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Ambient Assisted Living user interfaces

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AALuis Consortium

AALuis (AAL-2010-3-070) is a project within the AAL Joint Programme Call 3. The consortium members are:

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Abbreviations

Abbrev.	*Description*
AAL	Ambient Assisted Living
AAL JP	Ambient Assisted Living Joint Programme
AALuis	Acronym of this Project – Ambient Assisted Living user Interfaces
DLNA	Digital Living Network Alliance
GSM	Global System for Mobile communications
HbbTV	Hybrid Broadcast Band TV
ISDN	Integrated Services Digital Network
PSTN	Public Switched Telephone Network
SIP	Session Initiation Protocol
SMS	Short Message Service
SOAP	Simple Object Access Protocol
UPnP	Universal Plug and Play

Executive Summary

The services provided by the consortium partners can be divided into two types: digital services, supplied mainly by Verklizan and Philips, and non-digital services, supplied by 50Plus and Hilfswerk. For the AALuis project, main interest is in digital services and possibilities to integrate them with the AALuis middleware to be developed within WP2.

Philips's services are delivered within NetTV architecture. The services are generally developed by third parties, while Philips provides support in deployment and delivery of the service to users' homes. The services are aimed at many different types of consumers, and can be roughly subdivided in information, social network, game, music, photo, and video content services. While these 3rd party services are not suitable to be used within the project because of intellectual property rights, Philips also works on experimental services within other European R&D projects which are more suitable. One example of this are the services developed within AAL HOMEdotOLD project, which could be used within the AALuis project.

Verklizan's services work in conjunction with Verklizan's UMO platform, which is a set of protocols that allows various devices to connect and communicate with the back end call center. As such, Verklizan's mission is to enable easy integration and management of different services by the service providers who maintain a support call center. The services vary from very simple alarm services, to more complex scheduling and monitoring services. Most of the services are suitable for use within the AALuis project, but due to various protocols used, before making a selection, the analysis of the services in this document should be carefully taken into consideration. All the services provided by Verklizan are targeted at older adult population.

The services provided by 50Plus and Hilfswerk are mainly social services that either aim to improve the social exchange in this target group or enable or provide support in independent living. Many services also have healthcare elements. Most of these services are not digitized at all, though the infrastructure that exists around them could be adapted into a digital form that could be further integrated within the AALuis project.

The digital services presented in this document were analyzed in technical aspects. Both NetTV and UMO services present good options for integration with the middleware. The further technical specifications should take the analysis presented in this document into account.

1 About this Document

1.1 Role of the document

This document presents various services that are delivered by WP4 partners: Verklizan, Philips, Hilfswerk and 50Plus. The services are described in detail, categorized, and feasibility of use within the project is analyzed according to selection criteria.

1.2 Relationship to other AALuis deliverables

The deliverable is related to the following AALuis deliverables:

Deliv:	*Relation*
D4.2	Handbook Service Application Specification – this document will specify application interface of the services that will be used within the project, as they were selected according to analysis in D4.1
D3.1	Report on User Interface Analysis – the analysis of the services can be used to find the best ways to implement user interface fitting for the services.
D2.1	Report on Middleware Analysis – the results of analysis from both deliverables will be used to find a solution on how to connect the service infrastructure to the proposed middleware.

2 Area 1: General Analysis

2.1 Types of AAL services

The services provided by the parties participating in the consortium can be generally divided in two types: digital services and non-digital services. The digital services are services which aim to improve the quality of life older adults through employment of some type of digital technology – including (wearable) mobile devices and consumer products which have either been built purely for this purpose or have been adapted for this particular user group. The non-digital services are services which aim to improve the quality of life, by offering organisation of social events, providing advice or adapting household items to make them easier to use for the target user. In the following sections, a more thorough description of the services is given.

2.1.1 Digital services

Within the consortium, Verklizan and Philips will be providing platforms for digital services. The platform that is provided by Verklizan is the UMO[1] telecare platform, which was developed as an open platform for communication of care and security equipment. Philips will provide the NetTV platform which allows the user to access many digital services (apps) via their Philips television set. While Verklizan's platform and subsequently, the services that are deployed with it are developed directly with older adults in mind as target users, Philips's platform is developed with much wider audience in mind, and the available services are developed by third parties targeting many different consumer groups.

[1] UMO, **U**niversal **MO**nitoring Platform

Philips NetTV platform overview

The Philips NetTV platform has been launched in 2009 as a new feature on higher end television sets. A TV with the NetTV function has access to the internet and various customized online applications and services. Since its introduction, the number of applications and services offered through NetTV has grown steadily – some examples of services available today are TomTom Traffic (a service offering live traffic updates), YouTube and Videoland (movies on demand).

A TV with NetTV functionality does not have any services installed locally. Instead, the TV connects to a Philips server, where it is authenticated, and then retrieves a list of services that has been customized by the user. The list is presented on the TV to the user. When a user subsequently selects a service that he wants to use, a connection is made with the server where that service is deployed by a 3rd party, and then the service is sent to the TV through a direct link. A schematic of the Philips NetTV architecture can be found in Figure 1.

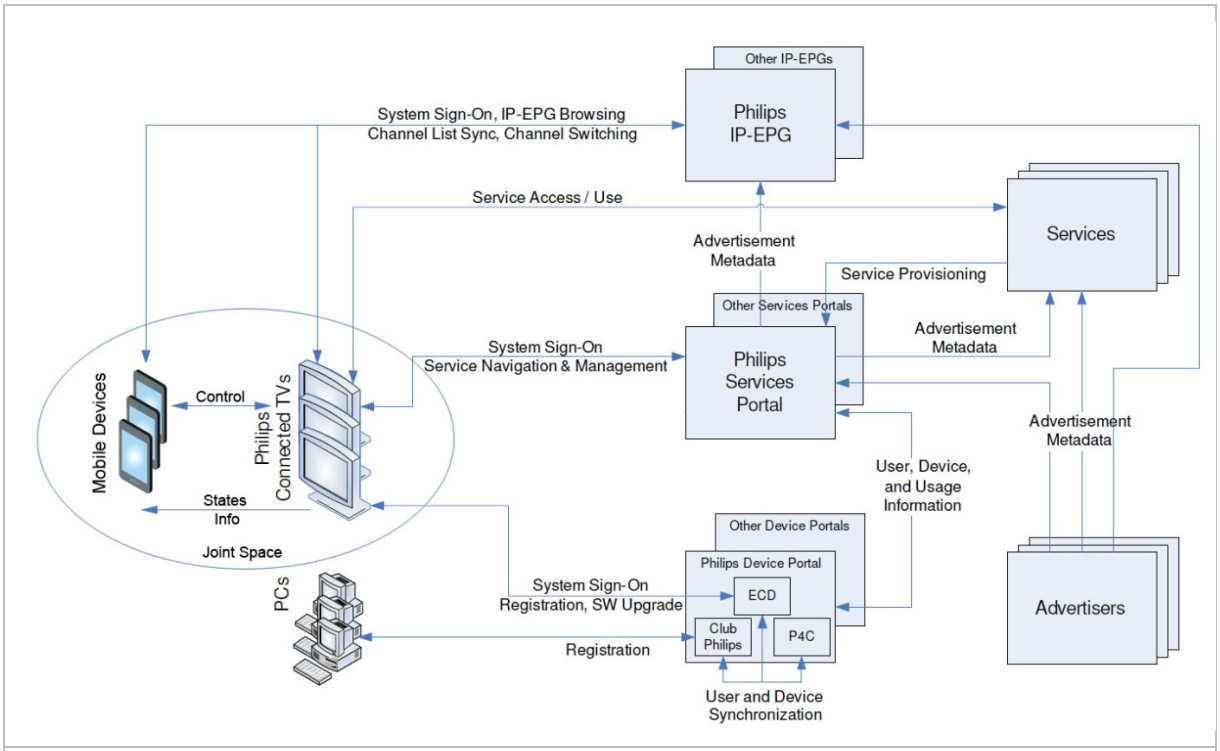

Figure 1: Philips NetTV architecture, basic overview.
Services are hosted on external, 3rd party servers. The TV users connect directly to the Philips Services Portal. After selecting a service, a direct link is created with the service provider. The whole experience is integrated with the remaining TV functions (EPG).

In order to customize the list of the services, the user can access the “App Gallery”, where he can select which services should appear in his service list.

All services are basically websites, built to CE-HTML standard, which is similar to HTML, but allowing for precise description of how the interaction through a remote control should work. The user can also access regular websites through an in-built browser, “Open Internet”. In this case the interaction through the remote control can be clumsy, as most websites do not account for this. Philips aims to minimize the use of browser, but this functionality allows for testing of new services, before they are integrated as one of the apps in the Philips Services Portal.

Currently, access to all the services provided through NetTV is free. There are country-based restrictions, as some services are allowed to operate only in certain countries, or are not localized. Some services may require additional charges when using (e.g. renting a movie); however these charges are dictated by the service provider.

The business model relies on advertising. Advertisements are provided on the NetTV app selection page and they can be general, an advertisement of a specific service or TV programming related advertisement.

List of Philips NetTV platform services

There are three different types of NetTV services that can be considered for AALuis. The first are the services which are inherent to every NetTV, with the purpose of facilitating access and management of other services. These services are implemented and provided by Philips, and are integrated deeply in the NetTV architecture.

The second are the 3rd party services which make up the bulk of the services available on the NetTV. These services are implemented and deployed by 3rd parties before being linked with the Philips Service Portal. There are thousands of these services, and they cover many different areas and target groups. Because it would be impossible to cover them all in this document, different archetypes are described instead, and a number of examples is given for each type. These services are not being developed by Philips, and subsequently, Philips does not own the rights. This means that inclusion of these services in AALuis would require negotiations and agreement with 3rd parties.

Finally, there are services that are being prototyped within other similar European R&D projects. In specific, Philips is participating in AAL HOMEdotOLD project, where part of the work involves development of NetTV services aimed to provide support for older adults living independently. These services can be considered for inclusion in AALuis, as they are developed by either Philips or consortium partners working within AAL platform.

Functionalities that are offered by the NetTV platform services are listed below:

Nr.	1
Provider	Philips
Name	Service Portal
Description	The service portal is the starting point for the user, and is the service that is automatically launched when the user turns on the NetTV function on his or her TV. The service portal is used to launch other services.
Target	End-user
Functions	- Providing a link to other services (including App Gallery service for management of the services) - Providing a picture-in-picture (PIP) view of the currently selected TV channel

	- Recommending a relevant service - Removing a service from the list - Parental locking and unlocking of a service - Providing links to legal documents (terms of service)
Other	A service is visible in the Service Portal only if the user has added it to the list via the App Gallery.

Nr.	2
Provider	Philips
Name	App Gallery
Description	The app gallery is a Philips service for managing of other services. Through the app gallery, the user can customize the offer of services that is seen in the service portal. The app gallery lists all available 3rd party services.
Target	End-user
Functions	- Filtering available services by country and type - Searching through available services (input through virtual keyboard) - Adding a service to the portal - Recommending a relevant service
Other	Only the services that have been connected with Philips Service Portal through agreement between Philips and 3rd parties are visible in the App Gallery.

Because of high number of 3rd party services available via Philips NetTV, and this number rising every day, not all will be listed in this report. Instead an overview of common archetypes of services provided is listed here.

Nr.	3
Provider	3rd parties
Type	Video content services
Description	These services provide video streams on demand. There are free services and paid services.

Target	End-user
Functions	- Searching for a video - Playing a video
Examples	YouTube, Videoland, RTL 4 Uitzending Gemist

Nr.	4
Provider	3rd parties
Type	Information Services
Description	These services provide real-time world information on various topics.
Target	End-user
Functions	- Selecting location / time - Viewing predictions
Examples	TomTom Traffic, Meteo Consult

Nr.	5
Provider	3rd parties
Type	Social Networks
Description	These services provide access to online communities.
Target	End-user
Functions	Depending on the service, some examples are: - Picture and video sharing - Updating status
Examples	Twitter, Netlog

Nr.	6
Provider	3rd parties
Type	Games

Description	These services are intended for entertainment.
Target	End-user
Functions	Depending on the service.
Examples	PlayinTV

Nr.	7
Provider	3rd parties
Type	Music
Description	These services provide access to music on-demand and radio stations.
Target	End-user
Functions	- Searching for music (songs or genres) - Playing music
Examples	Tunin-fm

Nr.	8
Provider	3rd parties
Type	Photo
Description	These services provide access to online picture portfolios for viewing on TV.
Target	End-user
Functions	- Searching for albums / photos - Viewing photos
Examples	Picassa

Nr.	9
Provider	3rd parties
Type	Other

Description	The services that do not match one of the abovementioned types. Often, these are the services that mirror the functionality of an online service available on the internet.
Target	End-user
Functions	Depending on the service.
Examples	eBay

The following services are being developed within AAL HOMEdotOLD project. As such they can be considered for inclusion in AALuis.

Nr.	10
Provider	Teletel
Name	Photo and Video Sharing
Description	This service aims to provide older adults an easy way of viewing and sharing various pictures and videos with other users. The service builds upon existing Picassa and YouTube services.
Target	Older adults
Functions	Viewing albums Viewing pictures / videos Rating pictures and videos
Other	The service is optimized for use by older adults.

Nr.	11
Provider	Singular Logic
Name	Social Voluntary work
Description	The goal of this service is to provide an interactive calendar to older adults through which they can see various upcoming social voluntary work events. The service ultimately aims at involving older adults more in the community.
Target	Older adults
Functions	Viewing calendar

	Viewing individual events Accepting / Declining an event
Other	The service is optimized for use by older adults.

Nr.	12
Provider	Singular Logic
Name	Intelligent Calendar
Description	The goal of Intelligent Calendar is to provide users with an agenda that keeps track of their activities and provides reminders for their appointments.
Target	Older adults
Functions	Schedule an appointment / event Invite other users to participate Cancel an event Move an event
Other	The service is optimized for use by older adults.

Nr.	13
Provider	Philips
Name	Skype
Description	This implementation of Skype provides a way for older adults to communicate between each other or with their family members. The functions normally available in Skype are trimmed to reduce complexity and the interface is optimized for use on the NetTV and with a remote control.
Target	Older adults
Functions	Accept a contact requests View contact status Make a (video) call Receive a (video) call.
Other	The service is optimized for use by older adults. While Philips is aiming to integrate Skype fully in their television sets in the future,

	the current implementation is a prototype, and relies on a setup functioning outside NetTV architecture.

Verklizan UMO platform overview

The UMO telecare platform (also called monitoring centre platform, call centre platform or alarm centre platform) is the open telecare platform designed and manufactured by Verklizan BV. The UMO is an open platform to which a wide range of care and security equipment can be connected. This varies from the traditional personal alarm devices to advanced set-up boxes for video and telehealth applications.

Verklizan delivers the UMO platform as a product to AAL service providers (such as the AALuis partner Hilfswerk) which use the platform to offer AAL services to end-users. So Verklizan is a platform provider and the clients of Verklizan are the service providers which deliver their services based on the platform.

In general the service providers operate as a hub between:

- (Elderly) persons in need of AAL services
- Caregiver organizations and personal carers
- Care homes & nursing homes
- Organizations installing and servicing AAL equipment
- Financing bodies

To support the service providers in their daily business, the UMO platform delivers a wide range of services for several types of users. In this document we mainly focus on the platform services delivered to the end-user, defined as person in need of AAL services. In addition services delivered to (personal) carers can be relevant in this context.

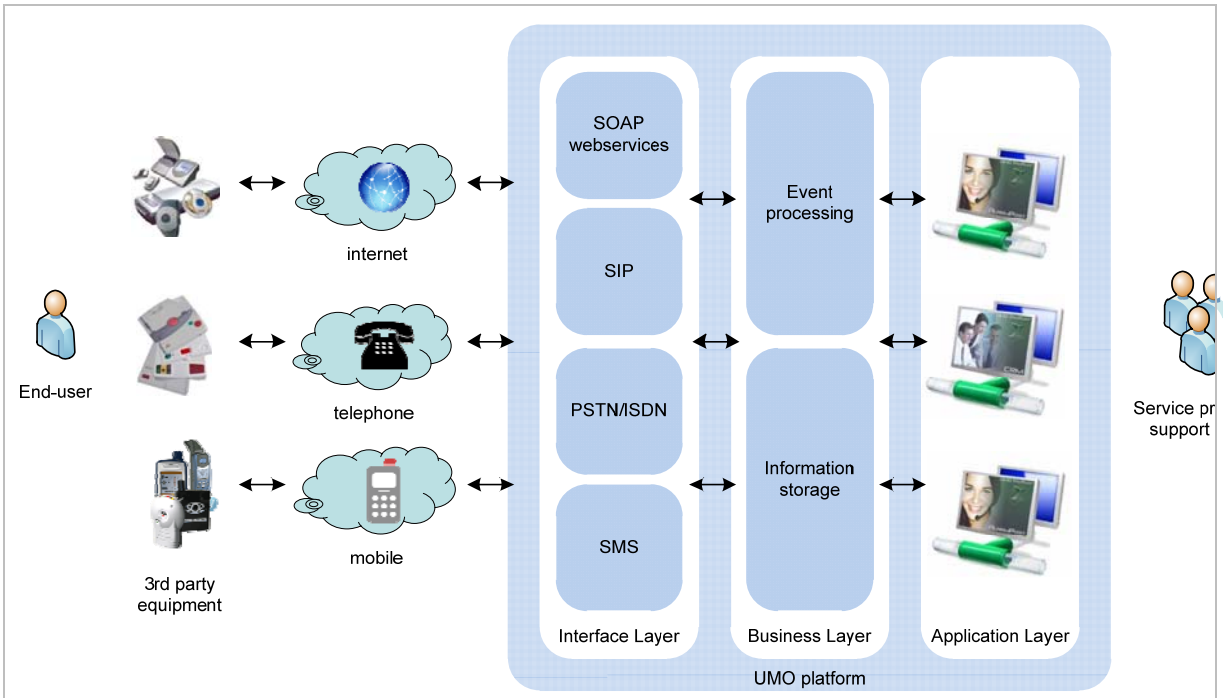

Figure 2: Verklizan UMO platform basic overview.
The platform enables the connection to a wide range of telecare and security equipment, in use by the end-user of the AAL services. The platform supports the AAL service provider in the provision of AAL services to the end-user. Those services are always delivered through 3th party telecare and security equipment.

The UMO telecare platform can be divided into three architecture layers which are the interface layer, the business layer and the application layer. The interface layer provides the connection with the public communication networks, namely the telephone, mobile and internet. This layer provides protocol conversions to be able to communicate with a wide range of third party equipment. The interface layer delivers all incoming information in a uniform format to the server layer and vice versa.

The business layer provides the central processing of all incoming information delivered by the interface layer, the control of outgoing information towards the interface layer and the storage of information. In this layer information is combined and translated to business events such as social alarms and incoming calls. These business events are routed to the appropriate handler for each event. This could be an automatic handler (i.e. for automatic processing and logging) or an alarm handling application in the application layer (i.e. for manual handling by the service provider support staff).

The application layer contains the end-user applications of the UMO telecare platform to support the service provider support staff with a wide range of tasks. In the scope of AAL end-user services, the service provider support staff is supported by a call centre application which enables the handling of calls, social alarms, mobile alarms, telemonitoring, outbound contacts, screen to screen contact and video monitoring.

Other end-user applications support the service provider with back office related tasks such as scheduling, financial reporting, relation management, equipment management, call centre management etc.

The platform contains no end-user applications which deliver AAL services to the end-user. Those AAL end-user services are always provided to the end-user by means of 3rd party telecare and security equipment.

The business model is B2B, the platform is supplied to AAL service providers. No telecare equipment is supplied with the platform. Instead, there is a close cooperation with all the manufacturers of telecare equipment, to ensure maximum compatibility with UMO and to provide complete freedom of choice to our customers. The UMO platform is open and universal: all possible telecare services could be included. The UMO business model stimulates innovation: new services can be showcased at low initial costs and prove themselves in practice.

List of Verklizan UMO platform services

Functionalities that can be offered by the UMO telecare platform to the AAL end-users are listed below. These services are always provided by the combination of the UMO telecare platform and 3rd party telecare or security equipment. UMO platform services targeting other end-users are not described.

Nr.	1
Provider	AAL service provider
Name	Active residential alarming
Description	The basic service active residential alarming offers users the ability to call for help from their homes. After pressing the alarm button typically a direct connection will be made with the UMO Monitoring Centre. A two-way voice connection will be automatically available to assist the agent on investigating the situation and examine which type of help is necessary. Another option is that the alarm signal is initially routed by UMO to a (personal) carer instead. This enables care handling directly by carers with the monitoring centre for back-up and case management. The caregiver mostly handles the alarm using a normal mobile phone but other devices can also be supported.
Target	Elderly living independently at home (without partner)
Functions	- initiate an alarm in the monitoring centre of the AAL service provider - set up a two-way voice connection to the monitoring centre of the AAL service provider - routing of the alarm to the monitoring centre of the service provider or a specific carer.
Other	Available over the telephone network (PSTN/ISDN) and the internet (IP)

Examples	A base station and wearable personal alarm button is installed at home. After pressing the alarm button, the base station will contact the monitoring centre. The service centre support staff can contact relatives, a nurse in the field, or (if required) contact the emergency services.

Nr.	2
Provider	AAL service provider
Name	Passive residential alarming
Description	The service passive residential alarming contains applications which are able to generate an alarm to the UMO Monitoring Centre automatically. In many emergency situations the end-user is not able to generate an alarm or is not aware of upcoming danger. There are various applications aimed at specific needs. When an (automatic) alarm is generated there will be a two-way voice connection available to assist the agent on investigating the situation and examine which type of help is necessary. These applications are mostly connected to the basic personal alarm kit but can be part of a home automation system. Here also the alarm signal can be initially routed by UMO to a (personal) carer instead with the monitoring centre as back-up. These services typically are safety oriented, with at most a very simple interface for the end-user. In one example the end-user would have to press ‘a green button’ at pre-set intervals, with the monitoring centre contacting the end-user when the button was not pushed.
Target	Elderly living independently at home (without partner)
Functions	- automatic alarm generation in the monitoring centre of the AAL service provider - set up a two-way voice connection to the monitoring centre of the AAL service provider - routing of the alarm to the monitoring centre of the service provider or a specific carer.
Other	Available over the telephone network (PSTN/ISDN) and the internet (IP)
Examples	Fall detection, smoke detection, gas detection, flood detection, intrusion detection, movement detection, activity detection, epilepsy-detection.

Nr.	3
Provider	AAL service provider
Name	Active mobile alarming
Description	The service active mobile alarming offers users the ability to call for help anytime anywhere. After pressing the alarm button a direct connection will be made with the UMO Monitoring Centre. A two-way voice connection will be available to assist the agent by investigating the situation and examine which type of help is necessary. Additional there can be a GPS module added to provide specific location data. Originally dedicated devices were deployed. However the trend is to try and deploy mainstream smartphones here, enabling combination of services.
Target	Elderly people, people with a physical handicap
Functions	- initiate an alarm in the monitoring centre of the AAL service provider - set up a two-way voice connection to the monitoring centre of the AAL service provider - provide GPS location information as part of the alarm
Other	Available over the mobile telephone network (GSM/SMS) and the mobile internet (IP)
Examples	The ability to generate an alarm anytime anywhere. With GPS: location services, assisting with transport, helping people to get back home.

Nr.	4
Provider	AAL service provider
Name	Passive mobile alarming
Description	The service passive mobile alarming contains mobile applications which are able to generate an alarm to the UMO Monitoring Centre automatically. In many emergency situations the user is not able to generate an alarm. Especially going outside, people might not be able to push an alarm button when help is needed. Therefore passive alarming offers the possibility to check in by SMS or phone call, users have to check in again within a specific set timeframe (1 hour). Currently only basic phone functionality is used, one can envisage that this service can be enriched using extended end-user interfaces. If the user does not check in again and does not respond to a

	reminder there will be an automatic alarm generated to the monitoring centre, where the appropriate action will be taken. Optional a GPS module can be added to provide specific location data.
Target	Employees, active elderly, children
Functions	- automatic alarm generation in the monitoring centre of the AAL service provider - provide GPS location information as part of the alarm - check in to prevent automatic alarm generation
Other	Available over the mobile telephone network (GSM/SMS) and the mobile internet (IP)
Examples	Ensure the safety of employees who work individually outside the office, active elderly who still go out a lot, children going out on their own.

Nr.	5
Provider	AAL service provider
Name	Telemonitoring (monitoring vital signs, wellness, activity)
Description	Telemonitoring offers users the ability to measure their health and wellbeing within their home environment and send the data for analysis to the UMO Monitoring Centre. The measured data will be analysed and if necessary the monitoring centre agent can send help directly or contact the user or his/her family/relatives. In relation to the health status there can be specific thresholds predefined, if a measurement exceeds the threshold there will be an alarm generated automatically. The services are aimed to be able to detect worsening in health status at an earlier stage and to be able to act directly to prevent exacerbations and/or hospitalizations. In addition telemonitoring can support users on improving the general health and maintaining a healthy lifestyle.
Target	Coronary heart patients, congestive heart failure patients, COPD patients, diabetic patients, obesity patients and any chronic illness or bad lifestyle.
Functions	- provide monitoring data to the monitoring centre of the AAL service provider - generate alarm in the case the monitoring data exceeds set thresholds.

Other	Available over the internet (IP)
Examples	(Bi)daily monitoring of vital signs (like blood pressure, weight, glucose, ECG, lung capacity, oxygen) or send in a measurement when not feeling well. (Bi)daily completing of quality of life questionnaires.

Nr.	6
Provider	AAL service provider
Name	Telemonitoring (medication monitoring)
Description	Medication compliance is for many years a hot issue within the healthcare market. To take the correct medication at the right time is crucial for optimal results of medication use. However, a lot of elderly struggle to do so. Medication monitoring offers a solution. On a basic level there is the solution to receive a medication reminder on pre-set times during the day. When a reminder is received the user has to send a confirmation of taking the medication within a pre-set period of time. More advanced is the possibility to make use of a medication dispenser. A medication dispenser contains medication (even if the patient uses multiple types of medication) for a period of 7 to 30 days. The dispenser is (automatically) filled at the pharmacy and contains a string of satchel packages where each satchel contains the medication required for use at a specific time of the day. At this specific time an alarm will be generated, after pushing a button the satchel containing the correct medication and the right dose will come out of the dispenser. From the UMO Monitoring Centre support is available, when there is no positive reply to a "*take your meds alarm*" an alarm will be generated. The service provider support staff can contact the end-user or his relatives.
Target	Elderly taking more than 1 medication type, people with early stage of dementia, people with psychological conditions, young people who forget to take their medication regularly
Functions	- provide medicine monitoring data to the monitoring centre of the AAL service provider - generate alarm in the case the medication is not taken.
Other	Available over the internet (IP)
Examples	Medication dispenser service, medication reminder service

Nr.	7
Provider	AAL service provider
Name	Scheduled out-bound contacts (daily living support)
Description	Scheduled out-bound contacts can be an important building block in any service. It can serve the goal of checking each morning if an elderly person got out of bed alright. Currently a voice connection, but this is certainly extendable to other devices (including avatars probably). This way also more detailed information can be exchanged enriching the service. This holds true also for reminder services. Social calls can be scheduled from UMO for someone to talk regularly with an older person. This can be a volunteer, with UMO responsible for case management and quality control. Currently volunteers are required to come to the monitoring centre, but other devices and UI could make this more flexible.
Target	Elderly who can live alone but are at risk, elderly experiencing loneliness, elderly with mild cognitive impairment or for instance in need of special health services.
Functions	- Start an outbound contact in the monitoring centre. - Setting the preferred schedule for the client and modifying it (for voice calls, reminders, automated calls (IVR) or avatar interaction). - Giving the 'I am OK message' extendable with extra information; including confirmation of receipt from the monitoring centre to the client.
Other	Available over the telephone network (PSTN/ISDN), mobile telephone network (GSM) and the internet (IP)
Examples	Daily check call, social call, reminders

Nr.	8
Provider	AAL service provider
Name	Screen to screen contact
Description	Screen to screen contact offers users the ability to have video-communication with the UMO Monitoring Centre from their home. From a social perspective or to receive support on a specific medical condition. The addition of video gives a more pure and real experience because it enables to see body language and facial expressions.

	To remain socially active is very important in relation to the quality of life of the elderly, even more when they are not able to leave their homes on a regular basis. Social contact contributes significantly to joy of life and general health and vitality. Screen to screen contact can be used on preset times and days or on request of the consumer.
Target	Immobile elderly living without partner, people with chronic illness
Functions	- initiation of a video communication session from the monitoring centre of the AAL service provider - initiation of a video communication session by the end-user
Other	Available over the internet (IP) using videophone, PC, touchscreen and TV + set top box.
Examples	Social video call: on a (bi)daily basis a monitoring centre agent will contact the user. Or the user can start a video call with the monitoring centre (or relatives) if needed. Medical support: chronic ill patients can receive support on their condition or illness by having (bi)daily/weekly video contact with a medical monitoring centre agent.

Nr.	9
Provider	AAL service provider
Name	Videomonitoring
Description	Videomonitoring gives the ability of remote observation by camera(s). Within the UMO Monitoring Centre a user can be monitored within their home environment. It is often used in addition to a personal alarming system. To examine the actual need for help and to prevent “false” alarms. But videomonitoring is more and more being used in a passive way, where camera’s monitor the user’s behaviour continuously and generate an alarm when abnormal behaviour is detected. Another service of using videomonitoring is aimed at elderly partners living independently at home. If one of the partners is going out for shopping or another activity the partner contacts the UMO Monitoring centre. The camera(s) are activated and the Monitoring Centre observes, if anything occurs the Monitoring Centre will contact the partner (or relatives) directly. The videomonitoring system can be supplemented by various sensor technologies (movement, activity, fall).
Target	Elderly living independently at home (without partner)

Functions	- initiate a video alarm in the monitoring centre of the AAL service provider
Other	Available over the internet (IP) using a personal alarm system or (passive) videomonitoring system combined with video analyses.
Examples	Video Alarm: in addition to the regular personal alarm, video stream will be available during an alarm. Mostly multiple cameras can be installed at the user's home. Video Watch: when one of the elderly is going out (for example to go shopping) and the other is staying at home. The monitoring centre can keep an eye on the house. Video analysis: automatic video analysis of people's behaviour, when abnormal behaviour is detected an automatic alarm will be generated.

2.1.2 Non digital services

Within the consortium, Hilfswerk and 50Plus are the organizations with a large experience with support of older adults. The services that they are providing aim primarily on benefitting the end-user, and are not directly reliant on use of technology. Hilfswerk provides various services and adapted home appliances and home security devices which aim to help the older adults to live independently. The services provided by 50Plus aim to enrich the social life of the older adults after retirement, and consist of various organized group activities, advices and courses.

List of Hilfswerk services

Nr.	1
Provider	Hilfswerk / Provincial associations
Name	House Nursing / Medical House Nursing
Description	The home health care / medical home care is the care of clients / inside in their private living area. The care includes diseases of all types and ages. It includes the instruction, advice and support from family and others involved in the care and maintenance people The scope of nursing care measures include the implementation of and participation in therapeutic and diagnostic functions to assist the relatives of senior services for health and medical care and the doctors / physicians. In the medical home care is a temporary care through nurses at home. Analogous to the general home health care, it also specialized home

	health care for children and adolescents.
Target	older people needing care, who live at home

Nr.	2
Provider	Hilfswerk
Name	Elderly Aid / Mobile Assistance
Description	Mobile help and care includes care for the social and physical well-being of people of all ages through comprehensive assistance with the aim of all the capabilities of people assisted to promote, sustain, maintain and complement, in particular: • in the maintenance of the household by giving assistance in financial management; • in the preservation and promotion of physical well-being, eg by supporting personal hygiene, dressing accessories, in the preparation of meals, carrying out basic techniques of care, patient observation, execution of basic techniques of mobilization, nutrition and adherence to diets under the supervision of a professional; • in securing basic social needs, eg Accompanied by medical authorities and ways of motivation for independent execution of daily activities, etc.;
Target	Elderly or disabled people needing care, who live at home

Nr.	3
Provider	Hilfswerk
Name	Home Help
Description	The / the home helps / supports in care of dependents and people of all ages in the financial management and the activities of daily living. The services of home help include: • household activities • assistance with errands outside the living area • support for the preservation and promotion of physical well-being • securing the basic needs by maintaining and promoting independence • assistance with basic care • working with other professionals from the social and health

	sectors. The job title of the home help since 2005 in accordance with an agreement. Regulated under Article 15a B-VG between the Federal uniform in Austria.
Target	Elderly or disabled people needing care, who live at home and need help in the household

Nr.	4
Provider	Hilfswerk
Name	National Mobile Support / Care Advice
Description	The mobile support families and care consultation is an opportunity for nursing and care-needy people and their families with the aim of helping people help themselves. Depending on the federal state to the practical care, information about all the deals in the health and social services, financial support will be up to the establishment and support of self-help groups include persons trained by it. The advice will include psycho-social counseling and support for relatives.
Target	older persons who have care needs and their families

Nr.	5
Provider	Hilfswerk
Name	Organized Neighborhood Assistance
Description	With the help of organized neighborhood is a low-, community-oriented range of "self-help 'for older people and their Prospective hearing. In the context of organized neighborhood support activities in residential areas be carried out. This service is carried out under supervision and in collaboration with other professionals. The legal conditions for the use of organized neighborhood support are designed differently depending on the carrier / institution and state.
Target	older people living alone

Nr.	6
Provider	Hilfswerk
Name	Meals On Wheels / Food Delivery / Service Menu

Description	Under Meals on Wheels is defined as the delivery of meals to case-wise or continuous food for people who are unable to provide for their daily hot lunch. Meals on Wheels is (frozen, warm) in various styles and types of diet (normal diet, diabetics, etc.) are offered.
Target	older persons who cannot or don’t want to cook for themselves

Nr.	7
Provider	Hilfswerk
Name	Rental Of Care Remedies
Description	This offer also includes the customization of maintenance tools and instructions for their use.
Target	older persons who require nursing aids

Nr.	8
Provider	Hilfswerk
Name	Service Visits
Description	The visiting service is offered to (re-) establishment, continuation and promotion of social contacts for lonely people. The visiting service is carried out in the rules of "volunteers" under professional guidance.
Target	older people living alone at home

Nr.	9
Provider	Hilfswerk
Name	Laundry Care Services
Description	The laundry service is offered for persons who are not due to their illness, age or disability in the position to help provide clean linen. As part of this service, the laundry is collected, washed, ironed, if necessary, brought to the cleaners, repaired if necessary and then re-sent to the patient.
Target	older people who can not even do their laundry

Nr.	10
Provider	Hilfswerk
Name	Cleaning Service
Description	Under cleaning service refers to the acquisition of heavy domestic work such as major cleaning, washing windows, doors, furniture and floor care. This offer applies to persons who because of their illness, age or disability in these tasks cannot perform themselves.
Target	elderly or sick people who can not even clean their household

Nr.	11
Provider	Hilfswerk
Name	24-Hour Care
Description	The 24-hour care is the care of persons in their households, by the independent and dependent people can be carers / inside. The services include care of the person household services such as meal preparation, cleaning or laundry care activities. Further support for the conduct of life as assistance with daily activities, companionship and support for travel.
Target	dependent people who cannot live alone at home but do not want to live in a nursing home

Nr.	12
Provider	Hilfswerk
Name	Senior Clubs
Description	Senior clubs and similar offers are intended to maintain the social integration of older people.
Target	Seniors who do not have their own social networks

Nr.	13
Provider	Hilfswerk
Name	Therapeutic Services

Description	Mobile and outpatient physical and occupational therapy and speech therapy is the holistic rehabilitation of client / inside in private homes and outpatient facilities with the goal of maximum independence and quality of life to preserve or restore. It is implemented in accordance with federal legislation. The physiotherapy service includes the self-responsible use of all physiotherapy measures according to doctors in the intra-and extramural area, with special consideration of functional relationships in the fields of health education, prevention, treatment and rehabilitation. The occupational therapy service includes self-treatment of sick and disabled according to doctors by craft and design activities. The speech therapy, audiology services phoniatrists includes the self-responsible speech therapy assessment and treatment of voice, speech, voice and hearing and audiometric testing according to doctors.
Target	elderly or sick people who need therapeutic services

Nr.	14
Provider	Hilfswerk
Name	Psycho Social Welfare
Description	The mobile and stationary psychosocial service includes the diagnosis, treatment and rehabilitation of mental illness. Psychiatric specialists and graduate psychiatric nurses and health care for people with mental illness, enabling, among other things in the domestic environment to independent living at home.
Target	mentally ill persons
Other	offered only limited by Hilfswerk

Nr.	15
Provider	Hilfswerk
Name	Crisis Intervention
Description	Crisis intervention is a short-term assistance by specially trained personnel for victims and their families after traumatic events such as accidents, sudden illnesses and deaths, which aims to feelings of helplessness and helplessness to diminish in those affected.

Target	People in personal crisis situations
Other	offered only limited by Hilfswerk

Nr.	16
Provider	Hilfswerk
Name	Psycho-Social Support
Description	Psychosocial counseling is a bid to clarify the existing situation, to jointly develop solutions and to strengthen capacity building. Professionals help based on psychological / psychotherapeutic approaches people in stressful situations.
Target	people in stressful situations
Other	offered only limited by Hilfswerk

Nr.	17
Provider	Hilfswerk
Name	Stationary Part Time Care
Description	Serves as an intermediary between home care and inpatient admission to a nursing home. Objective is to maintain the existing trains full of life and the whereabouts of care and / or dependent people in their own homes by activating a staged and integrated care. In-patient facilities (day care centers, day care centers) different consulting and support services are offered. These range from lunch, through to day and / or aftercare (- care) to integrated special offers for specific target groups, such as people with dementia.
Target	Relief for family caregivers
Other	only a few offers available

Nr.	18
Provider	Hilfswerk
Name	Care Homes

Description	Inpatient facilities for the care and support of people mainly due to their advanced age or because of their physical and / or mental-emotional state, not the state, are to lead an autonomous and independent life.
Target	dependent people who can no longer live at home
Other	Hilfswerk: only few offers (focus is on home care)

Nr.	19
Provider	Hilfswerk
Name	Holiday Care / Short Term Care
Description	With the holiday / short-time care it is a temporary residential care and / or care of a needy person in an inpatient facility.
Functions	Relief for family caregivers

Nr.	20
Provider	Hilfswerk
Name	Organized (New) Living Forms
Description	Organized forms of housing (group homes, housing communities) provide older people with care needs and the opportunity live together in smaller groups and thus promote independent living and social contact. Care and support services are provided depending on the type of housing in the context of mobile nursing and care and / or in the form of residential care and make direct caregivers. These are forms of housing are available with and without night care. In supervised / Assisted living elderly people live in individual housing units (subsidized, barrier-free apartments) have independently and according to the "form of care" is entitled to a defined service package.
Target	People who cannot live alone at home and don’t want to live in a nursing home
Other	Only few offers

List of 50Plus services

Nr.	1
Provider	50plus GmbH
Name	Courses
Description	The aim is to advance lifelong learning (active aging) and helping elderly people staying fit, mentally and physically.
Target	Elderly people, retired
Functions	offer about 100 courses / semester language courses, gymnastic courses, hobby courses, computer courses
Other	The Centre offers an area, where people can meet, get in contact with other people, have fun (playing cards…). Aim is: avoidance of loneliness and isolation of older people.

Nr.	2
Provider	50plus GmbH
Name	Traveling
Description	Providing senior-focused travels
Target	Elderly people, retired
Functions	Senior focused travels (medical care on site, comfortable, affordable …)
Other	Own travel Centre in the 50plus Centre

Nr.	3
Provider	50plus GmbH
Name	exhibitionExhibition
Description	Things that makes life easier for elderly people
Target	Elderly people, retired

Functions	On 80m² the Centre presents a permanent product exhibition with different partners all specialized in the generation 50plus (e.g. e-bikes, stair lift, age-based furniture (e.g. bathroom). But the Centre also presents products and prototypes to test the usability and functionality – Visitors can test the newest and modern comforts and put out a statement.

Nr.	4
Provider	50plus GmbH
Name	Health & Beauty
Description	Rooms where Doctors & Beautician & Physiotherapists offers a permanent service
Target	Elderly people, retired
Functions	The offer is supplemented by the property integrated partners and companies with segment focus 50plus®: doctors (eg acupuncture, orthopaedics …) health and beauty suppliers and others who are specifically targeted by special price and service packages to the Generation 50plus®.

Nr.	5
Provider	50plus GmbH
Name	Lectures
Description	The centre offers their partners the opportunity to use rooms for lectures and convivial gatherings. (eg lectures about travelling, health …)
Target	Elderly people, retired
Functions	Lectures about traveling, health, law, living,
Other	And the operator of the centre organizes itself within the 50-plus dialogues at least once monthly presentations on topics or focus days to match the target group (e.g. value facility, spa, etc.)

2.2 Service categorization

After considering the service descriptions above, there are two kinds of categorization that can be proposed. The first one concerns the service goal. Every service has a particular domain that is being addressed. A number of different domains were identified by inductive method.

The categorization according to service domain is as follows:

Category	*Description*
Service Management (meta-service)	Services which are used to setup the options or preferences within other services.
Entertainment	Casual services, not directly aiming to provide support to older adults.
Information	Services providing targeted or general information about different subjects to the user.
Social	Services aiming to improve or expand the user's social life.
Security	Services that trigger domestic or health-related alarms and warn either user or 3rd parties.
Health	Services aiming to safeguard or improve health of the user.
Home	Services aiming to enable or support independent living of the older adults.
Lifestyle	Services offering ways to personally develop.

Table 1: Service categories based on service goals

According to this categorization, the services can be divided in according groups as follows:

Service Name	*Category*	*Nr*
Service Portal	Management	Philips(1)
App Gallery	Management	Philips(2)
Video Content Services	Entertainment	Philips(3)
Information Services	Information	Philips(4)
Social Networks	Entertainment / Social	Philips(5)
Games	Entertainment	Philips(6)
Music	Entertainment	Philips(7)
Photo	Entertainment	Philips(8)
Other NetTV Services	Entertainment / Information	Philips(9)

Photo and Video Sharing	Entertainment / Social	Philips(10)
Social Voluntary Work	Social	Philips(11)
Intelligent Calendar	Social	Philips(12)
Skype	Social	Philips(13)
Active Residential Alarming	Security	Verklizan(1)
Passive Residential Alarming	Security	Verklizan(2)
Active Mobile Alarming	Security	Verklizan(3)
Passive Mobile Alarming	Security	Verklizan(4)
Telemonitoring	Security / Health	Verklizan(5)
Telemonitoring (medication)	Health	Verklizan(6)
Scheduled Contacts	Social	Verklizan(7)
Screen to Screen Contact	Social	Verklizan(8)
Videomonitoring	Security	Verklizan(9)
House Nursing	Social / Health	Hilfswerk(1)
Elderly Aid	Home / Health	Hilfswerk(2)
Home Help	Home / Social	Hilfswerk(3)
Care Advice	Health	Hilfswerk(4)
Neighbourhood Assistance	Social / Home	Hilfswerk(5)
Meals On Wheels	Health	Hilfswerk(6)
Rental of Care Remedies	Health	Hilfswerk(7)
Service Visits	Social	Hilfswerk(8)
Laundry Care Services	Home	Hilfswerk(9)
Cleaning Service	Home	Hilfswerk(10)
24-Hour Care	Social / Home	Hilfswerk(11)
Senior Clubs	Social / Lifestyle	Hilfswerk(12)
Therapeutic Services	Health	Hilfswerk(13)
Psycho Social Welfare	Health	Hilfswerk(14)
Crisis Intervention	Security / Health	Hilfswerk(15)
Psycho-Social Support	Health	Hilfswerk(16)
Stationary Part Time Care	Health / Home	Hilfswerk(17)
Care Homes	Health	Hilfswerk(18)
Holiday Care	Healt	Hilfswerk(19)
Organized Living Forms	Health / Social	Hilfswerk(20)

Courses	Lifestyle / Social	50Plus(1)
Travelling	Lifestyle / Social	50Plus(2)
Exhibition	Social / Lifestyle	50Plus(3)
Health & Beauty	Health	50Plus(4)
Lectures	Social / Lifestyle	50Plus(5)

Table 2: Service categorization by goals

The other type of categorization that can be considered is based on back-end involvement of service providers. Regarding this, three categories can be identified. These are:

Category	*Description*
Automatic	No operator is required on the back end of the service / The operator does not interact with the user directly
Callcenter	The operator monitors and manages the system and interacts with the user indirectly (through phone or internet) if required.
Hands-on	The operator is the service – the service consists of close, personal, interaction between the user and the operator.

Table 3: Service categories based on involvement of services providers.

According to these categories, the services can be designated as follows.

Service Name	*Category*	*Nr*
Service Portal	Automatic	Philips(1)
App Gallery	Automatic	Philips(2)
Video Content Services	Automatic	Philips(3)
Information Services	Automatic	Philips(4)
Social Networks	Automatic	Philips(5)
Games	Automatic	Philips(6)
Music	Automatic	Philips(7)
Photo	Automatic	Philips(8)
Other NetTV Services	Automatic	Philips(9)
Photo and Video Sharing	Automatic	Philips(10)
Social Voluntary Work	Callcenter	Philips(11)
Intelligent Calendar	Automatic	Philips(12)
Skype	Automatic	Philips(13)

Active Residential Alarming	Callcenter	Verklizan(1)
Passive Residential Alarming	Automatic / Callcenter	Verklizan(2)
Active Mobile Alarming	Callcenter	Verklizan(3)
Passive Mobile Alarming	Automatic / Callcenter	Verklizan(4)
Telemonitoring	Callcenter	Verklizan(5)
Telemonitoring (medication)	Callcenter	Verklizan(6)
Scheduled Contacts	Automatic / Callcenter	Verklizan(7)
Screen to Screen Contact	Callcenter	Verklizan(8)
Videomonitoring	Callcenter	Verklizan(9)
House Nursing	Hands-on	Hilfswerk(1)
Elderly Aid	Hands-on	Hilfswerk(2)
Home Help	Hands-on	Hilfswerk(3)
Care Advice	Callcenter / Hands-on	Hilfswerk(4)
Neighbourhood Assistance	Hands-on	Hilfswerk(5)
Meals On Wheels	Hands-on	Hilfswerk(6)
Rental of Care Remedies	Hands-on	Hilfswerk(7)
Service Visits	Hands-on	Hilfswerk(8)
Laundry Care Services	Hands-on	Hilfswerk(9)
Cleaning Service	Hands-on	Hilfswerk(10)
24-Hour Care	Hands-on	Hilfswerk(11)
Senior Clubs	Hands-on	Hilfswerk(12)
Therapeutic Services	Hands-on	Hilfswerk(13)
Psycho Social Welfare	Hands-on	Hilfswerk(14)
Crisis Intervention	Hands-on	Hilfswerk(15)
Psycho-Social Support	Hands-on	Hilfswerk(16)
Stationary Part Time Care	Hands-on	Hilfswerk(17)
Care Homes	Hands-on	Hilfswerk(18)
Holiday Care	Hands-on	Hilfswerk(19)
Organized Living Forms	Hands-on	Hilfswerk(20)
Courses	Hands-on	50Plus(1)
Travelling	Hands-on	50Plus(2)
Exhibition	Hands-on	50Plus(3)
Health & Beauty	Hands-on	50Plus(4)

Lectures	Hands-on	50Plus(5)

Table 4: Service categorization by service provider involvement

2.3 Service interaction with other technologies

Philips NetTV

A new service that is developed can be accessed via a NetTV platform in two ways. The first option is to access the service via the “Open Internet” browser, which is a function of Philips TVs present on all NetTV-enabled television sets. This requires minimum effort, but because the user would be required to manually enter the URL of the service, and some of the remote control buttons may not be available, it does not provide optimal user experience. However, this is a great way to evaluate services during development.

Another, more complex option is to register a service with the Philips Service Portal, making it appear as one of the apps in the App Gallery. In this way, access of the service is made more convenient for the end-user, however making a service available in this fashion would grant access to the service to all the users of the country in which the service is being deployed. For user-targeting and evaluation purposes within the project, this may not be desirable.

All 3rd party services provided via the NetTV platform are in essence websites that are hosted on various servers. For communication with one of these services, an agreement is required with the party that deploys the service.

Not directly related to NetTV platform, but in relation to TV interactivity in general, Philips is currently researching technologies that would allow connection and direct manipulation of both TV and NetTV functions through mobile devices (see Figure 1). Through Joint Space platform it will be possible to share the data that is displayed on the TV screen, making interaction easier and ubiquitous.

Verklizan UMO

Functionalities that can be offered by the UMO telecare platform to the AAL end-users are always provided by the combination of the UMO telecare platform and 3rd party telecare or security equipment. In this chain the UMO platform implements and delivers a service in a general way to the support staff (alarm and call centre operators) of the AAL service provider. On the side of the AAL end-user the service is delivered by means of 3rd party equipment. The reason for this approach is the aim to deliver an independent open service platform. This is one of the most important characteristics of the business model behind the UMO telecare platform. This means also that the UMO platform contains no interfaces targeting end-users but only technical (machine to machine) interfaces to deliver services through 3rd party equipment.

The interface layer of the UMO platform (see Figure 2) contains a number of network and protocol interfaces. These interfaces enable the communication with a wide range of telecare and security equipment. The supported telecommunication networks and related protocols are listed in the in the table below.

Telecommunication network	*Communication protocol implementations*
Public telephone network	Wide range of DTMF or tone based equipment and/or vendor

(PSTN/ISDN)	specific communication protocols
Mobile telephone network (GSM/SMS)	Wide range of GSM and SMS based equipment and/or vendor specific communication protocols
Internet (IP & mobile IP)	SOAP based web services SIP

Table 1: UMO Platform Network Protocol Interfaces

In general, the public telephone network, mobile telephone network and related communication protocol implementations are used for services which require simple data transmissions and/or two-way voice communications. These are often traditional services which are available on the market for decades now and originate from the world of closed platforms and vendor specific communication protocols.

The IP based protocol implementations offer the ability to deliver richer services which require more complex data structures and/or streaming media (e.g. voice and video). Verklizan has defined communication protocols for IP based interaction with 3rd parties based on open IP standards such as SOAP web services and SIP. The IP based UMO platform interfaces are more and more used nowadays and form a good basis to interact in a standardized way with 3rd party platforms such as the AALuis framework.

2.4 Interoperability & Standardization, Extendibility, Accessibility & Usability

Philips NetTV

Technology	*Description*	*Reference*
CE-HTML	A HTML standard allowing for specification of NetTV specific interaction and elements	-
JointSPACE	An open source protocol developed by Philips serving for communication between the TV and other devices in a home network.	[8]
UPnP	Universal Plug and Play, a IP based protocol for specifying communication between devices in a network	[9]
HbbTV	A protocol for sending additional information encoded in the broadcast	[10]
DLNA	Certification and authentication protocols for identifying device on the network	[11]

Table 5: Technologies and protocols used by Net

Verklizan UMO

As described in section 2.3, end-user service interactions with UMO telecare platform services takes place by means of 3rd party equipment. So, accessibility and usability with regard to AAL end-users is not addressed by the UMO platform. For this reason, interoperability and standardization is important to integrate with the 3rd party

equipment. The table below gives a brief description of the technologies/standards supported by the UMO interface layer.

Technology	*Description*	*Reference*
PSTN	Public Switched Telephone Network. The public fixed analog telephone network.	[1]
ISDN	Integrated Services Digital Network. A set of communication standards for digital data transmission over the PSTN.	[2]
GSM	Global System for Mobile communication. The mainstream standard for mobile telephone communications.	[3]
SMS	Short Message Service. Message service of GSM which makes it possible to send short (160 character) text messages between mobile users.	[4]
SOAP	Simple Object Access Protocol. Mainstream XML based messaging protocol used to implement web services.	[5]
SIP	Session Initiation Protocol. Mainstream protocol used for the control of streaming media sessions such as voice and video over IP.	[6], [7]

Table 2: Technology and protocols used by UMO platform

2.5 How can the Services be extended / made interoperable

The commercial Philips NetTV services are developed and operated by 3rd parties, and as such, any attempt to extend or change them requires business agreement with the involved parties. Within the scope of project this is a limiting factor. On the other hand, the improvements of the platform are constantly being researched.

Improvement of the UMO platform is a continuous process within Verklizan and therefore it is possible to extend the system if this fits the needs of Verklizan.

3 Area 2: Creating a list of selection criteria for deeper research / possible use in the project

3.1 Analysis criteria

Service analysis criteria	
Functionality	Short description of functionality
Inputs/outputs	Overview of inputs/outputs to deliver the functionality
Ontology (i.e. domain model)	Short overview of the most important domain entities the service uses/needs
How can it be connected to the middleware	This is described in section 2.3, 2.4, 0 on service platform level. if there are specific details or deviations then they could be listed here
Message brokering	Does the service (platform) use/implement a form of message brokering (e.g. message routing, message translation)? if so, are there requirements for the middleware layer?
Service discovery	Does the service (platform) implement/support service discovery and how?
Security	Does the service implement/require security and how is it implemented. are there requirements for the middleware layer?
Administration	Does the service need administration and if so, how is this implemented/arranged.
Accessibility from the scratch	Is the service easy accessible for the end-users? possible requirements and/or recommendations for user interface development could be listed here.
Intelligent response system	Does the service implement intelligent response systems and if so give a short description.

Table 3: Template for service analysis:
this table lists the service analysis criteria and forms a template which can be used for listing the analysis results

3.2 Analysis results for the different services of the different platforms

Philips NetTV platform services

Service Portal	
Functionality	The service portal is the starting point for the user, and is the service that is automatically launched when the user turns on the NetTV function on his or her TV. The service portal is used to launch other services.
Inputs/outputs	Input: remote control Output: forwarding connection with the service to the TV
Ontology (i.e. domain model)	Service Portal is installed on every Philips TV with NetTV function.

	Service Portal retrieves personalized list of 3rd party services from the Service Portal server.
How can it be connected to the middleware	Not possible without changing embedded software on NetTV's.
Message brokering	No. The remote control signals are captured by TV and interpreted as navigation commands within all the menus, including NetTV and Service Portal. In the future, through JointSpace platform, it will be possible to exchange messages between mobile devices and TVs, sharing content and interface.
Service discovery	No
Security	Yes. The service is installed on Philips TVs and makes a direct secure connection with a Philips server to retrieve service list. For the end-user, it is not possible to access the list of his services in another way.
Administration	No
Accessibility from the scratch	Yes, accessible by press of a button on TV remote control
Intelligent response system	No

App Gallery	
Functionality	The app gallery is a Philips service for managing of other services. Through the app gallery, the user can customize the offer of services that is seen in the service portal. The app gallery lists all available 3rd party services.
Inputs/outputs	Input: remote control Output: updating users service list on the Service Portal server
Ontology (i.e. domain model)	App Gallery is installed on every Philips TV with NetTV function. Service Portal retrieves list of all registered 3rd party services that are available to the user, taking in account TV settings (country).
How can it be connected to the middleware	Not possible without changing embedded software on NetTV's.
Message brokering	No. The remote control signals are captured by TV and interpreted as navigation commands within all the menus, including NetTV and Service Portal. In the future, through JointSpace platform, it will be possible to exchange messages between mobile devices and TVs, sharing content and interface.
Service discovery	No
Security	Yes. The service is installed on Philips TVs and makes a direct secure connection with a Philips server to retrieve service list. For the end-user, it is not possible to access the list of his services in another way.
Administration	No
Accessibility from the scratch	Yes, accessible by press of a button on TV remote control, and navigating to it.

Intelligent response system	No

Photo and Video sharing	
Functionality	The service is one of AAL HOMEdotOLD services. The service is developed in order to make it possible for older adults to easily access and view shared photos and videos, organized in albums.
Inputs/outputs	Input: remote control, ratings Output: selected albums / pictures / videos / current rating (as files streamed from the external server, embedded in a ce-html page)
Ontology (i.e. domain model)	The service is hosted on external servers and connected to the TV through Open Internet app.
How can it be connected to the middleware	Externally through direct connection to the server (database). An communication with the server needs to be established in the form of response calls (e.g. JSON or XML).
Message brokering	No.
Service discovery	No
Security	Yes. The user data is stored in a secure database on the server. Access is restricted.
Administration	Yes, the pictures and videos need to be uploaded with an PC.
Accessibility from the scratch	Yes, the service is online.
Intelligent response system	No

Social Voluntary Work	
Functionality	The service is one of AAL HOMEdotOLD services. The service is developed in order to make it possible for older adults to find out about social voluntary work in their area and indicate their willingness to participate.
Inputs/outputs	Input: remote control, participation confirmation Output: selected dates, current participation status (ce-html pages)
Ontology (i.e. domain model)	The service is hosted on external servers and connected to the TV through Open Internet app.
How can it be connected to the middleware	Externally through direct connection to the server (database). An communication with the server needs to be established in the form of response calls (e.g. JSON or XML).
Message brokering	No.
Service discovery	No
Security	Yes. The user data is stored in a secure database on the server. Access is restricted.
Administration	Yes, the events are managed by an administrator externally.

Accessibility from the scratch	Yes, the service is online.
Intelligent response system	No

Intelligent Calendar	
Functionality	The service is one of AAL HOMEdotOLD services. The service is developed in order to make it possible for older adults to keep track of their schedule, receive warnings and organize social events with others.
Inputs/outputs	Input: remote control, participation confirmation Output: selected dates, current participation status (ce-html pages)
Ontology (i.e. domain model)	The service is hosted on external servers and connected to the TV through Open Internet app.
How can it be connected to the middleware	Externally through direct connection to the server (database). An communication with the server needs to be established in the form of response calls (e.g. JSON or XML).
Message brokering	No.
Service discovery	No
Security	Yes. The user data is stored in a secure database on the server. Access is restricted.
Administration	No.
Accessibility from the scratch	Yes, the service is online.
Intelligent response system	No

Skype	
Functionality	The service is one of AAL HOMEdotOLD services. The service is developed in order to make it possible for older adults to make and receive audio and video calls with other Skype users, on NetTV and otherwise.
Inputs/outputs	Input: remote control, video camera, microphone Output: videostream, audiostream (encoded data streamed from Skype servers and represented locally through implementation of Skype API)
Ontology (i.e. domain model)	The prototype is implemented by means of additional hardware connected to the TV
How can it be connected to the middleware	Through reading of datastream between the Skype hardware and the TV, implementation of Skype API into middleware. It is not clear whether this would be possible because of the way how Skype encodes the datastream, and it would require additional hardware and implementation.
Message brokering	No.

Service discovery	No
Security	Yes. Provided by Skype servers.
Administration	No.
Accessibility from the scratch	No, the service is still in prototype phase.
Intelligent response system	No

Verklizan UMO platform services

Active residential alarming	
Functionality	Offer users the ability to call for help from their homes by means of alarm equipment in the home of the user.
Inputs/outputs	Input: alarm message with optional voice stream (telephone call or digital SIP audio stream) Output: alarm acknowledge message, optional two-way voice stream (telephone call or digital SIP audio stream)
Ontology (i.e. domain model)	Input (alarm with optional voice connection) is generated by the end-user by means of alarm equipment. Alarm is handled by an alarm operator in the monitoring centre of the service provider, alarm operator accesses situation and organizes the necessary care based on the situation.
How can it be connected to the middleware	Telephone network (PSTN/ISDN protocols) Verklizan IP interface (SIP protocol)
Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections, authorization & authentication based on SOAP security, message encryption of SIP messages
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party equipment with in general very simple user interfaces (i.e. a red alarm button).
Intelligent response system	No

Passive residential alarming	
Functionality	Generate automatic alarms in the case the end-user is in an emergency situation or is not aware of upcoming danger by means of alarm equipment in the home of the user.

Inputs/outputs	Input: alarm message with optional voice stream (telephone call or digital SIP audio stream) Output: alarm acknowledge message, optional two-way voice stream (telephone call or digital SIP audio stream)
Ontology (i.e. domain model)	Input (alarm with optional voice connection) is auto generated by means of alarm equipment. Alarm is handled by an alarm operator in the monitoring centre of the service provider, alarm operator accesses situation and organizes the necessary care based on the situation.
How can it be connected to the middleware	Telephone network (PSTN/ISDN protocols) Verklizan IP interfaces (SOAP + WDSL web service, SIP protocol)
Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections, authorization & authentication based on SOAP security, message encryption of SIP messages
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party equipment with in general very simple user interfaces (i.e. a green button) or no user interfaces at all (automatic initiation of alarm)
Intelligent response system	No

Active mobile alarming	
Functionality	Offer users the ability to call for help anytime anywhere by means of mobile alarm equipment.
Inputs/outputs	Input: alarm message with optional voice stream and/or GPS location information (mobile telephone call, SMS message, SOAP web service call or digital SIP audio stream) Output: alarm acknowledge message, optional two-way voice stream (mobile telephone call or digital SIP audio stream)
Ontology (i.e. domain model)	Input (alarm with optional voice connection and/or GPS location information) is generated by the end-user by means of mobile alarm equipment. Alarm is handled by an alarm operator in the monitoring centre of the service provider, alarm operator accesses situation and organizes the necessary care based on the situation.
How can it be connected to the middleware	Mobile network (GSM/SMS protocols) Verklizan IP interfaces (SOAP + WDSL web service, SIP protocol)

Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections, authorization & authentication based on SOAP security, message encryption of SIP messages
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party mobile equipment with in general very simple user interfaces (i.e. a red alarm button or a smartphone app)
Intelligent response system	No

Passive mobile alarming	
Functionality	Generate automatic alarms by means of mobile alarm equipment.
Inputs/outputs	Input: alarm message with optional voice stream and/or GPS location information (mobile telephone call, SMS message, SOAP web service call or digital SIP audio stream) Output: alarm acknowledge message, optional two-way voice stream (mobile telephone call or digital SIP audio stream)
Ontology (i.e. domain model)	Input (alarm with optional voice connection and/or GPS location information) is auto generated by means of alarm equipment. Alarm is handled by an alarm operator in the monitoring centre of the service provider, alarm operator accesses situation and organizes the necessary care based on the situation.
How can it be connected to the middleware	Mobile network (GSM/SMS protocols) Verklizan IP interfaces (SOAP + WDSL web service, SIP protocol)
Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections, authorization & authentication based on SOAP security, message encryption of SIP messages
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party equipment with in general very simple user interfaces (i.e. a green button, SMS message or call) or no user interfaces at all (automatic initiation of alarm)

Intelligent response system	No

Telemonitoring (monitoring vital signs, wellness, activity)	
Functionality	Measure health and wellbeing of end-users within their home environment and send the data for analysis to the UMO Monitoring Centre.
Inputs/outputs	Input: (alarm)message with optional monitoring information (SOAP web service call). Output: alarm acknowledge message, optional alarm handling if the supplied values indicate critical situations
Ontology (i.e. domain model)	Input (alarm with optional monitoring information) is provided by monitoring equipment based on manual or automatic measurements. Input is logged and analysed in the monitoring centre of the service provider. In case of critical values an alarm operator accesses the situation and organizes the necessary care based on the situation.
How can it be connected to the middleware	Verklizan IP interface (SOAP + WDSL web service)
Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections, authorization & authentication based on SOAP security, message encryption of SIP messages
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party monitoring equipment
Intelligent response system	No

Telemonitoring (medication monitoring)	
Functionality	Provide medication reminders and monitoring medicine compliance.
Inputs/outputs	Input: (alarm)message with optional medicine monitoring information (SOAP web service call). Output: alarm acknowledge message, optional alarm handling if the supplied information indicate critical situations.
Ontology (i.e. domain model)	Input (alarm with optional medicine monitoring information) is provided by medication dispensers or reminder applications. Input is logged and analysed in the monitoring centre of the service

	provider. In case of critical values an alarm operator accesses situation and organizes the necessary care based on the situation.
How can it be connected to the middleware	Verklizan IP interface (SOAP + WDSL web service)
Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections, authorization & authentication based on SOAP security, message encryption of SIP messages.
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party equipment (medication dispensers).
Intelligent response system	No

Scheduled out-bound contacts (daily living support)	
Functionality	Scheduled out-bound voice or video calls to end-users to provide daily living support
Inputs/outputs	Input: non Output: voice or video call to end-user ((mobile) telephone call or digital SIP audio/video stream).
Ontology (i.e. domain model)	A worker of the service centre support staff or a volunteer initiates a scheduled voice or video call to an end-user.
How can it be connected to the middleware	Telephone network (PSTN/ISDN protocols) Mobile network (GSM protocol) Verklizan IP interface (SIP protocol)
Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections and message encryption of SIP messages
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party telephone or video equipment.
Intelligent response system	No

Screen to screen contact	
Functionality	Screen to screen contact offers users the ability to have video-communication with the UMO Monitoring Centre from their home.
Inputs/outputs	Input: video communication session initiated by the end-user (SIP video stream) or Output: video communication session initiated by the monitoring centre support staff (SIP video stream).
Ontology (i.e. domain model)	A video communication session is initiated by the support staff of the monitoring session or the end-user.
How can it be connected to the middleware	Verklizan IP interface (SIP protocol)
Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections and message encryption of SIP messages
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party video equipment.
Intelligent response system	No

Videomonitoring	
Functionality	Remote observation from the monitoring centre by means of video communication.
Inputs/outputs	Input: video alarm (SIP video stream) or Output: video communication session initiated by the monitoring centre support staff (SIP video stream).
Ontology (i.e. domain model)	Video alarms are initiated by alarm equipment of the end-user (manual or automatic based on detection of abnormal situations). Video sessions could also be initiated by the monitoring centre support staff to support assessment of alarm situations from the monitoring centre.
How can it be connected to the middleware	Verklizan IP interface (SIP protocol)

Message brokering	No
Service discovery	No
Security	Optional for the IP interfaces by means of secure connections, authorization & authentication based on SOAP security, message encryption of SIP messages.
Administration	The services and used interfaces should be configured in the UMO platform. Technical administration is handled by Verklizan support staff on behave of the service providers (i.e. the customers of Verklizan). Alarm handling procedures & related information should be available in the system, this is handled by the service provider.
Accessibility from the scratch	Yes, accessible via 3rd party equipment.
Intelligent response system	No

3.3 Chapter Conclusions

A list of criteria for analysis was used to assess the digital services listed in chapter 2. When creating the criteria, many different facets that might influence integration of services in AALuis were taken into account.

Looking at the analysis of individual services, one thing that is immediately noticeable is that no Philips or Verklizan service supports the following features:

- Message brokering
- Service discovery
- Intelligent response system

Both Verklizan and Philips NetTV platforms do not provide services directly to the end-user, but provide opportunity for 3rd party developers or equipment to be connected to the end-user.

The most Philips NetTV services are purely software-based; websites that are viewable via the TV. In this, the stress lies in graphical user interfaces, and high interactivity. Verklizan's services are more commonly machine-to-machine services, creating connection between the user's home and back-end service providers. As such, many services do not have graphical interfaces, and interaction is either automatic (auto-response alarms) or very simple (message service or one-button alarm interface).

Both services from Philips NetTV and Verklizan's UMO are mostly being communicated through IP protocols (websites in the case of NetTV and direct IP connection in the case of UMO). In this sense, this creates an opportunity to connect both platforms with the middleware through the same protocol, although the NetTV services are communicated on higher level (http) than UMO services.

The big challenge lies in creating an easy way to bridge this gap, and a way to easily connect high-level graphical user interface in software to the services provided through UMO platform, and a way for translating the CE-HTML to other interface implementations in case that AALuis interface are implemented otherwise.

4 Area 3: Enabling free choice of User Interfaces on the level of Services

4.1 Which solutions exist on your level to separate information for User Interaction from other information

Philips NetTV platform

For Philips NetTV services, because the services are implemented in CE-HTML, the interaction is inherent in the renderer or browser. In the case of NetTV enable TV's this means that the interface of the services is directly connected to the remote control of the television sets. CE-HTML allows for direct specification of the interaction of the remote, by defining the element selection orders and functionality of the buttons on the remote.

Figure 3: A Philips NetTV remote of the current (2011) line of television sets.

The opportunity for extending interaction with the NetTV services lies mostly in UPnP and JointSPACE protocols that are now being integrated in the television sets. Using these protocols allows for connection and direct exchange of state information and controls between the TV and other UPnP devices on the same network. For example, a possibility would be to create a mobile phone application that would (partially) share interface with the TV and allow for direct control in the same manner as a remote, or for TV to send updates about programming directly to the mobile phone.

Verklizan UMO platform

Verklizan UMO services are implemented as technical (M2M) services usually without a user interface. These UMO services together form an open platform to which a large range of telecare, telehealth, and security equipment can be connected. The care organisations using the open UMO platform are able to service clients with a variety of types of interchangeable equipment from this platform. User

interaction properties are in this way fundamentally separated from the UMO services. Tailoring to the needs of the older person with regard to interaction with the service occurs primarily by the selection of the proper end-user device. In some cases, the equipment connected to the UMO service can itself have an adaptable user interface, adaptable to handling interaction in the way the end-user would prefer. The opportunities for extending interaction are primarily on the side of the manufacturer of the equipment or the designer of its GUI (for instance on mobile phone applications). Verklizan tries to support these new interfaces and services; connecting them over the service provider to the end-users.

4.2 How do the components handle user interaction

Philips NetTV platform

As mentioned earlier, the end-user interacts with the NetTV services primarily with the remote control. The user interfaces of the services include descriptions which makes it possible to optimize the selections of the interface elements with the remote control.

The remote control can broadcast a variety of instruction to the TV. The controls that are used within NetTV services are the directional controls (left, right, up, down), confirmation (ok), return button (indicated by a twisted arrow), main menu (for leaving the NetTV services), coloured selection buttons (for context-based functions) and the number based (for multi-tap keyboard input).

The TV translates the commands received from the remote control into local states for the service (item selection, confirmation, keyboard input). When the user confirms a selection of a link on the service, the commands are executed remotely and a new service page is loaded or the current page is refreshed.

Verklizan UMO platform

As mentioned above, there exists a wide range of interchangeable equipment connectable to UMO services, resulting in a great diversity regarding how the components handle user interaction. Below we see some examples of equipment, representing different categories of how components enable user interaction.

Figure 3: examples of 3rd party equipment connectable to the UMO platform

In one kind of equipment, the way the end-user interacts with the service is largely determined by the specifics of the hardware of the device. The services, used interfaces and handling procedures are all configured in the UMO platform; a configuration which is handled by the service provider.

Figure 4: Examples of 3rd party equipment with software based user interaction connectable to the UMO platform

Recently an increased use is made of equipment with a user interface that is at least partly software based. This enables adaptation of the way the component handles user interaction, primarily definable by the manufacturer of the device.

Figure 5: Examples of 3rd party screen-tot-screen equipment connectable tot the UMO platform

The same holds true for the screen-to-screen devices shown above. These present a richer interface exhibiting the combined used the Verklizan IP interfaces (i.e. SOAP and SIP based IP interaction).

4.3 Are there solutions for enabling interoperability with arbitrary user interfaces

Philips NetTV platform

As mentioned earlier, Philips is currently developing multiple ways of expanding interactivity with the Television sets and NetTV services in particular, through employing UPnP and JointSPACE protocols. These protocols allow direct exchange of information between the TV and external devices.

Within JointSPACE, any connected device is designated as either a renderer, control point or media server. The interconnected devices can subsequently communicate together to present a single interactive experience to the user, without the user requiring knowledge of how these interoperate together, other than setting up the initial connection.

While these solutions are currently under development by Philips, it is interesting to consider when creating alternative interfaces for the service within AALuis.

Verklizan UMO platform

The UMO open platform is specifically designed to allow for easy integration with a wide range of telecare devices and services. The open platform uses protocol translators for external proprietary input of third parties, resulting in a transparent and uniformly accessible communication with the telecare centre worker. From there, contact can be made with all kinds of healthcare workers and other parties such as personal carers, usable in any EU country but adaptable to local characteristics and wishes with regards to workflow. So this first and general solution for supporting arbitrary user interfaces in largely in place for the UMO platform.

Figure 6: Examples of 3rd party mobile equipment connectable tot the UMO platform !

Another aspect of achieving interoperability with user interfaces is to allow for different GUI on a specific device connecting to the UMO service. The Verklizan IP interfaces allow for services provided with for instance different mobile phone applications. In the picture below we see two devices used for active mobile alarming. In the dedicated device on the left, every user with the device has the same ‘user interface’.

The same services however, can also connect with mobile phone applications of various operating systems. This allows for ‘arbitrary’ apps to support interaction between the end-user and the service provider, mediated with the UMO service.

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