DELIVERABLE

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D2.1. – User Requirements Report

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final	31.1.12	EM	CURE	Final version of the deliverable

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1. INTRODUCTION

1.1   Scope and objectives of the deliverable

The use of information and communications technologies (ICT) is spreading rapidly but such elderly have only basic, low or no digital skills. This implies that most of the existing technological devices might not be accessible or friendly for older people. The ELDERHOP project, thanks to an accurate analysis of user needs and the definition of specific scenarios, want to adopt a user-centred approach in an attempt to close the gap between users and technology.

ELDERHOP project will be based on the real needs of potential end-users and this document Deliverable 2.1 titled "User requirements report", describes the research we carried out due to the Task 2.1 of the Work Package (WP2), "Collection and Analysis of Needs of Users". Our research activities aim to provide to the technicians and developers of the ELDERHOP solution, a realistic viewpoint of real needs of service's beneficiaries.

Therefore, we engaged in different activities to investigate the needs of potential end-users. We conducted a desk research related to the topics of elderly people and technology and their shopping behaviour and had a look at related projects and products. Furthermore we conducted four focus groups to collect data and opinions directly from end-users about their specific needs in shopping. As a further method we engaged in an ethnographic survey in the form of video interviews, to provide some insights for the ideation process. Thanks to the gathered information, it will be able to define the best technical specification of the system due to improve it according to elderly needs and requirements.

1.2   Structure of the deliverable

The report in structured in six chapters. Chapter 2 describes the results of the desk research conducted by CURE and COOSS. In chapter 3 the method and results of the four focus groups which took place in Austria and Italy are described in detail. Method and results of the ethnographic survey conducted by KIBU is described in chapter 4. Chapter 5 is about the implications for the system design and includes a summary of the research activities in work package 2 as well as a concrete proposal for the system design. The report concludes with the references part in chapter 6.

2.   DESK RESEARCH

We conducted a desk research on topics related to ELDERHOP project covering elderly people and technology, elderly people and their shopping behaviour as well as related projects and products. For the desk research related to elderly people and technology as well as shopping behaviour, we tried also to combine the focus on both research areas. This desk research should give a broad overview about the past research and projects on the intended user group (and user sub-groups) of the planned shopping assistant for elderly people. The results of this desk research are presented in the following sections.

2.1   Elderly People Research

In this literature review we included research on elderly people, their technology use and their shopping behaviour from the early beginnings of this field of research until latest research activities in the year 2011. We focus especially on latest literature as well as on the origins of the research, to show stable research patterns over time and to compare "old" knowledge to "state of the art"-knowledge. We included research from social and economic science to research in information and communication technology. For purposes of traceability of this literature review we define (according to Gilly & Zeithaml, 1985) elderly people as adults aged 65 years and older. Exceptions from this are clearly marked.

2.1.1   Elderly People and Technology associated to Shopping

The research on adoption of consumer-related technologies by the elderlies has a long history and started noticeably in the 1980's in the field of marketing research. Gilly and Zeithaml (1985) compared a group of nonelderly to elderly. The overall result was that awareness of technological innovations was not significantly associated with age. What has been stated clearly at this point is that the term "technological innovation" had surely a different meaning in the year 1985, where the progress of information and communication technology was not as fast as today, in the year 2011. An illustration of highly scientific "technological innovation" shows following example of today's innovations in the field of assistive technologies that could be used to facilitate the shopping trip of elderly shoppers.

2.1.1.1 Accessibility

Kohtsuka and colleagues (2011) focused on a technology that could assist elderly people on their shopping trips. In order to do this, they conducted research on a control system that is installed in shopping carts. This control system enables the shopping cart to automatically follow their owners. In first experiments the researchers could proof that the "robot shopping cart" follows the user in an accurate way by judging the users' position with laser technology and avoids obstacles and collisions automatically. Figure 1 shows a possible way of the automatic shopping cart in a store.
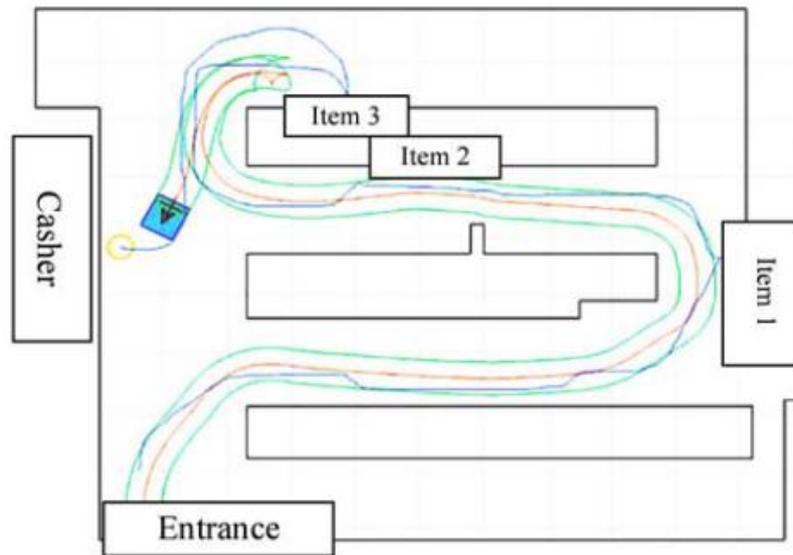
Figure 1: Trace of the shopping cart in a model store (Kohtsuka et al., 2011)

López-de-Ipina and colleagues (2011) address the subject "accessibility" in the PIRAmIDE-project (a project slightly related to the ELDERHOP-project1). The aim of the PIRAmIDE-project is to transform mobile devices into sense enhancers that give a "sixth sense" to its users, e.g. elderly people. One application of these "sixth sense"-mobile phones is to assist elderly people on shopping trips. Some of the requirements of this shopping device were: the "normal" shopping behaviour should not be altered through the use of the mobile phone, that means the user should not be forced to plan his/her shopping trip before s/he actually is in the store. Another point is that there should not be complex changes in the internal information management system of the store where the device is intended to use. Next, blind people should be able the use their "usual devices", that means only "inexpensive off-the-shelf already known technology" should be considered. The authors develop a system that enables navigation through the store with RFID-technology and product recognition with UPC- and QR-code technology. Figure 2 shows the prototypical implementations in a model store.

The coordination of the shopping trip (navigation and search for products) is done by a mobile device. The controlling of the device is implemented over gesture interface or by voice command. Figure 3 shows the gesture interface when addressing "Product recognition" by drawing the letter "P".

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[1] http://www.piramidepse.com

Figure 2: Navigation through RFID and a white cane (left), product recognition by UPC code technology (middle), product recognition by QR-code technology (right) (Lòpez-de-Ipina et al., 2011)
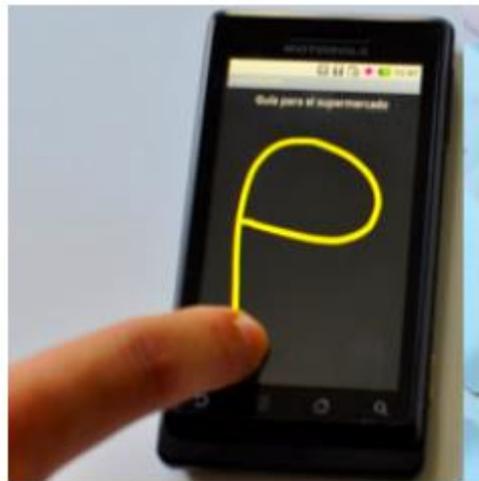
Figure 3: User drawing "P" on shopping device (Lòpez-de-Ipina et al., 2011)

2.1.1.2 Usability and User Experience

Besides the innovation and technological possibilities it is important that the researchers should not forget the intended user-group for the assistive technology. So besides "accessibility", "usability" is an important factor that should be considered. Meulendijk and colleagues (2011) developed design principles for ambient intelligent domotics (high-end electronic devices in the home environment for the benefit of its inhabitants) for elderly people. It is stated that the desire of elderly people to live at home as long as possible increases (Meer alleenwonende ouderen, Voorburg, The Netherlands: Ministry of Economic Affairs, 2001; cited in Meulendijk et al., 2011). With this increasing rate also the demand for "domotics" rises. Due to lack of experience and decreasing physical and psychological abilities, elderly people have more problems adopting technology than younger people (The deconstruction of a targetgroup for IT-innovations: Elderly users' technological needs and attitudes towards new IT. Östlund, B. 2002, Nätverket - Kulturforskning, Vol. 11, pp. 77–93.; cited in Meulendijk, 2011). As a theoretical framework for a technology acceptance model - especially for elderly people in the context of mobile phones - is the Senior Technology Acceptance & Adoption Model (STAM) by Renaud and Bijon (2008). The authors considered several well-established and elaborated Technology Acceptance Models. Besides this literature study on technology adoption models the authors conducted qualitative interviews with elderly people and then proposed their model (see Figure 4).
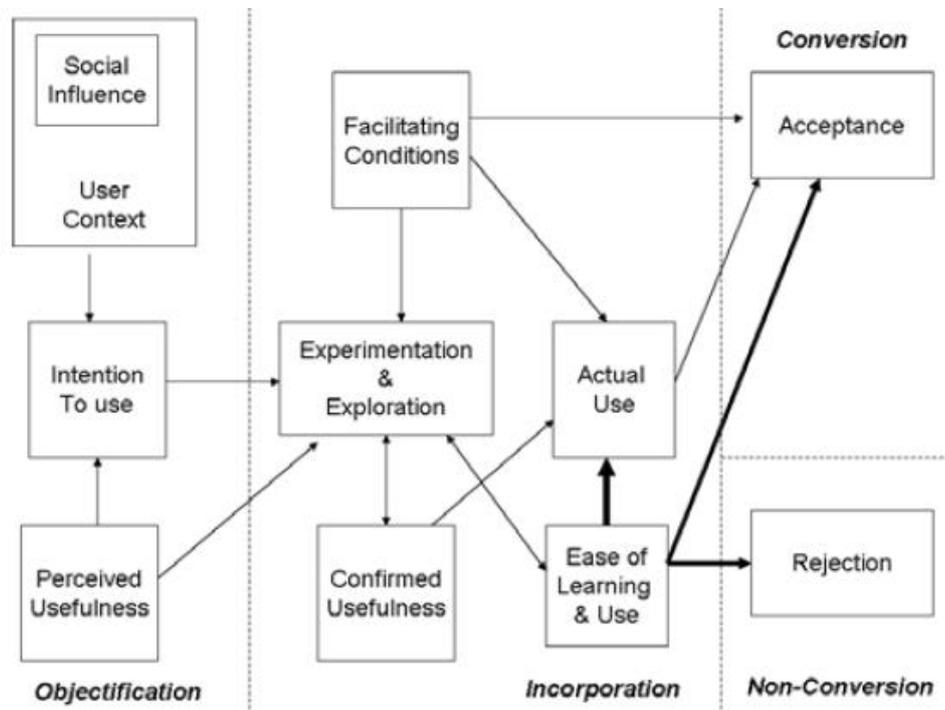
Figure 4: Senior Technology Acceptance & Adoption Model (STAM) by Renaud and Biljon (2008)

2.1.2 Elderly People and Their Shopping Behaviour

Elderly people and their shopping behaviour has always been an interesting focus of market research and marketing as well as an interesting point in management research. Lumpkin (1985) stated that past research on elderly people has treated this group as homogenous, unified one. To fully understand their shopping behaviour, elderly people should be divided into subgroups, because previous research by Towle and Martin (1975; cited by Lumpkin, 1985) has shown that elderly may not be homogenous. Lumpkin conducted the first - until today unrivalled - empirical exploratory research study, in order to identify a typology of shopping orientations of elderly people. Without any question, elderly people have special needs. Lambert (1979; cited in Lumpkin, 1985) states several concerns and desires of elderly shoppers like: "discounts, courteous and dignified service, transportation, help when shopping (locating items, faster checkouts, and package carry-out), package related concerns (readable price tags and labels, and suitable package sizes), rest facilities and more convenient parking and entrances". These concerns and desires can be directly taken as implications for designing a tool that facilitates the shopping trip of elderly people. Bernhardt and Kinnear (1975; cited in Lumpkin, 1985) found out that elderly people used more department stores than discount stores and paid less with credit cards than other groups. As a contrast to this Mason and Smith (1974; cited in Lumpkin, 1985) discovered, that elderly shoppers did not use e-commerce more or less than other groups. The remarkable thing is that this was in the year 1974, when e-commerce was not as widespread as in the year 2011.

Myers and Lumbers (2008) conducted research on the requirements on shopping of people over the age of 55. Still today, most marketing researchers still focus on younger people and neglect elderly shoppers (Carrigan & Szimigin, 2000; cited in Myers & Lumbers, 2008). Some approaches to open up the research field of elderly people and shopping are a segmentation of this group. Bone (1991; cited in Myers & Lumbers, 2008) reviewed segmentation methods and came to the conclusion that important segmentation variables were chronological age/perceived age, income, discretionary income, affluence level, health, activity levels, discretionary time, response to others. Myers and

Lumbers conducted qualitative focus groups and semi-structured interviews with elderly shoppers and identified three main themes as key components of the consumer behaviour, which were retail age, socialisation, shopping as a leisure event. From their findings the authors deduced an "older shopper typology": Targeted shoppers "shop alone and go to specific shops for specific items"; shopaholics shop whenever they can and are mainly female; and occasional leisure shoppers do "mostly targeted shopping, but enjoy an occasional day out for shopping" as well. Reluctant shoppers shop only when they have to.

From latest research again back to the origins of research on elderly people and their shopping behaviour, Guy (1985) used a Market Research Consumer Panel for statistical analyses and compared retired households to other households (unemployed households as second group, and other households as control group). The retired ones generally state to do more comparing of prices for ordinary food purchases, to try to buy good quality food, even if prices are higher, to go out of way to get to better shops, to prefer to shop at the "small man" type of shop than other households but generally agree less than the unemployed household group. Guy (1985) found that the majority of the expenditure of the retired households is spent in superettes and grocery stores, while the minority of the expenditure of the retired households is spent in superstores and large supermarkets. Furthermore the distance that is travelled to the main grocery source is mainly under 0.5 kilometres, the elderly people prefer main grocery sources that are near to their home. Although the data is not up to date, these facts and figures show the significant differences between elderly shoppers and other shoppers, as it can be assumed that some motives, arouses and patterns don't change in the core over the time.

2.2 Related Projects and Products

2.2.1 Background[2]

According to ISTAT[3], in Italy aged population is composed by over 16 million individuals, 26.6% of the total population. In this contest, the request for technological devices by over 65 persons is growing: there are a growing basin of over 60 individuals interested in mobile phone, smart-phones, tablets or computers because they want to feel safer by using modern solutions, to keep in touch with children and with grandchildren living around the world, to be on the run together with the technological society of nowadays.

But not all devices are accessible for them: they are in a period of life where physical impairments can appear and reduce their independence, not all of them have a digital literacy sufficient to let them use any kind of device and in general they look for devices duly tailored on their needs. For example, according to a market research presented in Italy on April 2011, among those over 65 who do not own a cell phone (6% of users between 65 and 75 years, 12% among those over 75%), 71 % of them consider the latest devices unnecessary or incompatible with their needs: unnecessary functions, keys too small, poor knowledge of the "tool".

So, keys larger than normal, simplified functions, applications developed for special needs: mobile phones, tablets, computers or operating systems, all new technological solution is providing now a special version or variation devoted to the seniors. The Apple services and devices are the most famous.

The use of internet-based services is also growing in Italy among population over 65; a growing number of aged navigators in a few years has managed to carve out an important role among the users of the web. This phenomenon is especially relevant within European and North American aged population, as demonstrated by the fact that email is the preferred service among users over

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[2] www.aiart.it
www.assistenzanziani.it
[3] www3.istat.it

65, followed by the search for information on products and topics related to health, shopping, travel bookings online and social networking.

The approach to a PC is, for the vast majority of older people, usually through courses organized by public authorities: in 2009 over 43% of people between 60 and 64 and almost 33% of those between 65 and 74 has participated in such initiatives. The other half get familiar with ICT through the help of children and grandchildren.

The figure of the grandmother will address the technological means of looking askance at this strange talking box called the TV looks like a memory of other times. To be in step with the times people use older technology that provides perhaps with a little 'less than manual skills, but once you learn the tricks and the dynamics are quite unable to disengage with the technological tools. This is not only with regard to the PC and the network, but also mobile phones, it will be because the children are safer to reach Mom and Dad, that the grandchildren can talk freely with her grandparents or grandparents themselves want to communicate with friends and relatives but mobile phones are in her purse and pocket people of all ages, so much so that recently came out on the market a phone with number keys visible. And 'in fact that of sight takes away one of the problems that older people by technological means: how to send SMS in these bodies so tiny mobile phones on the market? Or how to get along, maybe with some vision problem in front of a computer video annoyingly bright?

A group of psychologists at Florida State University has highlighted these difficulties and suggested some possibilities for improvement in an article published in Current Directions in Psychological Science (Charness & Boot, 2009). Their article shows that the difficulties in the use of technology by older people are strongly linked to problems auditory, visual, and motor control. They stress how web designers should avoid backgrounds that create a low contrast with the text and use a larger font.

At the International Consumer Electronics Show in Las Vegas, a special section was devoted to high-tech aspects of life in older people and proposals on display were very futuristic: everything from the sensors under the beds that detect movements, medicines intelligent module "remembers pill", to be put in motion sensors around the house - the bathroom to the living room - for monitoring the movement of puppies and person-robot grandparents lack of love.

Among elderly people and technology there is increasingly close relationship. The primacy of "appliance" as used by the elderly is still held by the television, that going forward with age is configured as the primary source of information, even if the spread of new forms of reception, such as satellite and digital Earth, is still rather limited. In second place is the square the VCR, the technology used mainly by men, and lately the computer and the Internet are slowly entering the everyday life of many over 65.

2.2.2   Products

2.2.2.1 Mobile Phone and Smart Phone[4]

The desk research found out information within the Italian and European market about phones for the visually impaired (with high contrast screen), phones with enhanced audio for those who have

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[4] www.telefonoanziani.it
www.ondacommunication.com
www.emporia.at
www.beafon.com
www.easyteck.net
www.binatoneonline.com
www.hagenuk.de / www.hagenukitalia.it
www.ittmmonaco.com

audio impairments, simplified phones, all or almost all with large keys and functions reduced to a minimum. The T100 Easyteck (59.99 euros), 200 contacts stored in the address book, calculator, alarm, radio, and an emergency button associated to 5 numbers. Or the Gold series of PhoneEasy (89.90 euros) with amplified sound. The mobile ergonomic Hagenuk sold at 29 euros. The EasyPhone from NGM, among 69 and 99 euros, equipped with an emergency device that, thanks to the dedicated button on the back, allows communicating via SMS and getting in touch with relatives in a time of need. Then there is the series of Binatone Speakeasy with key speakers at 69.99 euros, and the company ITT Easy series from Monaco to 69.90 euros.

Vodafone catalog shows Austrian company Emporia RL1, whith few functions (calls, messages, address book, alarm clock and little else, but also large buttons and fonts legible at 99 euros. To conclude, the Chinese company Auro, offering the Comfort model 2010 from at 125 euros, and the M301 model from 96 euros. The Dutch Beafon, which focuses exclusively on creating phones for the elderly with 6 models available, from the 19 to 129 euros. And the Italian Brondi too, which provides 8 phones for the over 60 presented on Company's website under the section strictly dedicated to the "senior".

2.2.2.2 Tablet[5]

American Memo Touch 1 LLC equipped with the Android platform. The basic idea is to provide a tool with which you can attach memos and related alarms, in the case of small tasks, like taking medications or go to the doctor. But also to have on hand the telephone numbers remain the most useful and, therefore, in contact with the family in case of need. For now only available for the U.S. market, Memo Touch costs $ 299 and requires semi-annual and annual subscription (respectively 174 and $ 300). The high cost seems to leave the product in a reduced market segment, but on the same side the "giant" Care Innovations Connect 2, a joint venture between Intel and General Electric, has also moved on the same direction with a range of products.

Touch Memo was born from the idea to use Android as a tablet digital agenda to help the elderly not to miss shots and remember all the little daily actions necessary to take medication from the doctor. Based on an Archos 101, this basic tablet with 10.1-inch screen has a simple and functional, with a few icons to help users: time, calendar, tasks, and services such as phone book and the 'list of pills to take. From the web also relatives of the elderly can add events to the calendar or send photos of their grandchildren.

In the case of tablets, even those devoted to a generic market such as Apple with its iPad or Samsung Galaxy Tab, special commercial communications and advising campaigns devoted to elderly seems to be not needed. Thanks to the easy-to-use interface, zoom in and out tool for any kind of contents, the VoiceOver feature (screen reader) and others, the iPad is having some success even among those over 65. The navigation through the multitouch screen and keyboard require some practice, but it revealed naturally accessible and usable for senior users.

2.2.2.3 Computer[6]

In Italy there are essentially two offers concerning personal computer. The Eldy non-profit organization has developed and distributed (you can download for free online) a simplified OS applicable both on Windows and Linux platforms. The goal is to offer a new and simpler graphical environment for those who are not especially familiar with technology. You can surf, chat, send emails, read news, check the weather. You can also use it as a word processor and image viewer

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[5] www.memotouch.com
www.apple.com
[6] www.eldy.org

and video. Part of the project was then adopted by another reality, this time English, computers Simplicity 5, who developed the eponymous software, but in this case sold preinstalled on a laptop or a desktop or even a video touchscreen table in version 20 or 24 inches. To return finally to Italy, where the Sr 6 of Milan Labs has developed dTouch, a real computer equipped with touch control iAble software, which allows you to benefit from online services such as email and internet, but also to make phone calls , read books (or have them read aloud) and even manage home automation devices. All this by simply touching the screen (18.5 'HD Ready, 1366x768 resolution, with aspect 16:9), without a mouse. Cost: € 1,250.

2.2.2.4 Apps[7]

Thanks to a survey of applications for androids and smartphones currently on the market, we can see that there are a lot of services to make shopping easier, cheaper and funny. But, if we consider different products, they are very specific, they don't integrate several applications (cost of the product, comparison of prices, creation of a shopping list) and in many cases they operate only with specific store or products.

The market seems so be open to a solution, as ELDERHOP is, that can offer into an integrated device, many applications usually diversified; a device that can be calibrated, personalized and tuned on the particular needs and specifications of older persons, ensuring a safe spending in every possible aspect: economic, social and health services. Below are some of the applications of "shopping assistant" available on the market.

Shopping Assistant

Shopping Assistant is a great app that makes shopping fun and pain free. It has a great looking and intuitive user interface that makes using it simple and enjoyable. Below is a list of the key features:

VERSION 1.2:
New trial capability: you can now try the app before buying it!
General usability enhancements: auto suggestion, correction and capitalization everywhere now!
New shopping store management capability: you can now add the stores where you shop and use them as a filter. You can also specify a default store
New rich general tagging system: you can now tag items to buy with multiple tags, (ex: bakery, important, produce, gaming) and then filter by these very same tags on the go
New powerful filtering capabilities: you can now filter by item name, store and a multiple selection of tags
Improved user interface with new beautiful background and animations

VERSION 1.0:
It is available in 3 languages: English (default), French and Spanish
All your shopping lists and items are stored locally on the phone, no need for an internet connection
You can create clones or copies of existing shopping lists to cover recurrent needs instead of entering the same data all over again
You can share your shopping lists via email to inform other people of the progress made or to just spread the word
Great user experience and well thought out intuitive user interface. For example, swipe/flick to the right to mark an item as purchased just as you would do on a piece of paper!

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[7] http://dev-arts.com
http://shopsavvy.moby/
www.future-store.org

Specify your own currency symbol and formatting options independently from your phone's settings
Fast search through all your shopping lists and items
Theme friendly user interface with subtle animations

ShopSavvy

ShopSavvy includes a simple mobile wallet for items sold online by select merchants. It allows consumers to buy products they scan with a single tap. Using custom built adapters, ShopSavvy delivers payment details including payment type (Visa, Mastercard, AMEX) and shipping details to a retailers web/mobile payment flow. The consumer is able to complete a purchase without ever visiting your website reducing the chance of losing the sale. The retailer is able to leverage the ShopSavvy Wallet without any custom development.

QR Codes are all the rage in retail, but most consumers have no idea what those strange 2D barcodes are all about. Our Scan with ShopSavvy program helps consumers bridge the gap between 1D and 2D barcodes.

AdOns® are designed to appear as extra features of the application and not advertisements. They offer the user real value, and are presented in such a way that the user does not fall victim to ad-Blindness.

ShopSavvy AdOns® are built using HTML5, CSS3 and JavaScript and run inside the fWebKit web rendering engine that is present on all major smartphone platforms. They can leverage all of the technologies and capabilities of modern mobile web technologies.

Advertisers looking to bridge the gap between physical goods and their digital alternatives or counterparts will find AdOns® to be the perfect solution. The user can scan a product's barcode and immediately be presented with the option to purchase the product digitally or interact with supplemental product materials.

With AdOns®, you are not limited to just a "Fourth Row," those Fourth Rows and their calls-to-action can bring the user to full screen in-app experiences. They can look and feel completely native so they feel like a "plugin" or they can be a completely custom design with your branding and logos. These experiences can be as complex or simple as you'd like: include video, maps, mini-games, product comparison charts, anything you can think of. You can go all the way and make your AdOns® feel like an app within an app

Mobile Shopping

The METRO GROUP Future Store Initiative tests new concepts and technologies that make shopping for customers even more convenient, eventful and informative.

Mobile Shopping

One of the most important developments in the real,- Future Store is the Mobile Shopping Assistant (MSA) – an entirely new application for powerful mobile phones. Every mobile phone that meets the technical requirements and is running the required software will be an MSA. Consumers will have one device with which they can perform multiple tasks: surf the web, make phone calls, take pictures and shop in a self-service store.

The MSA is unique; not only in Germany, but around the world. For the first time, a company's merchandise management system is linked to a mobile phone. The advantage for customers: they don't need any additional devices, but can use their own mobile phone to enhance their shopping experience.

Mobile Shopping List

The Mobile Shopping List of real,- is available throughout Germany. This application refers to an electronic shopping list that customers can take with them anytime and everywhere. They can, for example, prepare a shopping list on Real's website www.real.de and then access it with their mobile phone. Or they use their mobile phone to add items to the list. If the phone is equipped with an

autofocus camera, they can simply scan the bar code on the packing of a product. The software for the Mobile Shopping List is now available for more than 600 different mobile phones.

Real,- App for iPhone and iPod Touch
Those who own an iPhone or the iPod Touch can now also download the free "real,- App" from the App Store and thus use the tried and tested online services offered by the retail company on their mobile phone. The "real,- App" guides customers to the closest real,- hypermarket and offers a selection of the weekly special offers. In the same way, customers can also view the "real,- Kochshow" where renowned chef Armin Auer presents menu suggestions per video and offers the corresponding recipes. The ingredients required for these recipes can be entered directly into the "mobile shopping list".

Mobile Shopping Services
In addition to the mobile phone applications that directly support shopping, METRO GROUP offers further useful applications for the mobile phone.

Real,- body coach
Would you like to lose weight, keep your weight or put on weight in a controlled manner? The real,- body coach helps you keep a constant eye on weight and calories. Based on individual information, the device calculates the calories balance and offers recipes for suitable meals. According to the energy balance, the consumer can see at a glance if he is allowed to eat more or if he should rather do some exercise in compensation.

Payback account status
The MSA offers a further useful function to those who hold a Payback card. On request, the device displays the customer's current account status.

Shop Zap
The shop assistant needs to pack the conveyor belt, but the boss' strict instructions are to pack them in sets of 3's. Pack enough bags and you're up for a promotion to a better store which is a lot more work, but oh so worth it, pack too slow, and the bags will fall off the conveyor belt, and you might have to continue to work in the same store!

2.2.3 List of EU Projects on Related Topics[8]

2.2.3.1 Devices for Assisted Living (DALI)

Funded under 7th FWP (Seventh Framework Programme)
Research area: ICT-2011.5.4 ICT for Ageing and Wellbeing
Project Acronym: DALI
Project Reference: 288917

Project description. Ageing is generally associated with a decrease in mobility and social interaction. A growing body of research suggests that reduced levels of out-of-home mobility can have widespread, detrimental effects for older adults. Adults for whom mobility is a problem suffer in

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[8] www.aal-europe.eu
http://cordis.europa.eu
http://europa.informatik.uni-freiburg.de/

a variety of ways. Not only are their social lives restricted but they are also more limited in terms of their access to good nutrition, leisure and other activities. For example people with restricted mobility have fewer choices in terms of where and when they can shop, and they have been found to experience problems in maintaining a balanced diet. Shopping has been found to be a useful way of maintaining physical exercise as well as providing the opportunity for social interaction. However, older adults can lose confidence in their ability to go out independently, particularly in unfamiliar and crowded spaces and may start to withdraw into their homes.

Several factors adversely affect mobility, the most obvious being physical impairment, loss or reduction of visual and auditory ability and of the key function of balance. Less recognised but as important is the decline of cognitive abilities, which reduces confidence in manoeuvring around unfamiliar environments. The slower reaction to external stimuli and the diminished navigation skills can be predictors of the onset of more severe cognitive problems. With the median age in Europe projected to grow from 37.7 (2003) to 52.3 (2050), the population of potentially afflicted people is substantial.

In this context, sustained levels of physical and social activity by a prolonged autonomous mobility are key to successful ageing. In this project, we pursue autonomous mobility through the development of the so-called c-walker. This mobility aid supports navigation in crowded and unstructured spaces by acquiring sensory information, by anticipating the intent of human agents and by deciding the path that minimises the risk of accidents. The c-walker is aimed at providing physical, cognitive and emotional support to older adults in public environments such as shopping centres and airports. Its expected benefits are a reduction in the anxiety of navigating in these environments and an increased likelihood of continued autonomous use of these environments. The c-Walker has a merely assistive role: it recommends a course to the user through visual, acoustic and haptic interfaces. The user remains in charge of final decision making.

The c-Walker is the expected result of a multidisciplinary research, with an active involvement of the end user in the RTD activities to elicit requirements, co-define the specifications, monitor and test the project (through an advisory panel) and the prototype (through lab and field experiments). The intended users of the c-walker are older adults, who have a combination of mild cognitive, visual and/or auditory impairments and are losing confidence in independent exploration of public environments.

2.2.3.2 European robotic pedestrian assistant (EUROPA)

Funded under 7th FWP (Seventh Framework Programme)
Research area: ICT-2007.2.2 Cognitive systems, interaction, robotics (ICT-2007.2.2)
Project Acronym: EUROPA
Project Reference: 231888

Project description. In the field of robotics, there has recently been a tremendous progress in the development of autonomous robots that offer various services to their users. Typical services include support of elderly people, cleaning, transportation, and delivery tasks, exploration of inaccessible hazardous environments, or surveillance. Most of the systems developed so far, however, are restricted to indoor scenarios, non-urban outdoor environments, or road usage with cars. The goal of the EUROPA project is to bridge this gap and to develop the foundations for service robots designed to autonomously navigate in urban environments outdoors as well as in shopping malls and shops to provide various services to users including guidance, delivery, and transportation. EUROPA will develop and apply sophisticated probabilistic scene interpretation techniques to deal with the unpredictable and changing environments. Based on data gathered with its sensors, the robot will acquire a detailed model of the environment, detect and track moving objects in the environment, adapt its navigation behaviour according to the current situation and communicate with its users in a natural way, even remotely. EUROPA is targeted at developing

novel technologies that will open new perspectives for commercial applications of service robots in the future.

2.2.3.3 ADVICE : Virtual Sales Assistant for the complete Customer Service Process in Digital Markets

Project Objectives. Customer consulting and excellent service are key factors for the success in nearly all business domains. Especially in the arising age of digital marketplaces service becomes essential not only for SMEs. But service is difficult to implement with state of the art e-commerce concepts and systems, which are limited to the setup of catalogues with more or the less smart search engines.

The overall objective of the ADVICE project is the development and real-world testing of an intelligent virtual sales and service system beyond simple product listing or intelligent product search. ADVICE offers intelligent product advice and guides through the selection of products, instructs the application of products and provides step-by-step solutions for technical problems. The system is designed for the consulting about craftsman tools, but the architecture is designed to be as flexible as possible to enable the adaptation of the system to other products or languages.

Objectives: Existing "smart" systems limit consulting to intelligent products search by case-based reasoning or offer "reactive" dialogues based on reaction to keywords in the user dialogue. ADVICE develops a knowledge based multiagent system, which contains detailed knowledge on the products. Customers can communicate with the system using text input. The system advisor explores the needs of the customer and explains the products or at after sales service provides product application examples. The knowledge modelling technologies to be used in ADVICE are characterised by flexibility in the definition of the conceptual contents, the accessibility of the knowledge model components and the capability to support advanced user-system dialogues, with explanations and alternative conclusions.

The agent-based distributed architecture will provide the supporting intelligence for the virtual assistant. This enables the assistant to understand the needs of the potential customers and offer the most appropriate products according to these needs and the evolution of the user-system dialogue. It provides the possibility of adapting the selection of the products or services to be offered not only to the specific aspects of the product declared by the user but also to the characteristics of the user (experience, sales record). In this way, a higher level of customer satisfaction can be reached as well as an improvement in the sales results. This experience can be used to design models of customer behaviour that can be incorporated into the knowledge model, improving in this way the intelligent performance of the system.

To be prepared to the future the ADVICE system is multimodal (using text, graphics, speech), so that is accessible from a broad variety of devices, like the Internet, I-TV or mobile devices using the wireless application protocol WAP. Work description: The ADVICE system, is an agent-based system that simulates the competence of a human assistant in this activity domain. To achieve a flexible and coherent performance of the system (intelligent system behaviour) within the problem scenario and during customer interaction, a knowledge-based approach is selected in order to support an independent management of available knowledge and data. Several AI technologies (rules, frames, constraints) can be integrated to provide the optimal solution for each problem. This solution has been successfully used to develop systems in specialised domains where humans perform tasks based on their problem-solving experience (medicine, mechanical design, financial decisions, etc) as in FLUIDS, KITS (European funded projects) and will now be adapted to electronic commerce scenarios.

The ADVICE software architecture needs to include domain-dependent knowledge to offer the assistant services in which the ADVICE system is specialised. In order to support human-computer-interaction through natural language, ADVICE system has to include Linguistic Knowledge. In the particular case of the ADVICE domain, a knowledge-based solution is also useful to model the

different types of problem-solving strategies: During customer interaction: To manage dialogue-based interaction, considering well-known dialogues in such scenario or previous experiences (conversation models or dialogue scripts), client profile (frame of features), kind of explanations needed etc. During assessment: To search for appropriate products according to the user needs, considering factors such as the client preferences, general characteristics of the products at different levels of abstraction, relations between products and preferences, constraints about certain product configurations, market strategies, etc. During post-sales services: To search the appropriate explanations according to the user questions or identified needs from conversation, etc.

The virtual sales assistant focuses on an intuitive, "fluid way" of interaction between the user and the system. The virtual sales assistant will make use of the virtual reality mark-up language (VRML), which allows a free movement of the assistant. ADVICE will develop a plug-in-free architecture for the execution of the assistant. A presentation manager will handle the multimodal interaction with different devices.

The wireless ADVICE application will make use of the wireless application protocol (WAP) and implement a dynamic WAP service server. To achieve platform independence Java is used for most of the system components on the client and server site.

Milestones: ADVICE is targeting the challenges of the electronic commerce for the first time in parallel from four points of view: New concepts in artificial intelligence and knowledge based systems using distributed multi-agent systems. Tight and economic straight-forward integration in existing e-commerce environments like shop-systems, product databases and enterprise resource planning systems. New light-weight and plug-in free interface technologies using a 3D environment. Business concepts for the use of the system not only as an entertaining add-on, but as a mean of marketing and service.

The ADVICE project will develop prototype sites at Festo Spa and Tooltechnic Systems. The customers of Tooltechnic Systems will get both sales and after-sales service for high-quality tools. The after sales service will not be limited to problem solving. The system will also explain the application of the tools for special purposes. The site at Festool will focus on after-sales service. ADVICE is expected to deliver new research results on intelligent multi-agent based systems for the electronic commerce. The user interface will contain new methods for the multimodal interaction (text input/output, point and click) between the customer and the virtual sales assistant. The interaction models are validated by usability testings. ADVICE develops business concepts for the integration and the maintenance of a consulting system in a productive environment.

2.2.3.4 Preliminary results of desk research

After a preliminary survey carried out through an intensive desk research, it is possible to define a draft scenario about the existing products, projects and services similar to the ELDERHOP System. It seems that, at the state of art, there is no product/service/prototype exactly performing the same functions of ELDERHOP system; all the while, there are several products, each of them different from ELDERHOP and providing a few of its services. So we can find on the market apps devoted to support users during shopping, ore devices able to guide the users during the shopping activities. But all the existing solutions are not integrated together in a single device exclusively devoted to support elderly shop hopping as ELDERHOP does.

In other terms the desk research provided the idea that the novelty of the ELDERHOP solution is just in this capability to integrate different functions in a single device specifically devoted to aged users going out for shopping: this "invention" seems ready to become an "innovation" because the market looks ready to receive the proposed solution. This for two reasons: the first is that users are asking for the support provided by the system, as confirmed by the trend among aged population to use ICT devices; the second reason is that the technological and industrial research is going in the same ELDERHOP direction, as demonstrated by the initiatives, national, European and extra European, previously described.

Moreover, the element for success for ELDERHOP solution could be identified in the capability to provide few, essential and effective service in a usable, user-friendly and easy to use device; the desk research suggests to investigate the possibility to provide a device with easy interface, able to be personalized, with user interfaces and functions tailored to each individual and to users requirements and providing few but essential services which elderly consider important during their hopping. In this way adapted and adaptive user interfaces must be the key of the success on the market.

3. FOCUS GROUPS

3.1 Method

Four focus group sessions were conducted (two by CURE and two by COOSS) to cover the topics of general needs and expectations related to shopping trips as well as needs and expectations about specific services proposed in the project.

Researchers investigated the expectations of end-users through survey with potential end-users and by the organisation of focus groups. This report lists the results, aiming in particular to:

- Illustrate the findings emerged by the research carried out in Italy and Austria
- Compare them with each other in order to identify similarities and differences
- Identify how the findings could/should affect the system development
- Collect and provide useful information to describe potential scenarios in next Deliverables 2.2 – 2.3 "Functional and NON Functional requirements"
- Provide suggestions, information, inputs, end-users expectations, and support to the system developers.

3.1.1 Austria (Vienna)

The first focus group [FG1] took place on 02.11.2011 and the second focus group [FG2] took place on 03.11.2011 with 10 [FG1] and 9 [FG2] participants. The focus groups lasted 3 [FG1] and 2.5 [FG2] hours and involved participants above the age of 65 with basic, low or no digital skills, who are able to do their grocery shopping by themselves. This target group is considered as potential direct users of the project's services. Participants got a financial compensation of 40 euro for their time.

The focus group consisted of following activities:

1. Introduction
   - Introduction workshop instructors
   - Introduction to the project
   - General introduction and explanation of sequence of actions (roughly), declaration of consent for the video recording
   - Introduction of participants
2. Surveys
   - Demographic information
   - Technical affinity
   - Typical shopping trip
3. Groups discussion about
   - Shopping activity
   - Needs
   - Device use

4. Brainstorming about and Prioritising of functionalities of a technical shopping trip support
5. Discussion about some services proposed in the project
6. Prioritising of the functionalities
7. Final discussion

3.1.2   Italy (Ancona, Marche Region, Centre-East)

The methodology used consisted of surveys and focus groups. The survey's target group was elderly people above the age of 65. In Italy the activities consist in several actions:
- Creation of a "Compass" of potential groups of users, associations providing ICT literacy courses for aged population, groups of pensioners, universities for aged population (called University of Third Age in Italy) and users of COOSS' services
- Identification of groups better matching the consortium idea of target group
- Planning of meetings
- Implementation of focus groups
- Reporting activities

Italian focus groups took place between 16.11.11 and 11.11.11 with a total of 18 participants. The target group were elderly between 65 and 80 years old, mainly women, considering themselves hampered in daily activities due to age-related impairments. The first group was composed by 8 aged persons who attend a course for digital literacy; they are trained to the use of basic function of PC, i.e. internet, e-mails, home shopping, social networking. Participants of the second focus group were 10 selected among attendees of University of Third Age, a popular university providing different kind of training courses. A focus group instructor and 1 minute-taker joined the two groups according to the agreed guidelines. After a ten minutes "Introduction to the ELDERHOP project" of the workshop instructors and the presentation, the survey began. Both groups were not agree to be filmed during the focus group, so the declaration of consent, signed by all, has been read and agreed before the beginning of each session.

3.2   Results from the Focus Groups in Austria

3.2.1   Survey Results

To gather individual data about the participants of the focus groups surveys about a personal information, technical affinity and their typical shopping trip are provided. The results are summarized in the following paragraphs. Table 1 lists the demographic information of the participants of the focus groups in Vienna.

To assess the technical affinity of the participants, they had to state how much they agree to 19 statements (1 meaning total agreement and meaning 5 total disagreement). The following Table 2 shows the results of the technical affinity survey for the participants of the two focus groups in Vienna.

Finally Table 3 summarized the participants' answers to questions about their typical shopping trip.

Table 1: Demographic information about the participants of the two focus groups in Vienna

	FG1	**FG2**
Sex	male [5][9], female [5]	male [4], female [5]
Age	mean age 69.10 (SD[10] 3.35, min[11] 65, max[12] 75)	mean age 67.89 (SD 3.37, min 65, max 76)

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[9] Numbers in square brackets indicate the number of participants
[10] SD = standard deviation

Highest education	compulsory school [1], apprenticeship [5], high-school diploma [2], post-graduate [1], post-doctoral [1]	compulsory school [0], apprenticeship [2], high-school diploma [5], post-graduate [2], post-doctoral [0]
Professional life	retired [10]	retired [9]

Table 2: Technical affinity of the participants of the two focus groups in Vienna

	FG1	FG2
1. I love to possess new electronic devices.	mean 2.10 (SD 0.74)	mean 2.44 (SD 1.24)
2. Electronic devices make ill.	mean 4.00 (SD 1.05)	mean 4.44 (SD 0.73)
3. I like to go to specialist shops for electronic devices.	mean 2.80 (SD 1.32)	mean 2.22 (SD 1.09)
4. I have or would have problems with understanding when reading electronics or computer magazines.	mean 3.00 (SD 1.25)	mean 3.44 (SD 1.13)
5. Electronic devices enable a high standard of life.	mean 2.00 (SD 0.82)	mean 2.11 (SD 0.93)
6. Electronic devices lead to intellectual impoverishment.	mean 3.90 (SD 0.88)	mean 3.67 (SD 1.22)
7. Electronic devices make many things cumbersome.	mean 3.50 (SD 0.88)	mean 4.00 (SD 0.87)
8. I inform myself of electronic devices, even though I have no buying intention.	mean 2.90 (SD 1.52)	mean 2.33 (SD 1.32)
9. Electronic devices make addicted.	mean 2.50 (SD 0.85)	mean 2.33 (SD 1.32)
10. It is fun to try out an electronic device.	mean 1.90 (SD 0.99)	mean 1.89 (SD 1.05)
11. Electronic devices facilitate my daily routine.	mean 2.00 (SD 0.82)	mean 2.11 (SD 1.05)
12. Electronic devices increase security.	mean 2.70 (SD 0.82)	mean 2.56 (SD 0.73)
13. Electronic devices decrease personal contact between people.	mean 2.90 (SD 1.37)	mean 2.78 (SD 0.83)
14. I know most of the functions of the electronic devices I possess.	mean 1.90 (SD 0.99)	mean 2.11 (SD 0.93)
15. I am enthusiastic when a new electronic device comes on the market.	mean 3.20 (SD 0.92)	mean 2.89 (SD 1.54)
16. Electronic devices cause stress.	mean 4.10 (SD 0.99)	mean 3.88 (SD 0.83)
17. I know a lot in the area of electronic devices.	mean 2.70 (SD 0.67)	mean 2.44 (SD 0.73)
18. It is easy for me to learn to use an electronic device.	mean 2.50 (SD 0.85)	mean 2.11 (SD 1.05)
19. Electronic devices help to get information.	mean 1.60 (SD 0.70)	mean 1.22 (SD 0.44)

Table 3: The typical shopping trip of the participants of the two focus groups in Vienna

	FG1	FG2
Frequency of grocery shopping	almost daily [2], twice a week [6], weekly [2]	almost daily [1], twice a week [6], weekly [2]
Accompanied	alone [7], with a family member [3]	alone [8], with a family member [1]

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[11] min = minimum value
[12] max = maximum value

Usual shop	same shop nearby my home [5], random shop when I am on the move [2], targeted to specific shops with special offers [5]	same shop nearby my home [5], random shop when I am on the move [3], targeted to specific shops with special offers [2]
Payment	cash [8], debit card [2], credit card [1]	cash [3], debit card [6], credit card [0]
Highest priority	to have little effort [3], to save money [8], to meet with people to shop together [0]	to have little effort [7], to save money [2], to meet with people to shop together [0]
Euro spent on grocery shopping per week	mean 52.00 (SD 20.44, min 30, max 100)	mean 73.89 (SD 33.15, min 30, max 120)
Support wished for	reading prices [5], reading of product details [4], none [2]	special offers [2], reading prices [1], reading of brochures [1], bigger font [1], advice from salesman [1], quicker procedure at the counter [1], information on events [1], none [2]

3.2.2 Group Discussion

Following the survey participants were engaged in a group discussion. The results of the different topics of discussion are summarized in the following tables (see Table 4, Table 5, and Table 6).

Table 4: Results of the questions related to the shopping activity of the two focus groups in Vienna

1	*Do you usually go grocery shopping alone or together with somebody else? With whom? Why?*
	In **FG1** 7 participants mainly go shopping alone, 2 participants said about half of the time they go shopping alone and half of the time they go shopping with someone else, 1 participant mainly goes shopping with a partner (husband, wife, daughter etc.). In **FG2** 8 participants mainly go shopping alone, 1 participant said about half of the time he goes shopping alone and half of the time he goes shopping with his wife. As a reason why most of the participants go shopping alone they state: It is faster without someone else and one has more time while shopping.
2	*How do you usually get to the grocery market? Do you go by foot, bus or car? Why?*
	In **FG1** these possibilities were named (multiple answers were possible): By foot [8], by car [4], by public transport [3], by bike [2] In FG 1, most participants that mainly go by foot do this because they live near the special grocery store and the reason to go by bike and car is because the bags are too heavy to carry them. In **FG2** these possibilities were named (multiple answers were possible): By foot [6], by car [5], by bike [3], by public transport [1] In FG2, most participants mainly go by car because the bags were too heavy to carry them home (as in FG1).
3	*Do you have a favourite grocery market which you usually go to? Why?*
	FG1 (multiple answers were possible): Hofer [3], EuroSpar [2], Merkur [1], diverse [5] As a reason for their choice, the participants said: In their favourite grocery store they can buy cheap products (Hofer), they have a wide range of products (EuroSpar), a nice atmosphere (EuroSpar) and good quality (Hofer). **FG2** (multiple answers were possible): EuroSpar [3], Billa [2], Merkur [1], diverse [2] As a reason for their choice, the participants said: In their favourite grocery store they

	know where exactly the products are (Merkur) and they have a small distance to this store (different stores).
4	*Do you go to a specific market to make use of special offers?*
	In **FG1**, 4 participants explicitly said that they would go to a specific market to make use of special offers and 1 participant explicitly said that s/he would not go to a specific market to make use of special offers. In **FG2**, 9 participants explicitly said that they would go to a specific market to make use of special offers and no participant explicitly said that s/he would not go to a specific market to make use of special offers.
5	*How much effort would you make to save money with special offers?*
	In **FG1**, 3 participants would make no effort to save money with special offers and 2 Participants would make effort to save money with special offers (1: 30minutes; 2: 15-30minutes). In **FG2**, 3 participants would make no effort to save money with special offers and 5 Participants would make effort to save money with special offers (1: 20minutes; 2: 15-20minutes).
6	*For how much savings would you accept an extra effort of 30 minutes?*
	In **FG1** 1 participant said that he/she would accept an extra effort of 30 minutes for a saving of 10 euro. In **FG2** 5 participants said that they would accept an extra effort of 30 minutes for a saving of at least 10 euro, 10 euro, a 50% saving, "not for 50 cent or 1 euro" and a 25% saving.
7	*How do you usually pay when you are going grocery shopping? Why do you prefer this kind of payment?*
	In **FG1** 2 participants mainly pay with debit card and 8 participants mainly pay cash when grocery shopping (no multiple answers were counted). As a reason for mainly paying cash the participants said that they only pay large amounts of money (as it is normal for electronic devices for example) with debit card, "normal" amounts of money (like when going grocery shopping) they pay cash. In **FG2** 7 participants mainly pay with debit card and 2 participants mainly pay cash when grocery shopping (no multiple answers were counted). As a reason for mainly paying with EC Card the participants said that it is more comfortable and that they didn't have much money cash with them.

Table 5: Results of the questions related to the needs of the two focus groups in Vienna

1	*What is important for you when you plan your grocery shopping: little effort, money savings, and/or meet with people to shop together? Why?*
	FG1: Money savings [10], little effort [7] **FG2**: Little effort [9], money savings [7], meet with people [1]
2	*In which situations related to grocery shopping do you feel somehow insecure? Are there situations causing you problems?*
	In **FG 1** following situations were named: When price is written too small [3], when price is not listed [2], what the price for one kilo of a product is [2], when one does not know which special offers are in which grocery store [1], what the original producing country is [1], what products are available and what products are sold out [1]. In **FG 2** following situations were named: When price/ingredients of products are written too small [3], when only few supermarket checkouts are opened and many people wait to pay [2], when one does not know where certain products are (location of products) [1], buying meat [1],
3	*In which situations related to grocery shopping do you want assistance from somebody or something?*

In **FG1** some opinions were: To have someone to read out the prices and ingredients of the products and a person to ask where the products are located [2].
In **FG2** the overall opinion is that there is no need for an assistant for grocery shopping [8], only an assistant to find certain products would be good [4].

Table 6: Results of the questions related to device use of the two focus groups in Vienna

1	*How do you use your remote control? Do you use a restricted set of functions or do you explore the functions? (Passive or active usage) Do you like to use your remote control?*
	In **FG1** 3 participants explicitly said that they only use a restricted set of functions of the remote control. A reason for this was that not all functions are needed. 5 participants explicitly said that they use all functions of the remote control, but one participant added critically that he sees himself "forced" to use all functions. 3 participants explicitly said that they like the remote control. In **FG2** 5 participants explicitly said that they only use a restricted set of functions of the remote control. A reason for this was that one needs some of the functions just one time (like brightness for example). 3 participants explicitly said that they use all functions of the remote control; some participants said that they even sometimes "played" with the remote control.
2	*Which kind of text do you read on your TV-Screen? Which kind of (visual and auditory) information do you perceive via TV?*
	In **FG1** 5 participants explicitly said that they read text in the teletext on the TV-screen (this was the only option that was named more than once), on teletext most participants read text like programme reviews, weather forecast or general news. In **FG2** 4 participants explicitly said that they read text in the teletext on the TV-Screen, a reason for the other participants not to read text in the teletext is that the font is too small.
3	*How do you use you mobile phone? Do you use a restricted set of functions or do you explore the functions? Do you like to use your mobile phone?*
	In **FG1** some of the most named functions were: for telephoning [9], as an (alarm) clock [5], for short message services (SMS) [4] and for taking photos [4]. In **FG2** some of the most named functions were: for telephoning [7], as an (alarm) clock [5], for short message services (SMS) [3] and for taking photos [4].
4	*Which device do you like to use most? (Including modern devices but also tools, domestic appliance and vehicles)*
	In **FG1** some of the most named functions were: PC [3], CD-Player/Radio [4], mobile telephone/telephone [4] and some domestic appliances like washing machine and coffee machine. In **FG2** some of the most named functions were: PC/Laptop [7]. There were hardly any other options named. A general reason for this was a strong group dynamics in FG2 (FG2 had two "leads" which were technically very experienced and which influenced the other participants).

3.2.3 Functionalities of a Technical Shopping Trip Support

The most important clustered proposed functionalities (together with the functionalities of the scenario) of a technical shopping trip support are listed in the following Table 7. The functionalities are listed with their rating of the functionalities ("+" for favoured functionality, "-" for not favoured functionality).

Table 7: Functionalities of a Technical Shopping Trip Support of the two focus groups in Vienna

FG1	
Price	Can show cheap products (-1) Can show Price (+1) Can compare prices (+6)
Location	Where one can find rare products (+1)
Explanation	Better reading of text (+1) Read out names and prices of products (-3; +2)
Information	About original producing country (+4);(+1) Should customize to special store (+1) Should have an answer to everything Special offers (+1); (+3;-1) Ingredients Store where products are cheap and fresh Location of products in this store (+2) and navigation to the products (+2) Information about weight (+2;-2) Which products are sold out
Usability	Device should have not much weight (+1) Easy to use (+1) Buttons should be colourful (-5) Font not too small (+1) Magnifying glass (-3)
Planning	To provide the device with the information what one wants to buy in the future Plan the navigation to store (+1;-3)
Time	At which supermarket checkout is the shortest waiting time (+2; -3)
Simplification	The shelves can be controlled with a remote control (product "drives" out of the shelf) (+1) Products are on a moving transportation system, this system can be controlled with a device (-1) Device knows "thoughts" of customer (-6) There are devices on the shelves where the customer can type in his/her name; later at the supermarket checkout he gets his "marked" products (+1) The device can "read" the bar codes of the products and shows the price of the product (+2)
Social Features	Stay in touch with relatives (+1;-2) Location-based services (-3) Button for emergency (+1;-3) Reminiscence for PIN-Code (+2;-3)
FG2	
Information	Comparison of prices (same product – different producer; small package vs. big package) Prices of special offers (+2) Dates of expiry of products Separation between food and non-food Prices of other supermarkets Consultancy (+1) Where one can find the most fresh products Identification of additives (+1;+2;-1) Prices per kilo (+2); Prices per litre

	Best-price-information (+1)
	Weight of shopping bag (-1)
Special offers	An "App" which is the nearest store where one can find special offers (-1)
	Where one can find special offers (+2;+2;-1)
	Watch 100 special offers on TV and select them (-6)
Communication	A button that reminds the store to open a new checkout when all the others are crowded (+1)
	Send GPS-coordinates to family (+1)
	Call staff (-2)
	Button for "help"
	Contacting family and friends (-4)
Prices	Do the supermarket checkout "yourself"
	Pay with "Near field communication" (+3)
	Products are scanned in the shopping cart and a price is shown for all products that are already in the shopping cart (+3;-1;+5)
	Paying at supermarket checkout (+1)
Technical issues	Light weighted (+1)
	Small size (+1)
	Rechargeable
	Only person who owns device has access to device
Making shopping easier	Shopping cart should follow automatically (-5;-3)
	Mobile device with a list of needed products (+5)
Assistance	Automatically magnifying the text on the products (+3)
	Read out loud the list of needed products (-2)
Navigation	Map of products (Where can I find this product?) (+1;-5)
	Navigation to store (-3)
Environment	Ecological footprint (-1)
	Less package around products (-3;+1)
Usability	Bigger font (+1,-1)
	Overview over all available products (+1;-1)
	Not difficult to handle (+2)

3.2.4   Discussion of Some Services Proposed in the Project

The participants were provided with the use case of "Margaret" and were asked questions related to the proposed services. See Table 8 for the results.

Table 8: Results of the discussion about some services of the two focus groups in Vienna

1	*What do you think of this proposal for a technical shopping trip assistant?*
	In **FG1** there was a strong tendency of the participants to doubt that Margaret would be able to use the assistant. It was criticised that the first paragraph of the use case describes Margaret as a rather helpless person, who is probably not able to operate the complex system described in the second paragraph.
	In **FG2** similar opinions appeared.
2	*After getting a deeper impression of how the assistant could work which functionalities would you add? Are their some features missing which could support your grocery shopping activities?*
	In **FG1** the overall opinion was that it is good that the information is given acoustically. Some other opinions were: The device is too complicated and it should not solely

	focus on grocery but also on non-food products; at a certain age those devices are rejected by the people. In **FG2** an opinion was that the essential part of this device is the user interface. The interface should be usable for elderlies. Some participants had concerns about possibilities of misuse of authentication systems of the device. An important function should be the speech-based programming and speech-output.
3	*When you think about the mobile device which provides you e.g. navigational information, how would you like the information to be provided? Via text or speech? Why?*
	In **FG1** and **FG2** the overall opinion was: You should have the choice how the information will be provided.
4	*Which kind of device would you prefer for a technical shopping trip support? Would you like to use a smart phone or a device dedicated and limited to the functionalities of the shopping trip assistant? Why?*
	In **FG1** one participant proposed (for example) an "App" for the "iPad". 6 participants voted for a Smartphone, 1 for an I-Pad and 3 for a special device. In **FG2** one participant said that it would be better to have just one device with him (like a mobile phone) than many devices (like mobile phone, mp3-player, shopping trip assistant etc.).

3.2.5 Final Discussion

The results of the final discussion are presented in the following Table 9.

Table 9: Results of the final discussion of the two focus groups in Vienna

1	*For which other purpose could one use such a system additionally to grocery shopping? What other information would be interesting?*
	In **FG1** some opinions were: booking travels, buying tickets, comparing prizes for fuel, coordination of dates, suggestions of excursions, tariffs for public transport, opening hours for the doctors, banking-functionalities etc. In **FG2** one participant said that the device should have all functionalities that the internet has, but it should be no competition for the internet.
2	*What are the advantages of the proposed shopping trip support? Which disadvantages might appear?*
	In **FG1** some opinions were: Other people could find out the PIN-Code for the device and misuse it; one could lose the device with all the personal information on it; the device could tend to induce users to buy more products. In **FG2** some opinions were: The device could also be used for marketing ("today we have coffee for half of the price"); the device could make the users "dependent"; there is a possibility for locating the people; privacy issues.
3	*How could the technical shopping trip assistant be promoted to a wider audience?*
	In **FG1** some ideas were: It should have to offer an overview over special offers; it should be appealing to elderlies; it should have good marketing methods ("Your life will be cheaper"); It should promise to have more time when using this device. In **FG2** some ideas were: Offer the device not only in grocery stores but also in stores where electronics are sold; it should be offered very cheap.
4	*Would you use the assistant when it comes available? Under which conditions? What would prevent you from using the assistant?*
	In **FG1** this question was not answered. In **FG 2**: 2 participants would use the assistant under nearly every condition (early adopter), the other participants said that they would only use it when the assistant is

	not an extra device but an "App" for example and when it will not cost too much.
5	*How much would you spend for such a technical shopping trip support?*
	In **FG1** some participants named following sums: 10-20 euro; up to 200 euro; 150-200 euro; 100 euro. In **FG2** some participants named following sum: 100 euro for an extra device, 5 euro for an "App".
6	*Do you think that your friends or relatives would use the assistant?*
	In **FG1** 6 participants said "yes" and 4 said "no". In **FG2** 4 participants said that some friends or relatives would use the assistant, 5 participants said that friends or relatives would not use the assistant.
7	*Would you recommend the assistant to others? Why?*
	In **FG1** some opinions were: Others should decide for themselves; One has to test the device before one could answer the question if one would recommend it. In **FG2** this question was not answered.

3.3 Results from the Focus Groups in Italy

The survey conducted in Italy resulted with a general appreciation of the Project idea and scope; expectation and interest emerged. In particular a general approval of the proposed system can be recognized: interviewees seems to agree with the idea of a tool aiming to support them during the shopping, particularly if the system will be able to help them in saving money suggesting special offers and facilitating their hopping. The Italian research staff collected their answers to the closed questions in the table here following; the answers to the open questions are listed below.

3.3.1 Survey Results

To gather data about the participants of the focus groups a short survey about personal information is provided. Questionnaires were marked with the initials of the participant followed by year of birth (e.g. EM83); in this way also participants' privacy was granted. Answers to the questionnaires are summed and listed in Table 10 and Table 11. Even if the number of interviewees is not significant in statistical terms, the groups' characteristics do not differ from the Italian demographic trends: more women than men, with low-medium study background, young-older still working and older persons living with a pension as only income. The digital literacy is rather low, even if ICT generate curiosity and interest. Devices look difficult to be used for them, and they feel usually "out of target".

Table 10: Survey results related to demographics and technical affinity conducted in Italy

	With the following questions some personal information is assessed. Please answer the questions by ticking or writing down an answer. Thank you! **Results**

D1	Sex: **5** male (Q1, 2, 5, 10, 12)
	        13 female
	         0 missing answers (m.a.)

D2	Age: - **6** people (Q2, 6, 9, 14, 16, 18) are 65 years old,
	          - other respectively 70 (Q15), 71(Q10), 72 (Q11), 73 (Q13), 75 (Q12), 78 (Q5), 79 (Q4), 80 (Q1) years old
	          - **4** (m.a.)

D3	Highest education:
	                     5 Compulsory school
	                     3 Apprenticeship
	                     8 High-school diploma

		1 Post-graduate **0** Post-doctoral **1** (m.a.)					
D4	Professional life:	**17** working as (7 employees, 3 teachers, 2 administratives, 1 railwayman, 1 public, 1 craftsman, 1 professional, 1 housewife) **13** retired **0** (m.a.)					
D5	The following statements are about your personal opinion towards electronic devices. With electronic devices we mean devices like computer, mobile phone, digital camera, DVD-player, mp3-Player, ticketing and cash machine, navigation system and NOT tools, domestic appliance and vehicles. Please state how much you agree on the statements. Thank you!						
		Strongly agree	Agree	Neutral	Disagree	Strongly disagree	(m.a.)[13]
D5	1. I love to possess new electronic devices.	**3**	**7**	**5**	**1**	**0**	**1**
D5	2. Electronic devices make ill.	**0**	**6**	**4**	**3**	**0**	**4**
D5	3. I like to go to specialist shops for electronic devices.	**1**	**3**	**6**	**4**	**1**	**2**
D5	4. I have or would have problems with understanding when reading electronics or computer magazines.	**2**	**6**	**1**	**6**	**0**	**2**
D5	5. Electronic devices enable a high standard of life.	**2**	**11**	**2**	**1**	**0**	**0**
D5	6. Electronic devices lead to intellectual impoverishment.	**1**	**3**	**5**	**8**	**0**	**0**
D5	7. Electronic devices make many things cumbersome.	**0**	**3**	**3**	**10**	**0**	**1**
D5	8. I inform myself of electronic devices, even though I have no buying intention.	**2**	**6**	**6**	**2**	**0**	**1**
D5	9. Electronic devices make addicted.	**2**	**9**	**1**	**3**	**1**	**1**
D5	10. It is fun to try out an electronic device.	**0**	**8**	**7**	**1**	**0**	**1**

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[13] M.a. = missing answer

D5	11. Electronic devices facilitate my daily routine.	3	**12**	2	0	0	0
D5	12. Electronic devices increase security.	2	**9**	3	2	0	1
D5	13. Electronic devices decrease personal contact between people.	5	**7**	4	1	0	0
D5	14. I know most of the functions of the electronic devices I possess.	2	**7**	1	6	0	1
D5	15. I am enthusiastic when a new electronic device comes on the market.	1	5	**7**	2	1	1
D5	16. Electronic devices cause stress.	2	**5**	4	**5**	0	1
D5	17. I know a lot in the area of electronic devices.	0	2	4	**5**	4	2
D5	18. It is easy for me to learn to use an electronic device.	0	4	1	4	**6**	2
D5	19. Electronic devices help to get information.	6	**11**	0	0	0	0

Table 11: Survey results related to the typical shopping trip conducted in Italy

In the following there are some questions regarding your grocery shopping behaviour. Please answer the following questions by ticking or writing down an answer. Choose one answer. Thank you!					
	My typical grocery shopping trip				
D6	I go shopping…				
D6.1	**9 =** almost daily	7 = twice a week	2 = weekly	**0** = other	**0** = (m.a.)
D6.2	**12** = alone	0 = with (a group of) friend	4 = with (a) family member(s)i	**0** = other	**2** = (m.a.)
D6.3	**9** = usually to the same shop nearby my home	3 = to a randomshop when I am on the move	**6** = targeted to specific shops with special offers	**0** = other	**0** = (m.a.)
D7	When I go shopping…				

D7.1	**11** = I pay with cash	**6** = I pay with a debit card	**1** = I pay with a credit card	**0** = other	**0** = (m.a.)
D7.2	**7** = most important for me is to have littel effort	**10** = most important for me is to save money	**0** = most important for me is to meet with people to shop together	**1** = quality	**0** = (m.a.)

D8	**About 100 Euros** per week on grocery shopping (max €200 – min €36); - **5** (m.a.)
D9	Related to grocery shopping, I would like support for: - check the date of expiry of products = 2 - read prices more comfortably = **2** - better choose products in terms of quality and price = **1** - check the price, ingredients and characteristics of products = **1** - Read timetable of local transportation to reach a shop = **1** - no support needed = **1** - Compare prices of the same product in different shops= **1** - ICT is dangerous! (Q7) = **1** **-** (m.a.) **= 10** NB. 2 persons provided two answers

3.3.2   Groups Discussion

3.3.2.1 Shopping activity

Even if the target group is statistically less available to change attitudes than other groups of age, persons interviewed were open to change their shopping behaviours only if the new solution allows them to save money and time and to reduce physical efforts. In fact, from the two focus groups emerged an homogeneous scenario of aged persons usually going out for shopping every day, paying with cash quite always and preferring the use of "cash machine card or debit card" (for direct payment too) than credit cards or pre-paid cards. The grocery is usually always the same, while they don't dislike to change shop for other kind of products as most of interviewees usually look for special offers and discounts.

3.3.2.2 Needs

The answers received concerning their needs were particularly interesting; when talking about needs and requirements the two groups agreed on the fact that they are in need of a way "to reduce the expenses" and "save money"; if the provided solution is technological as ELDERHOP is, than it has to consist on a device:
- big enough, with a screen as wide as possible, with few and easy-to use buttons
- a speaking device for those with vision impairments
- able to identify and suggest discounts and special offers
- not expensive

The world financial crisis seems to affect their views; the older individuals appreciated, at the same time, the idea of a device able to detect falls ore equipped with an alarm button; anyway physical impairments seems to be lesser important than their fear of getting poorer that before.

The majority of interviewees described the public transportation (bus) as the main way to move out for shopping; younger people among them also use the car.

3.3.2.3 Device Use

In order to introduce the answers received to the following set of questions made in order to deepen the discussion about users' requirements, few assumptions need to be underlined. Firstly, all participants to both the focus groups declared to use a remote control and all of them own a mobile phone. This seems a significant datum: the target group is familiar with devices that, for what concerns shape, functions and typology, are similar to the proposed ELDERHOP device. Younger people among them are aware about existing advanced solutions as touch-screen, smartphones or tablets, but they perceive that such devices are not tailored for their needs.

Given that, the participants to first focus group agreed on the fact that they are used to practice a restricted set of functions for what concern the remote control; such an answer is widely diffused among participants to the second focus group too. Anyway in these days, the traditional broadcasting system based on analogical technology was switched off; therefore all persons in the area have had to deal with the new digital broadcasting technology.

It means that TV users had to deal with new remote controls, with more channels and functions; such event affected participants attitudes, in fact part of them declared to be in need to explore the new functions of the remote control, while most of them declare to delegate the setup of the new TV system to relatives. Researchers could understand from this discussion that users looks not happy to deal with devices which needs to be explored deeply to look for all functions, while they seems to prefer few and essential functions easily to be reached. Half of participants to first focus groups declared to use teletext system on their TV screen; they use it to access information like daily news and TV guide mainly. Other participants declared to have accessed only once or few times the teletext service but they dislike it due to the small dimensions of fonts. In the second focus groups only four among participants declared to have accessed the teletext service at least once.

3.3.3   Functionalities of a Technical Shopping Trip Support

The functionalities proposed by the participants of the focus groups are listed in the following Table 12.

Table 12: Functionalities of a technical shopping trip support proposed by the participants of the focus groups in Italy

Price	• Comparison of prices between similar shops • Comparison of prices within the same shop (similar products) + + • Estimation of final cost "during" the shopping -
Location	• Parking Areas nearby the selected shop -
Information	• Advise/Reminder of forbidden ingredients +
Usability	• Wide screen (as big as possible) + • Photo-zoom • Audio reading of prices
Planning	• Traffic information - • Local Transport information in particular delay, strike, sudden changes

	• + • Shopping list
Time	• Open and closure time of shops + • Day of closure of shops (i.e. Sunday, bank holidays, etc.)
Simplification	• Reminder for usual equipment: shopping bags, keys, mobile phone, medicines, forbidden ingredients +
Special offers	• Special offers during the travel from home to the shop (alternatives) - • Special offer within the shop during the shopping
Communication	• Receive/make phone calls, easy-call system for usual contacts • Sharing of shopping list with relatives for check – • Save, read and share recipes and related ingredients during shopping - -
Technical issues	• Possibility to create a shopping list and save/store it for the shopping day by audio/video solutions +
Making shopping easier	• Reminder of PIN codes • Payment by credit card - • Advice of availability of money in pre-paid credit cards - -
Assistance	• Alarm button • Alarm system (fall detector)

3.3.4 Discussion of Some Services Proposed in the Project

The participants were provided with the use case of "Margaret" and asked questions related to the proposed services. The results are listed in Table 13.

Table 13: Results of the discussion of proposed services

1	*What do you think of this proposal for a technical shopping trip assistant?*
	In **FG1** participants find ELDERHOP interesting and helpful but probably too complicated to be used. They underline the fact that they have low or no digital skills and they say that the system might be a solution for the next generation of elderly. In **FG2** elderly have a similar opinion: they think them not able to use the system.
2	*After getting a deeper impression of how the assistant could work which functionalities would you add? Are their some features missing which could support your grocery shopping activities?*
	Elderly in **FG1** and **FG2** think that the device is complicated for them because of too many functions. The overall opinion was that it is good that the information is given acoustically. The older one are sceptical for what concern innovation and change in their customs.
3	*When you think about the mobile device which provides you e.g. navigational information, how would you like the information to be provided? Via text or speech? Why?*
	The common opinion (**FG1** and **FG2**) was that selected information must be provided via speech or via TV when they're at home.
4	*Which kind of device would you prefer for a technical shopping trip support? Would you like to use a smart phone or a device dedicated and limited to the functionalities of the shopping trip assistant? Why?*
	Both in **FG1** and **FG2** participants prefer a dice as a mobile phone, best if not too

	small, strong and easy to use.

3.3.5   Final Discussion

The participants were asked some final questions which are presented in the following Table 14.

Table 14: Results of the final discussion in the focus groups in Italy

1	*For which other purpose could one use such a system additionally to grocery shopping? What other information would be interesting?*
	In the two Focus Group (**FG1**- **FG2**) they confirm that would like support for what concern services that ELDERHOP just proposes (like checking the date of expiry of products, reading and comparing prices more comfortably, ingredients and characteristics of products and also timetable of local transportation to reach a shop) 1 person in **FG1** underlines that for him no support needed and another one in **FG2** thinks that he considers ICT dangerous.
2	*What are the advantages of the proposed shopping trip support? Which disadvantages might appear?*
	In **FG1** someone is puzzled about ethical issues (private information about their health, custom, personal codes) In **FG2** one older says that ICT can be dangerous because they make people lazy and ICT don't let elderly improve their memory.
3	*How could the technical shopping trip assistant be promoted to a wider audience?*
	In **FG1** they suggest low cost and discount possessors only. In **FG2** this question was not answered, they don't know.
4	*Would you use the assistant when it comes available? Under which conditions? What would prevent you from using the assistant?*
	People in **FG1** and **FG2** don't think that would use the device before they get used to the new technology.
5	*How much would you spend for such a technical shopping trip support?*
	In Italy most of people over 65 years old live only thanks to their retirement. Retirement, generally, is not very high and due to this situation elderly cannot spend so much for technology and devices in general. Agree with that consideration, participants of **FG1** and **FG2** suggest sums between 50 and 200 euros.
6	*Do you think that your friends or relatives would use the assistant?*
	Most of people both in **FG1** and **FG2** think no for what concern elderly over 75 years old. The overall opinion is that ICT is matter for younger.
7	*Would you recommend the assistant to others? Why?*
	Both in **FG1** and **FG2** elderly says that they have to know and try the device before.

3.4   Conclusions from the Focus Groups

The following paragraphs summarize the findings of the focus group in **Austria** and point out the most important results in regard to the system design.

- Demographic details show that participants are quite representative for potential users of the ELDERHOP services, in terms of their age, retirement and also the distribution of men and women in the groups. However, we have to consider for our conclusions that the participants of the focus groups in Vienna show a rather high degree of technical affinity.
- From the survey as well as the discussion it can be seen that most of the participants go shopping alone, and that the social aspect of shopping in terms of meeting other people is of

low priority to them. They prefer to go shopping alone because it is more efficient.

- Most important about grocery shopping is for them to have little effort as well as to save money.
- The importance of little effort is also reflected in the fact that participants tend to go to the same shop nearby. They tend to go by foot and only go by bike or car if they have to carry much. Most of them have a number of different grocery shops right in their neighbourhood (which is quite typical for an urban environment like in Vienna), therefore there is no need for them to go to a shop further away.
- The distance from home is an important factor for the choice of the grocery shop. In the focus groups participants gave the impression that they simply go to the next available shop and when they have the choice between more than one shop rather near to them, also factors like lower price, higher quality or product range are important.
- Most of the participants stated that they go to specific markets to use special offers, but it became also clear that they would not take too much effort for it. The savings should be significant and not just a small amount.
- The usual way to pay in the grocery shop is cash or debit card.
- The discussion related to the use of remote control, mobile phone and TV reflect the rather high technical affinity of our participants. Nobody explicitly reported about major problems with one of the devices. Interestingly related to the TV use they make heavy use of teletext to access information.
- It was pointed out by the focus group instructors that they should imagine the whole shopping activity (including the way to the shop) when they think about potential issues. When asked about problems related to grocery shopping and their wishes for support, participants focus strongly on the support in the grocery shops. As most of them go usually to the same shop the wayfinding seems to be not such a big deal. An issue frequently stated is the fact that they can't read small fonts and related to that have problems with finding information or products.
- Similar to the stated problems also the proposed functionalities of a technical shopping trip support mainly focus on the shopping activity inside of the grocery shop. In contrast to the proposed ELDERHOP use case participants thought about the assistant more as a system which is used in a specific shop and supports them there in the shopping activity. The functionalities which were most favourable according to our participants were:
  o compares prices, lists all needed products, magnifies text on the products, pays with NFC, scans products in the shopping cart and shows price of all products in the shopping cart, shows location of products in the store, navigates to the products, shows prices, reads bar codes, shows special offers and where to find them in the shop, shows prices per kilo, identifies additives, shows where to find rare products, and that the user can mark products which s/he gets at the checkout.

  The most favourable properties of the device were:
  o not too heavy, small size, easy to use, and not to small font size.
- About the use case of Margaret participants thought that it is hard to believe that a helpless person like Margaret would be able to use the complex device. Participants criticized that at a certain age such complicated devices may get rejected. The usability of the interface was mentioned to be crucial as well as a mechanism to avoid a misuse of the device by other people.
- The participants agreed that the user should have the choice about how the information is provided (via text or speech) by the device.
- Most of our participants preferred to have only one device, so it should be rather integrated in the mobile phone, which they already all possessed. Again it has to be pointed out that our participants were rather technophile.
- Participants stated that such a device could be used also for other information like booking

travels, opening hours for the doctors etc. In theory it could give all information which is available through the internet.

- They brought up some concerns about privacy, dependency, and the possibility for location tracking.
- The device could be used for marketing to transmit special offers to the users and it could be promoted by making the user's life easier and cheaper.
- We experience different opinions about whether the participants and their friends or relatives would use the device.

Researchers in **Italy** carried out the present survey in a context, which shows several peculiarities for what concerns the relation between aged population and ICT devices. In fact, Italian population is one of more "aged" across Europe: by a side it means that Italy could represent an interesting market for those ICT based devices devoted to elderly people; but on the other side, recent survey from the National Institute for Statistics revealed that Technological devices and ICT solutions such as intern access devices, tablets, and other innovative devices are not as diffuse as in other EU countries. Only the mobile phone represents a widely owned device: quite all persons in Italy owns a mobile phone, traditional mobile phones among the aged persons, new phones and smartphones more diffused among working aged individuals and younger population.

This general assumption is needed to better understand the results of the Italian survey carried out for ELDERHOP Project: the sample interviewed, even if not statistically significant, seems to confirm general trends in terms of attitude of aged individuals towards ICT devices. We can say that the interviewees look curious and interested about new devices but at the same time they feel "out of target", they perceive the new technologies as not tailored on their needs, and they look to them as something they will not use or that they "are not well prepared to use". We could call it as a sort of a "perceived digital divide". From the research resulted, in other terms, that a device (as for remote controls and mobile phones happened in the past) is accepted by aged individuals if its usefulness is immediately visible, and if it doesn't affect the daily routine but increase the quality of life.

Also, if we add this datum to the fact that the target group is generally unhappy to change attitudes and daily routine, we can extract from such Italian scenario several suggestions for the ELDERHOP Project purposes: the main suggestion is to provide a device as less intrusive as possible, that people could immediately and easily perceive as useful. But, finally, what "useful" does it means for them? From the Italian survey, useful for them seems to mean "a tool which allow them to find solutions for saving money". So they suggest the ELDERHOP consortium to focus on those functions devoted to identify special offers and discounts, prices comparisons and comparisons among different shops and groceries; also those functions which emphasize the price (photo zoom) and allow to store pictures of prices for future reminder are appreciated. As previously described in the document, the economic difficulties are worrying the persons interviewed, so solution going in the direction of saving money looks more appreciated than others.

4. ETHNOGRAPHIC SURVEY

4.1 Method

Video interviews were conducted by KIBU to cover the topics of general needs and expectations related to shopping trips as well as needs and expectations about specific services proposed in the project. The interviews were made by KIBU members with their elderly relatives or old people they know. Our aim was to provide the creative team with an insight by having some video interviews available for the ideation process.

4.2 Results

The results of the video interviews confirm the results of both surveys from CURE and COOSS. Our elderly (78+) interviewees were asked questions and shown devices (smart phones, laptops, tablets) and their reactions were captured. The videos (sounds in one case) are available in Hungarian.

- Video 1: http://www.youtube.com/watch?v=dM6y1GOI5r8&feature=youtu.be
- Video 2: http://www.youtube.com/watch?v=IKNCbq8wPso&feature=email
- Video 3 (only sound): http://www.youtube.com/watch?v=GRg72JSA5uo&feature=g-upl

4.3 Conclusions

4.3.1 Defining the People We Are Targeting

Single or elderly (65+) couple living separately, in urban environment, they do not depend on anyone but have a strong family background, living an active life, they are open to learn new technologies (they do use a mobile phone).

4.3.2 Issues Collected

- products in larger quantities are cheaper but they don't consume this amount (to share goods sold in big quantities),
- to collect information and promotion on known products and their prices
- to go shopping is entertainment
- to share information on good offers, good shopping experiences, on specific products (recommendation)
- neighbourhood science has key importance
- to plan the optimal shopping trip based on available, reliable, local (neighbours) information
- information on products in occasional shopping lists (e.g. presents for grandchildren)
- to inform younger relatives of heavier products in shopping plans
- when entering the store products on sale should appear on personal device's screen (system message every morning on products on sale)
- device signals when scanning restricted ingredients (e.g. when read sugar signals red cross for diabetics)
- magnifier application can be turned on by request easily
- listing device (designing paper & pen for image communication)
- receipt 2.0: digital data from shopping receipt is saved and can be used for reediting by user later
- news should be available through the device (subscription of newspapers are expensive)
- device share user coordinates in case of emergency and connects to medical assistance
- traffic information if car is involved
- shopping is also a social experience (recommendation / one recommends by product experiences with others via device and share location, sharing only with friends) - "elderly foursquare"
- can this device be a cheap form of communication amongst local elderly communities?

5. IMPLICATIONS FOR THE SYSTEM DESIGN

In the following sections the main results of the various user research methods are incorporated to

lead us to implications for the system design. Following the summary and integration of the findings of user research, we will present concrete proposals for the system design suggested by the ethnographic survey in Hungary (which was based on the previous user research in Austria and Italy).

5.1   Summary of Findings

The following paragraphs summarize the results of the user research and categorize them according to different topics:

- **Price of products:** That saving money is an important issue for elderly people when they conduct their grocery shopping became clear from desk as well as user research. However, the amount of savings seems to be essential for them to decide how much they compromise in terms of additional effort or quality of the product. Therefore the system has to consider that elderly people will not go in several different shops only to save a small amount of money. However, due to economic reasons "saving money" should be the main focus of the system to develop. Therefore the system should be able to compare prices (especially within the same shop not only between shops).
- **Use of special offers:** Participants of the focus groups in general state that they do make use of special offers by going to specific shops. Nevertheless it is also a matter of additional effort and amount of savings (see below).
- **Quality and other characteristics of products:** Not only the price of a product is important for elderly people, the quality and other characteristics of the products (e.g. origin, ingredients, brand etc.) are crucial for them. They seem to buy specific products in a very targeted way, therefore a personalisation of the system to their personal needs and preferences (e.g. by proposing offers related to their favourite products) may be reasonable. The system to develop could include also other information about product than the price, e.g. it could inform about unhealthy ingredients of a product.
- **Package size:** Another relevant factor for elderly people is the package size, since they don't want to by a big package which is actually cheaper but too big for them to use up. In the Hungarian user research we found that this instance is actually a possibility to include a social aspect by sharing goods sold in big quantities.
- **Distance to shop:** From our desk research as well as the focus group we learned that elderly people are not willing to take long distances to do their grocery shopping. This has direct implications for the system design, since the proposed special offers should take into account the location of the user and respectively the distance to the shop.
- **Little effort:** Related to the distance to the shop elderly people seem to put emphasis on having little effort for doing their grocery shopping. For many of them this is more important than to save money.
- **Social aspect of shopping:** The participants of the focus groups in Austria as well as Italy clearly stated that they usually go grocery shopping alone. They consider it to be more efficient, and they do not see grocery shopping as a kind of social event. We found different results in the Hungarian user research, were social aspects like shopping being entertaining, sharing information about products with others and informing relatives about heavy shopping items was an issue.
- **Journey to the shop:** Since elderly people usually go to shops nearby their home, they tend to go by foot. That is also why they do not have any navigational problems, and rate a supportive functionality to navigate to the shop as not so important. However focus group participants in Italy suggest that the system should provide local transport information, and participants of the Hungarian user research state interest in receiving traffic information when they go by car.
- **Preferred shop:** Most participants of our user research in Austria and Italy have preferred

shops they usually go to, because they are nearby their home or offer the preferred product range. In terms of an adaptive system, the ELDERHOP system could take these preferences into account.

- **Payment with debit card:** We learned from previous research that elderly people are a very inconsistent user group. This is also reflected in the payment habits of our focus group participants, since some of them rely on cash while others prefer to use debit card. Forgetting the PIN is not such a great issue, nevertheless participants would welcome a system that handles the payment automatically (e.g. paying via NFC). Paying with credit card is not so common for our Austrian as well as Italian participants.

- **Emergency functions:** These functions were not intensively discussed in the focus groups, but participants of the ethnographic survey suggested that the device shares the user's coordinates to other in case of an emergency.

- **Privacy and security:** When thinking about such a system privacy and security concerns came up in the focus groups in Austria, which is why the users need the certainty that nobody else could (mis-)use the system. Also ethical concerns about medical information were stated. The system design should take these issues into account, since people will not use a system they don't trust.

- **Support in reading:** Age-related visual impairment is a crucial issue for elderly people when they go grocery shopping. They would welcome a system which supports them in reading price tags and information on the product package (e.g. ingredients). This functionality should be implemented in the ELDERHOP system.

- **Support inside the shop:** Participants of the focus group in Austria focused very much on support possibilities inside of a specific shop. They stated insecurities in reading information, finding special offers, knowing that a product is sold out, knowing which checkouts are opened. A support system could furthermore show all products in the shopping cart with their prices and show special offers and where to find them right when the shop is entered. Except a support for reading information, these issues are so far out of scope of ELDERHOP project, but could be considered in the final design.

- **Navigation inside a shop:** Whereas navigation to the shop was not a big issue for participants of the focus groups conducted in Vienna, providing assistance to find products inside of shops was of special interest for them. Previous research and projects (e.g. PIRAmIDE) has engaged in this topic by using RFID-technology. In ELDERHOP no such technology was planned so far, since it is not in the project's focus.

- **Device use:** Desk research shows that - although elderly people are often considered to be technophobes - there is a lot of activity going on to make devices accessible for elderly people because of a trend among the aged population to use ICT devices. Also our user research confirmed that a great part of the participants is already familiar with a variety of ICT devices. Most of our focus group participants are familiar with using remote controls, mobile phones and teletext. Teletext should be considered for the system design, because this seems to be a familiar technology for elderly people, which they use to search for and access information. With an easy to use system we should overcome the issue of some elderly people perceiving ICT technology as not targeted for them.

- **Mobile device:** In the user research we saw that most participants would prefer to have just one single mobile device instead of several devices with specific functions. For the system design it has to be considered to include the ELDERHOP services in a standard smart phone. Some participants would like to have simply an app on their phone which they could buy for little money. In that case special attention has to be drawn to the ease of use. A further requirement of the participants towards the mobile device is that it is not too heavy and big.

- **The whole ELDERHOP system:** The whole service system should be as less intrusive as possible so that elderly people can adapt to it without changing their daily routines.

- **Information provided by the mobile device:** The user research revealed that elderly people wish to have a choice between auditory and textual presentation of the information. However in the Italian focus group there was a preference for auditory presentation. Of course when the information is presented in a text, the font has to be large enough.
- **Usability:** Based on the desk as well as user research it became clear that the ELDERHOP system to be developed has to provide an easy interface to gain acceptance of elderly users. Therefore it seems also reasonable to focus only on a few but the most important services (e.g. related to saving money). Furthermore the screen of a mobile device should be big, which few and easy-to-use buttons.
- **Personalization, adaptation and adaptivity:** The functionalities of the device should be tailored to each individual's needs and preferences.
- **Other information:** Information like open and close time of shops was of interest for Italian participants of the focus groups. In theory all kinds of information could be implemented in the system, like news, travel planning, shopping other products than just grocery.
- **Expenses:** Most participants pointed out that the services should not be too expensive. Only some would pay over 100 Euros for the service.

5.2 Concrete Proposal for System Design

In this section the findings of user research are translated in some concrete suggestions for the system design.

5.2.1 Use Case Redefined

Marika is a 70+ year old lady goes to do shopping on her own regularly. She would like to optimize her expenses and likes promotions, find the best offers and usually plans shopping in advance. She finds it difficult to organize information by information leaflets, is willing to walk and travel for best price. She is in active contact with other elderly ladies, and regularly communicates about products and prices among them. By using this new device we will help her optimize shopping routes by providing information already at home, find best deals in shops, and share product information and experiences, locations with friends. This device will also provide emergency assistance by using GPS coordinates. This device also offers cheap communication and information services, such as cheap voice communication and local news to help their integration in their local community.
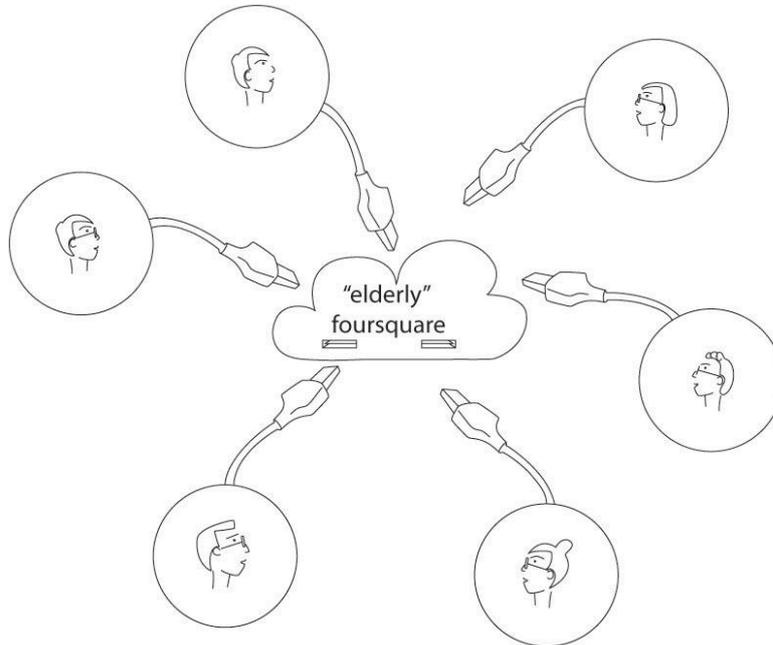
Figure 5: Elderly people also want to be connected – via a simple interface
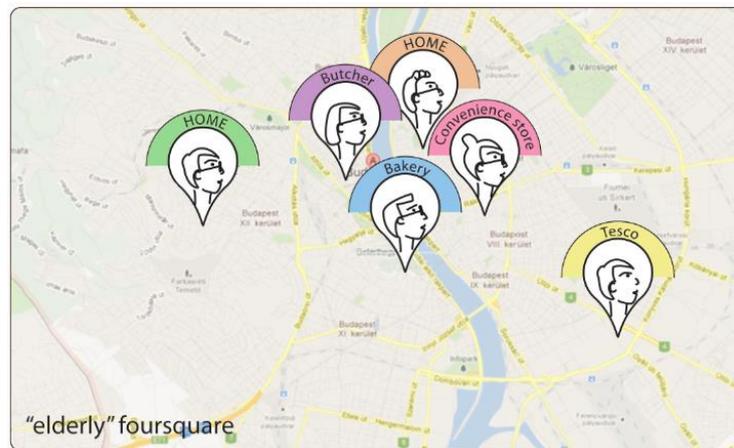
Figure 6: The idea of Foursquare appeared to be very positive
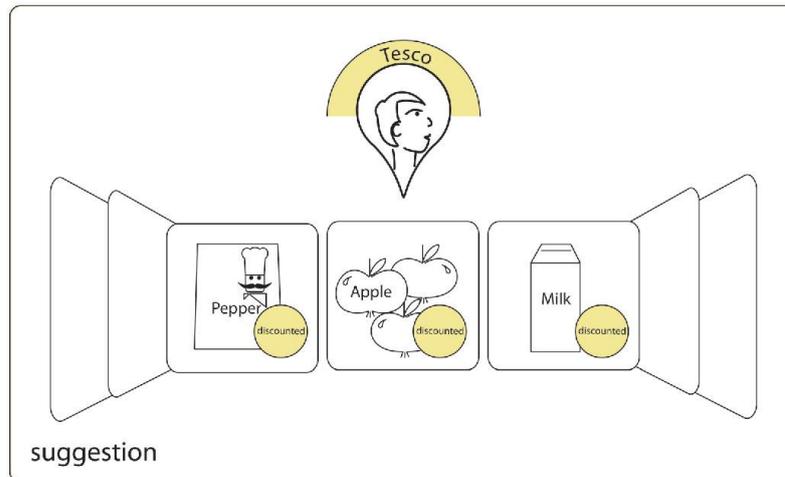
Figure 7: They'd like to share information with each other

5.2.2 Basic Functions

1. shopping assistant
2. travel assistant
3. TV offers
4. emergency button + medical assistant

+ 1 function to be added: social experience

5.2.3 Possible Ideas to Consider

1. http://www.taskrabbit.com/
   To learn from TaskRabbit we can build a community of volunteers to help people connected with single products (eg. 6 liters of mineral water can be assisted by younger neighbour friends).
2. We are suggesting to integrate Foursqare into the system.
3. A real time and regularly updated database of products and promotions might be a crucial issue, as it requires almost daily cooperation from the local stores. Some smaller shops may not have the infrastructural background and the chains may not be willing to dedicate resources to it. There were attempts for developing commercial applications based on a database like this in Hungary, we may use the results of these pilot projects.

5.2.4 Software Requirements

- Critical aspects of the UI design:
  - Easy to See
  - Easy to Hear
  - Easy to Use
  - Easy to Understand
- Core function: Shop assistant with social function
- Shopping Planner:
  - Helps to plan the optimal shopping trip
  - Shopping list
  - Searching goods in local area
  - Sharing goods

- Regular newsletter about the local sales
- Recommendations by friends, neighbours/Sharing suggestions
- Editable Receipt Book
- On the Go:
    - Traffic information
    - Magnifier application - 'PricetagEnlarger'
    - Shopping List
    - To get additional information about goods
    - Emergency button - gives the coordinates of the user to the relatives, ambulance
    - Locate the user's contacts

5.2.5 Additional Possible Functions

- Free Digital Newspaper
- Phone
- Video\Text Chat
- E-mail
- Browsing
- Medical helpdesk
- Brain Games
- Calendar
- Medication reminders
- Picture frame

5.2.6 Hardware Requirements

- - Cheap
- - Wearable or Portable (It could be attached to a Shopping Granny Trolley)
- - Easy to hold (it should be two handed - shaky hands)
- - Bulky
- + Rugged
- + Camera
- + Wifi / 3G
- + GPS

5.2.7 Form Factors

- Touchscreen device with several function buttons on it (Emergency, Camera, Home, Back)
- Large enough buttons
- Screen size : 4"-8"

5.2.8 Existing Available Technologies and Devices

We would like to concentrate on the software development, by using an existing device which covers the requirements above.

- Android based phones: Android 4.0 based phones are open and has a large user base (for previous versions). Earlier versions should not be addressed, because of the too wide variety of platform versions and devices. With 4.0 it became more mature. Since it's an open source OS, we've the largest "hacking" possibilities here, we are not limited to use the public APIs.

- WindowsPhone 7.5 "Mango" based phones: The style of the UI is in line with the requirements where the users said: "not too colourful". Metro UI - the design language of the WindowsPhone 7 phones - are a "monochromic" design, which means that we can use and vary colours, but the various colourful icons will not distract the users. The Live Tile support - which can provide realtime notifications to the user - is a great plus in this platform. We're restricted to the public API set, but with the 7.5 release all of the required APIs are available for consumption. The platform itself has APIs for several Social platforms like Facebook, twitter and others as well, which can help us to focus on solving the real problems.

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