



MobileSage Deliverable D 5.3: Market Analysis & Socio-Economic Impact and Potential

Authors:

Víctor Sánchez; Jesús Sánchez - ISOIN

Version: 00

Date: 2012-10-11

Dissemination Level: Public

Abstract

This document aims to analyse the market on which MobileSage results will be introduced at the end of the project.

The analysis is based on a study of the current market of the assistive ICT technologies. The value chain of this market it is described and so the main actors of it.

A first description of the possible business models is provided in order to start analyzing which one will better adapt to MobileSage solutions.

The type of target users, the elderly, is a community with special requirements and the fulfillment of their requirements in a must for any assistive ICT technology. A brief analysis of their main requirements related to MobileSage project is presented.

It is also important to have knowledge on the existing solutions on the market or under development, so it has been also provided brief description of these. The number of solutions similar to MobileSage could be many in some aspects. The ones here described are the most important and similar to this project scope.

Also, the socio-economic impact is commented and also the factors of the target group community that directly affect to this impact.

At the end of this document the results of a SWOT analysis is presented following the one carried out in early stages of the project. There have been some changes during the work performed since the previous SWOT analysis and so these changes are shown in the chart included in this deliverable.

With this document the consortium aims at gain knowledge on the potential market of MobileSage solution in order to refine the project development for obtaining better results in the future exploitation phase.

Table of Contents

1	Introduction.....	1
1.1	Background	1
1.2	Scope of the Deliverable.....	1
2	MobileSage.....	2
2.1	Objectives.....	2
2.2	Key results	2
3	Potential market	4
3.1	ICT sector context.....	4
3.2	Assistive ICT technologies value chain.....	5
3.3	Stakeholders	8
3.3.1	Industrial organisations	9
3.3.2	End users	9
3.3.3	Governments.....	10
3.3.4	MobileSage stakeholders	10
3.4	Business models.....	11
3.4.1	Closed source	12
3.4.2	Open source.....	12
3.4.3	Dual Licensing	12
3.4.4	Software as a Service (SaaS)	13
3.4.5	Freemium	13
3.4.6	Public-private partnership (PPP)	14
4	Target User Needs.....	15
5	Existing solutions on the market.....	17
5.1	Mobile Navigation.....	17
5.1.1	Navigon	17
5.1.2	Navteq.....	18
5.1.3	TomTom	18
5.1.4	Google Maps	19
5.1.5	Ovi Maps	20
5.1.6	OpenStreetMaps (OSM)	20
5.1.7	Indoor Navigation	22
5.2	Help on demand system.....	24

5.3	Accessible multimodal content.....	24
5.3.1	Joomla.....	25
5.3.2	Quick and Easy	25
5.3.3	Plone.....	25
5.3.4	Drupal	26
5.4	Accessible Mobile Applications	26
5.4.1	iPhone	26
5.4.2	Android	27
5.4.3	Examples of accessible mobile applications.....	27
5.5	Existing EU projects on the domain.....	29
5.5.1	OASIS.....	29
5.5.2	MyITS	29
5.5.3	2PCS.....	30
5.5.4	ENTRANCE.....	30
5.5.5	NACODEAL.....	31
5.5.6	STIMULATE	31
6	Socio-economic impact	32
6.1	Gender	32
6.2	Education	33
6.3	Social status.....	33
6.4	Incomes.....	33
7	SWOT analysis	35
8	Conclusions.....	38
9	References.....	39

1 Introduction

1.1 Background

The market analysis described in this deliverable is aligned with other tasks and deliverables from MobileSage Work Package 5, which embrace all the activities related to impact creation. The market analysis is one of the first steps of the roadmap described in the deliverable *D5.2 First draft of dissemination and exploitation plan*.

This market analysis and socio-economic impact will be an input to the future *Business models* analysis, also in the scope of Work Package 5, and for the future refinement of the *Dissemination and Exploitation Plan*, which will be performed at the end of the project.

1.2 Scope of the Deliverable

The scope of this deliverable is to present the results from the market analysis, from the point of view of exploiting in the future MobileSage key results.

The analysis aims at showing the current status of the ICT sector in relation with the assistive and accessible solutions, specifically focused on navigating solutions for the elderly.

This deliverable is structured in different sections, each of them composing and aiming at making sense to a market analysis suited to MobileSage project. The sections of this document are:

- Section 1 provides information about the reason for this document and its scope.
- Section 2 presents MobileSage project, its objectives and the expected results to be exploited at the end of the project.
- Section 3 explores the potential market of MobileSage outputs. Firstly it describes the ICT sector context, secondly dives into the assistive ICT technologies value chain and finally defines stakeholders and potential business models.
- Section 4 explains the target user's needs when it comes to elderly people using ICT technologies.
- Section 5 explores the existing solutions that are similar to the work being done in MobileSage, either already in the market or still in development. This is presented in different subsections; each one focusing on the different MobileSage main technologies. A look at EU research projects on the domain is also presented.
- Section 6 looks at the socio economic impact on the target group taking into account different aspects.
- Section 7 provides a SWOT analysis, showing the strengths and weaknesses of the project together with the opportunities and the threats.
- Section 8 includes some concluding remarks.

2 MobileSage

2.1 Objectives

The innovation of MobileSage is the development of a help-on-demand service together with an adaptive content generation service for assisting elderly people in their transport daily activities. The focus is on making the elderly feel healthy, well and safe, taking into account their specific limitations and healthy habits. The main challenge is to aggregate a huge amount of information from different sources and including them into a mobile service with an intuitive interface (voice-touch-write).

The project considers a variety of end-user centred objectives regarding different aspects from the help demanded and the adaptation needs of each user, such as the following:

- Avoiding inaccessible routes;
- Finding necessary facilities along the route.
- Public transport schedule information.
- Ticket machines usage.
- Multi-input and intuitive interface.
- Geo-reference help.

Hence, MobileSage aims at improving the quality of life of elderly people affecting at different aspects: maintaining the person mobility; guaranteeing navigation, essential for safe moving around in an unknown environment; enabling independent living by allowing elderly people to maintain high degree autonomy; and helping elderly people to participate into digital self-service society.

2.2 Key results

MobileSage key results are the outputs of the project. These can be considered as independent modules (speaking in term of exploitation) or as a whole, as a holistic solution. The key results of MobileSage project detected so far appear in Figure 1.

MobileSage affects several sub-sectors where there are different kind of actors (companies and customers) and conditions; furthermore, the market dynamics evolves differently. However, the core of MobileSage solution is a mobile application from which the elderly gain assistance for navigating, orientating, and overcoming the required tasks when they are travelling by themselves.

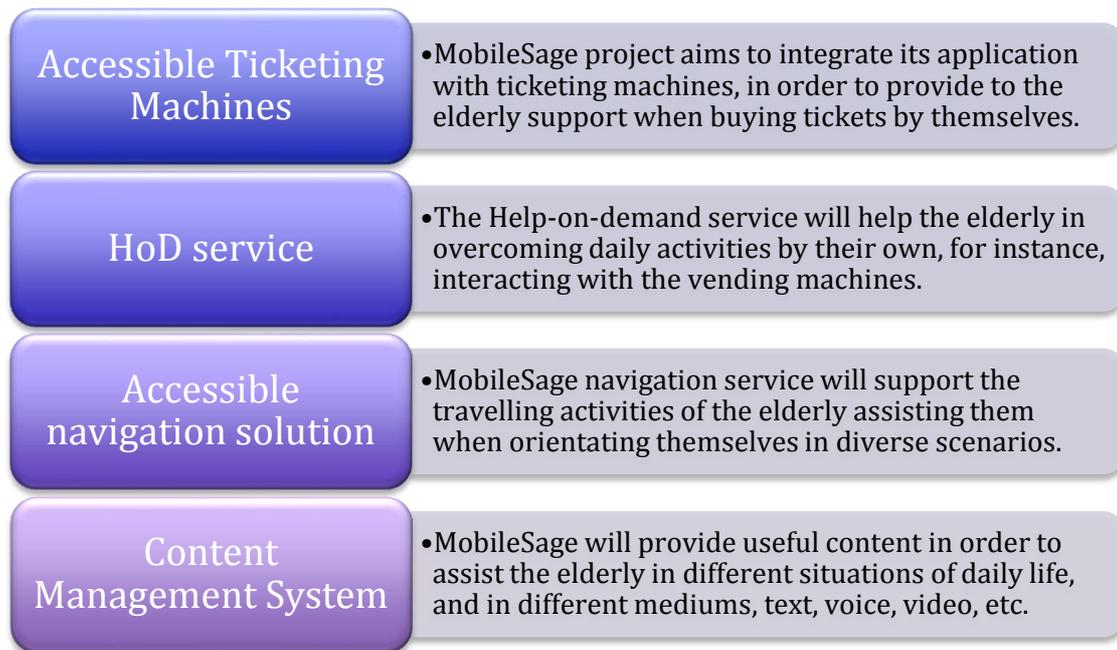


Figure 1 Exploitable key results detected so far

Specifically, the aim of the MobileSage solution is to provide the elderly with an efficient tool with geo-located on-demand services, providing the assistance in an accessible manner (taking into account the end-user and the scenario conditions). Based on this, the analysis will be mainly focused on the mobile applications market, addressing the group of mobile applications designed specifically for assisting the elderly in such kind of travelling activities.

3 Potential market

3.1 ICT sector context

MobileSage project is under the framework of the ICT sector, which is a very heterogeneous one, depending on the kind of service or product under study. The dynamics of this sector is typically led by trends and customer requirements, and also by highly R&D intensive activities.

In 2008, the ICT market was structured as shown in Figure 2, organised in several segments and with clear predominance on some of them.

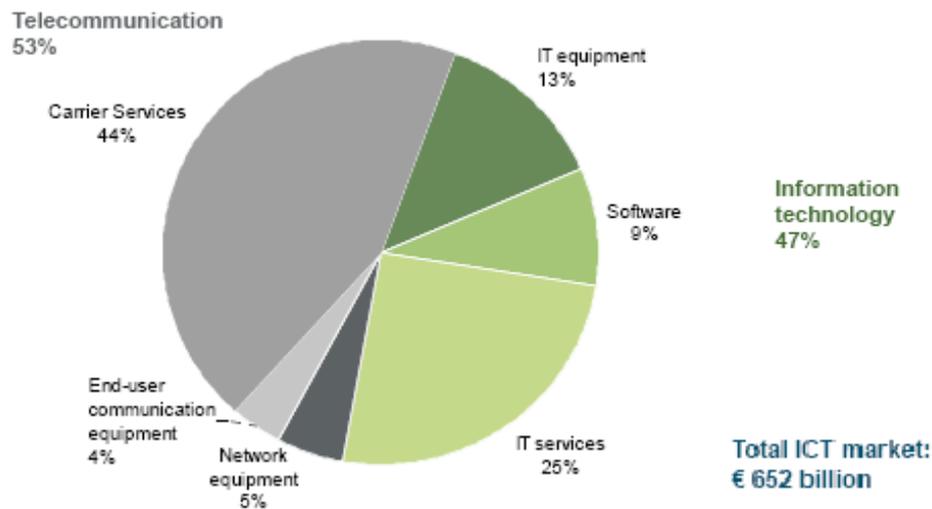


Figure 2 Western European ICT market by segment¹

Even though the economic crisis had a huge impact on the world IT market in 2009, the software industry started to grow by the end of 2010 and increased in 2011. The forecasts were of maintain these increasing rate for 2012 and 2013 (Figure 3).

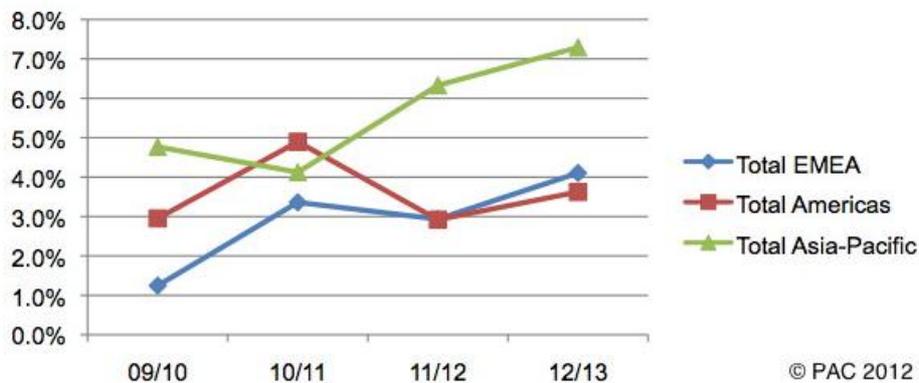


Figure 3 Forecast growth of the Software & IT Services Market by region 2009-2012²

¹ EITO 2008

² PAC Consultants 2012

A closer analysis to the current situation shows that the software and IT services spending recovered in most regions in 2011. Yet, several sources point out that 2012 will definitely be a challenging year for the IT industry because there will be big disparities in performance [1].

Nowadays the IT companies are evolving and adapting to new market trends in order to increase performance and gain robustness in the global ICT market. Therefore the elderly community has become very appealing for ICT companies and is consolidating as a market niche, due to the increasing size of the community:

- The OECD predicts, that by 2020, the number of older people living in institutions will increase by, 26% in Germany, 29% in France, 27% in Sweden and 18% in the UK [2].

The European countries healthcare expenditures are also increasing year by year due to this rising rate. The ICT sector could provide solutions for improving the quality of life of the elderly and, at the same time, reduce the expenditures on healthcare and social services in European countries as has been shown in recent studies:

- Early patient discharge from hospital due to the introduction of mobile health monitoring would save €1.5 billion p.a. in Germany alone [3].
- In Scotland, 7,902 people receiving telecare equipment has delivered savings of £11.15m in 2007–08. The estimated total cost savings over the period 2007 to 2010 are on track to be a minimum of £43m [4].

For this reason the European Commission is leveraging the research and technology development related to ICT technology for the elderly, as it could be proved having a look to some of the recent projects funded and oriented to the topics of elderly and the information society [5].

3.2 Assistive ICT technologies value chain

Nowadays there is evidence of a significant number of companies addressing the elderly requirements at different levels (hardware, software, both of them) in order to become important actors in this specific and recently active market.

First of all it is important to define what is understood by Assistive ICT technologies in this specific market within the overall ICT sector. According to the definition provided by the standard ISO 9999 “Assistive products for communication and information”³, *Assistive ICT technologies are understood to be devices/services for helping a person to receive, send, produce and/or process information in different forms.*

This standard aims at classifying assistive products especially produced for people with impairments and disabilities, and the specific ones that make reference to assistive ICT technologies are classified as “Assistive Products for Communication and Information”.

According to EASTIN, the principal Assistive Technology Information Network in Europe, which is composed of six national information systems (Germany, Italy,

³ <http://www.iso.org>, ISO – International Organization for Standardization

Spain, Denmark, UK, The Netherlands), the number of Assistive ICT products available in the EU is currently 9,321⁴.

This number of products has increased in the latest years from 3,982 products in 2009 to the current 9,321 in 2012. This is due to the increasing acceptance of the ICT technologies over the elderly and the people with disabilities. Pertaining to the elderly group, several studies have stated the increasing number of seniors using ICT technologies [6]:

- Internet usage amongst the older age groups has almost doubled since 2003 to 2008.
- Mobile telephony has rapidly spread through all parts of the population. The way that older people use their mobiles has become similar to that of the younger age groups.

The Assistive ICT technologies industry has a very complex value chain, as shown in Figure 4, due to the importance of the Service Providers organisations. These organisations typically assume responsibilities on product assessment and financing and are the intermediaries between the target user and the product manufacturers.

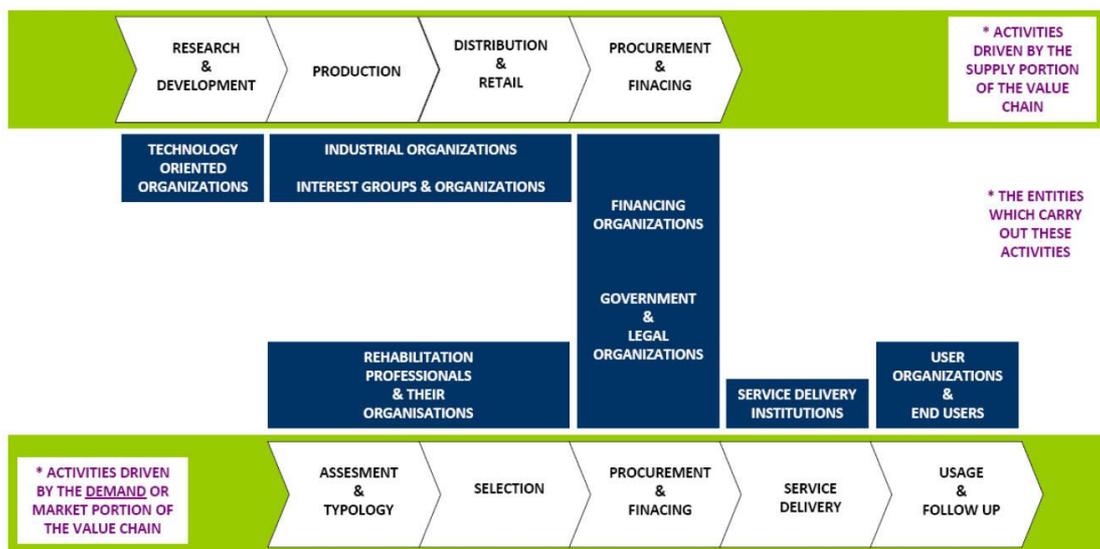


Figure 4 Assistive Technologies ICT value chain [7]

R&D is mainly carried out by technology-oriented organisations such as research centers, universities, or companies. This includes all the research projects carried out under the umbrella of, for instance, the *7th Framework Programme* and the *AAL Joint Programme*.

It is important that the target users participate at this stage of the value chain, so they can orientate the products/services designs for better fulfilling their requirements, and doing so before the product is in the production phase. The companies of the sector work with different methodologies, either *technology push* or *market pull*. Either way the opinion of the target user is crucial for the success of the products.

⁴ <http://www.eastin.info>, EASTIN – European Assistive Technology Information Network

The key of the Assistive ICT value chain is the *Distribution and Retail*. The actors in this phase are agents which play the role of intermediaries between the manufacturers and the end-users. Moreover, the type of intermediary involved in this phase of the value chain may change depending on the kind of product and the country, and so this is the most complex phase of the value chain.

Based on the previous paragraphs, the companies aiming at this market have to know the different agents and conditions for distributing their products on each country. The international distribution presents benefits for companies because of the bigger size of the market, but maintaining the needed partners' network for selling assistive ICT products in several countries has also meaningful costs. Each company can decide on using one distribution channel model or other, depending on the benefits obtained on each country and for each of its products.

Software companies generally follow a distribution model in most cases with neither wholesalers nor retailers. They usually distribute their products and services via Internet. This could be the closest case to MobileSage software solutions as it has minor costs and still can be reached many different countries.

App stores (the short form of *Application Stores*) are the main way of distributing mobile applications via Internet. These websites offer a wide variety of applications for smartphones and people can download and install those directly from there (a user account is usually required). Examples of these sites are *Google Play* for Android and the *Apple App Store* for iOS. In some cases the applications have to pass a review process in order to ensure that they are reliable, performing well and free of offensive material before being published and downloadable on the online store.

Within Europe, each country has its own service delivery system, it means the entity which selects and pays for the product. These delivery systems may vary from public health systems to individual end-users within different European countries.

MobileSage software could be, to a certain extent, independent from service delivery systems institutions as the final users is interacting with the mobile application which runs on its smartphone, and this could be downloaded from Internet. However, it could be necessary to use different devices, sensors or small infrastructures on the cities, which complete the holistic solution. In that case the presence of these organisations is needed in delivering part of the technology. For instance, if the government decides (based on the assessment of experts) not to purchase assistive ticket delivery machines on the train stations, MobileSage project would be still useful for the elderly, but the functionality would not be as good as desired.

The phases that appear at the bottom of Figure 4 (assessment, selection, procurement & financing, service delivery and usage & follow up) are heavily depends on country policies in terms of what assistive ICT products are selected, covered (including to what extent they are covered), and the possibility of a technology or product that enables that individual user to play the role of the entire service delivery system. Depending on the country and on the product, there are three main service delivery models: medical, social, and consumer (more information about these models can be found in [7]).

As a conclusion of this section it can be said that most of the companies in the AT ICT industry participates in manufacturing, distribution, and product development activities. However, there are other many factors as the aforementioned that affects the final benefits obtained by companies of the sector.

It is difficult to compare data sourced from different national and other organisations that do not share common criteria, so the percentages shown by different reports analysed in this deliverable are far from being entirely reliable.

In this context, MobileSage project technology focuses on the closest side to the elderly with a solution that aims to interact with the elderly from a mobile phone, providing assistance to them when they walk, travel and navigate independently in their daily activities. The solution aimed is very mobile application-like, with several software modules run on the remote servers via Internet as the Content Management System and others. Taking this into account, MobileSage results could be easily delivered with minor costs via internet. In the case that it is needed, the dissemination and marketing of the service need contribution from other entities, largely in the usage & follow-up phase.

From the previous point of view, the end-users and their organisations would take the responsibility in many of the phases involved under the service delivery systems aforementioned. In the case that the technology developed in the project is some kind of infrastructure, some organisation needs to provide the service.

It is too soon to clearly identify the actors of the value chain in the specific case of MobileSage results; this is dependent on the different models selected and the market strategy. However, MobileSage aims at gaining enough knowledge on the different structure of the assistive ICT value chain in different EU countries through its project pilots.

MobileSage pilots have been planned to be held in three different countries i.e. Norway, Romania and Spain. The interaction with the end-users and several other actors in the value chain when celebrating the pilots will help to refine the market analysis and the exploitation plan at the latest stages of the project.

3.3 Stakeholders

The parties interested in the assistive ICT market turned out to be many. The value chain, as it has been described in section 3.2, involves a variety of actors which play important roles in the whole creation process of an assistive ICT product. Figure 5 aims at showing almost all of these actors.

There is some complexity in the assistive ICT value chain at several stages, e.g. *Distribution & Retail* and *Service Delivery*. These phases involve numerous types of organisations depending on the kind of assistive product and the country where it is sold. However, a description of the main stakeholders, these who play the most important roles, is provided below.

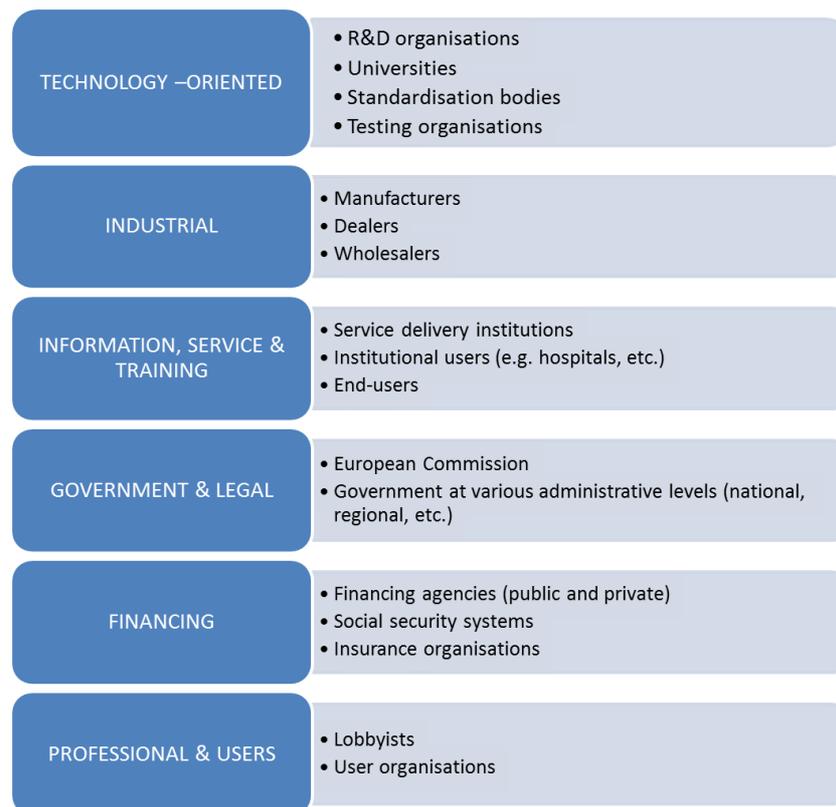


Figure 5 Main actors on the assistive ICT value chain

3.3.1 Industrial organisations

Private companies and manufacturers have been one of the most important drivers in this scenario. The assistive ICT market is partially technology-driven and so the actors pushing are industrial organisations.

Other industrial organisations may be considered in this group, such as wholesalers and retailers, but their role in the market does not *push* as much as the manufacturers' role.

Even in many occasions, the research & development activities are demanded by industrial companies which aim at create new products for gain the acceptance of the end-user and consequently a bigger portion of the market.

R&D is usually performed by universities and research centers; however, there are also industrial organisations carrying out their own research oriented to the company's areas of interest.

The European Assistive ICT industry is structured as a large amount of SMEs (Small and Medium Sized Enterprises). In the United States the scenario is similar and the 60% of the AT companies have less than 10 employees [8].

However as it has been explained before, there are many other interested parts in the assistive market, so the activity of these companies is highly dependent on their partnerships.

3.3.2 End users

The end users of the assistive ICT market are the elderly and the disabled people. Other types of end users may be indirectly considered depending on the type of

product. These are carers (formal and informal) and the disabled or elder’s family which would beneficiate from the well-being and independent living of the elderly and disabled.

The elderly and disabled organisations would be considered as actors of the follow-up phase but not as real end-users, because their goal is to help the people with impairments and, in this case, to inform them about solutions available on the market for their needs.

Hospitals, retirement homes and other related institutions would not be considered as end users. These are deeply involved in service delivery activities and also, depending on the context, in procurement.

3.3.3 Governments

European countries have different legal frameworks related to the assistive ICT market. Depending on the country the role of participating in this market value chain could be played by a national, regional, county or local government.

Governments basically perform the task of defining the legal framework in their jurisdiction and procurement of assistive technology, either funding the entire value of a product or only a part of it.

Sometimes governments participate in the delivery of the service as this could serve them as the way of reaching societal goals or even political, but this is more likely at small levels e.g. in regional or county governments. In this case it is important to identify the governments that are willing to take part in service delivery as they are as catalysts of the product or service and the penetration into the market could be faster.

3.3.4 MobileSage stakeholders

After the description of the main stakeholders in the assistive ICT market, it is time to introduce ones that would be interested in MobileSage results.

The goal of the project is to test and validate the technology in pilots. In these, the end-user will try to navigate by itself and overcome daily life situations independently. The mobile phone of the end-user will provide, via internet and on-demand, the needed assistance for each situation. For example, in some pilots it is expected that the end user interacts with a public transport ticket machine in order to use public transportation.

Pertaining to the scenario described above MobileSage potential stakeholders are listed in Table 1.

Stakeholder		Member of MobileSage consortium or represented by one of them
Industrial organisations	Ticket machines providers	X
	Ticket machine manufacturers	
	E-learning and multimedia content providers	
	Telecommunication and network service providers	X

	Transport companies	
	Infrastructure providers	X
End users	The elderly	X
	People suffering from disabilities	X
	Carers (formal and informal)	
	Families	
	End users organisations	X
Procurement & Legal	Governments	

Table 1 MobileSage potential stakeholders

Two companies from MobileSage consortium heavily involved in the exploitation activities and in contact with all the industrial users are:

Ruter: In eastern Norway the majority of all ticket machines are Ruter's property. In practice, Ruter is the major actor defining all functional and technical requirements to ticket machines in the Norwegian market. The position of Ruter in the market gives a great opportunity to exploit MobileSage's results for an accessible design of ticket machines and how elderly can handle it. Ruter also plays an important in contacting ticket machines manufacturers and public kiosk looking for technological opportunities.

Telefónica I+D: Telefónica I+D is known worldwide as a telecommunication and network infrastructure provider. The company would obtain benefits from the MobileSage software solution, as the company could provide additional services to the elderly. The MobileSage application also generates network traffic by sending requests for other services and the transmission of multimedia data like video and speech.

On the side of the end users, MobileSage has also several organisations representing them as for example Seniornett in Norway and Ana Aslan Foundation in Romania.

In summary, the core of MobileSage is an application for installation on smartphones, offering geo-localised assistance in basically any situation. As such, it provides added value for any company that offers services via the Internet and other kind of devices with interfaces with which the elderly may have to interact. For example, content providers or web services companies could benefit from MobileSage in the adaptation of their services to elderly requirements as this is one of the aims of the project and, there are not currently many accessible interfaces on the market.

3.4 Business models

The success of an assistive ICT technology depends on how the end-users pay for it, i.e. the business model.

Assistive ICT here differs from classical assistive technology, which may be attached to common business models as paying once for the item e.g. a wheelchair or a cane. Common ICT technologies have several options as business models due to the fact that usually are services provided as software or a

combination of hardware and software. For this reason, assistive ICT technologies also present different business models that can be used for its commercialization.

MobileSage solution is basically a software system, which is run partially on a mobile phone application and partially on a server. The communication between both parts of the system is via Internet.

Taking into account the nature of the MobileSage solution and the current business models available on the assistive ICT market, several potential models are described below that could fit in the exploitation of MobileSage results. The final business model will be selected in the future when MobileSage project comes to an end. Also, it would be possible to use different business models for the different modules that compose the MobileSage solution. A deeper analysis of the proper business models for MobileSage project will be done in future deliverables in the scope of work package 5.

3.4.1 Closed source

This is the traditional model where the software is licensed with a strict proprietary license. The license is distributed and the user has the right to use, but not adapt or redistribute the software. The user pays a regular fee (e.g. annual) or a one-time fee for a perpetual license. This license may or may not include a limited period of free updates.

This model is not suited for MobileSage solution as the aim of the project is closer to an open model.

3.4.2 Open source

In this model the software is provided typically free or just paying a small donation to the provider for delivering the software to the user (e.g., physical transport). The source code usually is provided and users have the right to adapt, modify, or otherwise derive work from the original with no requirement of payment to the original developer. This model is usually supported by a community of developers – either enthusiasts or professionals – that develop and maintain the code.

Companies may dedicate themselves to this approach in order to provide a platform upon which they base other services or use themselves, often as an alternative to dominant closed source products.

This model could be considered as suitable for some MobileSage modules in order to get rapid and widespread uptake because it is free.

3.4.3 Dual Licensing

Some software companies are also using another business model based in a dual licensing approach. The biggest motivation for using the dual licensing model is to free distribute the software to those who are not going to pay for it and charge those who are willing to pay for it.

Examples of these companies are MySQL, Mozilla and Trolltech. MySQL states on its Web site, that its software is 100 percent GPL, and other software developers

using GPL (or OSI compliant) do not have to pay them for using MySQL software; in all other instances, there is a commercial license.

Mozilla is another example of multiple licenses (three in this case), but in this case the most important reason to use dual licensing is to ensure compatibility with other licenses. Mozilla Foundation implements a tri-licensing model to following the Mozilla Public License (MPL), the General Public License and the Lesser General Public License (LGPL). More information about multiple licensing could be found in [9].

3.4.4 Software as a Service (SaaS)

This is a business model that combines on-demand provision of software through the Internet, with pay-as-you go revenues.

It could be seen both as an alternative form of licensing to traditional purchase or as an integrated cloud offer as an alternative form of IT management. This model it is gaining wide acceptance among the ICT community as it is closely related with the current computation paradigm of *Cloud Computing*. Examples of companies offering services under this business model are Microsoft or Oracle.

Closely related to this model exists several ways of getting revenues, depending on the service for which the end user is paying, i.e. paying once for each time you use the service, for the duration of the connection or for the amount of data the end user demanded.

At first sight this model could be one of the most appropriate for MobileSage exploitation, due to the fact that the costs for the end user are depending on the usage and he/she will not pay when the service it is not used. This model does not incur a big one-time expenditure by the end user so it could be more suitable for the elderly community.

3.4.5 Freemium

The word freemium is a portmanteau of “free” and “premium”. This model provides some services for free to build a customer base and demonstrate value. Apart from these there are other (premium) services provided within the same platform for which users pay some regular fees.

The services offered as premium could be the same free service but with high quality or add-ons services that complete the free ones. For instance Skype is an example the Freemium model, which allows users to chat and call to other users with the Skype application installed on their computer, but requires some payment for calling to land lines or mobile phones.

This business model could be one of the most appropriate for MobileSage project there is a set of services offered by free and other ones requires some payment. The elderly could beneficiate from the free services and pay for the premium services if these are affordable for them.

In this model a user can use one service a limited number of times without paying anything for this; in this case usually the service is provided together with some commercial banners or advertisement videos. If he/she wishes an unlimited use, avoid the commercials or a better performance of the service (for

example a wider bandwidth) some price will be charged to him/her. Examples of this are Evernote⁵ and Spotify⁶.

3.4.6 Public-private partnership (PPP)

This model, sometimes referred to as PPP, P3 or P3, could be considered not as a typical business model but a value chain structure on the service delivery system.

Usually in this model a public body is interested in providing a service to the society but does not have the technical capacity to do it, so the public body partially or fully provides funds to private company or a group of them to perform the provision of the service or the development of the project.

The type of contract and the portion of financing of each part may depend on the type of service, the community that receives the service or the region where the service is provided. Sometimes the cost of using the service is borne exclusively by the users of the service and sometimes the cost is borne wholly or in part by the government. Private companies that take part in the partnership get revenues for that but also assume technical and operational risks in the project.

MobileSage is very oriented to assisting the elderly in daily live activities that they have to face independently. In many cases these activities are linked to the use of public services as using public transport or similar. In that case, this type of model could be suitable for exploiting MobileSage service as the elderly community of a city or region will benefit and the city services will be also easily available to the elderly.

⁵ www.evernote.com

⁶ www.spotify.com

4 Target User Needs

The elderly, as the target users, is a community that presents special requirements, many times attached to age-related impairments. For several years, they have been demanding a different approach from technology providers where solutions were far away from the requirements of the elderly [10].

The increasing elderly population is an enormous potential market, and this market is becoming more competitive, so the better an ICT service is in fulfilling the elderly's requirements, the more the service will gain acceptance and a bigger penetration in the market. This is the reason why the design of user-friendly interfaces, self-adaptive technologies are one of the goals of companies when developing their products and services.

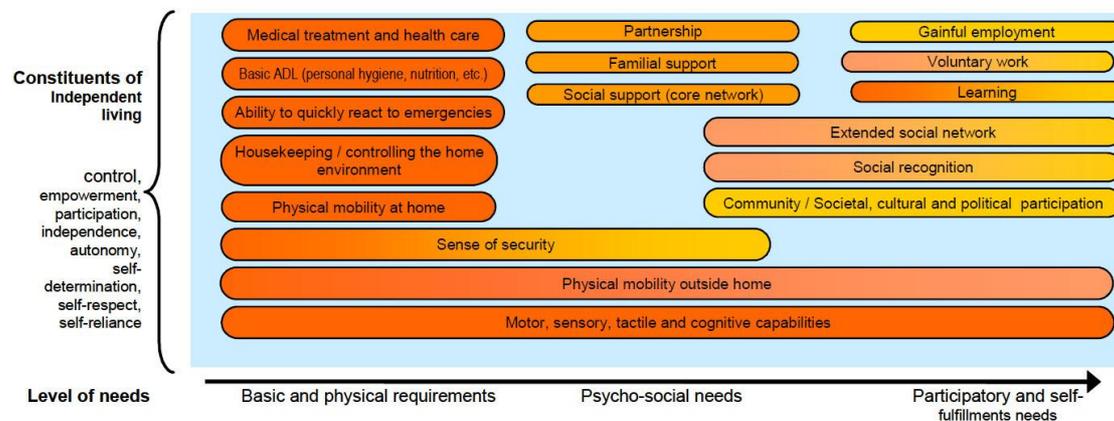


Figure 6 Constituents and shaping factors of independent living [6]

Target users present special needs in the areas of health, safety, transportation and social life, etc., and they are always aiming at maintaining an independent living lifestyle longer. Figure 6 shows the elderly level of needs against the constituents' parts of independent living. It is clear that outside mobility is one of the areas where the elderly have more needs, and so the ICT technology in this area has to perfectly fulfil their needs.

The value chain actors realised this important aspect when the target users are the elderly or disabled people. For example, in a questionnaire related to the analysis of the European Assistive ICT Technology, 94% of the respondents agreed on the fact that having knowledge of a disabled end-user has important effects on the success of an assistive ICT product [7].

There are several needs of the elderly that are generic and are always present when this community interacts with ICT technologies; these are listed below:

- Useful functionalities, useful enough for overcoming everyday activities but not complex ones that may confuse the user
- Interfaces that maximize usability for users with age-related impairments, e.g. voice for interacting with the devices (multimodality)
- An easy and intuitive usage of the technology

- The minimal burden of configuration on the user side (e.g. self-adaptation by selecting a profile)
- Help-on-demand assistance for overcoming potential problems when they arise on site
- Easy assistance in case of errors and failure

MobileSage has taken into account the target user needs and has developed an analysis about their requirements on the field of the project services, and these are described in deliverable *D 2.1 User needs analysis* [11]. The main requirements in the context of assistive technologies for orientation and navigation of elderly people are summarized below:

- Maps (in- and outdoors) and signals for orientation and navigation easily understandable by the elderly.
- Travel information (e.g. departures and arrivals, tickets purchase and others).
- Points of interest (ATMs, restaurants, hotels, cinemas, etc.).
- Practical information about the city services e.g. public transport, events, and leisure activities (including emergency information).
- Translation services.
- Manuals, demos and tutorials – preferably step-by-step guides to avoid difficulties when interacting with self-service machines, domestic appliances and others.

5 Existing solutions on the market

MobileSage will be available for assisting the elderly when carrying out daily tasks on which they need assistance, e.g. purchasing public transport tickets or interacting with an ATM. MobileSage consist on a set of different modules that perform different functions so the assistance provided to the elderly is useful and complete. The different modules composing MobileSage are described below and compared against existing solutions on the market.

5.1 Mobile Navigation

MobileSage project aims at providing navigating functionalities to the elderly and also geo-localized assistive information. The elderly may be travelling by foot and then taking a public transport for reaching their destination, so there is clear need for pedestrian navigation.

The information demanded by a pedestrian and by a car driver to a navigation device is different. While driving the target is usually simply to reach the destination. However, by foot one may have preferences on the path or on the places of interests that are midway. A short description of the most well-known pedestrian-oriented navigating solutions is provided below.

5.1.1 Navigon

Navigon is a cutting-edge navigation solution for visually impaired users. Navigon is property of Garmin Ltd., one of the well-known companies on the field. This solution is also provided through a mobile application named MobileNavigator app (Figure 7).



Figure 7 Navigon pedestrian navigation⁷

MobileNavigator is provided for different mobile operating systems as Windows Mobile, Android and iPhone. This latest one provides an excellent and assistive platform for pedestrian navigation and together with the VoiceOver screen reader utility provide an assistive tool for navigation that is really useful for the elderly.

⁷ <http://www.navigon.com>

This navigation solution provides much information that may be of interest to the user as public transport information and ATMs location. It provides many configuration settings like display options, route configuration, and the amount of information to shown.

5.1.2 Navteq

Navteq is one of the leading global providers of digital maps with headquarters in the United States. Navteq maps can be found in nearly all navigation devices or software currently available on the market.

Navteq provides a service for pedestrian navigation called *Navteq Discover Cities* (Figure 8). This service provides relevant information for the pedestrian as with public transport information, including the transport stops, service timing. It also allows advanced searches by districts, areas or by proximity.



Figure 8 Navteq Discover Cities service⁸

This is not a global service yet; its availability is currently limited to the biggest cities in the world.

5.1.3 TomTom



Figure 9 TomTom 930 Map Screen in Pedestrian Mode⁹

⁸ www.navteq.com

⁹ www.gpspassion.com

This company is one of the leading ones in navigation systems. It is a subsidiary company of Tele Atlas, one of the most important digital maps providers in the world.

Despite its background in navigation solutions, TomTom has been focused in car navigation. There is the possibility to select *pedestrian mode* on some of its products as it is shown in Figure 9.

Despite its successful business in car navigation systems, they have not taken advantage of its know-how and experience on the matter for creating a high quality pedestrian navigation solution.

5.1.4 Google Maps

Google Maps is a well-known online map service provider by the giant company of web searches, Google. Google provides lots of maps and satellite images with information about points of interests, shops and business, users comments, etc.

The use of Google Maps API is free for non-commercial use. Commercial usage of Google Maps is only allowed when acquiring a commercial license.

Google Maps can be displayed either by using a web browser, Google Earth software or other mobile apps for smart phones. Google provides a route planner on which the user can select if he is going to the destination by car or by foot.



Choose the "Walking" option after selecting the Navigation icon (left) to use Walking Navigation (right).

Figure 10 Google Maps mobile application for pedestrians¹⁰

Pedestrian mode of Google Maps provides several functions that are not in the car mode, e.g. vibrations when a turn is needed in the trajectory or a rotatory map on your mobile screen for helping the pedestrian to orientate. There is also voice navigation provided on the pedestrian mode, which can be useful for the elderly.

¹⁰ www.google.com

5.1.5 Ovi Maps

Nokia has been on the top of the mobile phone manufacture for years. However it has also a background in the field of navigation with its services *Ovi Maps* with free walk (pedestrian) and driving (car) modes, which includes turn-by-turn and voice guided navigation functionalities (Figure 11).

Ovi Maps has global coverage, with 74 countries covered by its navigation services. Maps for all regions will be available, for free, for loading over the air or pre-loading via a desktop computer. Ovi Maps also provides traffic information and city guides, from Lonely Planet and Michelin, these last of high interest for pedestrians.



Figure 11 Ovi Maps solution with free walk mode

It is also an advantage that this service is provided by Nokia mobile phones with no added costs. It also includes a service for sharing your opinions and pictures related to a certain location and which may be published on Facebook (Figure 12).



Figure 12 Ovi Maps and social sharing service

5.1.6 OpenStreetMaps (OSM)

OpenStreetMap is a project that generates and provides free geographic data and mapping following an open source license. The project started back in the year 2004 motivated by the fact that most free maps actually have legal or technical restrictions on their use.

This project is supported by the OpenStreetMap Foundation which is an international not-for-profit organization supporting, but not controlling, the OpenStreetMap Project. As it is stated in tis website¹¹, the Foundation “is dedicated to encouraging the growth, development and distribution of free geospatial data and to providing geospatial data for anyone to use and share”.

OpenStreetMap uses the same approach to mapping as Wikipedia does for general knowledge. Registered users can upload GPS track logs and edit the vector data using the site's online map editor or free GIS editing tools like JOSM.

There are many solutions using OSM as data source but providing these data with different added value services. One example is Osmand in Android OS. Osmand is the acronym of *Open Street Maps Automated Navigation Directions*. Osmand is a turn by turn navigation application for Android devices with online/offline features (Figure 13). Nowadays it is also available for Blackberry phones.



Figure 13 Osmand navigation application¹²

Currently the application provides:

- • Pedestrian navigation
- • route planner
- • draw the trajectory of the walk
- • Points of interests on the maps
- • Save your own points of interests

¹¹ www.osmfoundation.org/wiki/Main_Page

¹² www.osmand.net

Osmand has the advantages of an open source community which is further developing the maps (Open Source Maps projects) and also the support of the Android community.

5.1.7 Indoor Navigation

While outdoor navigation has been commercially exploited successfully, as it can be seen in some of the previous navigation tools presented, indoor navigation is a less common product in the market.

MobileSage goals are to provide assistance to the elderly either outdoors or indoors, because the elderly may need assistance to overcome any situation when he is in an indoor environment, e.g. purchasing tickets for the subway.

Apart from some forerunners in the topic, there is much research about indoor navigation solutions. Some of the current solutions existing on the market for indoor navigation are described below.

5.1.7.1 Navizon

Navizon Indoor Triangulation System (Figure 14) is a Wi-Fi based real-time locating system (RTLS) that provides accurate location of Wi-Fi devices, including smart phones, tablets, laptops and tags, anywhere inside a building or throughout a campus.

Navizon it is also providing services of Global Positioning System for mobile device by combining the location of cell phone towers and Wi-Fi access points in addition to GPS.



Figure 14 Navizon demo usage in RFID Journal Live 2012¹³

However, while this solution is available both outdoors and indoors, its service is only positioning, not navigation. This could be partially useful but in some cases this solution is not enough for some requirements.

5.1.7.2 NavIndoors

NavIndoors is a pedestrian indoor navigation system for indoor environments such as shopping malls, governmental institutions, universities, hospitals, museums and airports.

¹³ www.navizon.com

NavIndoors is available on the market for using with several smartphones operating systems e.g. iPhone or Android.

The positioning and navigation are based only on the sensors available on the mobile device and it also uses enhanced WiFi signal-based positioning technology (Figure 15).

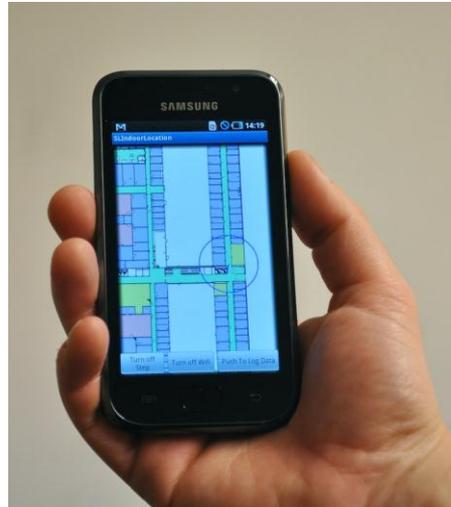


Figure 15 NavIndoors application on an Android phone¹⁴

The service provides:

- Precise positioning and pedestrian navigation in indoor environments.
- Fully documented Application Programming Interface (API) for easy integration with third-party location based application.
- The possibility of monitor movements and extract user behavior charts and analytics.

5.1.7.3 Awiloc technology

Awiloc is an indoor positioning technology developed by the Fraunhofer Institute for Integrated Circuits IIS. Awiloc is a WLAN positioning technology that has been helping smartphone users since 2008 to find the shortest, fastest, most convenient or even the most interesting path through shopping centers, airports, train stations and museums.

Two German companies has recently appeared on press releases due to the use of Awiloc technology in order to offer indoor navigation solutions within their services portfolio. These companies are N-Solut GmbH (expert on customized software development kits (SDKs) and customer-specific solutions) and CloudMade from Stuttgart, which already offers road and outdoor navigation solutions.

CloudMade has as indoor navigation experience the complete vector cartography of the Hamburg airport and a shopping center in Berlin.

¹⁴ <http://www.senionlab.com>

5.1.7.4 Navteq Destination Maps

NAVTEQ Destination Maps¹⁵ are a solution to enhance the consumer shopping experience by enabling the creation of applications that facilitate “internal” direct routes to stores, ATM’s, exits etc., whilst providing detailed information about Points of Interest (POI) and improved search functionality.

NAVTEQ Destination Maps provides pedestrian-specific attributes unique to interior requirements like stairs, elevators and escalators as well as recognizing different floor levels.

This solution already covers more than 200 of the largest shopping centers in the United States and it is planned to expand to more shopping centers and more types of destinations throughout North America, Europe and Asia Pacific.

Nokia has announced that its Location & Commerce business will made its NAVTEQ Destination Maps available to customers seeking to offer indoor navigation solutions in India.

5.2 Help on demand system

The end user will have MobileSage system assistance through the Help-on-Demand module. The idea is to provide assistance about the issues that the elder person may have in his/her current location.

Nowadays there is no clear evidence of such kind of solutions. The most similar ones are those systems or institutions that provide a service when the user demands it, but usually the demand is related to a fixed place, e.g. the home of the user.

One example of these help-on-demand services is *Keep Mobile*. This is an organisation that provides Transport for the elderly and disabled in the United Kingdom. Basically the elder person or disabled phone the organisation and book transport for getting the desired destinations.

Other example comes from Spanish social services that, in some regions, offer help-on-demand service sin case of emergencies. The elderly can apply for this service and a special phone will be installed at their home. In case of emergency they can use the phone and all the services required for assisting the person will be mobilized.

5.3 Accessible multimodal content

MobileSage will generate multimodal content (text, slides, video, voice or others) which conforms to basic accessibility and usability criteria. The contents, available online will be eventually shared or provided by the Help-on-Demand Service.

¹⁵ www.navteq.com

The CMS (Content Management Service) will provide a mixture of content produced by non-professionals (users, user care persons, user organizations) and professionals (commercial actors) alike.

There are many Content Management systems in the market either open or closed source. The most popular are of course the open source ones as the developers' community behind is bigger but some other are famous and have low cost. Some of the CMSs more appropriate for creating accessible interfaces and contents (Figure 16) are described below:

5.3.1 Joomla

Joomla¹⁶ is a well-known open source content management system (CMS), which enables the developers to build Web sites and powerful online applications. One of its main features is its ease-of-use and extensibility.

Joomla stemmed from another CMS called Mambo making great improvements on the overall accessibility matter.

Joomla has been tested together with a screen reader user and no focus problems and no mixing up of lists or combo boxes, etc. issues appeared. It has been classified as easy to understand.

5.3.2 Quick and Easy

Quick and Easy¹⁷ is a low cost commercial product which could be suitable to a wide variety of community based groups. However it seems to be anymore a commercial product we comment here some of its features.

The administration interface is accessible and standards compliant. There is a user determined choice of HTML tool, so different people managing the same site can choose whatever suits them.

Quick and Easy has some advanced functionality, such as built in blog, a mailing list application and a photo gallery plug-in, but may not be as extendable as some other open source CMSs such as Plone or Drupal.



Figure 16 Examples of Accessible Content Management Systems

5.3.3 Plone

Plone¹⁸ is a free and open source CMS built on top of the Zope application server and released under GNU General Public License (GPL). In principle, Plone can be

¹⁶ <http://www.joomla.org>

¹⁷ <http://www.qnecms.co.uk/>

¹⁸ <http://plone.org/>

used for any kind of website, including blogs, internet sites, webshops and internal websites.

From a usability perspective the first impression is that Plone is not that intuitive. This is likely due to the fact of highly configurability. The Plone main features are its flexible and adaptable workflow, very good security, extensibility, high usability and flexibility.

5.3.4 Drupal

Drupal ¹⁹ is an open-source content management system and content management framework (CMF) distributed under the GNU General Public License. Drupal is very used for building websites of many kinds of purposes, ranging from personal blogs to corporate, political, and government sites. It is also used for knowledge management and business collaboration.

Drupal has an interface simple uncluttered and clean. It has adopted a modular approach which allows you to customise Drupal, adding other modules such as a blog, etc. as you need to.

Drupal presents the user with a simple to understand and easy to navigate interface, which does not overload the user when they first open the application.

5.4 Accessible Mobile Applications

As MobileSage will be provided as a mobile application, it is important to identify currently the mobile applications available and its features. This may provide useful information to MobileSage consortium in order to refine the best way of providing assistance to the elderly when using a mobile application.

The Web Content Accessibility Guidelines (WCAG) is a useful standard for anyone wanting to create an accessible website, but there are no equivalent general guidelines for creating mobile applications (there are more platform-dependant guidelines as it is explained below). Despite this, the WCAG is pretty general and can be applied to mobile applications.

Within the hundreds of thousands of applications for Apple and Android, there are dozens that stand out for their attention to accessibility.

Despite this context there are several possibilities for developing mobile applications in an accessible way. Below it is described the accessibility features from the two mobile phones operating systems that have considered accessibility as part of its design.

5.4.1 iPhone

The iPhone has fast become a serious contender in the technology fashion parade among blind and partially sighted people. Apple changed the accessibility world when they introduced the iPhone and iPad with a built in screen reader (VoiceOver), an intuitive interface, and an open platform for people to build unique applications that solve personal problems.

¹⁹ <http://drupal.org/>

The array of accessibility features built into the iPhone since the release of the 3GS is stunning, and even moreso taking into account that the iPhone provides these services for free.

There is an *Accessibility Programming Guide for iOS* on the Apple website that explains the steps to make an application accessible. There is also an excellent blog called *Accessibility for iPhone and iPad apps*, written by Matt Gemmell.

Once a developer has created an accessible application it is possible to list it as an accessible app on the AppleVis²⁰ website. This is a website for blind and low-vision users of Apple's range of Mac computers, the iPhone, iPad and iPod Touch.

5.4.2 Android

Android phones are not so advanced in accessibility matters as the iPhone, therefore they are a step behind in blind and partially sighted people mobile applications.

Building accessible applications onto Android isn't quite as easy as creating an accessible iPhone application. This is mainly because the Android accessibility API has more limitations.

However, there are some information sources that may help Android developers when creating accessible mobile applications, e.g. in the *Designing for Accessibility* page on the *Google Eyes Free* site, or also the blogs *eyes-free*²¹ and *Accessible Android*²².



Figure 17 Mobile Accessibility for Android by Code Factory

Code Factory²³ is working on an accessibility framework for developers. They are the creators of the Mobile Accessibility for Android screen reader (Figure 17).

5.4.3 Examples of accessible mobile applications

Some examples of accessible applications are:

- **Proloquo2Go**: is an assistive communication device; software that allows non-communicative people to “talk”. It uses an intelligent series of icons to represent objects, actions, wants, places, etc.
- **Ariadne GPS**: It provides enough geo-specific information to make navigating streets enjoyable and encourages new adventures. Ariadne allows you to quickly explore what is nearby, announces changes as you walk, and lets you know when you approach favorite destinations, such as bus stops.

²⁰ <http://www.applevis.com/>

²¹ <http://eyes-free.blogspot.com.es/>

²² <http://accessibleandroid.blogspot.com.es/>

²³ <http://www.codefactory.es/en/products.asp?id=415>



Figure 18 Ariadne GPS Apple mobile application

- Tiramisu: This app provides real-time public bus tracking. It currently is based in Pittsburgh but will grow to other communities. Tiramisu provides significant information on wheelchair accessible buses and users are able to share information about the current bus routes.

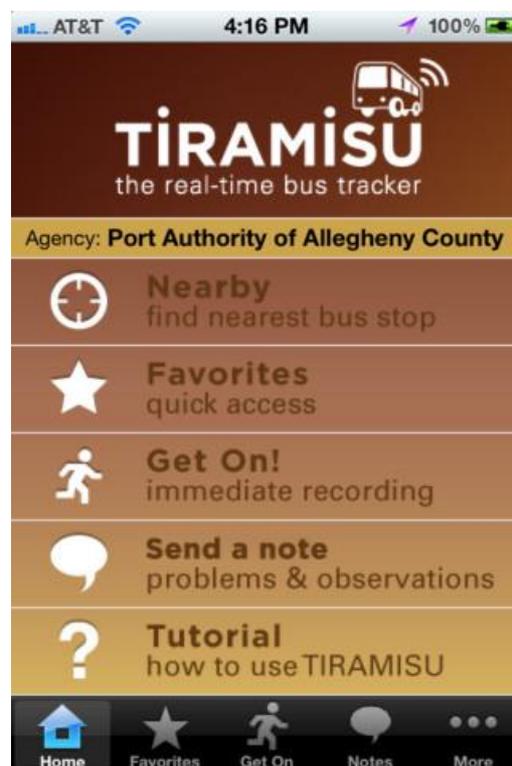


Figure 19 Tiramisu mobile application for Android and iPhone

- **Caption Fish:** Caption Fish provides comprehensive information on current movies with captions and the nearby theaters that provide closed captions services. You can also watch captioned trailers to see if there anything worth watching.

5.5 Existing EU projects on the domain

Several European projects are related to MobileSage scope and could be potential partners for building synergies. Below there is a brief description of some of them. These and other projects will be under study in order to have knowledge on their developments and the methodology used in order to identify potential weaknesses and strengths of MobileSage against them.

5.5.1 OASIS

OASIS²⁴, also known as Open architecture for Accessible Services Integration and Standardisation, is a Large-Scale Integrating Project co-financed by the European Commission (7th Framework Programme). OASIS introduces an innovative, Ontology-driven, Open Reference Architecture and Platform, which will enable and facilitate interoperability, seamless connectivity and sharing of content between different services oriented to the elderly and beyond.

The OASIS platform is open, modular, holistic, easy to use and standards abiding and is designed for the benefit of the elderly, covering user needs in terms of:

- Independent Living Applications.
- Autonomous Mobility and Smart Workplaces Applications.

Applications are all integrated as a unified, dynamic service batch, managed by the OASIS Service Centre and supporting all types of mobile devices (tablet PC, , smartphone, ...) and all types of environments (living labs, sheltered homes, private homes, public transport, etc.).

As user friendliness and acceptability is a top priority for the project, a user-centred design approach is followed along the service and application development. Tested iteratively and thoroughly by hundreds of end users, their caregivers and other stakeholders, the OASIS platform and applications will be optimized and submitted for standardization by the purpose-established OASIS world-wide Industrial Forum.

5.5.2 MyITS

MyITS project is supported by the Österreichische Forschungsförderungsgesellschaft mbH (FFG) under the 3rd call of the programme ways2go.

MyITS main aim is enabling target groups like the elderly to personalise traffic services like route-planners to their own requirements, This project will for the first time develop a modular personalised concept for web and mobile devices, combined with a Semantic Web concept (e.g. user oriented searching) and an intelligent, self-learning advice algorithm.

²⁴ <http://www.oasis-project.eu/>

Using the words of the partners, their goal is to develop innovative concepts for mobility services as:

- Modular, personalised and integrated concept for web and mobile devices.
- Semantic Web concept (needs oriented searching, integrated social networks, human oriented dialogue).
- Intelligent, self-learning advice algorithm including a feedback system and based on an innovative combination of mixed- and cross-nested Logit models.

MyITS wants to apply the next evolution step of the web, the Semantic Web, on a mobility service: the semantic web concept uses, in addition to a start-target-searching, a user oriented searching, such as: "I want to go for a vegetarian meal within 10 minutes of walking distance and I do not smoke". So it is oriented to the human dialogue and also integrates social networks like Facebook.

This project is close to its end so it would be very interesting to analyse their results in order to learn from the possible aspect that may be of interest for MobileSage.

5.5.3 2PCS

2PCS is a research project approved in the 3rd call of the AAL Joint Programme. The goal is to develop an attractive, intelligent, demand oriented and age-independent personal protection and caring system (2PCS device and infrastructure) without stigmatisation, restriction of freedom and permanent monitoring.

The aim of the project is to improve the mobility, the information accessibility and the subjective as well as objective safety of elderly people. Also it aims at reducing the emotional and psychological burden for care persons as well as for family members and to improve mobility, safety and freedom along all relevant life-phases.

A modular approach allows for individual customisation and thus personalised services for end-users. Depending on the end-users' needs, all features and services can be activated as well as deactivated by the user or by an entitled secondary end-user.

5.5.4 ENTRANCE

ENTRANCE project is also a research project approved in the 3rd call of the AAL Joint Programme. It focuses on the development of the ENTRANCE platform, which comprises a home terminal and a multimodal mobile interface for wayfinding.

The home terminal consists in a usable hardware (a silent computer to be used in living rooms) and software adapting to users with different levels of technology proficiency. The software is used to learn how to book e-tickets and vacation packages.

The mobile platform comprises navigation software, which is also used in the serious game on the home platform. This navigation software will be installed on a smart phone, and combined with outdoors and indoors positioning system, and a haptic navigation device (e.g. a wristband) for giving directions, and informational messages during navigation.

This project has many similarities with MobileSage but expands its action also to the home of the elderly with a fixe computer. MobileSage intends to set the smartphone as the unique device for the end user and also avoids sensors and other kind of devices as haptics ones that may be annoying for the elderly.

5.5.5 NACODEAL

NACODEAL has been also funded under the 3rd call of the AAL Joint Programme. This project aims at providing a guidance service by using Augmented Reality, creating friendly guides, to enable elders to be self-sufficient despite their memory diseases and access online services which are relevant to them.

NACODEAL will create a portable device easy to use and easy to understand, taking into consideration the elderly preferences. This device will enable them to actively face challenges related to daily life while keeping them connected to today's Information Society.

MobileSage scope is quite similar to this one but does not use augmented reality. This could be a potential synergy in the future with MobileSage solution as both projects could create a more complete navigation tool combining its features.

5.5.6 STIMULATE

STIMULATE has been also funded under the 3rd call of the AAL Joint Programme. The project will enable seniors to specify their assistance needs, to extensively plan a trip, to optimize the transport means and itineraries, to secure advice, to be provided with personal assistance while on the move, as well as to secure local shopping recommendations and assistance.

Advanced user communication technologies will be used for interactions, namely adapted graphical representations and navigation using common place terminals (PC, mobile phones and tablets), as well as multimodal natural / seamless expression. Advanced knowledge based GIS technologies will be used for processing and personalizing seniors' travel and shopping requests, optimizing transport itineraries, providing travel assistance, securing health care support, and enacting the overall execution of the planned travel and shopping.

This project coincides on several goals of MobileSage project as well. Also a synergy in the future with this project may be considered.

6 Socio-economic impact

Apart from the huge group of customers that are the elderly and the disabled, the impact of assistive ICT technologies in the market depends on many factors, e.g. the product/service provided, the support of the legal bodies (i.e. government), the status of the standardization process on the matter, the target user community situation on the country and many others.

However, there is a current trend that it has been gaining acceptance from governments of the European countries and others outside Europe, this is the fact of assistive ICT technologies may reduce the countries expenses in health and social services, by providing the same services provided by the governments or even other more advanced services.

Obviously the target community will benefit from this context as the offer of assistive ICT services will be wider due to the willingness of companies in providing such kind of services to an increasing ageing population.

As examples of the situation aforementioned several reports support this trend, as the following ones:

- The ACTION-service started in Sweden as a Fourth Framework Programme under the name of Assisting Carers using Telematics Interventions to meet Older people's Needs (ACTION). In the year 2008 the ACTION-service was provided in five municipalities in Sweden and cost analyses reveal savings for municipalities of approximately 96 000 Swedish kronor per family per year [12].
- In Scotland's, it has been delivered savings of £11.15m in 2007-08, based on 7,902 people receiving telecare equipment. It estimates that total cost savings over the period 2007 to 2010 are on track to be a minimum of £43m [4].
- In Sweden, around 70% of assistive devices prescribed are provided to elderly people over 65 [7].

These data are examples of success stories coming from business cases developed in two European places, Sweden and Scotland. However the aim is to spread this success to many other countries in Europe and other continents.

There are several factors, that differ from one country to another, and which directly affect the deployment of assistive ICT technologies in a country. These factors have a strong impact on the elderly propensity to get involved in ICT technologies.

It has been stated several times that whether or not the older Europeans make use of ICT is not simply a result from the age, but is strongly related to several dimensions of social aspects as several studies have investigated [13] [14]; these are described below:

6.1 Gender

Several statistics have shown that:

- The 29% of older men are daily internet users, while only 16% of older women are.
- The 53% of men live in a household with internet access, compared to 42% of women.

Gender effects in older age have to be taken in account without forgetting the close relation to differences between men and women in:

- Life expectancy in women is higher than men's, therefore their share among the very old, who are less likely to be users, is much higher.
- In education matters the years of schooling of our current elderly community differ strongly between men and women.

6.2 Education

The differences among older age groups when using ICT technologies is striking when taking into account education matters.

- The 25% of those with lower secondary and less schooling have ever used the internet
- More than the 75% of those with tertiary education.
- Daily users are 53% of all with tertiary education.
- Only 13% of the daily users have basic schooling.

6.3 Social status

The social status is also an important factor affecting the use of. The results from the SeniorWatch study were measured as a combination of occupational status and education.

- Managerial and well educated (non-manual employees) use the internet by a majority of more than 60%.
- The 44% of skilled workers and employees use the internet.
- The 22% of the lower skilled workers use the internet.

6.4 Incomes

Regarding the incomes, the statistics shown that there are clear differences on the elderly who belong to the upper quartile in comparison with those who belong to the lower:

- Upper quartile: the 84% have a computer; the 76% internet access at home; the 54% are internet users on a daily basis.
- Lower quartile: the 37% have computer; the 27% internet access at home; the 7% only are daily internet users.

As a summary of the factors described above it is important to stress that are related among each other. For instance person's educational level has a particularly strong influence in the income. Furthermore, educational background and consequently occupational status may affect the development of the personal capabilities that are required when coping with technology-related innovations.

It is also important the fact that in ten or twenty years, the elderly community will be closer to the ICT technologies as they already learn about that from their children, this is likely to facilitate access to and/or usage of ICT.

MobileSage aims at becoming a service useful for the elderly community and also to take part in the assistive ICT market. However it is still very soon to identify to what extent MobileSage solution will be affected by the factors described above.

What is important is that MobileSage solution is being designed according to the elderly community requirements from three different countries. The elderly group is a mixture of people from different education levels, age, gender, and jobs. This is a high valuable input for the project design.

Whatever the reason is for the lack of knowledge on ICT technology from the elderly, MobileSage is focusing on solving this potential problem on the future use of MobileSage solution by addressing end users requirements and adapting to their needs.

7 SWOT analysis

SWOT analysis is a strategic method for evaluating the Strengths, Weaknesses, Opportunities and Threats involved in a project. In this analysis are taken into account the internal factors, those which depend on the company work and final product or service; and the external ones, which embrace the factors closer to the market status e.g. the competence, the customer community, etc.

In this section we aim to perform this method with regard to MobileSage solution, in order to know in advantage possible areas where the project should re-orientate.

This method was already applied in a very early stage of MobileSage project so here it is followed the previous analysis and it has been changed what has changed during the development carried out so far. The SWOT analysis is shown in Figure 20.

On one hand, the main strengths of MobileSage project we found that the project partners are highly qualified in the different matters the project requires (e.g. ICT experts, target users communities, industrial partners...), this conforms a consolidated consortium for doing high quality research and development towards the main objectives of the project.

It is also a strength that the technology for building MobileSage system is already available and there is no dependence on future discoveries. The hard work to do is to make use if this technology in the proper way for offering the elderly a quality service/product, and fortunately there is no such product available in the market (as some industrial partners have expressed in their specific scenarios).

In this document, it has been presented the heterogeneous target group of MobileSage project, and several aspects that affect this community in several locations (e.g. different countries). This project has anticipated this situation and it is in close contact and gathering information from target users groups from different countries.

In the context of this market analysis, a study of the assistive ICT technologies value chain has been done, thus there is already knowledge on the consortium on the nature and processes of this specific value chain.

The project has planned wide range dissemination activities in order to increase the impact of the MobileSage solution among the elderly community and also among the scientific-related groups.

On the other hand the main weaknesses of the project comes from the existence of similar solutions already having an important part of the market at the time MobileSage product is inserted into this market. Some factors as low innovative design and few outstanding functionalities of MobileSage may even worsen the competition with the similar solutions.

One important point that is being addressed by the project partners is to offer to the elderly a solution for easing their daily activities, not for making them even more complex. The elderly related partners provide important information for the developers in order to avoid this situation.

Sometimes the information transference is difficult due to the collaborative nature of the project and the spatial separation of the partners. However this is solved with periodic in-person meetings in order to synchronise the developments and share information about the current status of each part of the project.

Among the external factors that may affect to MobileSage project, there are two sides, the positive and the negative. As positive factors there is the fact of the huge target market, due to the ageing society of Europe. Also, it is positive that MobileSage project could serve as a catalyser for the elderly to start using smartphones and even using them for easing the interaction with other machines (e.g. ticketing machines). There are also several initiatives trying to solve the gap between the elderly and ICT technologies, which helps to MobileSage interests.

The market of assistive ICT solutions is mainly composed by SMEs and so is also positive, as there is no a big player controlling the overall activities on the market. This situation makes easier to introduce a new product in it.

The nature of MobileSage solution, as a software application that can be downloadable makes easier the distribution of it and also there is a variety of business models applicable to this kind of service/product.

The benefits that this kind of solutions could bring to the society are also remarkable, as it could become part of a more active and self-serving society. Possible synergies with other solutions in this line could be beneficial as the resulting product could be more complete and reach a wider target community.

As negative factors there are few, but even so they have to be taken into account. For example, it is possible that some rapid advancements in technologies at the late stages of the project lifetime result in a final MobileSage product built over the not-latest technology. However the main aim is to offer a high quality solution to the elderly and if this situation finally comes up, it could be positive to improve MobileSage product even more.

The increasing competitiveness in this market, as it has been shown in this document, is also a negative factor as it could lead to difficulties in introducing the product into the market due to a bunch of similar solutions. There are also several projects developing similar products/services so this increases more the competitiveness.

An important point to take into account is the possible non-readiness of the elderly, due to, for example, education or social aspects that have strong influence in this. This could lead to partially reach the target community because the rest of them are not ready for this kind of solutions. However, this situation only can improve year by year because the next elderly generations will be already closer to the digital society and more familiar with the ICT technology.

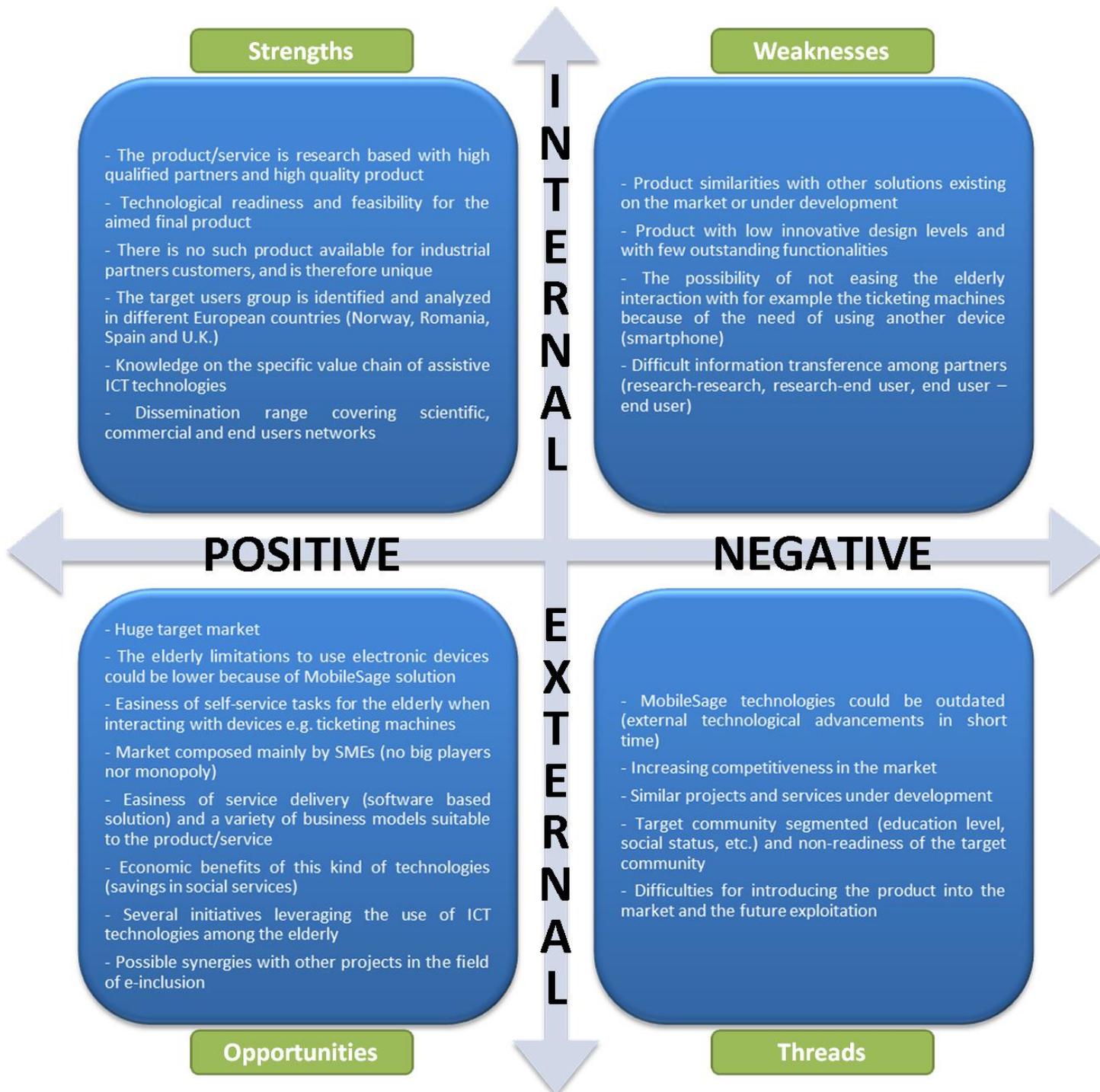


Figure 20 MobileSage SWOT analysis

8 Conclusions

In summary, the document has aimed to describe in detail the market of assistive ICT technologies.

This market is highly dependence on each country and the kind of product provided. Depending on this, the number of actors in the value chain may be numerous or only a few.

The fact that MobileSage has a transnational consortium and it is planned to develop pilots in several different countries, e.g. Norway, Romania and Spain, will be very useful for interacting with the value chain actors of each country. It is highly recommended to study the complete value chain before penetrating in different European countries.

The target user community is appealing for the companies in this sector; however, the elderly have many requirements that the new assistive technology must fulfil in order to gain their acceptance. A cutting-edge assistive ICT project designed without using the needs of the target users will not have success in this market.

The assistive ICT market in Europe is mainly composed of SMEs and there are no big players currently. However, there are an increasing amount of products, services, and developments in this field and several bear similarities to MobileSage project. Most of the R&D activities are mainly carried out by universities or research centres.

After analysing the similar solutions on the market, there are two possibilities. The first one is to stress the advantages of our solution in order to gain acceptance and thus a bit of the market; this is the competitive way. The second possibility is to study the path of a potential synergy and the benefits that may bring to the organisations to face the market together.

Apart from the scenario aforementioned, there are several socio-economic factors directly affecting the market penetration of an assistive ICT technology, when the target group is the elderly or the disabled. These factors include age, gender, and education.

Today we have an elderly community that did not grow up in the digital society, but there is a clear evidence of initiatives leveraging the existent gap between the elderly and the ICT technologies. This is very beneficial for the future market. For sure, the context will evolve in twenty years and even more, because the elderly community will be composed by people in direct contact with ICT technologies during his adulthood, not only during its old age.

Finally it is important to self analyse the product or service in development and identify the strengths, weaknesses, opportunities and threats in a SWOT analysis at these stages of a project. This will serve to improve the weaknesses and better face the threats, and to stress the strengths and take advantage of the opportunities.

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