 or more groups) for MySpace members who want to connect with people who share their interests.

Members can search for a specific person by name, display name or email address, school and interest. In the browse section the advanced search option allows members to make their searches more specific by narrowing down specifics like age range, relationship status, body type, lifestyle, sexual orientation or education.

There is a wide variety of networking features enabling members to connect with other members, and the ability to customize the profile page makes it an excellent resource for a user to express itself. **MySpace**'s extra features allow members to listen to their favorite music, watch their favorite TV shows and watch user–generated videos.

Security

MySpace values members' privacy and it gives them complete control over their profile's privacy settings. Members can make their profile viewable to everyone on MySpace or use the privacy settings, located in the "My Account" tab, to limit who can access their page such as the users' circle of friends or block individual members. Reporting of spamming messages and account abuse is also possible.

Users must be at least 14 years old to join MySpace. MySpace will delete profiles of members that have lied about their age to obtain a membership. Additionally they will delete any member profile that is between the ages of 14-17 but represent themselves as 18 or older.

MySpace provides contact information to report suspected underage members and objectionable content. They also have a useful section on online safety tips for MySpace users and tips for parents, which include instructions for parents who want to limit or delete their child's profile.

MySpace does not encourage random people connecting. Although users are not prohibited from striking up friendships with strangers, nor are strangers prohibited from contacting them, members are not completely inundated with random friend requests.

In January 2008 the state attorneys general of 49 states of the USA wrote guidelines for online safety for MySpace and other services. They included restrictions for behaviour on social networking services[1]

Security Threats

The customization of user pages currently allows the injection of certain HTML which can be crafted to form a phishing user profile, thus keeping the myspace.com domain as the address.

Other security threats regarding profile content are for example the embedding of videos inherently. This allows all of the format's abilities and functions to be used on a page. A prime example of this is the detection of hyperlinks to JavaScript files, into QuickTime videos. Users who entered their login information into a fake login bar that appeared would also become 'phished', and their account would be used to spam other members, thus spreading this security problem.

MySpace's anti-phishing and anti-spam solution include a warning that is sent to the user when clicking on external links on profiles, informing the user that they will be leaving the myspace.com domain.

Another problem is that MySpace is often used as a venue for publicizing parties, sometimes with the host's knowledge and sometimes without.

Similar to other social networking websites, like Facebook, posting of personal information increases the possibility of stalking.

[1] "Joint Statement on Key Principles of Social Networking Sites Safety", January 14, 2008

Public APIs

MySpace offers a developer platform, namely MDP – MySpace Developer Platform, which allows developers to share their ideas and write their own MySpace applications. MDP is based on **OpenSocial** API.

OpenSocial defines a common API for social applications across multiple websites. With standard JavaScript and HTML, developers can create applications that access a social network's friends and update feeds. This eliminates the problem that many social applications present: “Growing list of site-specific APIs that developers must learn”.

4.1.2.5.3 TWITTER.COM

Overview & Main Features

Twitter is a free social networking and microblogging service which enables members to broadcast short messages (limited to just **140 characters**) to their friends, family, co–workers or so called “**followers**” in real-time. As a social network, Twitter revolves around the principle of followers.

When members choose to follow another Twitter user that user's tweets appear in reverse chronological order on to the members’ main Twitter page. If 20 people are followed, members will see a mix of tweets scrolling down the page.

Twitter main features can be summarized below:

- **Send and read other users updates** (known as **tweets**)
- **Twitter messages**(tweets) are limited to 140 characters (microblogging)
- **Send and receive updates** via the Twitter website, SMS(text messages), RSS (receive only), emails or a third party application.
- **Restrict** delivery to your circle of friends (delivery to everyone is the default).
- Use third party **application** such as Tweetie, Twitterrific, and Feedalizr to send Twitter messages.
- **Search** for people by name or user name, import friends from other networks, or invite friends via email.

Functionality

Users can communicate and stay connected through the exchange of quick, frequent answers to one simple question like: “What are you doing?” Twitter is ideal mainly because of its simplicity. Prospective members can get up and running, simply by following these steps:

1. Register at twitter sign up page - all that is needed is an email.
2. Upload a photo, since no one likes talking to a faceless profile.
3. Start following people. In order to start doing this you'll need to follow other users.
4. Start Tweeting

Security

Privacy is increasingly difficult to protect, especially with the wide use of social networks that are designed to share member information with their family and friends. However, users should do their best to maintain a level of privacy that are comfortable with.

As already mentioned Twitter is micro-blogging platform that lets users update their status, telling their “followers” and the world what they are doing. Posting Twitter updates publicly means:

- Updates appear in Twitter’s public timeline – a flowing river of every member’s status
- Twitter updates van be viewed by anyone

- Twitter updates can be indexed by search engines

Twitter has a very simple user profile, so there is less personally identifiable information requested compared to other social networks. Still, there are several basic security considerations users should pay attention to when creating their accounts. These are presented below:

1. Users should not accept the default privacy and security settings, since the default privacy settings make much more of a user information available than they are aware of
2. User should use complex and unique passwords
3. Users should disable the Geotagging option, since this feature allows users who opt-in to the service to selectively Geotag their tweets with their exact location and provide more context to users about their surroundings. It is important to note that this functionality is off by default
4. Users should periodically run the "Delete all location data"

Security Threats

Twitter collects personally identifiable information about its users and shares it with third parties. The service reserves the right to sell this information as an asset if the company changes hands. While Twitter displays no advertising, advertisers can target users based on their history of tweets and may quote tweets in ads.

There are two potential security issues currently plaguing the popular social network:

- The popular use of link shorteners like TinyURL that lead users to unknown destinations, and
- A single login system that some hope will be fixed with the arrival of *OAuth*[2]

TinyURL is the most common link on Twitter, but it's also one of the easiest ways for a malicious user to expose a member to issues ranging from phishing scams to malware installs. Users should simply consider whether the source of the link or the creator are trusted and will not lure them into visiting a malicious Web site that will attempt to implant malware on their computers.

Another Twitter issue is the use of mobile devices. Walking around with client information or organizational data is a serious exposure, since this increases the possibility of data breaches due to the theft or loss of laptops, handhelds etc.

As with most of the social networking services posting something online is like writing it in stone. So again users should think about what they say online. Moreover 3rd party applications can be very useful but often that usefulness is at the cost of user personal information. When signing up for these Twitter applications, user should make sure to go to the source and check how their information will be shared outside of Twitter before using that service.

Twitter's Direct Message (DM) feature allows users to send private messages to other Twitter users that are currently following them. These messages do not appear on the main stream of Twitter messages like other updates. Even though these messages appear to be private, it is easy to mistakenly send the message publically and there is no guarantee that the other user will not make that information public. Because of this, it is recommended that users share information over DM that would be appropriate to share publically.

Unlike Facebook and other social networks, on Twitter, other users may follow ("friend") members without their permission. If members feel the content being shared by someone following them is threatening or offensive, they may block that individual. Following other users does not present a security risk. It is accepted on Twitter that "following" someone does not constitute endorsement.

Twitter security threats can be summarized below:

[2] http://oauth.net/ OAuth lets third party tools access your twitter's information in a safe way as long as you're logged on Twitter

- *Data leakage*
- *Inappropriate content*
- *Lack of IT control* On the Twitter website, there's no logging capability.
- *Loss of IP* If a corporate employee puts out information in a tweet that's IP or private, anyone in the world can see it. In Twitter, a tweet will be archived -- and the consequences are potentially much more significant.
- *Privacy* There is a real potential for abuse here, in terms of people who are being stalked or those who have restraining orders. Some types of communication must be kept protected, like medical information.

The substantive concerns over Twitter security risks, privacy threats and compliance have businesses considering how to address and plan for Twitter adoption.

Twitter's combination of lightweight information sharing and near-instant propagation of information provides considerable utility to journalists, publishers or any other entity that wants to offer an easy way for interested parties to subscribe to a feed. The speed with which information can propagate van used to describe Twitter as ***"now media"***, the latest and perhaps most important platform for the real-time Web. That same speed, however, means that a tweet that is damaging to a user or an organization's reputation or, potentially worse, leaks proprietary or personally identifiable information, can travel around the globe in seconds.

Public APIs

The Twitter API currently consists of two discrete REST APIs and a Streaming API:

- ✓ The Twitter REST API methods allow developers to access core Twitter data. This includes update timelines, status data, and user information
- ✓ The Search API methods give developers methods to interact with Twitter Search and trends data. The concern for developers given this separation is the effects on rate limiting and output format
- ✓ The Streaming API provides near real-time high-volume access to Tweets in sampled and filtered form.

4.1.3 COMMUNICATION SERVICES

In previous sections existing social networking services, allowing contents sharing and communication in the form of IM were presented. Bellow we will present communication services that offer more advanced communication features such as:

1. Video,
2. audio and
3. sms

Skype as the most popular one will be presented bellow.

4.1.3.1 SKYPE

Overview& Main Features

Skype is a software application that allows users to make voice calls over the Internet. Skype has also become popular for its additional features which include instant messaging, file transfer, and video conferencing. The network is operated by a company called Skype Limited, headquartered in Luxembourg and partly owned by eBay.

Unlike other VoIP services, the Skype Company does not run servers, but makes use of background processing on computers running Skype software.

Registered users of Skype are identified by a unique Skype Name, and may be listed in the Skype directory. Skype allows these registered users to communicate through both instant messaging and voice chat. Voice chat allows calls between pairs of users and conference

calling, and uses a proprietary audio codec. Skype's text chat client allows group chats, emoticons, storing chat history, offline messaging and (in recent versions) editing of previous messages.

The *Online Number* (aka SkypeIn) service allows Skype users to receive calls on their computers dialled by regular phone subscribers to a local Skype phone number. Local numbers are available for Australia, Belgium, Brazil, Chile, Colombia, Denmark, the Dominican Republic, Estonia, Finland, France, Germany, Hong Kong, Hungary, Ireland, Italy, Japan, Mexico, New Zealand, Poland, Romania, South Africa, South Korea, Sweden, Switzerland, the Netherlands, the United Kingdom, and the United States. A Skype user can have local numbers in any of these countries, with calls to the number charged at the same rate as calls to fixed lines in the country.

Skype for Windows supports “High Quality Video” with quality and features, *e.g.*, full-screen and screen-in-screen modes, similar to those of mid-range videoconferencing systems. Skype audio conferences currently support up to 25 people at a time, including the host.

Public APIs

The Skype Public API enables third-party applications to communicate with Skype. These applications can be hardware products or software applications, but they're all created by developers who use the Skype Public API, a text-based protocol, to interact with Skype software.

The Skype Public API is designed primarily to help developers manage calls from outside the Skype application.

Applications which use the Skype API are not endorsed, tested, or supported by Skype. Use of the Skype Public API is free for commercial and non-commercial application development, assuming you abide by the terms of the API Terms of Use.

The Skype Public API is great for accessories like headsets and webcams that connect to Skype's standard desktop clients. However, for applications to connect to Skype without a Skype desktop client, developers can use *SkypeKit*.

SkypeKit is a collection of software and APIs that allows Internet-connected devices or applications to offer Skype voice and video calls. *SkypeKit* is designed to work with a wide variety of chip sets, operating systems, and audio/video devices. *SkypeKit* can be thought of as a “headless” version of Skype, since it runs invisibly with no user display. That way, developers are free to surface and deliver Skype functionality through their own products' interfaces.

Security

Skype offers secure communication. Encryption cannot be disabled, and is invisible to the user. Skype reportedly uses non-proprietary, widely trusted encryption techniques:

- ✓ RSA for key negotiation and
- ✓ Advanced Encryption Standard to encrypt conversations.

Skype's encryption of communications is secure enough to prevent casual eavesdropping and it provides a measure of non-repudiation in that unless a user's credentials (username and password) have been compromised, it is nearly impossible to impersonate another user.

Although Skype's encryption makes it impossible to detect the contents of a user's communications on the network, and its firewall traversal abilities make it extremely difficult to filter at a border firewall, use of Skype can be detected on a network and it can be blocked by an Intrusion Prevention System (IPS) or other reactive Intrusion Detection System (IDS), or an ambitious administrator.

Security Issues

Skype provides an uncontrolled registration system for users with no proof of identity. Instead, a free choice of nicknames permits users to use the system without revealing their identity to other users. It is trivial to set up an account using any name. The displayed caller's name is no guarantee of authenticity.

Skype incorporates some features which tend to hide its traffic, but it is not specifically designed to thwart traffic analysis and therefore does not provide anonymous communication.

The Free Software Foundation (FSF) is concerned by user privacy issues arising from using proprietary software and protocols and has made replacement for Skype one of their high priority projects.

Although the core technologies used in Skype have not had a known security vulnerability in years, Skype still presents an attack vector for spam, phishing, or the transfer of malicious code by way of traditional social engineering. However, these attack vectors already exist on user's systems in e-mail clients, web browsers, or other IM applications. Skype's functionality makes it no more or less inherently secure than other network communication applications.

Skype should not be relied on for strong anonymity. Although it uses encryption to protect its network traffic, if this traffic is captured, it is trivial for the certificate owners (Skype and its parent company eBay) to decrypt the traffic. Additionally, Skype takes no measures to hide its presence on the system it's running on. It is possible to discover the presence of Skype and to enumerate a user's contact list among other details. Unless configured to use a proxy (a feature that is native only to the Windows versions of Skype), the direct peer-to-peer nature of Skype communications traffic indicates the IP address of the sender or receiver; in many cases this could lead to identification of either party.

Skype is designed to easily traverse firewalls and works fine behind a NAT firewall. This feature makes Skype extremely difficult to block with a traditional perimeter firewall. Even in very restrictive network environments, if either HTTP or HTTPS traffic is allowed, Skype will use port 80 or 443 for its traffic.

Skype does an excellent job of getting around restrictive firewalls and obfuscating the contents of its communications, but it does not represent a secure computing platform, nor is it a secure storage platform. Text based chat sessions are logged by default, and information such as contact list entries, IP addresses, and Skype cookie information are all kept on the client systems with little, if any, obfuscation. On Windows systems, this data is kept in C:\Documents and Settings\username\Application Data\Skype and in

/Users/username/Library/Application Support/Skype on Mac OS X systems. In Linux, this data is kept in ~user/.Skype/

4.1.4 CONCLUSIONS

Regarding social networking sites what is apparent is that users should treat all photos and profile details they publish on a social network site as public information. Even with the high and well managed privacy settings, all information they post and pictures they upload can find their way outside of their profile page where it could be used by others for purposes they didn’t intend.

All of the social networking platforms can absolutely be used for social good, business, journalism, art or music -- but the potential for exploitation by cybercriminals and noncompliance with regulatory requirements are real and growing. Businesses are well-advised to assess risk, establish policies for rational, sensible use of social media services and disseminate them to every employee.

Regarding the age distribution, what we saw is that older generations are for one reason or another (tech savvy, interest, etc.) not using social networking sites to a large extent. This probably reflects general internet usage, but it’s expected that the difference is enhanced when it comes to the social media sphere where site usage tends to be more frequent and time-consuming than usual.

It is also noteworthy that social media isn’t dominated by the youngest, often most tech-savvy generations, but rather by what has to be referred to as middle-aged people.

Finally regarding the communication services, that offer pc-to-pc communication, Skype stands alone among VOIP applications due to its Peer-To-Peer network architecture and its extensive use of strong encryption of not only communications content but signaling traffic as well. The

application itself and its network communications are extremely resistant to reverse engineering, making Skype activity difficult to detect and its communications impossible to decipher. For networks that are subject to strict legal or administrative regulations, Skype should be banned to prevent unauthorized communications. For more open networks, Skype can be an advantage for end-users who wish to communicate with colleagues, friends and/or family.

This analysis will assist in identifying functionality and existing subsystems that could be used for the implementation of the social networking HOMEdotOLD services.

4.2 SURVEY AND SHORT DESCRIPTION OF SIMILAR SERVICES FOR THE ELDERLY - INITIAL MARKET SURVEY

Europe is bracing for the social and economic impacts of a retiring “baby boom” generation. But aging population is a long-term and global trend – one that will continue for generations to come. Some claim it is a sign of our success: as medicine, sanitation, and agricultural production have improved, life expectancy around the world has risen. This, combined with falling birth rates, is causing what experts call the "demographic transition" - the gradual change from high to low levels of fertility and mortality.

One of the biggest impacts of this transition is population aging. Europe has seen both mortality and fertility fall since the 19th century. Since the 1960s, however, fertility has declined even more dramatically. Europe now has so many elderly people and so few newborns that mortality rates have started to climb again, now reaching levels similar to those of developing countries. Today, 19 of the world's 20 "oldest" countries - those with the largest percentage of elderly people (65 or older) - are in Europe. In Italy, the world's oldest country by these standards, over 19 percent of the population is elderly. This figure is expected to reach 28 percent by 2030. In Germany, life expectancy is expected to reach 90 by 2050. While the most striking examples of aging populations are in Europe and Japan, it is a global trend, as can be seen in the following figure. Average ages elsewhere in the world - particularly in Asia and Latin America - are slowly creeping up. In China, declining birth rates will cause its elderly population rise from 88 million to 349 million by 2050.

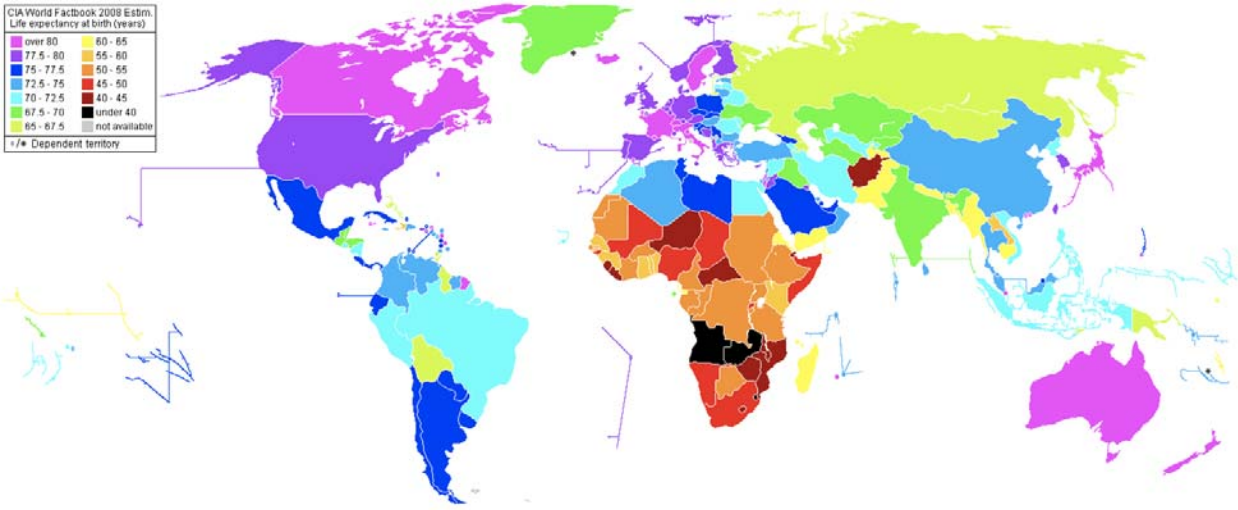


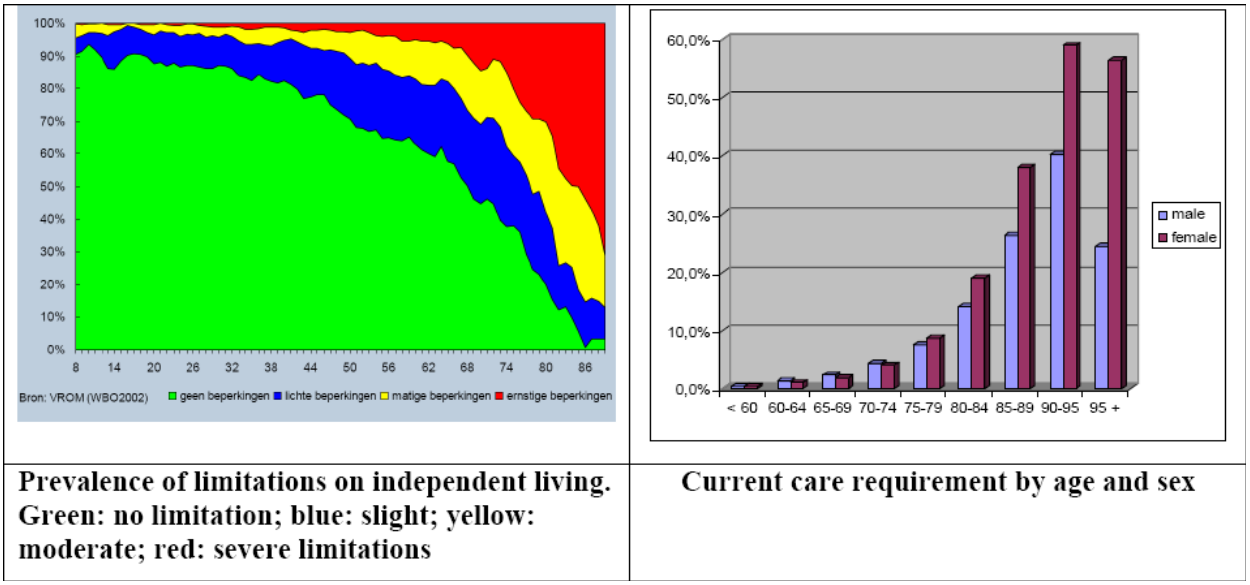
Figure 16: CIA World Factbook 2008 Estimates for Life Expectancy

Longer life expectancy could mean a more substantial restructuring of society and life planning. Aging populations create a number of challenges, one of the most important of which is preservation of their quality of life and their well-being. Concepts such as quality of life, wellbeing, social interaction and connectivity are of crucial importance for all. Social connectivity is about the subjective awareness of being in close interpersonal, meaningful, and positive social relationships and contexts. It is affected by the quality, quantity, frequency, diversity and reciprocity of contacts as well as the possibilities and opportunities for establishing

them. If the need for positive social relationships and inclusion in societal contexts is unfulfilled, an individual may be predisposed to loneliness. This is a risk often faced by older people and can potentially lead to a cascade of deterioration in their health and lives. Ultimately, the result of this could be social exclusion, isolation and loneliness, depression, self-neglect, malnutrition or even suicide. Elderly persons have a higher risk of suffering from loneliness than other age groups. There is evidence that loneliness decreases the quality of life and may cause illness, depression, self-neglect especially amongst elderly men. The loss of roles which may accompany aging can be a major challenge not only for the individual but also for society. Elderly people should be able to spread out their activities longer, providing more time for social interactions, education, and leisure.

Elderly people want to perform meaningful activities, to have fun and to experience satisfaction when learning new things. They want to create new experiences for themselves and have fun in doing so. Many older people have valuable resources (e.g. life experience, creative skills), and can significantly contribute to society. These resources can be used to support others to stay socially active and to promote intergenerational relationships. Research has shown that when embedded in active social networks people tend to enjoy better physical and mental health. When elderly people are connected to family and friends, this fosters links to neighbors and the (physical) neighborhood and by extension the community and society. The networks of a lifetime (from education and employment) can be maintained or reestablished through involvement in common interest groups.

Latest research[3] has shown that AAL technologies offer a very large and as yet unrealized potential to enable older people to continue live independently in their preferred environment and in the wider community. How to assist older people and support independent living is one of the key challenges posed by demographic change, and relates to specific age-related threats to independence. The prevalence of those with undiminished sensory and other abilities declines rapidly in older cohorts (left-hand figure below). Those experiencing no limitation on independent living (green), even if old, can be expected to demand AAL services mainly for comfort while those with severe restrictions (red).can be expected to require advanced AAL to maintain independence at all. The right-hand figure shows the current distribution of demand for care by age group and sex.



Prevalence of limitations on independent living. Green: no limitation; blue: slight; yellow: moderate; red: severe limitations

Current care requirement by age and sex

Figure 17: Age-related threats to independence

Even though so far it does not yet constitute a mature market, tools regarding the eInclusion

[3] The demographic change: impacts of new technologies and the Information Society. http://europa.eu.in/comm/employment_social/social_situation/docs/lot7_ict_finalreport_en.pdf

and the social networking of the elderly have been developed during the last few years. The scope of the current section is to undertake a survey regarding both commercial products and non-commercial services that are available over the web.

4.2.1 COMMERCIAL PRODUCTS

This section undertakes the survey regarding similar to the HOMEdotOLD concept commercial products that have been developed and launched in the market The following table provides the corresponding information:

Product	Description
JIVE	JIVE is a proof of concept for a new communication device and is a range of 3 products that were designed to get elderly technophobes connected to their friends and family. JIVE negates 3 major point of pain, which is currently stopping elderly users getting connected, namely a) getting online, b) loading and sharing contact details and c) no mouse is needed. A one plug router solves the getting online problem by being pre-loaded with ISP setting at POS. So setup is a true plug and play experience. In addition, JIVE uses friend passes to link a physical persons ID with digital life. A user simply links a friend pass to their friend feed account and this seamlessly updates all the information on the system. Last by not least, to operate JIVE one should simply place an avatar onto the system's display.
PAL4[4]	PAL4 is a special service, that makes living life safely easier for the elderly individuals. It is a Personal Assistant for life, an uncomplicated aid that helps the elderly do more things the fun way. PAL4 provides chatting abilities, while it also serves as an information provider, for example about local activities. In addition, PAL4 supports puzzles and games that assist the elderly individuals in being motivated and active. PAL4 is available as a skilful touch screen and as such no computer experience is necessary. PAL4 can be operated both through a separate channel on the television as well as through a personal computer.
Viedome	The Viedome platform is basically a videoconferencing service targeted mainly towards the elderly individuals supporting communication between client and (informal) caretaker, mainly through video calling. It offers the opportunity to browse web-based information and play videogames. Viedome can run on a PC, a television with Set top box and a touch screen device
Sagem Cosyphone	Sagem Cosyphone is a very tangible communication application. Using NFC technology users can hold a mobile phone close to a physical contact card. This contact card is tagged and activates the phone to dial the number of the person associated with the contact card. Similar concepts can be achieved with advanced RFID readers like the Nabaztag Mirror and Touchatag. These devices allow for one to tag all sorts of objects, pictures, books, keys, and mugs and activate various applications. A logical solution would be to activate a Skype call to a person when a picture of this person is swiped in front of the RFID reader

Table 4: Commercial products similar to HOMEdotOLD

However, examples like Jive and the Sagem elderly phone are unfortunately rare. Tangible RFID based solutions are very suitable but have not been 'discovered' by the elderly consumer market

4.2.2 NON-COMMERCIAL SERVICES

[4] http://www.pal4.nl/website/site.php?s=uk_home

Aside from these tangible solutions that include specialized equipment there are a number of social network sites that have been developed for the elderly generation. In the context of the non-commercial services, one can actually consider all the Facebook and MySpace-like networking utilities that can be found on the web. Social networking websites function like an online community of internet users. Depending on the website in question, many of these online community members share common interests in hobbies, religion, or politics. Once an individual is granted access to a social networking website s/he can begin to socialize. The friends that s/he can make are just one of the many benefits to social networking online. Another one of those benefits includes diversity because the internet gives individuals from all around the world access to social networking sites.

A recent survey by AARP, a U.S.-based non-governmental organization and interest group for retired people, has shown that among those who go online, around 37 percent of adults aged above 50 say they use social networking sites like Facebook[5]. "It connects you with your past. I'm on Facebook and I've met people that were stationed with me in the Air Force. Now we're having a reunion. There are 150 of us. It started with Facebook," said Jim Spencer, who teaches an internet class at the Northampton Senior Center. According to the survey, 63 percent of seniors who have joined Facebook did so because their son or daughter encouraged them to. The AARP survey also revealed that around 40 percent of adults aged 50 and above say they are very comfortable using the internet. But most aren't using laptops, 57 percent of seniors surveyed say they use desktops to surf the web.

In addition, another recent survey highlighted that about one-third of people ages 75 and older live alone, and increasingly they are turning to online social networks like Facebook and MySpace for support and companionship[6]. Online networks can provide benefits similar to those of real-world groups of friends, but often are easier to assemble and maintain. According to Joseph F. Coughlin, director of the AgeLab at the Massachusetts Institute of Technology , “one of the greatest challenges or losses that we face as older adults, frankly, is not about our health, but it’s actually about our social network deteriorating on us, because our friends get sick, our spouse passes away, friends pass away, or we move.” “The new future of old age is about staying in society, staying in the workplace and staying very connected.” “And technology is going to be a very big part of that, because the new reality is, increasingly, a virtual reality. It provides a way to make new connections, new friends and new senses of purpose.”

A non-exhaustive list of social networking utilities targeted towards not only the younger generations but also towards the elderly is provided in the following table.

Name	Description/Focus
Boomer Yearbook[7]	Boomer Yearbook is a Psychological-Informational Social Network Website for Baby Boomers and Baby Boomer Generation! Boomer Yearbook allows for the creation of Boomer Yearbook Profile, for the connection with old and new Baby Boomers, for the expansion of the mind and for warding off senior moments and elderly problems with dream analysis and online optical illusions and brain games provided by clinical psychologist Dr. Karen Turner.
CaringBridge[8]	CaringBridge is a charitable nonprofit organization offering free personalized websites to people facing a serious medical condition or hospitalization, undergoing medical treatment and/or recovering from a significant accident, illness, injury or procedure. Its functionality is

[5] http://www.siliconindia.com/shownews/About_37_percent_elderly_use_social_networking_sites-nid-68679-cid--sid-.html

[6] http://newoldage.blogs.nytimes.com/2009/06/01/social-networking-for-seniors/

[7] http://www.boomeryearbook.com/

[8] http://www.caringbridge.org/

	similar to a blog. The service allows family members and friends to receive consistent information via a single website, and eliminates the need to place and receive numerous telephone calls. Visitors who are provided the personal Website address (or URL) and password, if required, can read updates on the patient's condition and post their own messages of support and encouragement to the family.
Classmates.com[9]	Classmates.com is a social network service created in 1995. The social media website helps members find, connect and keep in touch with friends and acquaintances from throughout their lives — including kindergarten, primary school, high school, college, work and the United States military. Classmates.com has more than 40 million members in the United States and Canada. In early 2008, Nielsen Online ranked Classmates as number three in unique monthly visitors (U.S. home, work) among social networking sites.
DailyStrength[10]	DailyStrength is a social networking website where users provide one another with emotional support by discussing their struggles and successes with each other. The site contains online communities that deal with different medical conditions or life challenges. As of November 4, 2007, DailyStrength has created over 500 support groups focused on issues such as depression, divorce, parenting, and a wide variety of cancers. The site is free for members and the members are encouraged to remain anonymous. The site provides members with continual support as someone is always available to talk. Medical professionals are also available to contact and treatments for a variety of illnesses and problems are also listed on the site.
Eons.com[11]	Eons.com is a social networking site for baby boomers, launched in July 2006. The site provides games, photo and video sharing, groups, how-to lists, interviews, links and information on health, relationships, fitness, debt, retirement and insurance.
Friends Reunited[12]	Friends Reunited is a portfolio of social networking websites based upon the themes of reunion with research, dating and job-hunting. Each site works on the principle of user-generated content through which registered users are able to post information about themselves which may be searched through by other users. A double-blind email system allows contact between users. The main Friends Reunited site aims to reunite people who have in common a school, university, address, workplace, sports club or armed service; the sister site Genes Reunited enables members to pool their family trees and identify common ancestors; the Dating and Jobs sister sites link members with similar attributes, interests and/or locations.
Lifeknot[13]	Lifeknot is a social networking website with a focus on shared interests and hobbies. It was founded in November 2003. Members create activity profiles listing their favorite activities and hobbies, in addition to optionally creating a personal profile common to online dating web sites. Members may perform searches for people that share their interests. LifeKnot can compare members' interests to show members those with whom they share the most in common.

[9] http://www.classmates.com/

[10] http://www.dailystrength.org/

[11] http://www.eons.com/

[12] http://www.friendsreunited.com/

[13] http://www.lifeknot.com/

MyHeritage[14]	MyHeritage is a family-oriented social network service and genealogy website. It allows members to create their own family websites, share pictures and videos, organize family events, create family trees, and search for ancestors. With over 50 million users, MyHeritage is one of the largest sites in the social networking and genealogy field.
MyLife15	MyLife (formerly Reunion.com) is a social network service helping members find and keep in touch with friends and relatives. In its own press release, Reunion.com claims to be the 6th top social networking site as of August 2007 with 28 million members, growing by nearly 1 million new members each month, mostly in the United States and Canada.

Table 5: Non-commercial services similar to HOMEdotOLD

These social networks and websites though are often aimed at boomers, the relatively young elderly population and thus don't take into account inexperience with computers and physical disabilities that refrain elderly from using a computer per se.

4.3 TV-BASED PLATFORMS AND EQUIPMENT

4.3.1 DESCRIPTION OF TV-BASED PLATFORMS

In general, the use of an internet enabled television as an interactive tool for elderly has several advantages. The television:

- Has a central place in the home and can easily attract attention
- Is ubiquitous in the homes of elderly, in contrast to the computer
- Is a well-known and trusted device
- Can provide both visual and audio output, making it easier to develop for people with visual or auditory impairments
- Allows an easy integration. Since it is internet-enabled it can connect to any server and collect various types of information stored in databases.

4.3.1.1 AONTV AND OTHER IPTV PLATFORMS

The IPTV service of A1 Telekom Austria includes

- an IPTV Platform in the backend
- a Broadband Network and
- a secured set top box on the client side.

[14] http://www.myheritage.gr/

[15] http://www.mylife.com/

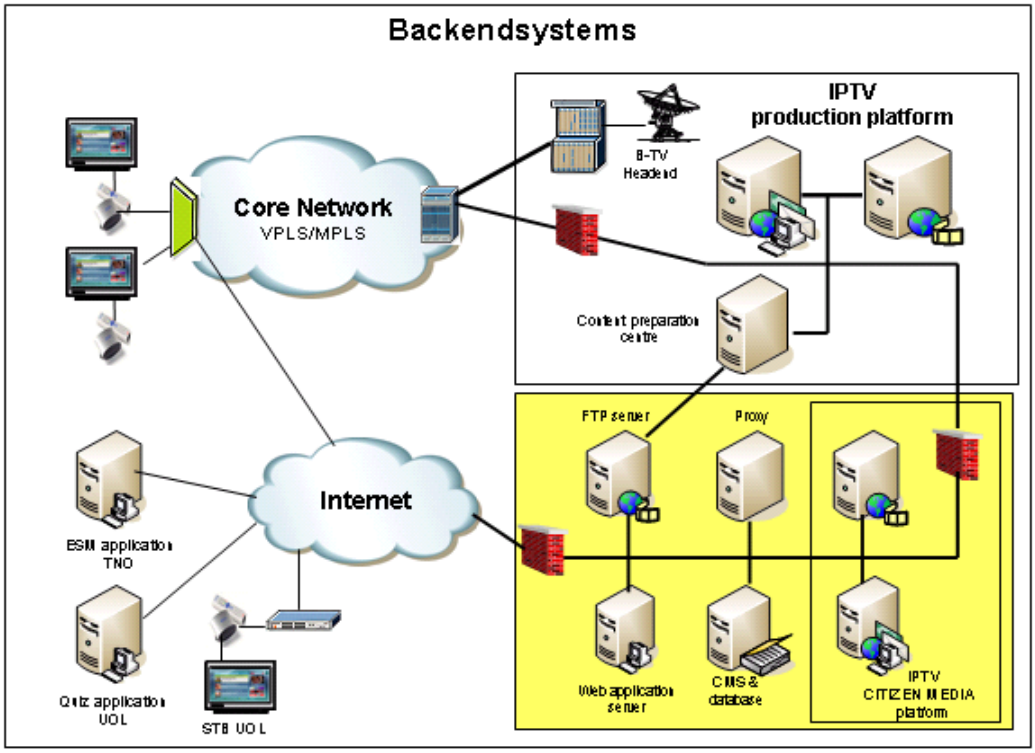


Figure 18: AonTV architectural overview

4.3.1.1.1 IPTV PLATFORM

"AonTV" is the standard IPTV product of A1 Telekom Austria which runs on the live IPTV platform for all IPTV customers. On this platform it is not possible to run any test applications or field trials due to the risk of influencing the live system.

To make sure that the live system is not affected by HOMEdotOLD applications, a dedicated IPTV platform will be established. This platform included one Ericsson IPTV Platform consisting of

1 x IPTV database server
1 x IPTV application server
1 x IPTV streaming server including storage

This hardware hosts all the IPTV applications developed in the project.

For content upload a FTP server with an upload application will be installed to give the users the possibility to upload their content. All uploaded content will be automatically transferred to the transcoding process which runs on the transcoding engine that is part of the live platform. After converting the content will be ingested into the IPTV streaming system. The metadata are handed over to the content management system and published into the IPTV platform. After this process the content is immediately available via the STB on the TV screen.

Server side logic is implemented in Java (1.4). Java has been chosen, because most of AonTV server side code is also implemented in Java, we could build upon a large code basis for our own functionality.

The following frameworks are used:

- resin 2.1.17 as application server
- Spring for application configuration
- Ibatis for database access
- Velocity for rendering the HTML/JavaScript output
- Apache commons logging and log4j for application logging

To assure the right usability and to have enough bandwidth all systems were connected via Gigabit LAN. For the internet access a 100 Mbit/s internet connection will be installed.

In the Live system a service application has to be integrated to enable the test-bed users to switch between the standard IPTV platform of A1Telekom Austria and the HOMEdotOLD IPTV platform. With this configuration A1Telekom Austria made sure that the HOMEdotOLD IPTV applications could not influence the live system.

For this process we have to consider the existing release process of the live system. Changes in the live system are only possible in compliance with the fixed software release cycles and so we have to plan exactly the development and deployment of this service application to have it ready for the field trial.

The provisionings of the test users are necessary in 3 different systems. In the IPTV live system the service application has to be provisioned for the test users enabling them to select the service in the menu of their standard IPTV service. Also in the billing systems those test users will have a special flag to provide them with free of charge IPTV service during the running period of the project. These two configurations will be done in the live systems and so have to be defined and coordinated within the processes of the relevant departments before implementation.

The test users has also to be configured and provisioned in the IPTV field trial platform in order to enable the set top boxes to register themselves on the platform and the test households to use the HOMEdotOLD IPTV portal and applications.

4.3.1.1.2 CLIENT (SET TOP BOX) SIDE

The set top box is a closed system and no modifications are possible at the equipment without the STB provider. For software applications a SDK are available for A1Telekom Austria. This SDK can only be used from authorised programmers of A1TelekomAustria and cannot give to other parties.

Further we are limited to technologies supported by the set top box. This is mainly JavaScript and HTML.

At the server side of the set top box the IPTV Framework is used for communication with the set top box hardware and the Web browser.

Fetcher calls are done using the IPTV Framework functions for calling fetchers, which use the HTTP-GET protocol.

For transmission of user behaviour data (aka: user tracking) the HTTP-POST protocol is used, as the maximum data length for a single request is higher, compared to the GET protocol. The posting function itself relies within the IPTV framework.

The main functions used for HOMEdotOLD are encapsulated in reusable modules, defining the functions to be used by the application.

Therefore only A1Telekom Austria can program and HOMEdotOLD application running on the state of the art IPTV-Set Top Box which is connected to the users TV. The application will be built on existing standards (HTML, JavaScript) and is optimized towards the restrictions of the hardware.

4.3.1.1.3 NETWORK

The backbone network is a Gigabit VPLS/MPLS Ethernet network with ISAM/DSLAM access technology.

As the IPTV network is in our case separated from public internet, it means that you have to foresee connection points between the IPTV infrastructure and common internet services.

For enabling the household to bring their contents to the public, we offer them easy to use web based applications for uploading own content to the IPTV platform.

In order to ingest this content automatically into the IPTV System a whole new workflow has been established which required numerous network connections and web services between the

various workflow participants (upload server, video conversion service, and IPTV service).

4.3.1.2 NETTV AND OTHER SERVICE PLATFORMS

The Philips television product range includes internet enabled televisions. These televisions come with the 'NetTV' platform. Using NetTV, users can interact with online content, and browse the 'open internet'. Furthermore, NetTV provides access to a video on demand (VOD) service and services that allow watching content that has been broadcasted.

NetTV is distinct from other internet enabled television solutions using a set top box. There is:

- No need for an extra remote control
- No need for extra cabling
- Only one User Interface
- No expensive set-top box, no need for a X-box, it is all standard integrated in the NetTV
- All services on internet, no need for a set-top box

Figure 19: NetTV showing portals to websites designed in CE-HTML

The NetTV is able to display CE-HTML web pages using a browser that supports this language (Wikipedia, n.d.). The CE-HTML standard is similar to XHTML, but has some extensions that make it more usable for electronic devices. For example navigation with a remote control is supported. Web pages written in CE-HTML include for example You Tube, weather reports, and news sites. Aside from this, the NetTV can be used to browse the open internet. Navigation on these websites is less optimal using a remote control, but still very well possible.

The browser that NetTV uses runs on a chip with little storage space. Thus, running applications on the NetTV platform is not possible. Applications are to be located elsewhere and offer content to a website that is accessed via NetTV. Furthermore, CE-HTML cannot be displayed in conjunction with broadcast television. The Hybrid Broadcast Broadband TV (HbbTV) initiative aims to address this functionality, and also Philips Consumer Lifestyle is developing a solution.

4.3.1.3 INHOME PLATFORM

TELETEL has designed and developed the INHOME infrastructure and the corresponding value-added services for assisted living for the elderly home user. The services are accessible through Internet-enabled TVs/Set-Top-Boxes and it can be easily integrated with existing IPTV service provider platforms.

Its application areas include but are not limited to:

- Home infotainment and communication services

- Proactive healthcare monitoring
- Home automation and administration

The overall infrastructure for the services provision is depicted in the following figure:

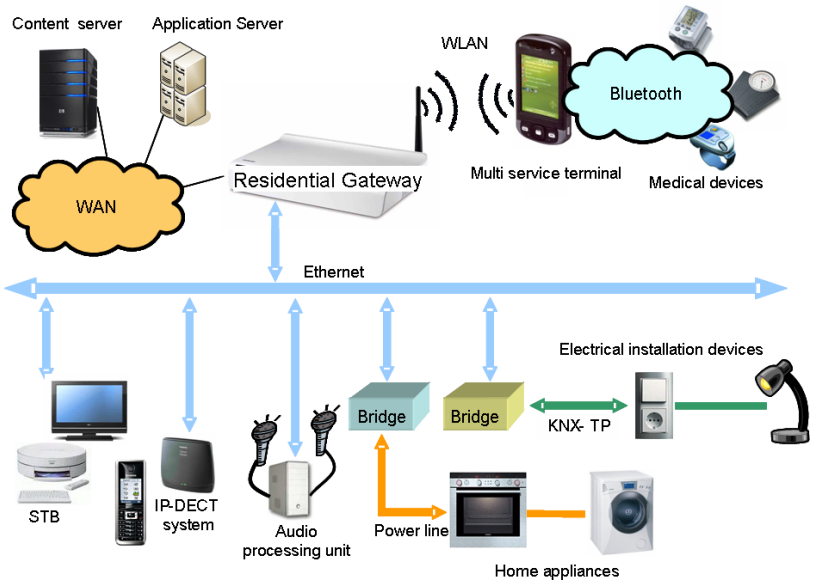


Figure 20: INHOME Architecture

All service functionality is provided at an external application server, which is accessible over the public Internet.

The Internet-enabled TVs/Set-Top-Box provides the main Human Machine Interface for the elderly, while at the same time the supported services through well designed Graphical User Interfaces provide the requested functionality according to the elderly needs.

Finally, the application server may communicate with other home equipment such as household appliances.

The supported value-added services include, home infotainment and communication services, advancing the social interaction of elderly people, through the support of “Photos sharing” and “Phonebook and messaging” services. Moreover, “Home automation and administration” services, allow for the control of household appliances and other electrical installation devices. Finally the “Proactive healthcare monitoring” services, assist the elderly with daily health related activities, such as blood pressure and pulse rate monitoring, weight monitoring and reminders.

The INHOME service infrastructure is built on open and standard technologies offering open interfaces to third parties allowing for easy integration with IPTV service providers. As such it’s possible to extend its services to support new services for the elderly or the patient home user and new interactive TV services for the home user or other targeted user groups.

Its integration with home appliances from BSH and Gorenje offer an additional service infrastructure benefit, further to the one presented from the integration with Electrical Installation Devices and DECT systems from Siemens and medical devices from A&D. Other platform benefits include its stable operation during test trials, and its validation at various sites such as:

- ✓ Gorenje premises in Velenje, Slovenia
- ✓ Alcatel-Lucent testbed for commercial value added home services
- ✓ Elderly support centers in Greece

4.3.2 SURVEY ON RELATED EQUIPMENT INCLUDING STBS, INTERNET-ENABLED TVS

In order to achieve user acceptance and usability HOMEdotOLD services must deploy mainstream technologies and simple intuitive interfaces that even elderly people are well familiarized with. This is possible with the use of TV sets (through Set-Top-Boxes), which are among the most commonly used technologies, present in almost all houses and most of the elderly users are familiar with, not other complicated devices.

This chapter is reporting the findings of a market survey based on the initial requirements of the HOMEdotOLD project. Generally, the AAL idea supports flexibility of users in their well known surrounding. In addition to that, usability of entities to be considered and usability of services are of very high importance in order to enhance the quality of life.

The main categories of hardware that are documented here-in are the set-top-boxes and internet-enabled TVs. The most representative products are presented aiming to show what technologies are available in the market. For each hardware product, a brief description is given. A photo of the product is also included.

4.3.2.1 REQUIREMENTS OVERVIEW

To start with the STB has to provide some basic interfaces, in order to connect to the TV set (HDMI, SCART) and the internet (RJ-45). It's understandable that internet-enabled TVs provide internet connectivity.

Keeping in mind that the user services will not be accessed from the traditional PC domain, but rather from the TV domain, new technologies that cross different domains are required. Several major companies within these different domains have decided to work together on these issues. One of the results is a framework for remote user interfaces for both UPnP networks and the Internet. This framework is called Web4CE (a.k.a. CEA-2014) and has been accepted as the baseline remote user interface technology within the Digital Living Network Alliance (DLNA), which is a large industry-wide effort for creating true interoperability between network-enabled devices.

The HOMEdotOLD application relies on proper configuration of the offered services from the user side and responses from the HOMEdotOLD application server. Appropriate configuration of the "Personal Motivation Services" and the "Social Networking Services" will generate responses from the Application Server, via pop-up windows that interrupt what the user is currently viewing on the TV set. This mechanism will be used in order to notify the user about "social voluntary work" in which they have the competence to contribute to, based on their profile and interests. Moreover the same mechanism will be used to notify the user about possible common activities that can be performed with friends and family.

Due to the nature of the transmitted data, we need to establish a secure channel over an insecure network. This is achieved through the usage of HTTPS (HTTP over SSL or HTTP Secure), that provides adequate protection against eavesdropping and man-in-the-middle attacks.

The main STB-IPTV requirements are summarized bellow:

- Web4-CE compliance
- Interfaces (USB, HDMI, SCART, RJ-45)
- Pop-up windows
- HTTPS
- JavaScript 1.5

The main internet-enabled TV requirements are summarized bellow:

- Web4-CE compliance
- Interfaces (USB, RJ-45)
- Pop-up windows

- HTTPS
- JavaScript 1.5
- Web camera support, for communications services

The following devices have been found following an extensive market survey (found in ANNEX A: SET-TOP-BOXES) considering the aforementioned criteria as well as the fulfilment of the initial architectural and services requirements of the HOMEdotOLD system. However, this list of devices cannot be seen as compulsory or comprehensive, it constitutes an indicative list, which may be extended in order to make a selection of the devices to be used in the HOMEdotOLD system.

4.3.2.2 SET-TOP-BOX

This section presents different models of Set-Top-Box equipment which are commercially available and are suitable for use within the HOMEdotOLD platform. STBs shall be installed at the houses of the elderly. The STB shall be connected with a TV to display HOMEdotOLD services data. In that sense, the STB shall be the main user terminal and human machine interface for the elderly.

Using the findings of the market survey, together with the basic requirements/criteria presented before, augmented with non-technical requirements, such as: communication support, minimum order requirements, EU reseller/technical support, resulted in the table bellow:

IP-TV STB Requirements	ADB	albis technologies	amino	CTV completetv.com	Netgem	technicolor	TELERGY
Product	**3800W**	**SceneGate 8000**	**A110**	**STMC-XL**	**N8000**	DBI2210E	**T 502**
Web4-CE compliance	✓	✓	✓	✓	✓	✓	✓
Interfaces (USB, HDMI, SCART, RJ-45)	✓	✓	✓	✓	✓	✓	✓
SDK	✓	✓		✓			✓
Pop-up windows	✓	✓	✓	✓	✓	✓	✓
JavaScript API	✓	✓		✓	✓	✓	✓
HTTPS	✓	✓			✓	✓	✓
JavaScript 1.5	✓				✓	✓	✓

Table 6: Candidate HOMEdotOLD IPTV STB

4.3.2.2.1 ADB-3800W

Figure 21: ADB 3800W

The ADB-3800W is an advanced, interactive, digital set-top box optimized for IP-based telecommunications networks. The product is compatible with high definition (HD) and standard definition (SD) television transmissions and is compatible with the industry's leading Conditional Access (CA), Digital Rights Management (DRM) and middleware technologies.

The product has an advanced, single chip microprocessor, providing performance enhancements such as fast channel change and swifter rendering of applications, including the Electronic Programme Guide. The unit is compatible with HD and SD television transmissions across all industry standard compressions, including MPEG-2, MPEG-4/H.264 and VC-1 Advanced Video Coding (AVC). ADB's advanced and state-of-the-art HD technology, coupled with a High Definition Multimedia Interface™ (HDMI™), ensure crystal clear viewing.

The advanced, on-screen navigation of the ADB-3800W can be achieved by utilizing both MHP or JavaScript applications, and a dedicated remote control unit allows complete control of the user interface.

Its datasheet can be found at:

http://www.adbglobal.com/files/ADB_datasheet_3800W_HD_USqtrfinal_0.pdf

4.3.2.2.2 ALBIS SCENEGATE 8000

Figure 22: Albis SceneGate 8000

The SceneGate 8000 is an entry level IPTV STB built in a small housing. It is an ideal STB to deliver standard services or can be used as cost efficient «second room» STB. Using an external IR extender the STB can also be used in solutions requiring concealed environments.

It provides the most relevant interfaces while offering high definition (HD) decoding and display quality up to 1080p with 60 Hz via an HDMI 1.3 interface. Therefore high definition content services like Video on Demand (VoD) and linear IPTV services can be brought to the user with unique quality.

The latest system on chip technology provides enhanced processing power and memory, allowing sophisticated applications and attractive user interfaces.

Albis Technologies has made exceptional efforts to optimize the system and graphic performance to its best. The flexible software framework provides open APIs for integration with native or browser based middleware clients and applications. For integration with today's internet media offerings, the software framework can be extended with a flexible media engine allowing de-multiplexing and decoding of the most popular container and codec format including flash video. In addition DLNA based media sharing is available for applications to allow in-home streaming or multi-room concepts.

With its contemporary design the SceneGate 8000 STB is a cost-attractive device for today's living room services. High engineering quality and optimized software guarantee excellent user experience and customer satisfaction for your services.

Its datasheet can be found at:

http://www.albistechnologies.com/downloads/products/Datasheet_SceneGate_8000.pdf

4.3.2.2.3 AMINO A110

Figure 23: Amino A110

With an Ethernet input and flexible audio/video output, S/PDIF and RF Modulator outputs, the A110 provides a powerful means of delivering sophisticated interactive digital television including multicast, Video-on-Demand and Internet access. It is supported by a comprehensive ecosystem of middleware, browser and security applications to offer advanced service features. It connects with HD TVs through an HDMI interface and with routers with an Ethernet connection.

Its datasheet can be found at:

http://www.aminocom.com/product?pid=38

4.3.2.2.4 COMPLETETV STMC-XL

Figure 24: CompleteTV STMC-XL

The STMC-XL is a high performance hybrid IPTV and DVB-T set top media centre with a full range of customer-ready internet applications designed for Over-the-Top IPTV services. The STMC-XL supports all of today's VC-1/WMV9 and H.264 IPTV broadcast multicast and video on demand services and is software and hardware upgradable to meet next year's services as they evolve.

Supporting internet web browsing with the WebKit browser, YouTube video, BitTorrent file sharing, Adobe Flash Video player and Windows Media player, the STMC-XL is more than capable of providing an immersive experience combining entertainment with social networking.

The STMC-XL supports two digital terrestrial tuners for hybrid applications.

The STMC-XL supports Windows® DRM, SecureMedia and Verimatrix content security systems. Embedded AES decryption enables full support for other IPTV 'virtual' conditional access systems. The integrated SmartCard system enables support for card based conditional access systems.

With its extensive API library, embedded Java Virtual Machine, Adobe Flash player and Fusion Toolkit software, the STMC-XL is the ideal platform for a wide variety of customised video services and applications.

Its complete datasheet can be found at:

http://www.completetv.com/images/CTV_STMC-XL_Data_Sheet_1_1.pdf

4.3.2.2.5 NETGEM NETBOX N8000

Figure 25: Netgem Netbox N8000

The Netbox N8000, delivered with NetgemTV software, offers an exciting next-generation HDTV experience. Featuring a double hybrid DVB-IP tuner and silent hard disk drive for watching and recording TV and VOD programming, it provides advanced permanent time-shifting capabilities that truly redefine the TV experience. Shipping with complete audio/video connectors and home networking features, including WiFi and UPnP, the N8000 Netbox is elegantly designed with a glossy black casing and sleek finish.

Its datasheet can be found at:

http://www.comtrend.com/cee/dbase/upload/Microsoft%20Word%20-%20DS_STB7007_R1%201_011309.pdf

4.3.2.2.6 THOMSON / TECHNICOLOR DBI2210E

Figure 26: Thomson / Technicolor DBI2210E

Thomson, world leader in video technologies, offers a high performing and flexible DBI2210E that enables service providers to deliver personalized multimedia entertainment services.

Based upon a state of the art System on Chip, proposed with appropriate memory footprint and A/V connections, the DBI2210 with the Thomson Video Software Solution is future proof for next features and services evolution such as Home Networking and Media Sharing.

Its datasheet can be found at:

http://www.thomsonbroadbandpartner.com/ip-video/ip-set-top-boxes/product-detail.php?id=198

4.3.2.2.7 TELERGY T502

Figure 27: Telergy T502

Telergy's advanced Digital set top boxes enable service providers to deploy numerous services such as IPTV, VOD, VoIP, video surveillance, digital signage, gaming, shopping, e-commerce and a range of interactive services.

Telergy's custom designed browser, together with the implementation of and for DVB-T applications, a complete EPG platform, enables all these services to be provided quickly and efficiently.

The Telergy T502 advanced High Definition digital set top box is a powerful product that enables service providers to easily and rapidly take advantage of the opportunities that HD offers, at a sensible cost.

Telergy T502 includes a new, fully featured and integrated modular software stack. This supports the brand new Telergy browser, which is dedicated to greater functionality and better internet browsing. In addition is supported for the first time allowing enhanced graphics, feature rich content as well as speed of display.

With the additional benefit of the optional terrestrial (DVB-T) tuner, this avoids duplication in network infrastructure, by being able to operate over both IP and terrestrial networks

Its datasheet can be found at:

http://www.telergy.eu/downloads/Telergy502-datasheet.pdf

4.3.2.3 INTERNET-ENABLED TVS

Televisions have always been home entertainment devices, and the Internet has increasingly become part of the entertainment experience. Because of this, the marriage between flat screen and computer screen seems natural, but there are several things to consider.

An Internet-enabled TV is a set that is factory designed to connect directly to the Web and display content such as YouTube videos, weather reports and streaming movies or television shows. These sets differ from televisions that double as computer monitors, because no computer or outside equipment is required to display the Web-based content. It is important to note, however, that viewable Internet content varies by manufacturer.

For instance, Panasonic's Internet-enabled TVs can stream material from YouTube and Amazon Video On Demand, plus material from Picasa Web Albums, Bloomberg News and a weather channel. Samsung's Internet-enabled TVs can do some of the same, plus display material from eBay and Twitter. LG's Internet-enabled sets have a variety of Web content available as well, and they include access to Netflix's vast library of films and TV shows.

Different manufacturers also have different names for their Internet-enabled products. With Panasonic its *Viera Cast*, with Samsung its *Internet@TV*, with LG its *NetCast*, with Mitsubishi its *Vudu Apps*, with Sony its *Bravia Internet Video*, with Sharp it's *Aquos Net*, with Vizio its *Via HDTV* and with Philips its *NetTV*.

To use the Internet-enabled functions on any set, what is needed is to simply connect it to the Internet. In some cases, this can be done wirelessly, but most televisions require a wired

Ethernet connection.

Below is a chart that reflects the current trend for 2010 as well as future projected sales:

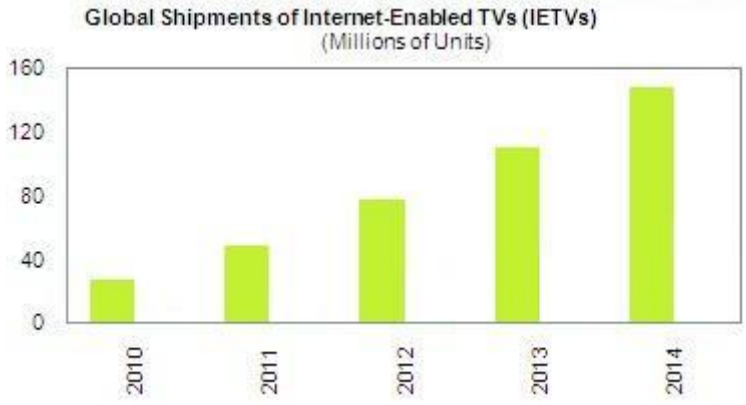


Figure 28: Global Shipments of Internet-Enabled TVs

This following sections present different models of IETVs which are commercially available. The IETVs shall display HOMEdotOLD services data. In that sense, the IETVs shall be the main user terminal and human machine interface for the elderly.

4.3.2.3.1 LG NETCAST

LG NetCast Entertainment Access system brings Yahoo!, Netflix and YouTube content directly to selected models in the company's HDTV range.

NetCast is DLNA compatible and supports streaming of JPEG images and MP3 audio files from networked computers.

The following LED models support the NetCast:

- INFINIA 47LX9500. 47" Class 3D 1080p 480Hz LED LCD TV
- NFINIA 47LE8500. 47" Class Full HD 1080p 240Hz LED LCD TV
- 47LX6500. 47" Class 3D Broadband 240Hz LED LCD TV
- 47LE5500 . 47" Full HD 1080P Broadband 120Hz LED LCD TV
- 47LE5400. 47" Full HD 1080p Broadband 120Hz LED LCD TV (fonts)

The following LCD models support the NetCast:

- 47LD650. 47" Class Full HD 240Hz LCD TV
- 46LD550. 46" Class Full HD 120Hz Broadband LCD TV

The following Plasma models support the NetCast:

- INFINIA 50PK950. 50" Class Broadband THX Certified 1080P Plasma TV
- INFINIA 50PK750. 50" Class Broadband 1080P Full HD INFINIA™ Plasma TV

Regarding support for communications services, LG Electronics and Skype have announced that embedded Skype software will be available on 2010, enabling users to make voice and HD video calls. However, we still have to purchase a separate camera with an integrated microphone.

Figure 29: LG and Skype

4.3.2.3.2 PANASONIC VIERACAST

Panasonic with the *VIERA Cast*™ technology allows users to access a wide range of existing web services such as:

- Twitter
- FOX Sports, including sports news, live scores and updates
- Netflix, for movies stream
- Amazon Video on Demand, offering a wide variety of movies and TV shows in high definition as well as the latest new releases
- Pandora, for listening to music
- YouTube
- Picasa Web Albums, for viewing online digital photo albums with family and friends
- Instant financial information
- Weather forecast

Regarding support for communications services, Panasonic introduced Skype on all of its 2010 VIERA Cast-enabled TVs. To take advantage of it, however, we have to buy Panasonic's TY-CC10W webcam (http://www.engadget.com/2010/04/20/panasonics-ty-cc10w-webcam-joins-skype-hdtvs-mostly-because-it).

The models that support the VIERA Cast technology are presented in ANNEX B: Internet-Enabled TV sets.

4.3.2.3.3 SAMSUNG INTERNET@TV

Samsung's *Internet@TV* solution is supported on selected TVs in 2010 range, allowing users to access a wide range of existing web services such as:

- eBay
- Twitter
- Flickr
- YouTube
- Yahoo Weather
- Yahoo Finance, displaying stock quotes, business news, and market updates
- Yahoo News, displaying breaking news, headlines, and top stories from leading news sources
- Yahoo Video, offering a wide range of lifestyle, and entertainment video content

- TV Guide

Internet@TV is DLNA compatible allowing PC Streaming from users' laptop or desktop.

The Internet@TV features will allow wired (Ethernet) or wireless (WIS09ABGN Samsung dongle) access for all of these features.

Regarding support for communications services, Samsung introduced Skype on all of its 2010 LED 7000 and 8000 series TVs. In order to use however we must attach a low-profile *FREETALK® TV Camera* provided by *In Store Solutions* (ISS), available at www.skype.com/store.

The models that support the Internet@TV are presented in ANNEX B: Internet-Enabled TV sets.

4.3.2.3.4 SONY BRAVIA INTERNET VIDEO

BRAVIA Internet Video seamlessly streams online content through the in-house broadband connection, offering a range of online video entertainment and services such as:

- YouTube
- DailyMotion
- Twitter
- Facebook
- Flickr
- eBay
- LOVEFiLM, offering a wide range of films

Regarding support for communications services, like Skype, at the time of the study there was no report from Sony that they will support such services.

BRAVIA TVs featuring *Sony Internet TV* are presented in ANNEX B: Internet-Enabled TV sets.

4.3.2.3.5 SHARP AQUOS NET

Sharp with *Aquos Net* offers similar types of services and content such as:

- MSNBC, offering News headlines
- Nasdaq, for Financial news
- MSNBC Sports,
- Navteq Traffic, displaying traffic information with overhead map, personalized to city/zip code
- Picasa Web Albums, for viewing online digital photo albums with family and friends

Supported models are presented in ANNEX B: Internet-Enabled TV sets.

As with Sony, regarding support for communications services, like Skype, at the time of the study there was no report from Sony that they will support such services.

4.3.2.3.6 PHILIPS NET TV

Philips with *Net TV* offers entertainment on demand. As with other IETVs, Philips TVs *Net TV* offers instant access to a wide selection of international films, TV, Radio programs and on-line services. In addition to specialized services the Philips NetTV allows access to open internet websites.

Net TV is available on a range of different TV models including Philips' 7000, 8000, 9000 and Cinema 21:9 Platinum series LED TVs. Net TV's latest content apps will launch from October 2010.

Currently supported models are presented in ANNEX B: Internet-Enabled TV sets.

Regarding support for communications services, Philips has announced that it will be available within 2011 on selected models, while NetTV is DLNA compatible and supports streaming of JPEG images and MP3 audio files from networked computers.

Summary

The following table will try and summarize the IETVs characteristics with respect to the HOMEdotOLD requirements:

IETV Requirements	LG Life's Good NetCast	Panasonic VIERA CAST	SAMSUNG	SONY BRAVIA	SHARP AQUOS	PHILIPS sense and simplicity
Web4-CE compliance	✓	✓	✓	✓	✓	✓
Interfaces (USB, RJ-45)	✓	✓	✓			✓
SDK						✓
Pop-up windows	✓	✓	✓	✓	✓	✓
HTTPS	✓	✓	✓	✓	✓	✓
JavaScript 1.5	✓	✓	✓	✓	✓	✓
USB Camera	✓	✓	✓			✓
DLNA	✓	✓	✓			✓

Table 7: Candidate HOMEdotOLD IETVs

4.4 RELATED TECHNOLOGIES AND STANDARDS

4.4.1 HUMAN MACHINE INTERFACES

As a Human Machine Interface (HMI) we consider all components that enable a user to interact with a system. This includes the graphical user interface, as well as auditory or tactile output and devices that are used to control a system. The human machine interface to the NetTV is a remote control. Other HMI can be envisioned for the future. Unfortunately, at the moment these can only be used in a virtual TV environment or a PC platform. Nevertheless we consider these interfaces as possibilities for the HOMEdotOLD project given the runtime of the project.

To limit the scope we consider here only the HMI with regard to controlling a graphical user interface (GUI). The design of this GUI and the selected control mechanism are however interdependent and the possibilities of the GUI should be taken into account when selecting a control mechanism. Human machine interfaces for control that can be thought of can be categorized in heads-up and heads-down interfaces. Consequently, heads-up interfaces can be divided into device and device-less interfaces. Possible human machine interfaces that can be considered are provided in the table below.

Heads-up		**Heads-down**
Device	**Device-less**	
Touch screen display	Speech interfaces	Conventional remote control
Gesture-based devices	Device-less gesture interfaces	Touchpad remote control
Affective interfaces	Eye or head tracking	Touch screen
	Affective interfaces	Keyboard
		Mouse

Table 8: Human Machine Interfaces

4.4.1.1 CONVERSATIONAL AGENTS

Conversational agents, more precisely, embodied conversational agents can be used to support a user in using a system. In this sense, agents are also part of the HMI. Users can be supported by providing visual or auditory feedback. Robotic agents have also been used with elderly in the context of social interaction. The Philips iCat and Paro are examples of this. A lot of research has been done into the expressiveness of robotic agents and web-based conversational agents.

4.4.1.2 ACCESSIBILITY

There exist accessibility guidelines for web interfaces. These are the Web Content Accessibility Guidelines (WCAG). The WCAG has three levels of compliance. The level of a web interface can be checked using various software development tools. For other HMI components guidelines exist in the literature, however, these have not been formalized.

Text to speech is an option that can greatly enhance accessibility for people with visual impairments. Text to speech functionality is nowadays a built-in feature in Windows and Macintosh. Commercial as well as open source text to speech software is available.

4.4.2 COMMUNICATION TECHNOLOGIES

Throughout the HOMEdotOLD system are different terminals. These terminals are distributed to the server and client sides of the system and use different set of technologies for their communication. These terminals includes':

- The STBs located in the elderly home environment,
- PCs and laptops (friends and family)
- Any other devices that let the interaction of the client side components with the server-side.

The following table provides the technologies used for the communication between the different elements of the HOMEdotOLD network architecture

Interface	Technologies/Protocols
IPTV STB <-> ADSL Router	ADSL, Ethernet, IP, HTTP
Internet Enabled TV <-> ADSL Router	ADSL, Ethernet, IP, HTTP
TV set <-> IPTV STB	SCART/HDMI
ADSL Router <-> HOMEdotOLD Application Server	IP
HOMEdotOLD Application Server <-> PCs and laptops	IP
HOMEdotOLD Application Server <-> Service Providers Application Server	IP
HOMEdotOLD Application Server <-> Social Services Organization PCs	IP

Table 9: Communication Technologies

As shown in the table, special weight is given to the communications of the Application Server with the terminals, since the Application Server (AS) constitutes the core system of the HOMEdotOLD platform.

The Application Server hosts all the applications logic, the interfaces to external services, the user profiles data and the associated policy as well as it handles security and privacy issues.

Since the Application Server is needed to communicate with many terminals located in different spots, a mechanism of identifying the different terminals must be implemented. The Internet Protocol (IP) is the best solution here since it supports the communication of the terminals and includes automatic detection, real-time transfer of data and secure data transmission.

On the application layer, there are several protocols able to connect a service and to exchange data based on queries and responses. They are commonly used Web based protocols that use description languages such as HTTP, XML, SOAP etc.

The Set-Top-Box in combination with the TVset is a User Terminal by itself. It supports different kind of wired connections with the TVset, where the user can also receive messages from the Application Server.

4.4.3 SERVICE PLATFORMS

Web applications are popular due to the ubiquity of web browsers, and the convenience of using a web browser as a client. The ability to update and maintain web applications without distributing and installing software on potentially thousands of client computers is a key reason for their popularity, as is the inherent support for cross-platform compatibility.

In earlier type of client–server computing, each application had its own client program which served as its user interface and had to be separately installed on each user's personal computer. An upgrade to the server part of the application would typically require an upgrade to the clients installed on each user workstation, adding to the support cost and decreasing productivity.

In contrast, ***web applications*** use web documents written in XHTML, which are supported by a variety of web browsers. Each individual web page is delivered to the client as a static document, but the sequence of pages can provide an interactive experience, as user input is returned through web form elements embedded in the page markup. During the session, the web browser interprets and displays the pages, and acts as the *universal* client for any web application.

Browser applications typically require little or no disk space on the client, upgrade automatically with new features. They also provide cross-platform compatibility in most cases (i.e., Windows, Mac, Linux, etc.) because they operate within a web browser window. However, browser applications rely on application files accessed on remote servers through the Internet.

Therefore, when connection is interrupted, the application is no longer usable.

The following table summarizes the current technology stacks, showing their differences in terms of:

- Programming languages,
- Web server
- Database support

Web Application Technologies	Web Server	Application Server	Web Services Support	Programming Languages / Technologies	Database Support
PHP	Apache	Not applicable. Can be combined with JSP (Glassfish, JBOSS, Resin, Tomcat)	Yes	Java, EJB	Oracle, MySQL, MS SQL Server
ASP	IIS	ADO.NET AS, SharePoint	Yes	C#	Oracle, MySQL, MS SQL Server
JSP	Apache	Glassfish, JBOSS, Resin, Tomcat	Yes	Java, EJB	Oracle, MySQL, MS SQL Server
CGI	Apache	Tomcat	Yes	Perl	Varies

Table 10: Web Application Technology stacks

These technologies are quite different, which means that someone who's familiar with one approach would have a high learning curve to use a different one. Once an application is developed using one technology, it is difficult and expensive to convert it to a different one.

Regarding the licensing scheme this depends on the selected application server. The table bellow illustrates that.

Application Server	OS	Vendor	License
Glassfish v.2.1	Windows/Linux	SUN	SUN Mozilla public license (GPL, Commercial)
JBOS v.5	Windows/Linux	JBOS AS / Red Hat	LGPL and Proprietary (Java)
SharePoint	Windows	Microsoft	Microsoft
ADO.NET AS	Windows	Microsoft	Microsoft
Tomcat v.6	Windows/Linux/Unix	Apache	Apache Software License (GPL, Commercial)
Resin v.3	Windows/Linux	Caucho	GPL and Proprietary (Java)

Table 11: Application Server Licensing Scheme

4.4.4 SECURITY

IPTV content streams - like other IP services, such as VOIP - are subject to spoofing, spamming, content theft, and other types of hacks [24]. In contrast to the analog world, where tampering with the content meant using black-market hardware to unscramble a signal, IPTV encryption takes place on the software level. So hacking into a system is really just a matter of writing some malicious code. And that's got some carriers and content providers worried. Several kinds of IP-based attacks are possible on IPTV networks. In the IPTV world, for example, spoofing is possible, but there's no precedent yet. Hackers can spoof an IPTV network by trying to pretend they are a head-end and flowing content down to your set-top box that might not be appropriate.

The nature of IPTV implies that most subscribers use their television set to browse information and applications (other compatible access models such as PCs and handheld devices will also be used, but to a lesser degree.) Access is based on the browser provided by the set top box (STB). Cryptographic functions and hardware within the STB can be used to store credentials or at least partial authentication information. This approach reduces the amount of information requested of subscribers. From the security domain point of view, the servers receive an access request from the subscriber STB. A set of stored credentials are matched against the authorization authority that issues the subscriber profile information. This information is sent by the assertion service to the attribute requested which, in turn, validates the information against the attribute authority. The attribute authority responds to the attribute requester with a set of entries from the approved schema. This information is used to grant access based on the approved profile model. A subscriber will be able to use the same credentials against a number of servers configured to support the federated identity model.

All the functions within the IPTV model are supported by security mechanisms at different levels. Content provisioning includes basic encryption provided by content owners, while content delivery is ensured using DRM [25]. The IPTV control and transport functions rely on standards with embedded security to avoid unauthorized modification or access to contents. The subscriber functions are limited using the security mechanisms deployed at the set top box and middleware server. In general, all applications and operating systems within the IPTV environment should have security mechanisms available to avoid security incidents. Specific elements from the IPTV environment can be matched with some of the functions.

4.4.4.1 REQUIREMENTS FOR IPTV SECURITY

Security requirements for IPTV [26] can be divided into the following three main categories:

Security requirements for IPTV Transport Stratum

Security requirements for IPTV Transport Stratum can be further divided into two parts: Security requirements for the network operator (dealing with issues including access control and authentication, authenticity of network entities, protection of data integrity and availability, accountability of data packets, and multicast security protection) and security requirements for the subscribers (dealing mainly with the authenticity of subscribers' devices)

Security requirements for IPTV Service Stratum

Security requirements for IPTV Service Stratum can be further divided into two parts: Security requirements for the service provider (dealing mainly with the controlled access and authorization of IPTV service and the availability of the IPTV service) and security requirements for the subscribers (dealing mainly with the authenticity/reliability of the IPTV service providers, the protection of the subscriber's information confidentiality and the protection of the subscribes' right to privacy)

Security requirements for IPTV Content Stratum

The security requirements for IPTV content concern with three entities: content provider (dealing mainly with the copyrights protection for contents), service provider (dealing mainly with the copyrights protection for contents and the protection for legality of contents) and end consumer (dealing mainly with the copyrights protection for contents). For different purpose, the technologies of DRM can be used by content provider or service provider, separately or together.

4.4.4.2 COMMUNICATION SECURITY

Regarding the state-of-the-art technologies and protocols for security in the "communication layer", the following are currently being implemented at the greater extent:

SSL & TLS: Transport Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL), are cryptographic protocols that provide security for communications over networks such as the Internet. TLS and SSL encrypt the segments of network connections at the Application Layer to

ensure secure end-to-end transit at the Transport Layer.

HTTPS: Hypertext Transfer Protocol Secure (HTTPS) is a combination of the Hypertext Transfer Protocol with the SSL/TLS protocol to provide encrypted communication and secure identification of a network web server.

IPSec: Internet Protocol Security (IPSec) is a protocol suite for securing Internet Protocol (IP) communications by authenticating and encrypting each IP packet of a communication session. IPSec also includes protocols for establishing mutual authentication between agents at the beginning of the session and negotiation of cryptographic keys to be used during the session.

4.4.4.3 DATA INTEGRITY & SECURITY

Data integrity and database security [26] can be achieved utilizing various technologies, the most important and most widely used nowadays being cryptography (either symmetric or asymmetric key cryptography) and watermarking.

Symmetric Key Cryptography: Secret key cryptography or symmetric key cryptography is a form of protecting data in which a secret key is used both to encrypt and decrypt the contents. The key then has to be shared using a different method or channel to avoid interception.

Asymmetric Key Cryptography: Public key or asymmetric key cryptography is a form of protecting data in which a pair of mathematically bound keys are derived from the same functions. At the same time the function reduces the possibility of deducting one from the other.

Watermarking: Watermarking is the process of imperceptibly modifying a carrier to embed a message, with the message carrying information about the cover. Information can include ownership, access rights, serial numbers or the last equipment that displayed a video.

4.4.4.4 GENERAL MECHANISMS FOR CONTENT PROTECTION

Within the IPTV market there are three primary types of technology used to protect video application intellectual property (IP) rights:

1. Content protection systems (CPSs). Content is transmitted across networks in an encrypted form to help protect against theft or unauthorized access.
2. Conditional access systems (CASs). These help to ensure that only authorized subscribers have access to the content and create a safeguard against theft of service.
3. Digital rights management (DRM). This manages how the content is used by the subscriber on the basis of specific conditions set by the distribution contract.

The term DRM is accepted in the industry to include the CPS and it operates in conjunction with the middleware to provide CAS-related services. The DRM software supported by the DRM client on the set top box is able to encrypt contents from the source and issue licenses for access only by authorized subscribers; in this particular example, DRM acts as CPS, CAS and DRM.

4.4.4.5 AUTHENTICATION

This section undertakes the analysis of the technologies utilized for encountering any security issues regarding the authentication of the users involved in any e-activity.

Public Key Infrastructure: Public Key Infrastructure (PKI) is a set of hardware, software, people, policies, and procedures needed to create, manage, distribute, use, store, and revoke digital certificates. In cryptography, a PKI is an arrangement that binds public keys with respective user identities by means of a certificate authority (CA). The user identity must be unique within each CA domain. The binding is established through the registration and issuance process, which, depending on the level of assurance the binding has, may be carried out by software at a CA, or under human supervision. The PKI role that assures this binding is

called the Registration Authority (RA). For each user, the user identity, the public key, their binding, validity conditions and other attributes are made unforgeable in public key certificates issued by the CA. The term trusted third party (TTP) may also be used for certificate authority (CA). The term PKI is sometimes erroneously used to denote public key algorithms, which do not require the use of a CA. There are two relevant concepts that support the technology: Digital Signatures and Digital Certificates

Single-Sign-On: Single sign-on (SSO) is a property of access control of multiple, related, but independent software systems. With this property a user logs in once and gains access to all systems without being prompted to log in again at each of them. Single sign-off is the reverse property whereby a single action of signing out terminates access to multiple software systems.

4.5 RELATED PROJECTS

The aim of the current section is the identification of European R&D projects that have similarities with HOMEdotOLD. The projects that have been identified and are summarised are similar to HOMEdotOLD either:

- at technological level, namely utilisation of Interactive television or interaction with other home appliances and electronic devices to which the elderly users are accustomed, or the development of multimodal interfaces and HMI
- at social level, namely provision of social services, bridging the distances between the elderly and friends and/or family members
- at inclusion level, motivating and helping the elderly stay socially active

PANACEIA-iTV	
Scope / Objectives / Impact The purpose of PANACEIA-ITV is to facilitate essential lifestyle changes and to promote compliance with scientifically sound self-care recommendations through the application of interactive digital television for family health maintenance through home care. The means to achieve these goals PANACEIA-ITV is based on technological, health services and business models. PANACEIA-ITV is looking for communication of monitoring microdevices with I-TV set boxes using infrared technology, and embodiment of analogous H/W and S/W in the I-TV set boxes. Moreover, interactive digital TV services will be developed for the delivery of the home care environment. The project objectives are: • To develop communication means between I-TV and microdevices capable of recording simple, daily routine measurements through infra-red communication. • Through the use of ITV to provide easily accessible high information contented educational and health prevention / monitoring material. • To create a business scheme that can glue together different competences such as information coding/processing, cable TV services, micro device manufacturers, telecommunication manufacturers, medic l service provision centres, contact centres	
General Information	
Partners	1) POULIADIS (GR) 2) ICOM (GR) 3) CARD GUARD (ISR) 4) BROMPTON (UK) 5) RAMIT (B) 6) AUTH (GR) 7) OTE (GR)
Instrument	5th FP – IST-2001-33369 – Citizens – Research
Duration	August 2001 – January 2004 (30 Months)
Website	http://www.itv4health.org

OLDES (Older People's e-services at home)	
Scope / Objectives / Impact OLDES will plan and implement an innovative technological platform, with low cost and easy use able to provide a wider range of services to an higher number of elderly. OLDES objectives are: • To develop a cost optimized technical solution; • To define the profile of “elderly people”; • To define a standardized procedure for tele-care interaction; • To develop a programme for results evaluation. This 36 month project aims at defining an innovative and alternative welfare system, replacing the existing one, no longer sustainable, where technology will be customized according to user needs and used on a large scale. Thanks to OLDES, potentially all elderly people in the cities and surrounding areas in the future will be tele-assisted, contributing greatly to the simplification and systemization of assistance services and providing public cost savings. The solutions produced will allow older people and their families to live serene and assisted lives in their own homes, without representing too high a cost burdening the whole society.	
General Information	
Partners	1) Cup 2000 SPA (IT) 2) Alma Mater Studiorum - Universita di Bologna (IT) 3) The University of Newcastle Upon Tyne (UK) 4) Centre d'Excellence en Technologies de l'Information et de la Communication (B) 5) Ceske Vysoke Uceni Technicke v Praze (CZ) 6) Ink Media Inc (Canada) 7) Agentscape AG (Germany) 8) Comune di Bologna (IT) 9) Azienda Unita Sanitaria Locale di Bologna (IT) 10) Univerzita Karlova v Praze (CZ)
Instrument	6th FP – IST-2005-045282 eHealth - STREP
Duration	January 2007 – December 2009
Website	http://www.oldes.eu

AAL (Ambient Assisted Living - Preparation of an Art. 169-initiative)	
Scope / Objectives / Impact	
The objective of the specific support action "Ambient assisted living" was to prepare an Art. 169 initiative in the field of "Small and smart technologies for ambient assisted living" to be submitted by the end of the year 2005. Ambient Assisted Living as a concept aims at prolonging the time, people can live in a decent way in their own flat by increasing their autonomy and self-confidence, the discharge of monotonously everyday activities, to monitor and care for the elderly or ill person, to enhance the security and to save resources. The Article 169-initiative in the field of "Small and smart technologies for ambient assisted living" undertaken jointly by several Member states will tackle the major challenges Europe has to face:1. It will stimulate the development of products and services for societies being characterised by demographic changes 2. It will improve policy co-ordination in a field where the innovation process has to be accompanied and stimulated by public authorities because of its social dimension.	
General Information	
Partners	1) TEMAS AG TECHNOLOGY AND MANAGEMENT SERVICES (SWITZERLAND) 2) INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM VZW (BELGIUM) 3) CONSIGLIO NAZIONALE DELLE RICERCHE (ITALY) 4) TECHNISCHE UNIVERSITAET WIEN (AUSTRIA) 5) TEKNOLOGIAN KEHITTAMISKESKUS (FINLAND) 6) BUNDESMINISTERIUM FUER VERKEHR, INNOVATION UND TECHNOLOGIE (AUSTRIA) 7) BUNDESMINISTERIUM FUER BILDUNG UND FORSCHUNG (GERMANY)
Instrument	6th FP – IST-2002-2.3.2.10 e-inclusion,IST-2002-2.3.5 - SSA
Duration	September 2004 – December 2006
Website	http://www.aal169.org/

COGKNOW	

Scope / Objectives / Impact

The challenging aim of the three-year STREP proposal is to breakthrough with research that addresses the needs of those with dementia, particularly those with mild dementia in Europe. At about 2% of the elderly population, this comes to around 1,900,000 people. In order to achieve this aim, this means helping people navigate through their day. This entails cognitive reinforcement and may be expressed as the social objectives of our research for the needs of people with dementia, helping people to remember, maintain social contact, perform daily life activities and enhance their feelings of safety.

The core technological objective of the project is to research and prototype a successful, near-to-market, portable, remotely-configurable, user-validated cognitive prosthetic device and associated services for people with mild dementia. The solution will help this group of people to navigate through their day, unobtrusively offering information and reassurance and allowing them to retain control over their daily life activities.

General Information

Partners	1) UNIVERSITY OF ULSTER (UK) 2) GROUPE DES ECOLES DES TELECOMMUNICATIONS (F) 3) THE QUEEN'S UNIVERSITY OF BELFAST (UK) 4) STICHTING TELEMATICA INSTITUUT (NL) 5) VERENIGING VOOR CHRISTELIJK HOGER ONDERWIJS WETENSCHAPPELIJK ONDERZOEK EN PATIENTENZORG (NL) 6) UNIVERSITETSSYKEHUSET NORD-NORGE HF (NO) 7) MOBI SOLUTIONS OU (Estonia) 8) NORRBOTTENS LANS LANDSTING (Sweden) 9) ACROSSLIMITS TECHNOLOGIES LTD (MT) 10) LULEA TEKNISKA UNIVERSITET (Sweden)
Instrument	6th FP – IST Call 5 (eInclusion) – 034025 – STREP
Duration	September 2006 – August 2009
Website	http://www.cogknow.eu/

DIADEM	
Scope / Objectives / Impact The goal of ***DIADEM*** is to provide an adaptable web browser interface, to enable people who suffer a reduction in cognitive skills to remain active and independent members of society both at work and at home. This will be achieved by developing an Expert System which, monitors the user, adapting and personalising the computer interface to enable people to interact more effectively with web based forms. This system will be located on the users PC and will ensure that the many services available over the internet are open and accessible to as many people as possible, whilst providing privacy and security. Service providers only need to use the Web Services standard and provide some meta-data.	
General Information	
Partners	1) SHEFFIELD CITY COUNCIL (UNITED KINGDOM) 2) NORSK REGNESENTRAL (NORWAY) 3) CONSORZIO PER IL SISTEMA INFORMATIVO (ITALY) 4) CITTA DI TORINO (ITALY) 5) MORE OPTIMIZED REGISTRATION ELEMENTS AS (NORWAY) 6) BLUEGARDEN AS (NORWAY)
Instrument	6th FP – IST Call 5 (eInclusion) – 034106 – STREP
Duration	September 2006 – August 2009
Website	http://www.project-diadem.eu/

ELDERGAMES	

Scope / Objectives / Impact

The **ElderGames** project is based on the verified importance of leisure for senior citizens quality of life and those scientific results that show how play activity not only contributes to an enrichment of leisure time, but can also prove to be a powerful application when used for rehabilitation and prevention of the negative effects linked to aging memory loss, degradation of cognitive ability, disintegration of social networks, etc.).

The project will create an interactive-play board (**ElderGames**) that will be the first opportunity to scientifically explore how emerging advances in ICT can be adapted, applied and combined with play activities to obtain a new preventive therapeutic tool for improving cognitive skills and quality of life (affective, physiological and social) in old age. **ElderGames** will also be the first play platform able to monitor cognitive health and welfare, allowing an early detection of cognitive disease or social unease and the response to them. The **ElderGames** interactive board will also integrate an alternative communication system for overcoming the linguistic barriers which could exist between different native languages, allowing on-line games between users from different European countries.

The Consortium of **ElderGames** project aims at building a network that mediates the geriatrics and gerontologist researcher's interests with the commercial projects, involving academia, industry, experts specialising in elderly care and final users. The complementarities among partners will guarantee the a perfect blending of scientific research with real commercial applications.

General Information	
Partners	1) UNIVERSIDAD POLITECNICA DE VALENCIA (SPAIN) 2) LAPPSET GROUP OY (FINLAND) 3) UNIVERSITA DEGLI STUDI DI PADOVA (ITALY) 4) INFOWERK SOFTWARE-ENTWICKLUNGS GMBH (AUSTRIA) 5) ASOCIACION DE INDUSTRIAS DE LAS TECNOLOGIAS ELECTRONICAS Y DE LA INFORMACION DEL PAIS VASCO (SPAIN) 6) BRAINSTORM MULTIMEDIA S.L. (SPAIN) 7) TRONDHEIM KOMMUNE (NORWAY) 8) KENT COUNTY COUNCIL (UNITED KINGDOM) 9) GENERALITAT VALENCIANA (SPAIN)
Instrument	6th FP – IST Call 5 (eInclusion) – 034552 – STREP
Duration	September 2006 – February 2009
Website	http://www.eldergames.org/

MONAMI	

Scope / Objectives / Impact

Technological augmentation of the living space can help alleviate the problems of daily living, increase quality of life and reduce the need for institutional and other care. The proposed project builds on these results and aims to move such services from the laboratory and small scale demonstrators to the status of mainstream technology. **MonAMI** focuses on:

1. capitalizing on Ambient Intelligence (AmI) technologies to ensure that the services can be used without behavioural change
2. building on top of mainstream devices and services such as TV based internet, nomadic devices, etc.
3. doing initial experimentation in Feasibility and Usability centres and subsequent large-scale validation in Validation centres in five countries
4. addressing economic viability and long term sustainability of such services in large communities in different Member States

MonAMI will select bouquets of services in the areas of comfort applications, communication/information, health, safety and security. It will build, test and deploy these services and demonstrate that they can be economically brought through the future mainstream ambient intelligence technologies.

General Information

Partners	1) TELEFONICA INVESTIGACION Y DESARROLLO SA UNIPERSONAL (SPAIN) 2) TRIALOG (FRANCE) 3) SIEMENS BUSINESS SERVICES GMBH & CO. OHG (GERMANY) 4) HMC INTERNATIONAL NV (BELGIUM) 5) FRANCE TELECOM SA (FRANCE) 6) UNIVERSIDAD DE ZARAGOZA (SPAIN) 7) KUNGLIGA TEKNISKA HOGSKOLAN (SWEDEN) 8) LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE (UNITED KINGDOM) 9) TECHNICKA UNIVERZITA V KOSICIACH (SLOVAKIA) 10) ELECTRICITE DE FRANCE SERVICE NATIONAL (FRANCE) 11) OPENHUB LIMITED (UNITED KINGDOM) 12) UNIVERSITAET PASSAU (GERMANY) 13) EUROP ASSISTANCE FRANCE (FRANCE)
Instrument	6th FP – IST Call 5 (eInclusion) – 035147 – IP
Duration	September 2006 – August 2010
Website	http://www.monami.info/

EASY-LINE+	
Scope / Objectives / Impact	
The **EASY LINE+** project aims to develop prototypes near to market of advanced white goods in order to support elderly persons with or without disabilities to have a longer independent life and will compensate their loss of physical and/or cognitive abilities. The project foresees using the integrated RFID, Neuronal Networks and HMI technologies to build a system that can capture data of the home environment, and can control via wireless communication (Zigbee) or the mains electricity (EMS PLC), any white good in the home. The users, elderly persons, may actuate by himself any white good in the home, or may leave the "e-servant" to do the actuation. The e-servant will be a white good control system, based on the sensor information and the habits of the user that can program any application without/or with user cooperation. The e-servant, also will be a learning system that detects the loss of abilities of the user and tries to compensate them.	
General Information	
Partners	1) SIEMENS BUSINESS SERVICES GMBH & CO. OHG (DE) 2) UNIVERSIDAD DE ZARAGOZA (E) 3) A D SOFTWARE SOLUTIONS LIMITED (UK) 4) GIS GERA.IDENT-SYSTEME GMBH (DE) 5) ISDE ARAGON S.L. (E) 6) NORTH EAST WALES INSTITUTE OF HIGHER EDUCATION (UK)
Instrument	6th FP – IST Call 6 (eInclusion) – 045515 – STREP
Duration	January 2007 – June 2009
Website	http://www.arenque-ks.com/easynet/

ENABLE	
Scope / Objectives / Impact The project will develop a personal, user-centred enabling system, with services, for use by an elderly person in or out of the home, to mitigate the effects of any disability and to increase quality of life: independence, autonomy, mobility, communications, care and safety. The system will be based on a distributed open platform, enabling other services to be added by third parties, by "plugging" into defined interfaces. The platform includes a mobile phone, enabling the user to get out and about, for visiting, shopping, recreation, etc, whilst maintaining contact for help and services.	
General Information	
Partners	1) INFORMATION SOCIETY OPEN TO IMPAIRMENTS E-ISOTIS (GR) 2) THE UNIVERSITY OF READING (UK) 3) ACCESSEQUALITY TECHNOLOGY LTD (UK) 4) KOMPETENZNETZWERK INFORMATIONSTECHNOLOGIE ZUR FOERDERUNG DER INTEGRATION VON MENSCHEN MIT BEHINDERUNG (AU) 5) ZIVOT 90 (CZ) 6) CARDIONETICS LIMITED (UK) 7) CODE FACTORY, S.L. (E) 8) ABATEC - ELECTRONIC AG (AU)
Instrument	6th FP – IST Call 6 (eInclusion) – 045563 – STREP
Duration	January 2007 – December 2009
Website	http://www.is.tuwien.ac.at/enable/index_en.html

PERSONA	
Scope / Objectives / Impact ***PERSONA*** aims at advancing the paradigm of Ambient Intelligence through the harmonisation of Ambient Assisted Living (AAL) technologies and concepts for the development of sustainable and affordable solutions for the social inclusion and independent living of Senior Citizen, integrated in a common semantic framework. It will develop a scalable open standard technological platform to build a broad range of AAL Services, to demonstrate and test the concept in real life implementations, assessing their social impact and establishing the initial business strategy for future deployment of the proposed technologies and services.	
General Information	
Partners	1) FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (DE) 2) CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (E) 3) UNIVERSITAT AUTONOMA DE BARCELONA (E) 4) UNIVERSITA DI PISA (I) 5) R&S INFO S.R.L. (I) 6) INSTITUTO DE APLICACIONES DE LAS TECNOLOGIAS DE LA INFORMACION Y DE LAS COMUNICACIONES AVANZADAS – ITACA (E) 7) CONSIGLIO NAZIONALE DELLE RICERCHE (I) 8) FUTURE CAMP GMBH (DE) 9) COMUNITA MONTANA DELLE VALLI DEL TARO E DEL CENO (I) 10) FUNDACION DE LA OFICINA VALENCIANA PARA LA SOCIEDAD DE LA INFORMACION (E) 11) CB DBT (E) 12) UNIVERSIDAD POLITECNICA DE MADRID (E) 13) REGION SYDDANMARK (DK) 14) A.E. SYSTIMATON ORGANOSIS LEITOURGIAS KAI EPIKOINONIAS EPICHEIRISEON (GR) 15) ANKO A.E. ANTIPROSOPEION EMPORIOU KAI VIOMICHANIAS (GR) 16) FUNDACION VODAFONE ESPANA (E) 17) MOTOROLA GMBH (DE) 18) RATIO-CONSULTA SPA (I) 19) ASOCIACION DE INVESTIGACION DE LA INDUSTRIA TEXTIL (E) 20) UNIVERSITETSSYKEHUSET NORD (NO) 21) ODENSE KOMMUNE (DK)
Instrument	6th FP – IST Call 6 (eInclusion) – 045459 – IP
Duration	January 2007 – June 2010
Website	http://www.aal-persona.org/

SOPRANO	
Scope / Objectives / Impact ***SOPRANO*** will design and develop highly innovative, context-aware, smart services with natural and comfortable interfaces for older people at affordable cost, meeting requirements of users, family and care providers and significantly extending the time we can live independently in our homes when older. User friendliness and acceptability is top priority for the project - a zero-slope learning curve is to be achieved and interfaces are to "vanish" into domestic settings. Large-scale viability in real homes will be demonstrated with 600 users to raise public awareness and accelerate AAL exploitation.	
General Information	
Partners	1) UNIVERSITAET STUTTGART (DE) 2) EMPIRICA GESELLSCHAFT FUER KOMMUNIKATIONS - UND TECHNOLOGIEFORSCHUNG MBH (DE) 3) NETHERLANDS ORGANISATION FOR APPLIED SCIENTIFIC RESEARCH (TNO) (NL) 4) THE UNIVERSITY OF LIVERPOOL (UK) 5) INSTITUTE FOR LANGUAGE AND SPEECH PROCESSING (GR) 6) INSTITUTE OF COMMUNICATION AND COMPUTER SYSTEMS (GR) 7) CAS SOFTWARE AG (DE) 8) ASOCIACION CENTRO DE TECNOLOGIAS DE INTERACCION VISUAL Y COMUNICACIONES-VICOMTECH (E) 9) ZENTRUM FUER GRAPHISCHE DATENVERARBEITUNG E.V. (DE) 10) UNIVERZA V LJUBLJANI (SL) 11) FORSCHUNGSZENTRUM INFORMATIK AN DER UNIVERSITAET KARLSRUHE (DE) 12) PROSYST SOFTWARE GMBH (DE) 13) FUNDACION ROBOTIKER (E) 14) FUNDACION INSTITUTO GERONTOLOGICO MATIA - INGEMA (E) 15) STICHTING VERPLEGING EN VERZORGING EINDHOVEN E.O. DE ARCHIPEL (NL) 16) STICHTING SMART HOMES (NL) 17) TUNSTALL TELECOM LIMITED (UK) 18) DIALOC ID TECHNOLOGY BV (NL) 19) FUNDACION ANDALUZA DE SERVICIOS SOCIALES (E) 20) WORK RESEARCH CENTRE LIMITED (IE) 21) SINGULARLOGIC INFORMATION SYSTEMS & APPLICATIONS S.A (GR)
Instrument	6th FP – IST Call 6 (eInclusion) – 045212 – IP

Duration	January 2007 – April 2010
Website	http://www.soprano-ip.org/

NETCARITY	

Scope / Objectives / Impact

NETCARITY proposes a new integrated paradigm for supporting independence and engagement in elderly people living alone at their own home place. The project fosters the development of a 'light' technological infrastructure to be integrated in homes of old people at reduced costs, that both allows the assurance of basic support of everyday activities and health critical situations detection, as well as the social and psychological engagement required to maintain in the elder the emotional well-being enhancing dignity and quality of life.

The project will seek to advance ambient intelligence technologies in the integration of micro and nano systems in a networked wireless/wired multi-sensing environment with plug and play capabilities and intelligent decision making for an effective detection of critical situations and support of task completion. Efforts will be concentrated in developing low-cost solutions and could rapidly reach the market and facilitate easy adaptation in a wide number of existing homes.

The social and psychological factors of the 'ageing-in-place' problem will be addressed in ***NETCARITY*** by the development of advanced multimodal interfaces that strengthen the communication channel between the elders and their friends and caregivers, reducing isolation and the feeling of being alone, and stimulating them in the execution of everyday activities to maintain high levels of motivation and a correct perception of their own abilities.

General Information

Partners	1) ISTITUTO TRENTINO DI CULTURA (I) 2) SIEMENS AKTIENGESELLSCHAFT (DE) 3) UNIVERSITA DEGLI STUDI DI PAVIA (I) 4) EBERHARD KARLS UNIVERSITAET TUEBINGEN (DE) 5) CESKE VYSOKE UCENI TECHNICKE V PRAZE (CZ) 6) IBM CESKA REPUBLIKA, SPOL. S R.O. (CZ) 7) M R & D INSTITUTE SRL (I) 8) IKERLAN S. COOP (E) 9) STICHTING VERPLEGING EN VERZORGING EINDHOVEN E.O. DE ARCHIPEL (NL) 10) PROVINCIA AUTONOMA DI TRENTO (I) 11) STEINBEIS GMBH & CO. KG FUER TECHNOLOGIETRANSFER (DE) 12) STICHTING SMART HOMES (NL) 13) KUIJPERS BEVEILIGINGSSYSTEMEN B.V. (NL) 14) A & O SYSTEMS + SERVICES GMBH (DE)
Instrument	6th FP – IST Call 6 (eInclusion) – 045508 – IP
Duration	February 2007 – January 2011

SENIOR ONLINE	
Scope / Objectives / Impact	
The Senior Online market validation is based on the assumption that seniors often have difficulties to use a computer and the Internet, though many would be interested to do so. The project will test and evaluate a business idea for an Internet package that will provide all the necessary services a mature person will need to make his first steps into the Internet, even without prior PC experience. The market validation will be carried out in test markets in Italy and Austria aiming to the deployment in almost six European countries.	
General Information	
Partners	1) Public Voice Lab - Labor zur Forderung von Alltagskommunikation durch neue Medien (AU) 2) OMEGA Generation srl (I) 3) King Com S.p.A. (I) 4) Vienna City Administration-Senior Citizens' Office (AU) 5) COMUNE DI BOLOGNA (I)
Instrument	eTen – 2000-1 (eInclusion)
Duration	March 2001 – September 2002

SENIORITY	
Scope / Objectives / Impact The main goal of Seniority is to extend the time during which elderly people can live independently in their preferred environment with the support of ICTs. The Seniority project aims to market validate a quality control system and tele-monitoring for elderly residences in order to allow the elderly to communicate, increase their mobility and decrease the sense of social isolation. The main goal of the Seniority project is to extend the time during which older people can live independently in their preferred environment with the support of ICTs.	
General Information	
Partners	1) ASOCIACION DE EMPRESAS DE ELECTRONICA, TECNOLOGIAS DE LA INFORMACION Y TELECOMUNICACIONES DE ESPANA (E) 2) PROVINCIA LOMBARDO-VENETA DELL'ORDINE OSPEDALIERO DI SAN GIOVANNI DI DIO – FATEBENEFRATELLI (I) 3) INSTITUTO SAO JOAO DE DEUS (P) 4) INVESTIGACION Y DESARROLLO INFORMATICO EIKON SOCIEDAD LIMITADA (E) 5) RESIDENCIA D'AVIS LA TORRASSA, SOCIEDAD CIVIL (E) 6) UNIVERSIDAD POLITECNICA DE MADRID (E) 7) MINISTERIO DE TRABAJOS Y ASUNTOS SOCIALES (E) 8) FUNDACIO PRIVADA PRESIDENT TORRES FALGUERA (E) 9) ASSOCIATION NOTRE-DAME-DES-DOULEURS, FOYER SAINT-FRAI (F) 10) APLIA, SOCIEDAD LIMITADA (E)
Instrument	eTen – 2003-1 (eInclusion)
Duration	Ιούλιος 2004 – Οκτώβριος 2006
Website	http://www.eu-seniority.com/

SPORT4ALL	
Scope / Objectives / Impact	
In the context of the information society and within the frame of the European integration, the SPORT4ALL project aims to benefit of the advances in the telecommunications sector in order to provide user-oriented and value added services, targeted at the disabled and elderly population and contributing, under this perspective, to their inclusion in the e-society in correlation to athletic events. SPORT4ALL aims at the creation of a novel pool of information and a network to provide them, targeted at the disabled, in the context of athletic events.	
General Information	
Partners	1) Pouliadis Associates Corp. SA (GR) 2) Fraunhofer IAO (DE) 3) STAKES (FI) 4) Institute of Accelerating Systems and Applications (GR) 5) Eurodiagnosi Medical S.A. (GR) 6) CERTH/HIT (GR) 7) Maguire, Mugen, and Associates (IL) 8) Disability Now (GR)
Instrument	eTen – 2001-1 (eInclusion)
Duration	September 2002 – February 2004
Website	http://sport4all.pouliadis.gr

EMOTIONAAL	
Scope / Objectives / Impact	
EMOTIONAAL specifically targets at elderly persons living in rural areas and offers them an integrated seamless solution including social services and new technologies to support self care, prevention and assistance to carry out daily activities, health and activity monitoring and enhances safety and security.	
General Information	
Partners	1) Opsolution NanoPhotonics GmbH (DE) 2) German Retail Federation/ EHV Hesse-North e.V. (DE) 3) University of Marburg (DE) 4) University of Kassel (DE) 5) Diaconia University of Applied Sciences (FI) 6) Vitaphone GmbH (AT) 7) German Aerospace Centre (DE) 8) Protestant University of Applied Sciences (DE) 9) Activesoft LTD (FI)
Instrument	AAL-2008-1

HERA (Home Services for Specialised Elderly Assisted Living)	
Scope / Objectives / Impact	
The HERA project aims at providing a platform with cost-effective specialised assisted living services for the elderly people suffering from mild Alzheimer or cardiovascular diseases with identified risk factors, which will significantly improve the quality of their home life, extend its duration and at the same time reinforce social networking.	
General Information	
Partners	1) Alcatel Lucent Deutschland AG (DE) 2) Forschungsinstitut des Roten Kreuzes (AT) 3) Diagnostic & Therapeutic Centre of Athens "HYGEIA" Societe Anonyme (GR) 4) Paris Descartes University (FR) 5) SingularLogic S.A (GR) 6) SOLINET GmbH Telecommunications (DE)
Instrument	AAL-2008-1

HOPE	
Scope / Objectives / Impact	
The Hope project addresses elderly people that suffer from Alzheimer's disease to achieve a richer lifestyle. An ICT system will enable persons to perform activities they were not able to do before and which are important for their daily personal life. The proposed system provides a basis for integrating further services, e.g. control of the home environment	
General Information	
Partners	1) Unita Operativa Geriatria & Laboratorio di Recerca Gerontologia-Geriatria - IRCCS (IT) 2) CETEMMSA Technology Centre (ES) 3) Andalusian Centre of Innovation, Information and Communication Technologies (CITIC Foundation) (ES) 4) KMOP Organization (GR) 5) Integrated Information systems SA (GR) 6) TRACS SRL (IT) 7) FORUS SRL (IT)
Instrument	AAL-2008-1

At this point, it is useful to create a similarities matrix in order to highlight the similarities that the aforementioned projects have with HOMEdotOLD.

PROJECT	Technological Level (IPTV, HMI)	Social Level (Interacting, Networking)	Inclusion Level (Autonomy, Motivation , Activity)
PANACEIA-iTV	√		√
OLDES			√
AAL-169			√
COGKNOW			√
DIADEM	√		√
ELDERGAMES	√	√	√
MONAMI	√		√
EASY-LINE+	√		√
ENABLE			√
PERSONA		√	√
SOPRANO	√		√
NETCARITY			√
SENIOR ONLINE	√		√
SENIORITY		√	√
SPORT4ALL			√
EMOTIONAAL		√	√
HERA	√	√	√
HOPE			√

Table 12: Relative project similarity matrix

5. TECHNICAL REQUIREMENTS

Technical requirements are identified by unique identifiers that shall remain constant during the full development process. The pattern is HOMEdotOLD-<Category>-<Number>, where <Category> is a letter identifying the category of the requirement and <Number> a unique number for the category. The categories are:

A……..General Architectural and Equipment Requirements

C……..Connectivity and Communication Requirements

I……...User Interface Requirements

S……..Security Requirements

T……..Technological and Development Requirements

Each requirement is placed in a table respecting the following template:

Requirement Id	Requirement text
	Requirement rationale
	Requirement example

5.1.1 GENERAL ARCHITECTURAL AND EQUIPMENT REQUIREMENTS

HOMEdotOLD-A-00001	The HOMEdotOLD service infrastructure shall be based on the public Internet
	Home environment should include internet connectivity (cable or wireless)

HOMEdotOLD-A-00002	Internet enabled television or STB shall be used as a user terminal
	A mechanism for accessing web-based services through the TVset is needed. This will be possible either with the provision of an internet enabled TV-set or an IP-STB that will be connected to a standard TV-Set

HOMEdotOLD-A-00003	Remote control or equivalent input device(s) shall be used for service access and navigation
	A standard input device (remote control) should be available for web-based services navigation

HOMEdotOLD-A-00004	TV-set audio capabilities shall be used for communication services
	A standard mechanism should be available for users to communicate with friends and relatives (videoconference and "remote dining" services)

HOMEdotOLD-A-00005	Microphone, shall be used for communication services
	A standard mechanism should be available for users to communicate with friends and relatives (videoconference and "remote dining" services)

HOMEdotOLD-A-00006	Indication light to show that camera feed is visible to others
	User should be made aware that they are being recorded. However we don't want to bother them with having to arrange settings to switch a camera on and/or off. We presume that if made aware, users will take their own action to avoid visibility

HOMEdotOLD-A-00007	Connection to server for video storage and video retrieval through url request
	Videos need to be stored at an external application server. The videos should be able to be retrieved through a url.

HOMEdotOLD-A-00008	The service logic shall be on the HOMEdotOLD Application Server (AS)

HOMEdotOLD-A-00009	Service access shall be also provided over PC/laptop, particularly for friends and family users.
	Dedicated HMIs providing similar functionality but from standard PC/laptop environment

5.1.2 CONNECTIVITY AND COMMUNICATION REQUIREMENTS

HOMEdotOLD-C-00001	Freedom to connect contacts
	Contact list should not be restricted to a care organisation. End-users and secondary users (family/friends) should be able to add contacts themselves.
	User adds contact personally or by telling the contact to connect to the user. (e.g. Ada tells Charles to add himself to her contact list)

HOMEdotOLD-C-00002	Control over contact list
	Users should be able to accept or reject contacts
	Charles adds Ada as a contact, Ada get's a notification of this and is obliged to accept or reject

HOMEdotOLD-C-00003	System has to connect real-time
	Live connection needs to be established

HOMEdotOLD-C-00004	System has to retrieve and provide availability and act accordingly
	System needs to retrieve availability status from contacts
	System detects that Kevins status is on absent

HOMEdotOLD-C-00005	Accessibility of the videoconferencing client while using HOMEdotOLD services
	System needs to retrieve availability status from contacts
	System detects that Kevins status is on absent

HOMEdotOLD-C-00006	Integration of HOMEdotOLD services with existing e-mail service
	e-mail service that runs in the background should be activated to send emoticons, earcons, messages and pictures selected in the HOMEdotOLD service without the users having to deal with the front end of an e-mail service
	Ada selects a photo taken in the zoo and selects send to Charles. The pictures is send using the email protocols of the installed e-mail software (IMAP/POP)

HOMEdotOLD-C-00007	Secondary users should have access to an existing videochat application/service
	The communication will be successful only if it is open for use with existing services being used by family members, friends and caregivers
	Secondary user/family/friends member uses for example Skype for videoconferencing

HOMEdotOLD-C-00008	Secondary users should have access to an existing photosharing application/service
	The communication will be successful only if it is open for use with existing services being used by family members and caregivers
	Secondary user, family member/friends uses for example facebook, flickr or picasa to share photos

HOMEdotOLD-C-00009	The service access shall be web-based
	The services will be implemented according to the HTTP standards. In particular the Web4CE

HOMEdotOLD-C-000010	The STB/Internet-enabled TVset – HOMEdotOLD AS connectivity shall be IP based
	The home environment should provide internet connectivity

HOMEdotOLD-C-000011	The HOMEdotOLD AS shall send notification messages
	Notification messages shall be sent, according to specific services requirements

HOMEdotOLD-C-000012	The HOMEdotOLD AS shall provide a user relations and high level service configuration functionality
	Define what kind of options the high-level service configuration functionality shall support and what relations between users shall be supported

5.1.3 USER INTERFACE REQUIREMENTS

HOMEdotOLD-I-00001	Elderly shall be provided with a web-based graphical user interface for viewing “social voluntary work” openings
	What is required to be viewed shall be specified and a mock-up should be prepared and given to the users first for initial comments and approval.

HOMEdotOLD-I-00002	Elderly shall be provided with a web-based graphical user interface for viewing “news headlines”
	What is required to be viewed shall be specified and a mock-up should be prepared and given to the users first for initial comments and approval.

HOMEdotOLD-I-00003	Elderly shall be provided with a web-based graphical user interface for managing their “intelligent calendar”
	What is required to be viewed shall be specified and a mock-up should be prepared and given to the users first for initial comments and approval.

HOMEdotOLD-I-00004	Elderly shall be provided with a graphical user interface for managing “video-conferencing” calls
	What is required to be viewed shall be specified and a mock-up should be prepared and given to the users first for initial comments and approval.

HOMEdotOLD-I-00005	Elderly shall be provided with a web-based graphical user interface for viewing photos and videos
	What is required to be viewed shall be specified and a mock-up should be prepared and given to the users first for initial comments and approval.

HOMEdotOLD-I-00006	Elderly shall be provided with a web-based graphical user interface for uploading photos and videos
	What is required to be viewed shall be specified and a mock-up should be prepared and given to the users first for initial comments and approval.

HOMEdotOLD-I-00007	Friends and family shall be provided with a web-based graphical user interface for managing common activities in the elderly intelligent calendar, from a standard PC environment

HOMEdotOLD-I-00008	Friends and family shall be provided with a web-based graphical user interface for managing “video-conferencing” and “Remote dining” service calls, from a standard PC environment

HOMEdotOLD-I-00009	Friends and family shall be provided with a web-based graphical user interface for managing (upload, edit, delete) photos and videos, from a standard PC environment

5.1.4 SECURITY REQUIREMENTS

HOMEdotOLD-S-00001	Security protocol to protect user data over the Internet, should be based on HTTPS, SSL

HOMEdotOLD-S-00002	Security without repetitive input password
	As long as the user is logged in the HOMEdotOLD platform, accessing of services should not require password

HOMEdotOLD-S-00003	Elderly authentication shall be supported through HOMEdotOLD AS for using any service

HOMEdotOLD-S-00004	Friends and family authentication shall be supported for configuration or viewing purposes
	Password based authentication shall be used

HOMEdotOLD-S-00005	Configuration and viewing capabilities for all stakeholders shall be provided over a secure connection
	HTTPS could do.

HOMEdotOLD-S-00006	The service shall support elderly anonymity

HOMEdotOLD-S-00007	Authorisation and policies related to the service functionality shall be applicable for all stakeholders
	Some initial thoughts are provided below: *1. "Social Services Organization" and "Content Providers" Administration authorities: Full access to database and use of appropriate configuration HMI panel to manage "social voluntary work openings". No anonymity measures for this access level* *2. Elderly / Friends / Family: Full database access to relevant tables and full anonymity for elderly user personal information* *3. Other stakeholders: Read-only database access to elderly user data only. Full anonymity for elderly user personal information*

HOMEdotOLD-S-00008	User data in the DB shall be protected from unauthorized use

5.1.5 TECHNOLOGICAL AND DEVELOPMENT REQUIREMENTS

HOMEdotOLD-T-00001	Remote software update
	The targeted users can not be expected to upgrade their software by themselves

HOMEdotOLD-T-00002	The HOMEdotOLD platform shall use a database for storing user profile specific information

HOMEdotOLD-T-00003	The HOMEdotOLD platform shall use an application server in order to host related service application logic and database

6. CONCLUSIONS

This report has gathered all the information needed for designing the HOMEdotOLD system architecture and services. Following a user requirements collection methodology, the HOMEdotOLD user groups were identified, and then the results of the user requirements collection process in all 3 pilot sites of the project were presented. Further to user requirements, information regarding issues related with the functional requirements of the HOMEdotOLD system was collected in a structured manner, as derived from the interaction of the user organisations of the Consortium with end users. A set of uses cases and usage scenarios were also defined.

Throughout the technological chapters the technological state-of-the-art in the area of HOMEdotOLD was presented, together with architectural approaches. We reviewed all the issues pertaining to the successful development of an AAL system and pointed out available the social networking, communication and content sharing services as well as candidate technologies for communication, HMI, security etc. along with the relevant standards so that D2.2 “HOMEdotOLD Specifications” can effectively come up with a state of the art system architecture based on the documented items herein.

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ANNEX A: SET-TOP-BOXES

Company	Product	OS	Web4CE (CEA-2014)	Browsers	Interface
ADB site	ADB-2500W (*Advanced, standard definition IPTV set-top box*)	Linux, ADB JavaScript API for IPTV	✓	Mozilla	RJ-45, HDMI, USB, S-Video, RCA x 3
	ADB-2810W (*High definition AVC IPTV set-top box with home networking capabilities*)	Linux, ADB JavaScript API for IPTV	✓	Mozilla	RJ-45, HDMI, USB, SCART, RCA, S-Video(O)
	ADB-3800/10TW (*Advanced, high definition IPTV set-top box with home networking capabilities*)	Linux, ADB JavaScript API for IPTV	✓	Mozilla	RJ-45, HDMI, USB, SCART, S-Video(O) RCA x 3, DVB
	ADB-3800 W (*Advanced, high definition IPTV set-top box with home networking capabilities*)	Linux, ADB JavaScript API for IPTV, Compatible with MS Windows CE 5.0 BSP	✓	Mozilla	RJ-45, HDMI, USB, RCA x 3
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
albis technologies site	STB-77xx series	Linux 2.6	✓	Opera Nokia Siemens Network (IPTV solution)	RJ-45, USB, S-Video, SCART, HDMI, IR-Remote
	STB-7710 and STB-7711	Linux 2.6	✓	Opera	SCART, HDMI, USB, RJ-45, IR-Remote
	SceneGate 8000	Linux 2.6	✓	Nokia Siemens Network- IPTV solution Dreampark – Dreamgallery Zappware – iView Tara Systems - TVolution	USB, HDMI, RJ-45, IR-Remote
	SceneGate 8500 (*HD IPTV with PVR*)	Linux 2.6	✓	Nokia Siemens Network- IPTV solution Dreampark – Dreamgallery Zappware – iView Tara Systems - TVolution	USB x 2, HDMI, RJ-45, IR-Remote
	SceneGate 8800 (*HD DVB/IPTV hybrid STB*)	Linux 2.6	✓	Nokia Siemens Network- IPTV solution Dreampark – Dreamgallery Zappware – iView Tara Systems - TVolution	USB x 2, HDMI, RJ-45, IR-Remote

Company	Product	OS	Web4CE (CEA-2014)	Browsers	Interface
amino Shaping IPTV site	A110 (SD MPEG-2 IP-STB) A110H (under desk)	Linux	✓		RJ-45, RGB, S-Video, USB, Remote Control
	A125 (Multi-codec IP-STB)	Linux	✓		RJ-45, RGB, S-Video, USB, Remote Control
	A129 (SD MPEG-2 and MPEG-4 IP-STB)	Linux	✓		RJ-45, RGB, S-Video, Remote Control
	A130 (HD IP-STB) A130H (under desk) A130M (Digital HD IP-STB)	Linux	✓		RJ-45, HDMI, S-Video, USB, Remote Control
	A132 (HD IP-STB)	Linux	✓		RJ-45, HDMI, S-Video, USB, Remote Control
	A140 (HD MPEG-2 and MPEG-4 IP-STB) H140 (HD IP-STB) M140 M540 (HD IP-STB)	Linux	✓		RJ-45, HDMI, S-Video, USB, SPDIF, Remote Control
	A530 (HD-IPSTB with PVR)	Linux	✓		RJ-45, HDMI, S-Video, Optical, USB x 2, Remote Control, 160Gb HD
	Mood400-030/32	Linux	✓		RJ-45, HDMI, SCART, S-Video, SPDIF, USB
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
ADTH Atlanta DTH, Inc. site	IP 89 IP 8950 IS 8920 IS 8936 IC 8935 IA 8925	Embedded Linux	✓	Embedded Browser based on ANT	RJ-45, USB, HDMI, Video RCA, Audio RCA, S/PDIF External IR Box and Remote Control
	IP 8956	Embedded Linux	✓	Embedded Browser based on ANT	USB
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**

Celrun site	TD 510	Linux Kernel 2.4.x	✓	eSpial Espreso Browser Mark-up Language Support HTML 3.2?HTML 4.0.1, XHTML 1.0 DHTML,DVB-HTML, BML, XML, WTVML	RJ-45, IR Controller, S-Video, USB
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
CTV completetv.com site	STMC-EC (IPTV set top media center)	Linux 2.6.12	✓	WebKit	RJ-45, HDMI, SCART, USB, RCA
	STMC-XL (Hybrid IPTV and DVB-T set top media center)	Linux 2.6.12	✓	WebKit	RJj-45, HDMI, USB, SCART
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
iPlus Technologies site	IPT-110VHA	Linux	✓	Embedded Browser based on ANT and Etcs. dHTML 4.01, CSS /DOM, JavaScript	HDMI, SPDIF, RJ-45
	IPT-600VHS2	Linux	✓	Ant Galio or Opera	HDMI, S-Video, SPDIF, RJ-45, Scart, USB
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
info-q site	IME20	Embedded LINUX	✓	Embedded Web Browser (ANT Galio) for Linux HTML4.0 SSL Java script ver 1.5	RJ-45, Composite
	IME34	Windows CE.NET 5.0	✗	Internet Explorer for Windows CE 5.0, HTTP 1.0/1.1 (http, https) FTP, HTML 4.0, Cascade Style Sheet support Jscript 5.5, VB Script 5.5 Active X control support, CSS1 & CSS2	RJ-45, Composite, USB, Serial
	IME50	Embedded Linux / WinCE 5.0	✗	Internet Explorer for Windows CE 5.0, HTTP 1.0/1.1 (http, https) FTP, HTML 4.0, Cascade Style Sheet support Jscript 5.5, VB Script 5.5 Active X control support, CSS1 & CSS2	VGA, HDMI, S-VHS, Component, Composite, SPDIF, RJ-45, USB
	IME52	Embedded Linux / WinCE 5.0	✓	Embedded Web Browser (ANT Browser) for Linux HTML 4.0 HTTP 1.1	HDMI, Component, Composite, SPDIF, RS232,

				JavaScript 1.5 CSS 1.0/2.0	USB
	IME300	Customized WinCE.NET 4.2	✗	Customized Brower / ?Internet Explorer	RS232, RGB, Composite, Component, RJ-45
	IME600	WinCE 5.0 or Embedded XP	✗	Internet Explorer V6.0	VGA, DVI, Component, Composite, SPDIF, RJ-45, USB
	IME700	Embedded Linux / WinCE 6.0	✓	Embedded Web Browser (ANT Browser) for Linux HTML 4.0 HTTP 1.1 JavaScript 1.5 CSS 1.0/2.0	Composite, Component, HDMI, SPDIF, RJ-45 USB x 2
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
Netgem site	N8000 series	Linux	✓	Netgem TV Browser : HTML 4.01, ECMAScript (JavaScript 1.5), CSS1&2, DOM1, DOM2 Events	RJ-45, WiFi (O), USB x 2, HDMI, DIN To SCART, SPDIF, IR Controller
	N7000 (Hybrid MPEG4 HD receiver)	Linux	✓	Netgem TV Browser	RJ-45, HDMI, SCART, USB x 2, IR Controller
	N5000 (IP Player)	Linux	✓	Netgem TV Browser	RJ-45, HDMI, SPDIF, USB x 2
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
NEXTVISION site	Fontana Model	MS CE 5.0, HTML 4.01 embedded Internet Explorer browser	✓	Internet Explorer 6.0	HDMI, Component, S-Video, RF, USb x 2, IR Controller
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
NIGHTHAWK site	MediaPro IP3000	Linux	✓	Opera	RJ-45, Serial port, HDMI
	IP5000HD (old product), IP6000HD	Windows XP	✓		USB x 6, HDMI, RCA SPDIF, RJ-45 x 2, Mic in
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
PACE site	DIT-Series	Microsoft Mediaroom, SoftAtHome, Miview TV	✗		HDMI, USB, RJ-45, RCA Audio, SPDIF, SCART
	DIP-Series	Microsoft Mediaroom,			HDMI, USB, RJ-45,

		SoftAtHome, Miview TV	✗		RCA Audio, SPDIF, SCART
	DIS-Series	Microsoft Mediaroom, SoftAtHome, Miview TV	✗		HDMI, USB, RJ-45, RCA Audio, SPDIF, SCART
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
peerTV site	PeerStation 220	Linux	✗	Extensive JavaScript based APIs & SDK for GUI development & integration with custom middleware	HDMI, Component, SPDIF, S-Video, Composite, Stereo RCA, RJ-45, USB x 2 WiFi (O)
	PeerStation 340	Linux	✗	Extensive JavaScript based APIs & SDK for GUI development & integration with custom middleware	HDMI, Component, SPDIF, S-Video, Composite, Stereo RCA, RJ-45, USB x 2 WiFi (O)
	PeerStation 540	Linux	✗		HDMI, Component, SPDIF, S-Video, Composite, Stereo RCA, RJ-45, USB x 2 WiFi (O)
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
PIRELLI BROADBAND SOLUTIONS site	P.VU2000	Linux 2.6.x Windows CE.Net option	✗	**Midlleware options**: Pirelli OpenSet SDK to let operators develop advanced and customised services. Alacatel-Lucent OMP/OMC and MiView TV. Microsoft Mediaroom and Ericsson IAP	RJ-45, USB x 2, SCART, S-Video, HDMI, SPDIF, 2 x Stereo RCA, WiFi (O)
	IP100	Linux 2.4.x Windows CE.Net option	✓	Opera 8.5, HTML, Cookies, HTTPS	RJ-45, RJ-11, USB x 2, IR Controller, WiFi (O), SCART x 2, HDMI, S-Video, RCA CVBS, SPDIF, Stereo RCA
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
SAGEMCOM site	ITAD81 HD				RJ-45, HDMI, SPDIF, Component, Stereo RCA, USB, SCART x 2
	ITAD84 HD				RJ-45,

					HDMI, SPDIF, Component, Stereo RCA, USB, SCART x 2
	ITAD83 SD				RJ-45, HDMI, SPDIF, Component, Stereo RCA, USB, SCART x 2
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
site	Tormado M53	Linux	✗		WAN, S-Video, USB x 2, Composite
	Tormado M55	Linux	✓		RJ-45, USB x 2, HDMI, Composite, IR Controller
	Tornado M60 Digital Media Center PC	Linux	✓	Firefox and Konqueror	IR Controller, S-Video, VGA, Stereo RCA, RJ-45, USB x 6, PCI, SATA, ATA IDE, Serial, Parallel, WiFi (O)
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
site	T 401	Linux 2.6	✓	Ant Galio v2.2	S-Video, SPDIF, RJ-45, USB
	T 402	Linux 2.6	✓	HTTP 1.1, HTML 4.01, JavaScript	SCART, SPDIF, RJ-45, USB
	T 501	Linux 2.6	✓	Ant Galio v2.2	HDMI, S-Video, SPDIF, RJ-45, USB
	T 502	Linux 2.6	✓	HTTP 1.1, HTML 4.01, JavaScript	
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
site	STB F8	Linux 2.4		Opera	RJ-45, SCART, HDMI, SPDIF, USB x 2
	Hybrid IP STB FS6	Linux 2.4		Opera	SCART, RJ-45, SPDIF, USB x 2 DVB-T,C HDMI
	Sh@rk				SCART, RJ-45,

					USB, HDMI, SPDIF
	F7 WebTVBox	MS OS		Firefox, IE, Opera	HDMI, USB
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
THOMSON images & beyond site	DBI2210			HTML 4.01, Javascript 1.3, JS extensions APIs SSL, CSS, DOM, Cookies	S-Video, SPDIF, HDMI, RJ-45, USB x 2
	DBI8500			HTML 4.01, Javascript 1.3, JS extensions APIs SSL, CSS, DOM, Cookies	S-Video, SPDIF, HDMI, RJ-45, USB x 2
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
UTSTARCOM site	MC-1088	Linux	✗		Composite, S-Video, Component, HDMI, SPDIF, RJ-45, USB
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
VISIONEERING corporation site	IPTV-100 (vPortal VP-10)	Linux (MontaVista)		Built-In Web Browser	RJ-45, Composite, S-Video, Component, HDMI, USB x 2
	IPTV-120 (vPortal VP-20)	Linux (MontaVista)		Built-In Web Browser	RJ-45, Composite, S-Video, Component, HDMI, USB x 2 RS-232
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
WISEMBED site	WE-300	Windows CE.Net 5.0	✓	Internet Explorer 6.0	RCA, Component, SPDIF, USB x 2, RJ-45 x 2
	WE-310	Embedded Linux	✓		RCA, Component, SPDIF, USB, RJ-45 x 2
	WE-700	Windows CE.NET Windows XPE Embedded Linux	✓	Internet Explorer 6.0	RCA, Component, VGA, SPDIF, USB x 2, RJ-45 x 2
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
wyplay	Wyplay HD IPTV Box	Linux	✓	XHTML 1.0 , HTML 4.01, CSS 2 Dom 1,2 Cookies	RJ-45, USB, WiFi (O), Bluetooth (O), HDMI

site				Javascript 1.5 (ECMAScript 262) AJAX SVG, Canvas XML Data parsing Javascript API for application framework	
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
XAVi Tripleplay express site	Pisces101-E2	Linux	✓	Oregan embedded web browser	RJ-45 x 2, USB x 2, S-Video, SPDIF, Component, HDMI
	Pisces102	Linux, Java	✓	Oregan embedded web browser	USB x 2, S-Video, Composite, SPDIF, RJ-45 x 2, HDMI
	Pisces111W	Linux 2.6.x.x	✓	Oregan embedded web browser	USB x 2, Component, Composite, S-Video, SPDIF, HDMI, RJ-45 x 2, 802.11n
	Pisces121W	Linux 2.6.x.x	✓	Oregan embedded web browser	USB x 2, Component, Composite, S-Video, SPDIF, HDMI, RJ-45 x 2, 802.11n
	XTV125	Linux	✓	Oregan embedded web browser	USB x 2, S-Video, Composite, SPDIF, RJ-45 x 2, HDMI
Company	**Product**	**OS**	**Web4CE (CEA-2014)**	**Browsers**	**Interface**
ZyXEL site	STB-1001H	Linux	✓	XHTML 1.1, HTTPS HTML 4.01 Javascript 1.5 Dom level2 CSS level2 Cookie Javascript API for application framework	RJ-45, USB, HDMI, SPDIF
	STB-1001S3	Linux	✓	XHTML 1.1, HTTPS HTML 4.01 Javascript 1.5 Dom level2 CSS level2 Cookie	RJ-45, SCART, SPDIF, USB

				Javascript API for application framework	
	STB-1003	Linux	✓	XHTML 1.1, HTTPS HTML 4.01 Javascript 1.5 Dom level2 CSS level2 Cookie Javascript API for application framework	RJ-45, USB x 2, Smartcard, SPDIF, CVBS, S-Video, HDMI

ANNEX B: INTERNET-ENABLED TV SETS

Panasonic VIERA Cast Televisions

- TC-P65VT25. 65" Class Viera® VT25 Series Full HD 3D 1080p Plasma
- TC-P58VT25. 58" Class Viera® VT25 Series Full HD 3D 1080p Plasma
- TC-P54VT25. 54" Class Viera® VT25 Series Full HD 3D 1080p Plasma
- TC-P50VT25. 50" Class Viera® VT25 Series Full HD 3D 1080p Plasma

Figure 30: Panasonic VIERA Cast VT25 Series

- TC-P50VT20. 50" Class Viera® VT20 Series Full HD 3D 1080p Plasma

Figure 31: Panasonic VIERA Cast VT20 Series

- TC-P50GT25. 50" Class Viera GT25 Series Full HD 3D 1080p Plasma
- TC-P42GT25. 42" Class Viera GT25 Series Full HD 3D 1080p Plasma
- TC-46PGT24. 46" Class Viera GT24 Series Series Full HD 3D 1080p Plasma

Figure 32: Panasonic VIERA Cast GT25 Series

- TC-P54G25. 54" Class Viera® G25 Series 1080p Plasma
- TC-P50G25. 50" Class Viera® G25 Series 1080p Plasma
- TC-P46G25. 46" Class Viera® G25 Series 1080p Plasma
- TC-P42G25. 42" Class Viera® G25 Series 1080p Plasma

Figure 33: Panasonic VIERA Cast G25 Series

- TC-P54G20. 54" Class Viera® G20 Series 1080p Plasma
- TC-P50G20. 50" Class Viera® G20 Series 1080p Plasma

Figure 34: Panasonic VIERA Cast G20 Series

Samsung Internet@TV Televisions

- UN55C8000 55" Class (54.7 inch diagonal) 1080p 3D LED HDTV
- UN46C8000 46" Class (46.0 inch diagonal) 1080p 3D LED HDTV

Figure 35: Samsung Internet@TV 8000 3D LED HDTV Series

- UN40C7000 40" Class (40.0 inch diagonal) 1080p 3D LED HDTV

Figure 36: Samsung Internet@TV 7000 3D LED HDTV Series

- UN55C6800 55" Class (54.6 inch diagonal) 1080p LED HDTV
- UN46C6800 46" Class (45.9 inch diagonal) 1080p LED HDTV
- UN46C6500 46" Class (46.0 inch diagonal) 1080p LED HDTV
- UN40C6500 40" Class (40.0 inch diagonal) 1080p LED HDTV
- UN32C6500 32" Class (31.6 inch diagonal) 1080p LED HDTV

Figure 37: Samsung Internet@TV 6800 & 6500 LED HDTV Series

- LN46C750 46" Class (46.0 inch diagonal) 1080p 3D LCD HDTV
- LN46C650 46" Class (46.0 inch diagonal) 1080p LCD HDTV
- LN40C650 40" Class (40.0 inch diagonal) 1080p LCD HDTV

Figure 38: Samsung Internet@TV 750 & 650 LCD HDTV Series

- PN50C8000 50" Class (50.1 inch diagonal) 1080p 3D Plasma HDTV
- PN50C7000 50" Class (50.1 inch diagonal) 1080p 3D Plasma HDTV

Figure 39: Samsung Internet@TV 8000 & 7000 3D Plasma HDTV Series

Sony Bravia Internet Video

- KDL-52NX803. 52” (132cm), Full HD 1080, LCD TV with Monolithic Design, Edge LED & built-in Wi-Fi access
- KDL-52EX703. 52" (132cm), Full HD 1080, Wi-Fi Ready, LCD TV with Edge LED screen, Motionflow 100Hz & eco features
- KDL-46HX703. 46” (117cm), Full HD 1080, LCD TV with Monolithic Design and Motionflow 200Hz

Sharp Aquos Net

- LC-40LE810UN
- LC-40LE820UN
- LC-46LE810UN
- LC-46LE820UN
- LC-52LE810UN
- LC-52LE820UN
- LC-52LE920UN
- LC-52LE925UN
- LC-60LE810UN
- LC-60LE820UN
- LC-60LE920UN
- LC-60LE925UN

Philips Net TV

- 58PFL9955H/12, Cinema 21:9 LCD TV series
- 40PFL9904H/12, Aurea LCD TV series
- 46PFL9705H/12, LED 9000 LCD TV series
- 40PFL9705H/12, LED 9000 LCD TV series
- 32PFL9705H/12, LED 9000 LCD TV series
- 52PFL8605H/12, LED 8000 LCD TV series
- 46PFL8605H/12, LED 8000 LCD TV series
- 40PFL8605H/12, LED 8000 LCD TV series
- 37PFL8605H/12, LED 8000 LCD TV series
- 32PFL8605H/12, LED 8000 LCD TV series
- 46PFL7605H/12, LED 7000 LCD TV series
- 40PFL7605H/12, LED 7000 LCD TV series
- 37PFL7605H/12, LED 7000 LCD TV series
- 32PFL7605H/12, LED 7000 LCD TV series

ANNEX C: SECURITY

COUNTERING THE THREATS

Most elements within the IPTV environment will be supported by commercial operating systems. This will be a common situation within the head end, transport network and even within the home end. In some cases, set top boxes will be running on proprietary operating systems and security information will be limited. However, the market tendency is to have open-source or commercial off-the-shelf products that can be used, facilitating increased flexibility and compatibility with hardware platforms and DRM/IPTV clients.

For all the components running on known operating systems, security professionals must ensure that the systems have been properly configured and accounted for and have been patched for known security problems. These three aspects of security tend to fail within large deployments and specifically when applications or components are changing frequently. An IPTV environment may have hundreds of servers and hundreds of thousands of set top boxes.

Clearly, manual configuration and patching is not a task considered economically viable. The IPTV platform brings a new set of applications and many additional servers that must be protected, and this could take its toll on the resources available for operations and maintenance of the platform. Having IT support personnel manually configuring all systems may create a significant overhead and also a long response time to known security problems.

One option available to reduce the amount of time and resources required for hardening the operating systems is to use automated tools to validate the security posture of the platform and also to deploy security configurations. There are existing security vulnerabilities that would allow intruders easily to take control of the middleware server via web service exploits. Intruders would then be able to use the middleware server as a stepping stone to attack other internal systems, which will bypass some of the security mechanisms deployed internally.

Regardless of the number of security layers implemented in an IPTV environment, and irrespective of the investment in security mechanisms, security will be broken if operating systems and applications are not patched and properly configured.

The Department of Homeland Security in the USA has funded the development of a number of projects supporting the technology required to automate the process of securing a computing platform [1]. The Mitre Corporation is developing a number of initiatives relevant to this goal, including:

- common vulnerabilities and exposures (CVEÂ®);
- common platform enumeration (CPE™);
- common configuration enumeration (CCE™).

CVEÂ® provides frequent updates describing vulnerabilities found on operating systems, and some major services and applications. This information includes a common numbering and classification for vulnerabilities, allowing for identification of security issues using a common language. CVEÂ® is also improved by the work from the national vulnerability database (NVD), which is a product of the US National Institute of Standards and Technology (NIST) Computer Security Division and includes threat classification for known vulnerabilities. Using CVEÂ®, security professionals will be able to determine which patches and modifications are required by a particular system. This information is extracted on the basis of the current configuration. The NVD entries are provided as XML feeds and are also available for online browsing. CVEÂ® provides a consistent naming of security vulnerabilities, which is critical if security professionals want to have a unified management of security across the IPTV environment. Using CVEÂ®, different software tools can be employed to assess the security of the platform, and results will be equivalent in terms of naming. More flexibility is added to the process, as different tools can be used and results can be compared on a like-for-like basis.

CPE™ allows automatic inventories of computer networks by providing a common naming

structure and some elements for recognition of operating systems. This can be used to create an XML representation of the inventory of systems within the network. With CPE™, security professionals can create a common inventory representing all elements in the IPTV environment and match that inventory with the existing vulnerabilities known on those systems. As new platforms are added, the inventory can be adapted to reflect changes in technology. This tool can be used as the basis of the inventory engine, allowing security professionals to have a clear view of the number and type of elements available within the IPTV environment. By having an updated inventory, the process of ensuring security for the environment is simplified. During the inventory audits, security professionals will be able to detect unauthorized elements within the infrastructure. In some cases, third-party vendors, system administrators or network administrators add systems or change their configuration. Systems are reinstalled without all the appropriate software patches, or servers are replaced without the required security configuration. Using CPE™, security professionals will be able to maintain up-to-date lists of systems and their current security level.

CCE™ provides an XML representation of the configuration of operating systems and major applications. This information includes the known security issues within operating systems as well as recommended security parameters that must be configured. In general, the CCE™ provides a common naming structure for software configuration issues. For example, it provides a common language to refer to password configuration parameters across all platforms. With CCE™, security professionals are able to document the specific security configuration required for each platform or for each platform profile. This information, added to the list of CVEÂ® entries applicable on a platform, would present the complete picture of known security problems on a system. Security configuration problems facilitate unauthorized access and disruption of systems. By using CCE™, security professionals can define a detailed configuration model (or checklist) describing all the parameters that must be set on the available systems. Even within systems providing different services there are similar functions that require configuration. For example, password length requirements apply to operating systems and applications alike. CCE™ can be used to translate compliance requirements against the specific configuration parameters on each operating system.

Security professionals can take an international standard such as ISO/IEC 17799 or an industry standard such as PCI DSS and translate most of the requirements into CCE™ language. Once the standard is in CCE™ form for a particular platform, it will act as a template that can be reused for all similar platforms (one template for each operating system and application; patches may not require a new template).

Additionally, the Forum of Incident Response and Security Teams (FIRSTSM) is working on the common vulnerability scoring system (CVSS-SIG™) providing a measurement of the criticality of vulnerabilities and their expected impact on the infrastructure. CVSS-SIG™ can be used to estimate the level of risk that a particular vulnerability presents. This information can also be used to select which vulnerabilities would be covered first and also the type of countermeasures more likely to provide a higher return on investment.

The information from CVSS-SIG™ can be considered an initial input. It considers the criticality of the vulnerability from a general perspective, but it will not provide the specific threat levels for an IPTV environment. Security professionals must add information about the asset value and exposure level. When comparing two servers with the same applications, operating system and asset value, if one is hosted on a DMZ exposed to the Internet and the other has only one physical connection linked with the video repository behind six layers of security, the two will suffer a different impact from the same vulnerability.

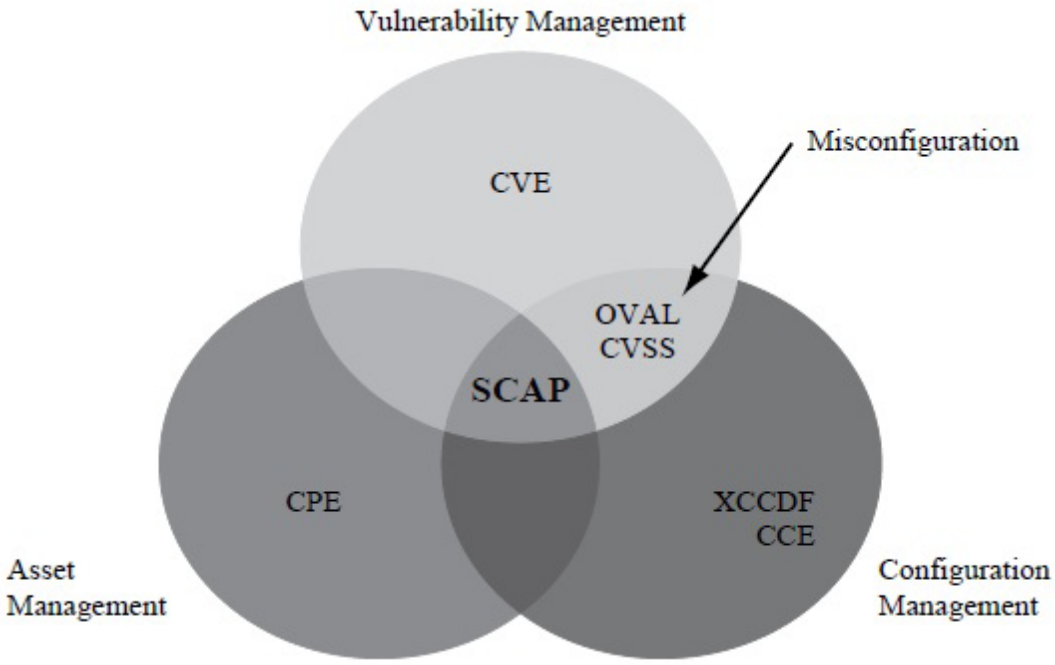

Figure 40: Common areas between CVE, CPE and CCE provided under SCAP

Set Top Box

Set top boxes tend to be solid-state components that host all the functions in chips. There are some limited examples of small-form or PC-based set top boxes. Set top boxes share the same type of challenges, usually linked with the threats of unauthorized access to contents or encryption keys. Intruders will try to remove hardware components in order to understand how the set top box works, and in some cases will reprogram internal chips to embed additional software within the system. PCs allow for more simple access to the information and keys, as the attacker already has complete control over the operating system and the only additional activities required are trying to capture keys while they are in memory or in some cases trying to capture content after it has been decrypted. In general, set top boxes are exposed to attacks and must be considered a nonsecure device.

Set top boxes are designed to store the operating system and clients using hardware components. One of the main components within the operation of set top boxes is flash memory. Flash memory is nonvolatile memory that can be electrically erased and reprogrammed (it is a type of electrically erasable programmable read-only memory – EEPROM). These components can be used to store software code and keys. Information will be stored even if the set top box is disconnected from the energy source.

While designing the IPTV environment, security professionals must ensure that the set top box selected has an acceptable architecture and appropriate security characteristics, ensuring protection from attacks. When comparing different set top box models, security professionals must explore the security characteristics of each model and confirm how well each model will withstand a local/hardware intrusion.

The operating system used by the set top box must be hardened following the recommendations at the beginning of the chapter. Unnecessary ports and services must be removed to avoid unauthorized access to the system.

Secure Processor

Some set top box manufacturers are able to include chip sets with security mechanisms to protect the programs within the equipment. This will allow for secure storage of information, logic and routines. Intruders will not be able to capture information while it is stored in memory.

In some available models, any block of a flash device can be individually protected against

illegal program or erase operations. Additionally, blocks can be locked so no future modification is allowed. Blocking sections of the flash memory ensure that intruders will not be able to reprogram the application. This will protect the set top box from insertion of backdoors and removal of protections and in general will ensure that the application will work as originally designed.

Other mechanisms available include authentication between the flash memory component and the CPU. Each element is able to validate its counterpart and also to provide credentials for verification. This type of authentication prevents illegal operations via unauthorized processor or flash memory connected in parallel. Attackers tend to replace elements that provide security barriers, and, in the case of flash memory with protected segments, intruders will try to replace it for a new chip without restrictions.

There are read protection mechanisms preventing unauthorized reading of memory, or duplication of data in pirate devices, hence safeguarding IP (intellectual property) and stored program code. Intruders will only be able to access encrypted memory entries. This will not facilitate the process of capturing decryption keys or even content. Additionally, application code will be secure from eavesdropping, adding complexity to the process of understanding how the code works.

In general, components of this type are referred to as secure system-on-chip processors. These elements can support antitamper and intrusion prevention. They have the ability to execute encrypted programs, and also to protect both data and code from intruders. All communication with the rest of the components is done through a secure channel. Secure processors comprise:

- processors;
- tamper detection system;
- key storage section;
- boot protection information;
- access controls;
- cryptographic engines;
- secure channel.

The tamper detection system is the overarching mechanism that will detect any attempt to manipulate the hardware. If the chip is removed from the board or there is an attempt to have unauthorized physical access to the component, the element will be damaged and operation will not be possible. Secure channels are used to communicate in and out of the secure processor. Encrypted data is fed to the element, and output will also be protected. Decryption and private keys are stored and used only within the elements of the secure processor. If the DRM or middleware servers send a symmetric key encrypted with the public key of the set top box, this packet will be received by the set top box in encrypted form and will be forwarded to the secure processor where it will be decrypted and stored for later use.

The cryptographic engines are used to accelerate the encryption-related processes and ensure a safe environment for the recovery of information. Encrypted content is sent to the secure processor via the secure channel and is decrypted using the available symmetric keys. The keys never leave the secure processor in clear text, and it is not possible for attackers to capture clear text information from memory. The main purpose of the secure processor is to protect critical data. Encrypted code is received, decrypted and executed by the secure processor. Memory entries are encrypted, as well as data managed by the processor. There is no opportunity for critical data to be captured in open text form; all entries are encrypted.

ANNEX D: QUESTIONNAIRE FOR USER REQUIREMENTS COLLECTION

HOMEdotOLD Personal-guideline-based interview August 2010

Stefan Schürz

Contents:

a. short introduction of the HOMEdotOLD system (freely held)

b. Section 1 - personal questions

c. Section 2 - questions about home entertainment and communication devices

d. Section 3 - questions about social activity preferences

e. Section 3 - rating of the HOMEdotOLD services

f. Discussion of the use-cases and scenarios with the Users

Section 1 - personal questions

1. What is your age?

2. Can you describe your household?

3. Who do you live with?

☐ Alone
☐ With my husband/wife/partner
☐ With a relative
☐
Other……
……..

4. Are you working, if so why?

5. Can you describe your health situation?

6. Do you use mobility aids?

Section 2 - questions about home entertainment and communication devices

1. Which of the following devices do you own?

- ☐ TV
- ☐ Digital TV set-top box
- ☐ DVD player
- ☐ Video Cassette player
- ☐ Computer or Laptop
- ☐ Mobile phone

2. How often do you use these devices?

3. Do you use a remote control to control any of these devices, if so do you have any problems with its use?

4. What do you consider positive/negative aspects of the TV?

5. What do you consider positive/negative aspects of the Computer/Laptop?

6. What do you consider positive/negative aspects of the mobile phone?

7. If you use a Computer, then what do you use it for?

- ☐ Writing E-Mails
- ☐ Doing videoconferences (Skype…)
- ☐ Sharing photos and videos
- ☐ Searching for information on the Internet
- ☐ Writing Texts
- ☐

Other……

8. Do you use teletext on your TV?

9. If you do not own one, would you consider buying a…?

- ☐ TV with internet connectivity
- ☐ DVB-T box
- ☐ DVD player
- ☐ Video Cassette player
- ☐ Computer

10. Would you prefer to control the HOMEdotOLD-System via remote control, speech or keyboard and mouse?

Section 3 - questions about social activity preferences

Open questions: To what extent do you prefer the following social activities?

1. Attend a social event (concert, talk, sports, etc.)

0	1	2	3	4	5	6	7	8	9	10
Not at all					**Moderately**				**Completely**	

2. Call and talk with a friend/relative on the phone

0	1	2	3	4	5	6	7	8	9	10
Not at all					Moderately				Completely	

3. Attend and expend time in a leisure centre for the elderly

0	1	2	3	4	5	6	7	8	9	10
Not at all					Moderately				Completely	

4. Face to face contact with a friend/relative

0	1	2	3	4	5	6	7	8	9	10
Not at all					Moderately				Completely	

5. Send and receive emails

0	1	2	3	4	5	6	7	8	9	10
Not at all					Moderately				Completely	

6. Navigate on the Internet (chats, forums, social networks)

0	1	2	3	4	5	6	7	8	9	10
Not at all					Moderately				Completely	

7. Participate in social games (cards, chess, board games).

0	1	2	3	4	5	6	7	8	9	10
Not at all					Moderately				Completely	

8. Participate in sport activities

0	1	2	3	4	5	6	7	8	9	10
Not at all					Moderately				Completely	

9. Participate in discussions with pairs

0	1	2	3	4	5	6	7	8	9	10
Not at all					Moderately				Completely	

10. Receive visits from friends/relatives

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Not at all					*Moderately*				*Completely*	

11. Go visit friends/relatives

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Not at all					*Moderately*				*Completely*	

12. Participate to social voluntary work activities

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*

Not at all ***Moderately*** ***Completely***

Section 4 - rating of the HOMEdotOLD services

Here is the list of services that the HOMEdotOLD-System could provide. Assuming each service would be very easy to use, please rate how interesting they would be for you!

Function	***Very interesting***	***Fairly interesting***	***Un-interesting***	***Don't know***
A notifier about social voluntary work in your area in which you can participate				
Personalized access to news headlines at regional, national, European or worldwide levels, based on your profile				
An intelligent calendar which automatically synchronizes your agenda with the agenda of your friends and family				

A videoconference service which allows you to talk with your friends and family while seeing their faces				
A remote dining service, which allows you to do a videoconference with your friends and family while dining in front of the TV				
A service which allows you to share photos, videos and messages with your friends and family				
A service that allows you to view photos that family and friends share with you, on your tv				
A service that allows you to leave a (video-)message without having to learn how to use a computer or the delay of conventional post				

For each of the above services, please tell us:

- In which cases would you use it?
- How often would you use it?
- What would be a necessary pre-condition for using it (e.g. that it is safe, that it is confidential, easy to use, etc.)?
- Would you recommend it to your friends / family?
- Would you pay for it? If yes, how much would you accept to pay?