



Smart your Home



Smart homes for seniors

Analysis on needs of senior citizens dealing with domotics

produced by the SmartyourHome consortium

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TABLE OF CONTENT

TABLE OF CONTENT	2
INTRODUCTION.....	3
ABOUT THIS PUBLICATION.....	4
THE NATIONAL FRAMEWORKS	5
GERMANY	5
IRELAND	6
SPAIN	6
ROMANIA	7
ITALY	8
THE MATRIX OF DATA COLLECTION.....	10
CONCLUSIONS AND CONSIDERATIONS	12
GERMANY	12
IRELAND	14
SPAIN	16
ROMANIA	16
ITALY	17
RECOMMENDATIONS FOR THE COURSE DEVELOPMENT	19
PEDAGOGICAL FRAMEWORK	20
ANNEX A – BIBLIOGRAPHY	27
GERMANY	27
IRELAND	27
SPAIN	30
ROMANIA	30
ITALY	30
ANNEX B – THE PARTNERS	31

INTRODUCTION

SmartyourHome is a European project funded by the European Commission under the Erasmus plus Programme. The consortium of SmartyourHome includes five partners coming from five countries: The Innovation in Learning Institute (Friedrich Alexander University Erlangen-Nuremberg) from Germany –is the coordinator; Eurocrea Merchant – Italy; the North-East Regional Development Agency – Romania; the Dublin City University – Ireland; the Asociacion Empresarial de Investigacion Centro Tecnologico del Muebley la Madera de la region de Murcia (CETEM) – Spain.

The SmartyourHome project aims to enable senior citizens to understand the characteristics and possibilities of digitalisation using *smart-home* concepts and to make active use of them. The overall aim of the project is to support senior citizens to remain autonomous in their own homes for as long as possible. Therefore, the project has the following goals:

- teach basic smart-home skills and abilities to senior citizens for senior citizens;
- enable senior citizens to understand the basic principles of smart-home and to perform initial installations.
- contribute to a long, autonomous and safe life for senior citizens at home by creating their own intelligent living environment;
- contribute to the social integration of senior citizens by enabling them to actively participate in the design of online courses;
- facilitate ubiquitous access to digital learning through online courses;
- promote interregional and European networking and cooperation between senior citizens.

ABOUT THIS PUBLICATION

This publication gathers all the information and data collected after the SmartyourHome European project has started off. The document provides an updated and structured analysis of the current national framework in terms of relations between senior citizens and smart homes. The research consists of two main sections:

- Data and conclusions post-survey;
- Data and conclusions post-focus groups;

The two different streams of information reported by each partner are combined in order to both provide a thorough presentation of the current framework in different European countries, and assess/ evaluate to prepare a fertile and solid ground for the upcoming activities of the project:

- e-learning platform;
- e-Tutors' training;
- smart-home online courses

In this study, one can observe the results, which stand out the most from the detailed research carried out within each involved country. After the analysis of the focus groups conducted in Germany, Ireland, Spain, Romania, and Italy, recommendations for the curriculum and training course development are provided, deduced by both the raw data and the sub-sequent study.

THE NATIONAL FRAMEWORKS

In order to determine the competence and needs of senior citizens regarding the smart-home concepts, one has to take into account the current framework in each partner's country. The following paragraphs answers some key-questions such as *what is the current situation of active aging/ senior citizens and ICT/ smart-home in your country? or are there already points of contact between senior citizens and technology/ smart home?* The document outlines the opportunities of any profit from the usage of smart-home products and ICT-devices in general. Furthermore, it explores the advantages and/or disadvantages of smart-home technology for seniors.

GERMANY

Modern societies are currently undergoing various transformation processes. This is reflected on the one hand in the ageing of the population and on the other in the increasing digitalisation of everyday life. Thus, the living environments of older people are also increasingly characterised by new technologies (e.g. smart home). These technical innovations harbour manifold potentials for communication, information, autonomy and social participation and can help older people in particular to prevent social exclusion (cf. Seifert, A. (2016), S.11).

This trend also emerges from various data from the Federal Statistical Office. For example, German society will increasingly be dominated by older people, as two central factors favour this development: on the one hand, the so-called "baby boomers" – the baby boomers of the 1960s – will soon reach retirement age. On the other hand, life expectancy is rising as living conditions improve. Currently, every fourth person in Germany belongs to the 60+ generation, and by 2050 it will be every third person. In addition, it can be observed that every second senior household lives within its own home, 80% of them in single-family houses or semi-detached houses, 20% in owner-occupied flats. In addition, even if the health problems increase with age as expected, most senior citizens in Germany over the age of 65 feel fit. Only less than a quarter have such serious health problems that they cannot cope with their everyday lives without outside help (cf. Federal Statistical Office (2016): *Ältere Menschen in Deutschland und der EU*, p.6f). The population feels fit despite increasing age and claims to live as long as possible in their own home. Here, smart-home concepts seem to have the potential to make a contribution to meeting this demand. The prerequisite, however, is to teach older people how to handle and use them.

IRELAND

Population ageing is coming into being as a substantial societal change (WHO 2019). Medical and technological advancements have directly contributed to the extension of one's life expectancy and to a greater quality of life in these newly *added* years. Although ageing is a worldwide issue, the process is heterogeneous. While Europe experiences an overall ageing population growth, with Italy and Germany at a more advanced stage, Ireland stands out momentarily as a contrast. According to the latest Census Report published by the Irish Central Statistics Office (CSO 2016), the average age of the Irish population is 37.4 years old – while the European is 42.4 years old – with 13.38% of the Irish population over 65 years of age. By 2041, however, it is estimated that at least 25% of the Irish population will be over the age of 60 (Walsh & Harvey 2011). It is also worth noting that of the total population aged 65 years and over (637.567), 156.799 live alone, representing 26.7% of the total (CSO 2016).

At a macro-policy level, Ireland is aligned with the frameworks adopted by most European states¹. In this sense, the demands brought by ICT massive modernisation are a policy concern to Ireland (NDS 2013). Often identified as a “tech hub”, it is the country that benefits most from US tech investment worldwide² (Goodbody 2019). Ireland is also witnessing the boom of early-stage technology start-ups. In the last few years, Sanyal (2018) observes that “technology start-ups building Artificial Intelligence, AR/VR, Blockchain and Internet of Things are gaining momentum”³.

In spite of such openness to technology, Ireland's seniors may not participate fully in society as digital citizens. Successive governments investments in programmes to assist senior citizens with ICT have not decreased the gap between internet use by seniors in Ireland and those of other EU countries (Age Action 2018). Seniors citizens are “left behind” as “an increasingly online Ireland” offers them little support to develop digital skills, a phenomenon known as digital exclusion (ibid). CSO (2016) statistics and the National Digital Strategy's report (NDS 2013) estimate that only 3% of people aged 75 and over use the internet in Ireland. Moreover, according to estimations, almost 440,000 seniors in Ireland have never been online (representing 70% of the total population over 65). Only 17% of Irish people aged 65-74 have “basic” or “above basic” overall digital skills, against 25% of EU average (Age Action 2018).

SPAIN

The share of the elderly population is growing worldwide, and Europe stands out as the world region with the highest current and projected values (Figure 1, World population ageing. United

Nations). Health care costs have been growing in recent years at a higher rate than the economy in most countries, and they are expected to grow even faster with the aging of population, becoming a bigger problem to deal with by our societies. The use of ICT for assistance, such as smart-home technologies, is clearly emerging as the only viable solution to address this problem.

In particular, Spain is one of the European countries with a highest growth of aging population. In 2015, Spain was the 14th country in Europe in terms of the percentage of older people in the overall population, but it will be the 5th in 2030 and 4th in 2060.

Older people in Spain get the following type of assistance from social services (data at 31/Dec/2016):

- Teleassistance: 9.28%. The main type of teleassistance solution is a personal wearable alarm with a button that can be pressed in case of emergency, however it could even be reached through phone;
- home assistance by formal career: 4.20%
- day care centres: 1.09%;
- nursing homes: 4.28%;
- assisted-living apartments: 0.11%;
- all of the above forms of care add up to 18.96%.

Those numbers imply that around 81% of people are not receiving any kind of formal assistance or teleassistance and implies that there is a big market for ICT solutions like smart home devices. Unfortunately, the market of smart-home for older adult care is still in its infancy, and special efforts such as the SmartyourHome project are required to promote it.

ROMANIA

Romania is undergoing a profound socio-economic transformation brought about by unprecedented demographic change. The process of population ageing has been the result of steady improvements in life expectancy and declining fertility rates during the last four decades. The process of demographic ageing in Romania is further accelerated by a more recent dramatic increase in net emigration among younger aged groups.

According to the National Institute of Statistics, nearly two-thirds of the total households in Romania, had a home computer in 2017, 65.9% of which were concentrated in the urban area.

Regarding the internet facilities, 68.6% of households in Romania had access to the home network in 2017, 64,3% being concentrated in the urban area.

In the residential environment, the frequency of computer use shows significant differences in the urban environment compared to the rural one, so the number of people using the computer in the urban environment is almost 1.7 times higher than that of the rural users.

Table 1. Frequency of computer use in Romania	People who have never used the computer	People who used the computer	Out of which	
			In the last 3 months	More than 3 months ago
16 – 34 years	8,5	91,5	92,5	7,5
35 – 54 years	20,8	79,2	84,3	15,7
55 – 74 years	55,2	44,8	68,5	31,5

http://www.insse.ro/cms/sites/default/files/com_presa/com_pdf/tic_r2017.pdf

ITALY

Italy presents an old and ageing population: statistics report the average age being 44,4 years old, with an average length of life estimated at 80,1 years for men and 84,7 years for women. People aged more than 65 years represent the 21,7% of the entire population: this ageing trend is not supposed to diminish in the next years. The Italian society will be composed by older and older citizens, since the life expectancy is expected to keep growing.

Italian elders, therefore, generally live long and alone: 52,2% of the ones aged 85 and more is living alone. In addition to that, people aged 64 or more also have significantly lower incomes comparing to the other population cohorts: from North to South, elders have worse economic conditions than the rest of the population, they spend less on food and groceries expenses. The 22,8% of elders living alone aged 65 years and more is at poverty risk comparing to the national average of 19,4% and enjoy less good health state, considering that less than 30% of the people aged 75 and more evaluate good or really good his/her health conditions, mainly because of the chronic illnesses and diseases affecting more than 85% of the older people.

Smart homes for seniors

Competences and needs



Unfortunately, the current level of elders' digital skills and competence of new technologies is not enough. Only 24,4% of the people aged 65-74 and 6,6% of the ones aged more than 74 can use the computer, very similar are the figures for Internet: Italian elders are 'digital primitives': their competences are at very basic and limited, impacting therefore on their willingness and ability to buy and use smart-home appliances.

THE MATRIX OF DATA COLLECTION

The following data were collected through a survey developed by the SmartyourHome consortium. Since the literature around the specific topic of senior citizens and smart homes is rather insufficient to take certain decisions, the pre-proposal analysis of the partners – that had shown a high interest towards the main topic – had to be completed and enhanced necessarily.

Therefore, a targeted study was carried out among each partner's local/ regional/ national network; you can find the information about the data collection methodology for each country – hence partner: Germany (ILI), Romania (ADR Nord-Est), Spain (CETEM), Italy (Eurocrea Merchant), Ireland (DCU).

Matrix of data collection	Germany	Romania	Spain	Italy	Ireland
Type of data collection	Online survey	Online survey	Online survey	Online survey	Online survey
Number of questions	19	19	19	19	19
Number of respondents	24	23	80	29	20
Number of beginners (those who necessarily skipped the technical questions due to survey logic)	6	17	52	22	4
Number of advanced users	16	6	25	6	14
Number of experts	2		3	1	2
Indication about the age ranges of the respondents					
Under 50 years	1	1	4	1	4

50-60 years	13	13	6	3	10
60-70 years	8	7	37	11	3
70-80 years	1	2	30	13	3
80-90 years			3		
Not disclosed	1				
Time span of the questionnaire	02.04.2019	02.04.2019	02.04.2019	02.04.2019	02.04.2019
	– 28.04.2019	– 10.05.2019	– 06.05.2019	– 28.04.2019	– 29.04.2019
Gender distribution					
Female	7	9	45	13	13
Male	16	14	35	15	7
Not disclosed	1			1	

CONCLUSIONS AND CONSIDERATIONS

This section summarises competences and needs of the senior citizens regarding smart-home technologies. Several aspects were taken into account, such as i) how much seniors already know about smart-home technologies ii) how these developments influence the lives of older people iii) to what extent seniors can benefit from these smart technologies. Each partner has provided conclusions – and hence considerations – based upon data and information collected by the project survey and the focus groups. The research and studies carried out by the SmartyourHome consortium within the first semester of 2019 is highly enriched by the contribution gathered from focus groups and interviews conducted in each partner's country by the respective organisations. A focus group consists of a small number of people (usually between 4 and 15, but typically 8) brought together with a moderator to focus on a specific product or topic. Focus groups aim at a discussion instead of on individual responses to formal questions, and produce qualitative data (preferences and beliefs) that may or may not be representative of the general population.

Having drafted a shared methodology for the focus groups management, each organisation has planned and set up its own focus group/ interviews rounds according to their local network and participants' needs. The results has been great in terms of overall participation, contribution supplied by both attendants and organisers, and dissemination of the SmartyourHome work.

GERMANY

Overall, it can be said that digitisation permeates large sections of the population and thus also focuses on older people over 50 as a target group. This means that the world in which older people live is also characterised by new technologies, which means that senior citizens should and want to deal with these issues. These technical innovations – such as in the area of smart homes – can be of great benefit to older people, especially because of the manifold potentials for communication, information, autonomy and social participation. Smart-home technologies can be of particular advantage, especially for older people who tend to live in their own homes - more than 95% of them in this data survey. This positive characteristic of smart technologies also applies to senior citizens who tend to live in rural areas and thus do not have it quite as easy in old age to participate in social developments as is perhaps the case with people who tend to live in urban areas. The gender distribution is also remarkable in the online survey, since contrary to all expectations, the topic of smart homes is not a purely male-dominated field either, but also arouses interest among the female sex.

Various studies on the subject of smart home as well as the results of the present evaluation of the online survey show that the best agers (50-99 years) already have ICT skills and experience in using the internet, computers and smartphones. Most elderly people – of the focus group – even know the term “smart home” and know what it means; more specifically, this can be seen from a small sample, but no general statement can be made for all seniors in Germany. However, the use and programming of such devices still accounts for a very small percentage, i.e. this is where the courses that are developed in the project should start and impart basic knowledge about smart home as well as expert knowledge for people who have already dealt with the devices in more detail. This is further supported by the fact that more than two thirds of the respondents have never used or programmed a microcontroller (Arduino, Raspberry Pi, ESP 32, etc.) and therefore the courses should definitely start on a basic level in order to teach older people how to use a microcontroller step by step.

As in the AAL study (2017), in this online survey smart devices for home monitoring, automated heating control, remote control of alarm systems with burglar, smoke and water detectors, automated control of lighting and cooling, and garden irrigation control are particularly useful for the respondents. The interviewees who had no contact with smart-home devices at all were particularly interested in smart home in the area of entertainment, followed strongly by health, home security, energy management and automation/comfort. However, these results also show that most elderly people are not yet aware of the full range of smart home possibilities. For this reason, the online courses that are being developed should be a bit more educational about smart home in order to make clear what potential there is in smart home and what advantages it offers, especially for older people.

Unfortunately, the occurrence of technical problems, which the participants of the online survey answered with “yes” to almost 43%, is still relatively high. At this point, care should be taken to ensure that our courses run well from a technical perspective (platform, etc.) and that both a responsible e-tutor (also a senior citizen) and the project partners are available as supporters and companions.

In addition, the senior citizens attach particular importance to safety and to a long life at home, which also makes it indispensable to inform about the correct handling and use of smart home devices. The topics of data protection and usability have also been regarded as very important. This means that the not yet fully developed technology still arouses great distrust in most elderly people. In order to counteract this, the online courses should teach seniors citizens how to use smart home applications and services responsibly in order to reduce their fear of innovative technology.

Overall, the focus group has helped to reinforce the information and results of the online survey and has provided a space to discuss certain details in more detail. This resulted in valuable information, which is of particular importance for the development and creation of the platform, online courses and interactive videos. All six participants were highly motivated to participate in the group discussion and expressed their interest in the smart-home topic. The SmartyourHome project thus picks up on a very current trend by making digitisation and in particular the smart-home theme accessible to older people.

IRELAND

SmartyourHome survey results show what seniors want from smart-homes: safety, energy efficiency and savings. However, they are concerned with privacy violations and installation and maintenance costs. The majority of the participants show openness to becoming smart-home e-tutors and have positive perception towards smart-homes and their potential benefits.

One crucial aspect of this investigation is the existence of little or no data on the specific population of senior citizens and the use they make of smart-home devices/services in Ireland, a gap SmartyourHome Survey has partially addressed. Despite being a fruitful medium for tech foreign investments and start-ups, which stimulates the dissemination of technology – in whatever form – across its society, Ireland's ICT efforts towards senior citizens are chiefly related to enabling the latter to access e-government services (NDS 2013), and health services, a fruitful field where smart-homes can be used actively (Kelly et al. 2009). One major example of the possibilities offered by smart-home environments is the new, cutting edge digital health technology project led by Trinity College Dublin, and launched by the Irish Government, enabling older people with multiple chronic diseases to self-manage their conditions and to be cared for in their own homes (HI 2016).

Ireland has a considerable pool of organisations that support senior citizens in distinct forms (see <https://www.hse.ie/eng/links/links-by-topic/elderly-links/>), but the examination of its current landscape indicates a hiatus between smart-home technology and senior citizens. Only 1 in 10 adults in Ireland own a smart home (IE 2018) and despite 70% of the SmartyourHome survey sample knowing “what smart-home means”, mere 20% have bought related products and/or services.

Moreover, the problematic of digital literacy and learning support should not be underestimated. Only 17% of Irish people aged 65-74 have “basic” or “above basic” overall digital skills (Age Action 2018). As one SmartyourHome survey participant points out, smart-home could bring an “increase in stress for some who struggle with the technology”.

As the focus group progressed, participants engaged progressively more with smart-homes thematic. Despite being oblivious to the term “smart-home”, 18% participants were already using smart-home technology (cameras, doorbell, wi-fi light switchers). 91% of the focus group participants use computers and smartphones on a daily basis, which demonstrates a high degree of engagement with basic technology. Participants’ concerns associated with smart-home involved: security (36%), savings (18%), concern in learning about smart-home technology (18%), and trust (9%), showing similarity with findings from SmartyourHome survey report.

All participants agreed that control over one’s environment, flexibility, and efficiency provided by smart-homes would be crucial should they engage in making their homes smarter. Other main factors that would make one’s home smarter are security, comfort and independent living (especially in relation to health issues). Those factors were associated with the use of smart devices, such as doorbells, lights, alarm systems, and cameras.

Concerns associated with smart-home technologies (Ireland)
Security (36%) with one mention to possible attack of hackers, and fear of privacy violation as “companies monitor users for quality control purposes” (Participant 8).
Savings (18%)
Interest in learning about smart-home technology (18%) Participant 3: I would like to have other people rather than my daughter to talk to me about technology. I’m not in the zone. Participant 10: I would like to know more, the more you know the better the decisions you can make.
Low digital skills hindering engagement with technology (18%) Participant 5: I don’t know which button to press, they look great, but I don’t know what to do with them. In the end of the day, it’s not practical. Participant 4: I’m not good on the internet.
Trust (9%) Participant 4: Old fashion key is sometimes better than technology and a lot of new cars are disappearing because of it. The other day I was in the middle of nowhere and my car keys didn’t work because of the battery, and there is no place to turn the car on...this is technology that backfires. I don’t want to learn. If I buy smart-anything, I want it to work.

SPAIN

The questionnaire results highlight that the target group of SmartyourHome is made up of people aged 60-80 years with low ICT skills and no programming knowledge. On the other hand, smart-home device users show a good level of competence in installing devices. This fact, together with their willingness to support other learners, points towards a good chance to find good e-tutors.

They prefer 2-4 hour of weekly training in face-to-face sessions or groups meetings with a predisposition to mixing other forms of training. They reject online-only training at the same level as intergenerational learning.

Considering their interests, expected smart-home benefits and concerns, the training content should include: i) energy and cost savings ii) assistance and health iii) home security iv) dealing with complexity and privacy v) solutions with low recurring costs.

Other areas that could be included, but not so important are i) entertainment/ communications ii) automation/ comfort.

The attendees of the Spanish focus group were concerned about the difficulties of learning about technologies due to their lack of familiarity with them, and its associated language. Therefore, special effort has to be put into designing the training content so that it can be easily followed by the students starting from basic concepts and using plain language. Too technical expressions should be avoided. Hands-on learning can also help to acquire technical knowledge and processes. Programming is seen as something too complicated that falls out of the reach of the common older adult, so this could only be studied by very few advance learners.

It was surprising to see how strongly they supported face-to-face training and shied away from online training. They would only accept online training after initial in-person sessions that teach them how to take the courses. Even in that case, they may lack motivation to finalise the course. This is related to the fact that they showed little interest in becoming e-tutors (they prefer in-person interaction). So, these issues have to be carefully addressed within the SmartyourHome consortium.

ROMANIA

The competences of the senior citizens from Romania regarding smart-home technologies are very weak, considering that more than half of the surveyed persons being without experience or beginners regarding ICT. Only 35% of the surveyed citizens know about the “smart-home” concept.

In the other hand, we should bear in mind that the citizens are opened to learn more about any methods of improving their quality of life and we should explore their willingness.

The smart technologies that have a great potential of implementation are those regarding safety houses, health monitorisation and home comfort, as for example: i) the connection of the smart phone to the video cameras ii) application for receiving text messages when the house alarm goes on iii) smart medical-care: monitoring the vital functions, pill reminder and medication trackers or medical appointments iv) intelligent lightning with wireless devices.

The smart-home devices for senior citizens are available to help users live independently and to improve the quality of their life. As more voice-controls appear on the market, connected to a growing array of smart home devices, the number of options for older people increases. As a result, gracefully aging in place is becoming a viable option for many elders who would previously have been unable to safely stay in the homes they love. Families can more easily be in touch, and can have the assurance that the people they care for are healthy and well, or can get help immediately if a problem occurs.

The attitude of the participants at the beginning of the discussion was very reluctant, but as we were presenting the smart-home concepts in simple words, their attitude changed, being proactive and started asking questions to find out more.

All in a nutshell, we should explore the willingness of the participants in learning new concepts, by creating a friendly course and platform. We can do this using simple words, using interactive video clips with a strong visual support, describing every concept with examples, and underlying the fact that the price of this devices is constantly decreasing, being more accessible.

ITALY

Smart-home technology is widely appreciated and of interest among Italian elders: the topic is considered important and many are the benefits and advantages attributed to smart home devices, namely and specifically the ones related to security and safety, simplification and comfortable living, day by day support, entertainment and relax, economics savings.

The seniors are mainly interested by the devices working on and supporting or guaranteeing security of their apartment and safety for themselves; health, like body measurements and alarms; energy; communication and entertainment. Seniors are aware of what smart-home technologies are and what are the various purposes and characteristics, they are also willing to spend money on

smart-home devices: curiously, costs are as well, together with lack of privacy, what most worry the respondents.

The general picture emerging from the questionnaire, also in relation to the specific country situation, highlights the positive impact and effect of smart home technologies on seniors, their strong interest in it and their willingness to know more and be trained to better use the devices: for sure smart-home devices could be greatly beneficial to older people, boosting their autonomy, helping them tracking their health and body values and empowering their experience in their own place. Unfortunately, the lack of digital skills and low level of technological awareness among seniors is the main barrier to the widespread of those innovations.

The three focus groups conducted among Italian seniors substantially confirmed the figures emerged from the analysis of the survey. In all the three groups, the interest of seniors for the subject was clear and openly expressed. The participants highly evaluated the value of smart devices applied to their life; they stressed the importance of technologies in general (not only smart-home appliances) for keeping in touch with family and friends and for being connected with the world as well. They saw technology under a positive light, reporting the utility, comfort, entertainment the devices provide. Nevertheless, in each group, seniors were worried about their own level of digital skills and competences and how it could negatively affect their experience with smart-home devices: they labelled their own level as low or intermediate and, in addition to that, they insisted on the need of help and support with smart technologies, from the installation to the usage and maintenance.

From the discussion, it emerged also the view of elders in terms of benefits and potential threats of devices, the main pros being safety's and security's sphere related ones and the main cons being the dangers to privacy and high money costs. The worries of the seniors are in line with what is actually their socio-economic situation, given that the vast majority of Italian elders live alone, is not autonomous and suffer material deprivation or has in any case very limited economic resources.

RECOMMENDATIONS FOR THE COURSE DEVELOPMENT

Now the document outlines a set of recommendations for the course development, reflecting the main common points and similarities of the outcomes among the partner countries. It is still important for the course development that the online courses don't last longer than 4 hours and consists of a mix of methods through which independent learning as well as the social contact so often longed for by older people is achieved. The following recommendations for action aiming to shape the best products to be created in the SmartyourHome project can be made at this point:

- Simplicity in handling smart-home devices
- Easy and simple operation of intelligent home technologies
- Important topics: i) health ii) help iii) data protection iv) (own) safety v) comfort vi) energy
- Explanation and instruction of older people in the use and handling of smart-home devices and applications (enable for independent use)
- Conception and development of online courses at basic level with increasing difficulty level during the course of the courses
- For the time being, excluding the topic of programming smart-home devices from the conception and development of the online courses and products in this project (conceivable only as the very last unit of the advanced course – for expert seniors).
- To teach older people the ability to distinguish useful from unusable smart-home devices (to retain their maturity).
- Attempt to reduce the distrust of older people towards smart home by means of the products developed in the project.
- Ensure that the smart home works (offline use – it should also be possible to use in case of power failure or no WLAN)
- Establishment and guarantee of support, assistance and contact point(s) for senior citizens with questions and problems regarding the project and its products (e.g. e-tutors to accompany online courses, etc.)

Although the majority of learners were relatively unfamiliar with smart-home concepts, they were able to point out benefits and concerns brought by this technology. Most significantly, there is a perceived openness from both survey and focus group participants to further engage with smart-home technology. In this sense, the findings from SmartyourHome survey and focus group reports indicate that the content and instructional design of future SmartyourHome training courses should be aligned with learners' little or no prior knowledge on smart-home technology.

PEDAGOGICAL FRAMEWORK

After the competencies and needs of the target group of senior citizens have been examined more closely across 5 European countries (Germany, Italy, Romania, Spain, Ireland), it is time to structure the results and the recommendations for action derived from them. This is necessary to have a kind of "roadmap" for the development of the online courses in the SmartyourHome project. This will be done through the development of a pedagogical framework, which can now be found in the following part of the document.

The following didactic, target group-specific components and activities for the planning and implementation of online learning offers within the framework of this project are described in this overview:

- Intrinsic Motivation
- Heterogeneity
- Social inclusion/ autonomy
- Openness for technical issues (smart home)
- Responsibility/self-management skills
- Communication

In addition, practical findings and pedagogical recommendations are defined.

At the end of the pedagogical framework can be found a first draft of the structure for the construction of the online-courses in the SmartyourHome Project. Based on this foundation the online courses will be developed. For the time being the course structure has only a design character, i.e. it will be dynamically adapted as soon as changes occur during the course development.

This structure has been developed especially for the online courses in the SmartyourHome project and does not claim to be universally valid.

<p>Intrinsic Motivation</p>	<p>The majority of senior citizens is interested in ICT. They are also motivated to learn new things – especially smart home – which is particularly important for this project. The only limitation that emerged from the survey and from the Focus Group is the fact that most senior citizens have only heard of the term smart home, but do not know exactly what it is and how to use it. Seniors are also very curious about innovations in technology and smart home, as they would also like to stay up to date, have a voice, want to be heard and help shape the future, get information on how to use and connect different smart home devices to have a longer autonomous and more comfortable life in old age in their own home.</p> <p>Senior learners have an intrinsic and/or extrinsic motivation to participate in the course (his/her own interest):</p> <ul style="list-style-type: none"> • The course is dedicated to those people who want to learn. • The course is aimed at people who want to learn more about technical innovations and smart home. • The course has to identify and address to the learners’ motives and interests to participate in the course. • The course should be at a level adapted to the target group, so that seniors are not deterred or even demotivated. • The course should include a mix of methods and supervision (support), so that learners do not interrupt the course during this time, because the topic of smart home is too complex. • Despite of an assumed high level of motivation to participate in the course, there should be the awareness that learners’ motivation is always a very fragile and not changeless thing.
<p>Heterogeneity</p>	<p>Online courses in SmartyourHome should start at a very low level so that also people with less ICT-knowledge can run the courses and all have access as a learner. The reason for this is that some senior citizens have fears and concerns of losing control about aspects of privacy and data security. One of the participants of the focus group pointed out there is a “feeling of insecurity” while using computers, tablets or smartphone, and that could be the reason, why senior citizens</p>

	<p>are sceptical and cautious about new technology and technical innovations. For course development in SmartyourHome, this means trying to reduce older people's distrust of Smart Home by using the products developed in the project. Only a few of the respondents' heart and worked with Arduinos or RaspberryPi's, so it is very important to find a good middle way so that a basic level of the course as well as a level for advanced learners is offered. This way each learner can decide for themselves which level he wants to enter and what content he is interested in. For conception and development of the online courses means that to start at a very low level with increasing difficulty during the courses.</p> <p>Since the partners have been working with senior citizens since many years, they know how to respect the large diversity of senior citizens by providing</p> <ul style="list-style-type: none"> • different paths • different levels of difficulty of the chapters/modules • increasing difficulty during the course • a very clear language • small learning bits • different ways of support • synchronous and asynchronous guidance and feedback <p>That means that the learners form a very heterogeneous group, and this must be considered during the development of the course concept and also the eLearning modules.</p>
<p>Social inclusion/ autonomy</p>	<p>One of the crucial points in the SmartyourHome project is the component of social inclusion of seniors. This is ensured in the project by the active participation of seniors in the creation and implementation of online courses and products. The approach is a peer-to-peer approach, which means that seniors teach seniors the smart home topic (e.g. seniors as eTutors in online courses). The desire for social inclusion is very high among seniors, which becomes very clear in</p>

	<p>the demand for a mixed-method approach (variation face-to-face and online sequences). This approach is especially intended for seniors who would like to participate in learning opportunities but cannot do so due to a lack of mobility or time (e.g. because they have to care for relatives, etc.). In addition, senior citizens want to be able to remain autonomous in their own homes for as long as possible. The SmartyourHome project could contribute to this by explaining smart home devices, applications and services comprehensively, teaching seniors how to use them responsibly and thus recognizing and becoming aware of the great benefit of using smart home devices for their own everyday life.</p> <p>The Consortium of SmartyourHome project recognized the following characteristics of senior learners:</p> <ul style="list-style-type: none"> • Social inclusion through active participation of senior citizens in the creation and implementation of the online courses and products developed in the SmartyourHome project. • The desire of senior citizens for a long autonomous life in their own home in old age. • Make the seniors aware of the great benefits of smart home devices and applications. • Online course offers enable all seniors to participate, only requirement is interest in the topic smart home.
<p>Openness for technical issues (smart home)</p>	<p>Many seniors use computers or smartphones, some of them even every day. Given this fact, it is not surprising that most seniors also have access to the Internet, mostly without help. This means that there is no person at their disposal who can ask them about any problems they may encounter while using their computer, smartphone or the Internet. This is exactly where the SmartyourHome project comes in. The online courses, which are developed in the project, not only wants to apply and pass on knowledge about smart home and services, but also offer appropriate support for courses for learning seniors. Although a large number of senior citizens have only heard the term smart home, but know nothing more about smart home, the interest in ICT remains very high. (New) technology is and will remain a topic on which seniors would like to stay up to date. As just mentioned, knowledge about smart home is not yet very widespread among</p>

	<p>seniors, which is why seniors would like the SmartyourHome project to focus on the basics of smart home. The topic of programming smart home devices and networking them with each other should therefore be left out for the time being, because of complexity. The only option could be to mention the topic programming and devices like RaspberryPi and Arudino in one of the last chapters of the online course for advanced learners. The seniors want simplicity in dealing with smart home devices and an easy application of those. In addition, it should be ensured that smart home applications and services really work (very important in case of emergency - even in the case of a power failure or WLAN malfunction).</p> <p>Learners in SmartyourHome project should be open for technical issues:</p> <ul style="list-style-type: none"> • It is supposed that learners who want to participate in the eTutors' course and the other eLearning courses of SmartyourHome are open to a certain degree for new and innovative technology like smart home is one, but have fears at the same time, too. • The online courses should start at a very low level and increase in difficulty during the courses so that concerns about the new technology can be addressed and seniors see smart home as more of a day-to-day support than a vice.
<p>Responsibility/self-management skills</p>	<p>In the online courses themselves, the seniors are responsible for themselves, they determine when, how much and what they want to learn. This does not mean, however, that they are completely on their own, quite the contrary: the course frameworks help and encourage the learners to find their own learning path and to follow it.</p> <p>Learners in SmartyourHome are characterised by the following characteristics in their learning behavior:</p> <ul style="list-style-type: none"> • Learners are responsible for learning themselves. • But the course framework should help and encourage the learners to find their own learning paths.

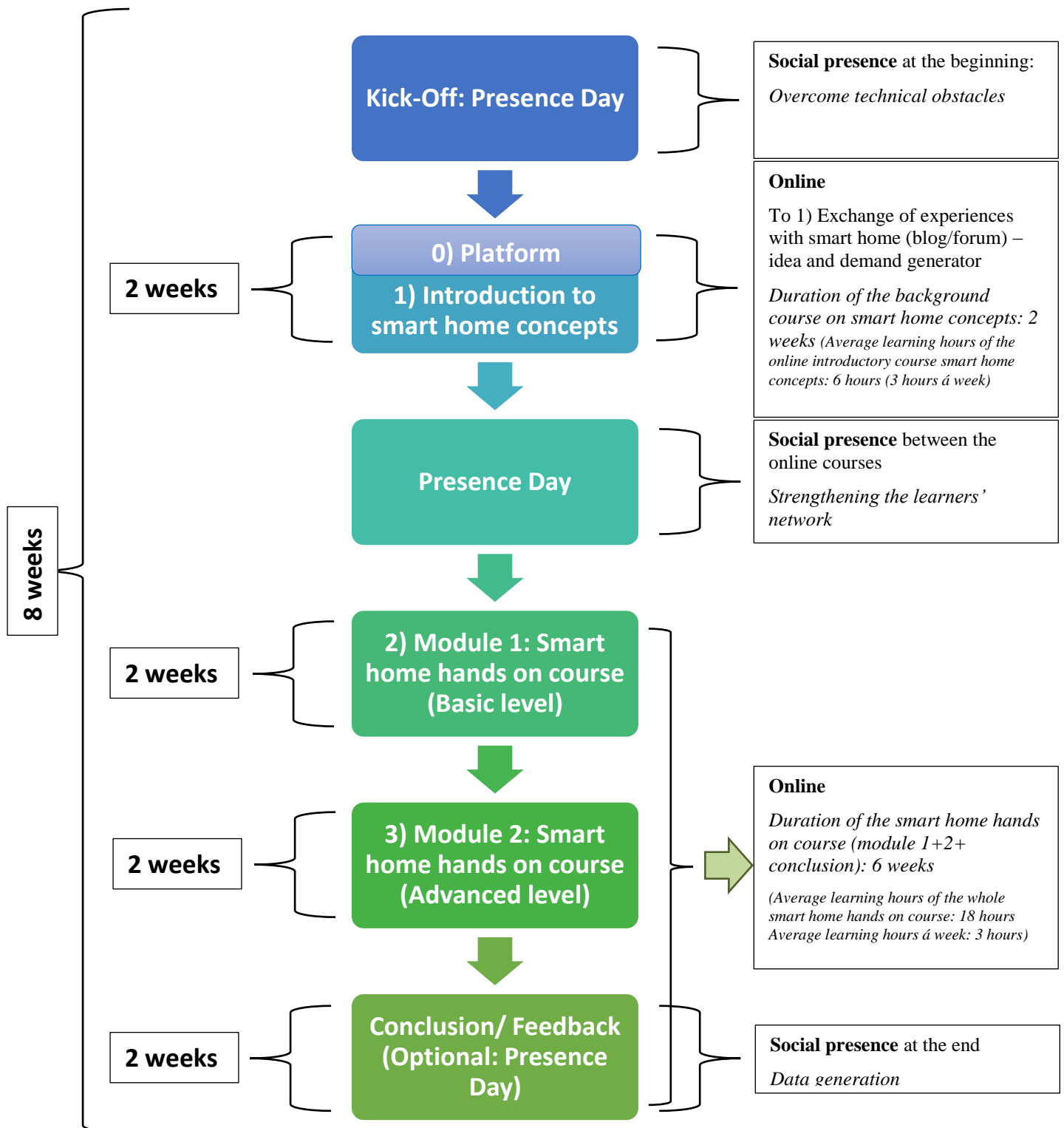
Communication

Communication between the course participants does not happen by itself. It has to be activated in the beginning (for example through a presence day at the beginning of the online course, an e-mail from tutors and course management, threads and comments in the forums, etc.) and it should be promoted during the whole course. To make sure that the seniors do not feel left alone in the SmartyourHome online courses, committed and motivated seniors are trained in advance to become competent eTutors (Peer-to-peer- Approach). An extra eTutors' training course (online) in the project itself is planned for this purpose. In addition, it is important to set up and ensure support, assistance and contact points for older people with questions and problems concerning the project and its products. This can be done, for example, by accompanying e-tutors in the online courses or by supervising the course creators, etc., so that there is no obstacle to participate in the SmartyourHome project – despite the complex topic. Another point is the fact that seniors wish to learn from the online courses in SmartyourHome to distinguish useful from useless smart home applications and devices. Always with the thought of keeping one's own maturity over these devices. The seniors also want explanations and instructions on the use and handling of smart-home devices and applications, so that they can use them autonomously and independently and are therefore not dependent on anyone else.

Communication in Online Learning environments a very important tool for exchange between trainer and learner:

- Communication between the course participants does not happen by itself. It has to be activated in the beginning (for example through e-Mails from tutors and course management, threads and comments in the forums, etc.) and it should be promoted during the whole course.
- Communication (for example peer-peer, one-many, etc.) is a factor for success in a learning environment.
- Communication enables and guarantees appropriate (learning) support, accompaniment and supervision of online courses, which is of enormous importance for senior citizens in the (online) learning process.

Construction of Online Courses in SmartyourHome



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ANNEX B – THE PARTNERS



In its research and development, the Innovation in Learning Institute (ILI) focuses on innovation processes in lifelong learning and teaching, education and skills development in a systemic perspective, and based on relevant societal changes. ILI is an interdisciplinary team consisting of 30 members from the humanities and technological sciences. The institute carries out research within the fields of digital and media based learning across the entire life span, including school children and senior citizens. Being part of a broad network of European and international partners, ILI participates in numerous projects and provides service, guidance, and know-how.



Eurocrea Merchant is a management consulting firm, active also in research and training, with three offices in Italy in Milan, Naples and Aversa (CE) and a point of contact in Brussels. Its mission is to improve the competitiveness and innovation of European society. It focuses on three core business units that correspond to three teams of qualified experts: i) management consulting ii) education and training iii) European projects. The team works to ensure access to the best funding opportunities to support our projects and those of our customers. The Eurocrea's experts offer consulting and training services in the fields of project design, project-cycle management, evaluation and quality assurance.



North-East Regional Development Agency is a non-governmental (NGO), non-profit, public utility organisation, established in 1999 with the mission of being a generator of economic and social development in the North-East Region of Romania, by promoting strategies, attracting resources, identifying and implementing financing programmes and offering services for stimulating sustainable economic development, partnerships and entrepreneurial spirit. In pre-accession period (1999-2007)

the main activities of the organisation were to fulfil the role of Implementation Authority for PHARE Program and for the National Development Fund, whereas in post-accession period (2007-present), NERDA was Intermediate Body for multiple programmes such as the Regional Operational Programme (ROP) and the Sectoral Operational Programme Increase of Economic Competitiveness (SOP IEC).

CETEM

CETEM is a non-profit scientific research and training organisation located in the south east of Spain. It was created in 1994 from an initiative led by private companies with the initial support of national and regional governments, as well as the EU. Its main goals are to promote the industry through R&D and technology transfer, and to contribute to the greater good of our society. CETEM is formed by around 40 professionals with a broad set of backgrounds: engineering, ICT, multidisciplinary teaching, technology transfer, business administration, chemistry, psychology, design, etc. In relation to SmartyourHome, the centre has a clear strength and focus in training and development of Electronic Embedded Systems and Sensors in general, and has participated in numerous research projects developing AAL (Ambient Assisted Living) technology and solutions for supporting the elderly.



The DCU Institute of Education is a centre of expertise and excellence in teacher education and education more generally. It hosts a range of research centres in key areas of priority and has an ambitious programme of research across education. With internationally recognised experts in policy, curriculum and pedagogy, assessment and teacher education, the Institute provides a learning environment that is student-centred and inclusive. Committed to academic excellence and innovation, the DCU Institute of Education is confident its graduates will flourish in the challenging and complex contexts of the 21st century societies.