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Elderly People's Quality of Life with Information and Communication Technology (ICT): Toward a Model of Adaptation to ICT in Old Age

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ABSTRACT

Demographic changes and limited economic resources require more in-depth society involvement. Therefore it is necessary to seek opportunities for the social inclusion of elderly people. A full participation in society would enable elderly people to take action for creating circumstances for active and healthy aging and thus positively affect their quality of life (QOL). The purpose of this study is to understand and support elderly people in their ICT engagement, through which they could become equal members of information and knowledge society and in this way, through personal empowerment, affect their QOL. Parallel to conducting an integrated literature review and developing a state-of-the-art report on the elderly's interaction with ICT, qualitative and quantitative data of different kinds were collected with non-standardized measurement tools among elderly people in Austria, Finland, Ireland, Slovenia and the UK. The aims of the studies were to evaluate and analyse elderly people's willingness to adapt to ICT and to evaluate correlations between ICT use and QOL from the perspective of loneliness. The empirical results show that elderly people's adaptation to ICT should be supported by personalized didactical methods, both from a motivational and a teaching aspect. Furthermore, inferential statistics showed a significant difference in the reduction of loneliness between the countries and genders, and a decreased level of loneliness of the elderly after an ICT intervention. Altogether, the research findings suggest that ICT interaction positively influences the QOL of elderly people; although the measurement tools focused mainly on subjective indicators of QOL. As a theoretical result, a model solution for elderly people's adaptation to ICT and definition of QOL connected to ICT were developed on the basis of the conceptual background of the study and the research results. Future research would profit from longitudinal studies of elderly people's ICT use with a direct evaluation of QOL indicators.

ABSTRAKTI

Ikääntyneen väestön määrä ja siihen liittyvät taloudelliset tekijät haastavat etsimään uusia keinoja ikääntyneiden yhteiskunnalliseen osallisuuteen. Ikääntyneiden osallisuus lisää mahdollisuuksia aktiiviseen ja terveeseen ikääntymiseen ja siten lisään vanhusten elämänlaatua. Tämän tutkimuksen tavoitteena on ymmärtää tieto- ja viestintätekniikan (ICT) yhteyttä ikääntyneiden voimaantumiseen ja tasa-arvoiseen osallisuuteen tietoyhteiskunnassa ja tarjota ICT -pohjaisia mahdollisuuksia elämänlaadun parantamiseksi. Tutkimus sisältää ikääntyneiden ICT:n hyödyntämistä koskevan kirjallisuuskatsauksen lisäksi erilaisia laadullisia ja määrällisiä tutkimusaineistoja irlantilaisilta, itävaltalaisilta, slovenialaisilta, suomalaisilta ja englantilaisilta ikääntyneiltä. Osatutkimusten tarkoituksena oli analysoida ja arvioida ikääntyneiden halukkuutta hyödyntää tieto- ja viestintätekniikkaa ja tarkastella ICT:n ja elämänlaadun välistä suhdetta erityisesti yksinäisyyden näkökulmasta. Empiiriset tutkimustulokset osoittivat henkilökohtaisen dialogisuuden merkitystä ICT:n hyödyntämisessä sekä motivaation että opetuksen näkökulmasta. Lisäksi tulokset osoittivat ICT intervention vähentävän yksinäisyyttä vastaajien sukupuolen ja kotimaan perusteella. Kokonaisuudessaan ICT:n hyödyntämissä on positiivinen yhteys vanhusten elämänlaatuun subjektiivisilla elämänlaatumittareilla mitattaessa. Teoreettisena tuloksena tutkimus tuotti mallin ikääntyneiden mukautumisesta tieto- ja viestintätekniikan hyödyntämiseen ja määritelmän elämänlaadusta ICT:n näkökulmasta tutkimuksen teoreettisen viitekehyksen ja empiiristen tulosten pohjalta. Tulevaisuudessa alueen tutkimus hyötyy pitkittäistutkimuksellisista asetelmista elämänlaatumittareita hyödyntäen.

Asiasanat: Vanhukset; Ikääntyneet; Tieto- ja viestintätekniikka; Tietotekniikka; Elämänlaatu; Yksinäisyys

Foreword

I would like to start this foreword with going a little way back in time, when I took my first steps in research in the field of health care. This happened within European projects, at first small ones and later, when getting more and more experienced, bigger ones. Mainly, the projects within which I collaborated were and still are, in one way or another, connected to elderly people and their interaction with information and communication technology (ICT). I remember how inspired I was at the beginning of my research career by elderly people, observing their efforts in contributing knowledge and wisdom which they transferred to us who cooperated in those projects. Thus my constant wish was to do as much as I could for elderly people by providing opportunities for their personal empowerment with ICT. Since I knew that it is only with new knowledge and development that I can help to change the world, this was my main reason for seeking to know more in the field of health care.

Now, as I am actually about to take the final step of the research process and am finishing my PhD study at the University of Eastern Finland, I would firstly like to thank both my supervisors, Prof Dr Kaija Saranto and Prof Dr Sari Rissanen. Without you I would not be the person I am today. With your wisdom, knowledge, and research enthusiasm which you shared with me, I became a better researcher with broader perspectives and even more curiosity for future research interests. I am grateful to both of you for giving me self-confidence and self-esteem for carrying out my research and especially for your selflessness, as you have never restrained me in my research engagement.

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This research process would not have been possible without the elderly people in Finland and Slovenia who participated in the computer training courses. Accordingly; I would like to thank all the elderly people who contributed to the research study, as well as Kuopion kansalaisopisto (Kuopio Community College), Kuopio, Finland, and the elderly homes Sunny Home and Danica Vogrinec Maribor, Maribor, Slovenia, where part of the research studies

were conducted. Additionally, I would like to thank all scientists, researchers and ICT facilitators from Slovenia, Austria, the UK and Ireland who participated in the European project PRIMER-ICT and in this manner contributed their time, devotion and knowledge to this research, as well as Mr. Rauno Piiroinen, the facilitator of the ICT training courses in Kuopio Community College, and Maarit Tamminen, MSc student, for her valuable Finnish translations.

I am also grateful to all experts and elderly people who participated in testing the validation process and the actual validation process of the Model of Adaptation to ICT in Old Age and shared their knowledge in suggesting necessary amendments to improve the model.

The beginning of the year 2011 was hard for me as well as for my family, since I decided to move to Kuopio, to be able to be more focused in my study process and to learn most efficiently. My closest family always understood and trusted my decisions; therefore, thank you Jani for giving me the loving support I needed and most of all, for sharing scientific and research views which helped in developing even stronger scientific conclusions. Thanks to mom and dad, for calling me now and then on Skype just to know that I am OK, for providing the opportunity, when I was weak and exhausted, to talk with my cute nephews Nejc, Žan and new-born niece Neža, who gave me the energy to carry on.

True friends are very rare; however, I am blessed to have a few in life who love me truly, for me alone. Throughout the year 2011 there was a person who knew what I was going through, knew all my ups and downs during this process and was always truly there, despite the 2,500-km distance… Thank you, Maria, I am grateful for you and your love, support and devotion.

Another person whose knowledge and wisdom have affected my life tremendously is Mrs. Majda Šlajmer Japelj, with whom I had the honour to collaborate and in this way learn important lessons; professionally as well as personally. Her contribution to the nursing, health and social sciences within the World Health Organization is invaluable. She will always be a role model for me and her dedication to the health profession will always inspire me.

During my stay in Finland and especially after my return to Maribor, I received special support from my dear colleagues Nevenka and Zdenka; thank you for your friendship and personal support when I most needed it and most people looked away.

Finland will always be my second home, since I made friendships for a lifetime with people who did not know me at all, yet helped and supported me unconditionally during my stay and represent my second family: Taru, Silja, Niko, Tanja, Helena and Tuula. Thank you all for making my life in Kuopio so much easier and friendlier.

Finally, I would like to thank Peter, my dear colleague: you are the reason I love research so much and you were the one who helped me take my first steps in scientific research. Peter, you are not only an inspiring person, but truly a devoted friend, who believed in me even in times when I doubted, and

supported me during this process. I know that writing all this would not have been possible without you, so I dedicate this book to you. I hope you will understand my actions and decisions related to the time I spent in Finland and that it was something I just needed to do.

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ABBREVIATIONS

AT	Austria
CINAHL	Cumulative Index to Nursing and Allied Health Literature
EC	European Commission
EU	European Union
GDI	General Definition of Information
HRQOL	Health Related Quality of Life
ICT	Information and Communication Technology
IE	Ireland
IMRaD	Introduction, Methodology, Results and Discussion
IPA – CSA	International Pharmaceutical Abstracts - Current Serials
IT	Information Technology
KT	Knowledge Translation
M	Mean Value
OARS	Older Americans resources and services
PQOL	Perceived Quality of Life
PRIMER-ICT	Promoting the improvement of elderly ICT skills and well-being by inter-generational and multi-sectoral education
QOL	Quality of Life
QWB	Quality Well-being
RAND	The RAND Health Status Measures
RNL	Reintegration to Normal Living
SD	Standard Deviation
SI	Slovenia
SIP	Sickness Impact Profile
SWOT	Strengths, Weaknesses, Opportunities, and Threats
WHO	The World Health Organization
WWW	World Wide Web
WHOQOL	The World Health Organization Quality of Life
UNESCO	United Nations Educational, Scientific and Cultural Organization
UK	United Kingdom
USA	United States of America

1 Introduction

This research focuses on exploring the current state of information and communication technology (hereafter ICT) use by elderly people with the aim of understanding elderly people's needs in interaction with ICT solutions which enable them greater inclusion in information and knowledge society.

ICT is rapidly developing, which is why, for the past twenty years, the European Union (EU) has intensively developed and implemented various initiatives to increase the use of ICT and encourage the general e-literacy of European citizens. The term "e-literacy" stems from the term "electronic literacy" and is a synonym for "skills-based computer literacy" (Saranto & Hovenga, 2004; Bawden, 2008). Additionally, the Leeds University (UK) glossary of teaching technology points out that e-literacy still in some way "combines the traditional skills of computer literacy, aspects of information literacy (the ability to find, organize and make use of digital information) with issues of interpretation, knowledge construction and expression" (Bawden, 2008).

Nowadays, when the majority of the middle-aged generations have more or less adopted ICT as a tool for efficient work performance and leisure activities, and the younger population has practically been raised by ICT, which represents to them a way of living, the majority of the elderly population is still quite ignorant about ICT. The large gap in the ICT knowledge between age groups raises the question of how elderly people can be motivated to learn ICT skills and use ICT solutions for their personal empowerment and quality of life (hereafter QOL) (Gatto & Tak, 2008). Empowerment is a dynamic process within which individuals, organizations and communities pursue a maximal impact on their own life and make their own decisions (Kieffer, 1984; Gibson, 1991), and is as such associated with personal growth, development and QOL (Kuokkanen & Leino-Kilpi, 2000). Therefore, elderly people should have opportunities in enjoying the benefits of ICT interaction which, with time, could become a way of living for them and in this way enable them to remain active at work or in their community. As a researcher, I see a challenge and opportunity for the elderly in understanding the importance of ICT interaction, since it could improve their co-existence in information society, and consequently could have a long-term effect on their personal life.

It is commonly considered that ICT influences the everyday lives of most individuals, since it can support a real-time, efficient flow of information especially through WWW (World Wide Web). The internet can offer a wide range of personal, social, educational and business opportunities connected to active aging. However, due to their lack of ICT knowledge, elderly people are

not able to use those opportunities. Active aging allows elderly people to continue their participation in society, whether in social, economic, cultural, or other affairs, and also means the ability for the elderly to be physically active and able to participate in the labour force (World Health Organization, 2011a).

Due to the fact that the world is aging, not just as individuals or as societies, but globally (National Institute on Aging, 2007), demographic changes have to be considered as a global challenge (Muenz, 2007). At the moment, there are 650 million people aged 60 years and older, and by the year 2050, the number of the "greying" population is predicted to reach 2 billion (World Health Organization, 2011b). Therefore, a significant effort by European governments is needed to assure elderly people's efficient adoption of ICT, through which they will be able to use the possibilities offered by ICT. A similar effort is also needed in the USA and Canada, as seen from the data gathered from Statistics Canada, which states that only one third of the elderly people know how to use the computer and internet (Retire at Home Services, 2010) and are able to exploit the advantages that technology offers.

The global phenomenon of ageing can have great benefits for public health and social policies, as well as for socioeconomic development; however, it also requires society to adapt, to be able to maximize the health and functional capacity of elderly people and their participation in society (World Health Organization, 2011c). The perspective of this study is that e-literate elderly people could be empowered for full inclusion into society; additionally, they would be able to use various services that are accessible only via the internet. Additionally, e-literate elderly people are important from the practice point of view, since they will be able to use various on-line services and will therefore to some extent relieve health and social care professionals by searching for additional on-line assistance and using e-health care services (Brennan, Moore, Bjornsdottir, Jones, & Rogers, 2001). Still, the question remains, how to awaken in elderly people the desire to learn and use ICT so as to be involved in society as equal partners and contribute to the societal development on the one hand, and on the other hand, to live active and healthy lives, which in turn would affect their QOL. To this end, the European Commission (EC) has developed the strategic framework i2010, with the main purpose of contributing to the on-going information society development that promotes competitive digital economy and emphasises ICT as a driver of social inclusion and QOL of elderly people (del Hoyo-Barbolla, Guillén, & Arredondo, 2009).

Therefore, the purpose of this study is to understand and support elderly people in interaction with ICT solutions through which they could become equal members of information and knowledge society and would be able to affect their QOL through personal empowerment. Part of the study is conducted in an international context; which gives it the possibility to cover multicultural aspects which influence elderly people's attitudes toward ICT. The problem is in actions currently implemented which aim to increase the e-literacy of elderly people.

Such actions should not be general in nature, but focused on individuals, taking into account country specifics and cultural differences. In addition, the study includes an assessment of a large number of factors affecting elderly people's QOL, which brings added knowledge to finding associations between ICT use and QOL of elderly people.

Past studies indicate the importance of e-literacy for elderly people's personal as well as a societal perspective (Ng, 2008; Morris et al., 2012), especially the importance of elderly people being able to participate in social networks to decrease the level of loneliness and isolation which is very often a health condition among elderly people (Gatto & Tak, 2008; McCausland, 2012). Despite the fact that previous studies on ICT use among elderly people showed promising results toward an increased level of e-literacy among the older population (Meischke, Eisenberg, Rowe, & Cagle, 2005; Hernandez-Encuentra, Pousada, & Gomez-Zuniga, 2009; Koopman-Boyden & Reid, 2009), sustaining the motivation to use ICT is still obviously the main issue after the elderly users' first acquaintance with ICT (Morris & Brading, 2007).

Furthermore, various studies confirmed the added value of ICT in the lives of elderly people: for example, using electronic communication tools, possibilities to influence the development of society, opportunities for lifelong learning (Russell, Campbell, & Hughes, 2008; Koopman-Boyden & Reid, 2009; Hernandez-Encuentra, Pousada, & Gomez-Zuniga, 2009) and studies dealing with the psychosocial impact of computer use on elderly people's feeling of depression, loneliness, self-esteem (Heyn Billipp, 2001; White et al., 2002; Shapira, Barak, & Gal, 2007). However, these studies do not clearly show a significant correlation between computer use and QOL of elderly people. Therefore, Chiungjung (2010) carried out a meta-analysis to examine the relationship between internet use and psychological well-being, especially depression, loneliness, self-esteem and life satisfaction, and found that most research examined only a single point in time from which it is not possible to make conclusions regarding the above-mentioned relationship.

One substudy of the present study explores the level of elderly people's e-literacy in two European countries; Finland and Slovenia, which are different from both, a geographical and a cultural perspective. The other substudy explores the level of teachers' and multipliers' (two groups of facilitators) enthusiasm for ICT and how their attitude is reflected in elderly people's willingness to learn and use ICT in Austria, Ireland, Slovenia and the UK. Cultural differences in both studies are reflected in access to the internet and also in the use of computers and the internet by elderly people. However, no research has been done to compare the level of e-literacy among elderly people in the two countries or the effects of a computer intervention on elderly people's subjective indicators of QOL, such as loneliness.

All in all, this research contributes to the importance of e-literacy awareness among elderly people, and in this way also stimulates discussion

among scientists, researchers, health and social care professionals, people who in whatever way support elderly people, of the possible effects of ICT engagement. Scientific debate will lead to scientific results through various projects connected to ICT and elderly people. However, the basic assumption of this study is that elderly people have to have an active role in that debate to assure the visibility of their needs and wishes regarding ICT use to improve their QOL. The study generates knowledge about elderly people's attitudes toward ICT use and its effects on their social behaviour, especially from a multicultural perspective, which should be taken into account in developing ICT literacy strategies for elderly people.

The study is based on three original papers which are included in the chapter Original papers. Altogether, the Summary includes 7 chapters; starting with Introduction and Theoretical background, within which the concepts Information, Technology, Information society, Knowledge society and QOL are described. After presenting and explaining the main theoretical concepts of this study, the purpose and aims of the study are described. Thereafter, the detailed methodological research design is presented. Although the chapter Results is mainly based on the results presented in the scientific articles, some results included in the Summary contain some unpublished data, especially concerning the Model of Adaptation to ICT in Old Age. The chapter Discussion includes a discussion of the validity and reliability of the study, a discussion of the main and most important findings, a review of the practical implications of the model developed and suggestions for future research. The summary ends with recommendations for best practices of elderly people's adaptation to ICT for potential QOL improvement.

2 Theoretical background

2.1 INFORMATION AND COMMUNICATION TECHNOLOGY IN INFORMATION SOCIETY

ICT provides a great potential for the world economy and society, since electronic interdependence creates the world as a global village. With information technologies (hereafter IT), the world became smaller and communities closer and more compact. Indeed, information society is not a new concept; though it is a concept that is dynamic and constantly evolving. The on-going development of new technologies and applications has a radical impact on people's everyday lives, since they provide new ways of conducting business, new markets opportunities, new social and cultural expressions and experiences, and new ways for people to interact (Lindroos & Pinkasov, 2003; Mogley, 2011).

In scientific papers, ICT is often used as an extended synonym for IT. IT is a more general term, emphasising the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers, middleware, as well as the necessary software, storage and audio-visual systems, which enable users to create, access, store, transmit, and manipulate information. ICT consists of IT as well as of telecommunication, broadcast media, all types of audio and video processing, transmission, network-based control and monitoring functions (Free On-line Dictionary of Computing, 2008) and as a term, was first used in 1997 (Kelly, 2000). On the other hand, the expression ICT is also used to refer to the merging (convergence) of audio-visual and telephone networks with computer networks through a single cabling or link system.

ICT supports various activities such as the creation, storage, manipulation and communication of information; however, IT makes it possible to record, store, process, retrieve, and transmit information. IT includes modern technologies such as computers, telecommunications, facsimile and microelectronics; however, older technologies such as document filling systems, mechanical accounting machines, printing and cave drawings are also included in the term IT. Nowadays, ICT mainly refers to technologies that provide efficient and effective communication and to devices which allow the handling of information (Okereke, 2009). Therefore, ICT today means the computer-based management of data or ideas (Whitmar, 2011).

ICT has a great impact on the business environment, it underpins the success of modern public and private corporations; even more, it provides them with an efficient infrastructure. However, this is not all ICT can do: it also adds

value to the overall learning processes within organizations as well as management (Anderson & van Weert, 2002; Kokkonen, Rissanen, & Hujala, 2012).

In his chapter about the philosophy of IT, Mitcham (2004) defended a close relation between the terms IT and "information systems" and "media technology", since they are both described as technology and represent data processing and telecommunications. The terms "information" and "technology" are at the same time narrow and broad definitions, and include engineering philosophies as well as humanistic ones.

Information Society toward Knowledge Society

Information society is a highly abstract concept since it consists of the phenomena of information and knowledge. Many definitions of information society can be found in research literature; however, Burch (2006) is convinced that it is necessary to differentiate between definitions of information society which aim to characterize an existing or emerging reality and those aiming to express a vision or desire for a potential society. Obviously, both definitions are relevant, for one enables an analysis and the other has the power to guide policies and also actions to assume future implications.

The term "information society" emerged in social sciences in Japan in the 1960s and describes social changes in the second half of the 20th century. However, the term was quickly filtered into the political sphere and social media, and therefore became a multiple challenge (Karvalics, 2007).

Information societies have, according to Moore (1997), three main characteristics: the first is that information is used as an economic resource; secondly, a greater use of information is possible among the general public; and thirdly, there is the fact that an information sector has developed within the economy.

Castells (2001) thinks that information society must be reconciled with the development of the people who utilize it, the technology as it has developed in a historical context and the method by which the utilization of technology in specific ways has defined the development of the information age. However, he prefers the term "informational society" to "information society". He defends the idea that knowledge and information are decisive elements in all modes of development, "the term informational indicates the attribute of a specific form of social organization in which information generation, processing, and transmission are transformed into the fundamental sources of productivity and power, due to the new technological conditions that arise during this historic period." (Burch, 2006). Castells (2001) also states that technological revolutions are not at the centre of knowledge and information, but "the application of this knowledge and information to knowledge generation and information/ communication processing devices, in a cumulative feedback loop between innovation and the uses of innovation."

The term "society" is the most fundamental concept in sociology, and there are many different ways of defining it; however, no universally agreed definition exists. Classical sociological theories were created in Europe in the early 1800s by Auguste Comte, Karl Marx, Herbert Spencer, Emile Durkheim, Max Weber, Georg Simmel, and Vilfredo Pareto, all of whom played a central role in the development of sociology. However, the term "society" was first mentioned in the mid-16th century with the meaning of companionship and friendly association with others (Ritzer & Goodman, 2004). Similar to other concepts, also the concept of "society" has various definitions and researchers are still not unanimous about its meanings. One of the greatest American sociologist, Talcott Parsons, viewed society as a "complex system of interdependent elements - as social system – which, when operating normally, tended to remain inequilibrium routinely sloughing off disruptive changes." Furthermore, Parsons pointed out the importance of motivation, which at the end represents the link between culture and personality, group and person (Parsons, 1968; Gouldner, 1979). Furthermore, Parsons claims that a social system consists of different roles, which are maintained by structural relations among them. Individuals who form the society have their own role defined in the value system. Thus, society is ruled by cultural norms. In this way, cultural norms are transmitted from one generation to the next by socialization, and individuals internalize their roles in their infancy in which they learn to behave and relate to others according to these cultural models (Bernardi, Gonzales, & Requena, 2006). Pintér (2008), on the other hand, argues that the conditions for community to be defined as society depend on the potentials of interaction among members, as well as on the frequency and scale of these interactions.

It is a fact that at the end of the previous century, the world had more or less accepted ICT infrastructure, but what is more, communication technologies have had a significant impact on the public image of information society, which shows the friendlier aspects of globalization, such as the internet, mobile technology, satellite signal, etc. (WSIS, 2003). Although the concepts of information and knowledge society are closely related and interdependent, UNESCO prefers to promote the term "knowledge society" rather than "information society" (UNESCO, 2003). Knowledge society represents new QOL support systems and is based on contemporary developed knowledge. Knowledge society is about understanding the distribution of knowledge, access to information and the capability to transform information into knowledge. Moreover, the definition of knowledge society depends on the understanding of knowledge. Knowledge requires information processing and it has the specific aim of obtaining the conceptual understanding of life support systems within a specific cultural system, so that it represents more than information. The development of knowledge society is possible with access to the global information pool (Afgan & Carvalho, 2010).

Somehow, knowledge society represents a new paradigm for future development and it is strongly correlated to sustainable development. The sustainability paradigm of knowledge society is therefore a potential frame for human society development which leads to social cohesion, economic competitiveness and stability, use of resources and economic development, safeguarding biodiversity and the ecosystem (Afgan & Carvalho, 2010).

Just as with information society, the role of knowledge society is also knowledge distribution, access to information and capability to transform information into knowledge. Knowledge society's main requirement is knowledge distribution, which must be based on equity and non-discrimination, justice and solidarity (Afgan & Carvalho, 2010). UNESCO (2003) highlights the importance of four principles that are essential for the development of equitable knowledge societies: Cultural diversity; Equal access to education; Universal access to information (in the public domain); and Freedom of expression. Indeed, knowledge societies should be strongly based on a commitment to human rights and fundamental freedoms, including the freedom of expression. Knowledge societies have to ensure to all members of society the full realization of the right to education and of all cultural rights. Additionally, access to public information and knowledge for educational and cultural purposes must be as broad as possible. The basic principle of information is that it has to be of high quality, diversified and reliable (UNESCO, 2003). The capability of the cultural system is the transformation of information into knowledge; furthermore, it is also the capability to convert available information into scientific and technological values used in everyday life. All the factors mentioned above depend strongly on the cultural and social system (Afgan & Carvalho, 2010).

The present study explores the possibilities of elderly people being equal partners in society. However, to make this possible they have to have access to several kinds of information. For the elderly to be able to handle information in the most efficient way, it is necessary for them to be ICT skilled. In this way, they can become members of information society and in further process, help to build knowledge society.

Society handles different kinds of information for decision-making processes; however, elderly people, due to their low level of computer use, may not be able to identify and use information for their individual needs. Within this study, elderly people interact with technology through which they are able to purposely use their current knowledge, experiences and resources in social interaction with other people. In this way, the elderly are able to satisfy their wants and needs and consequently affect their own health and QOL. ICT offers various tools for maintaining and developing social relations which influence elderly people's feelings (happiness, loneliness, depression etc.); however, within the study this depends on different life situations, lifestyles, as well as on the time spent using a computer. Additionally, ICT offers new ways of

spreading knowledge and information, enabling the elderly to transmit wisdom and life experiences to younger generations, which is later likely to result in elderly people's empowerment and positive feelings of achievement, and a general contribution to the societal development.

Information

The definition of information is very broad. According to Pintér (2008), information is related to "experience, the communication of knowledge and experience, data, knowledge, learning, communication, and news". However, Drucker (1988) explained the relation between those concepts as "transformation of data to information necessitates knowledge". Of course, various definitions appeared to link information and communication, such as Pintér's (2008), who explained that "communication is the transmission of information taking place in one particular context". Buckland (1991) actually sums up conceptual interrelations and presented four aspects of information (Table 1).

Table 1: The Four Aspects of Information

ENTITY	INTANGIBLE Information-as-knowledge Knowledge	TANGIBLE Information-as-thing Data, document, recorded knowledge
PROCESS	Information-as-process Becoming informed	Information Processing Data processing, document processing, knowledge engineering

Source: Buckland, 1991

Buckland (1991) defended the idea that *information-as-knowledge* is strictly subjective, regarding the fact that it is linked to a particular person, from where it gains meaning in one particular context. If observed as an entity, it could be shared with others. In the same way as knowledge, *information-as-thing* exists and the fact that it is tangible is recorded. As seen from Table 1, data are also included to represent recorded knowledge which allows one to understand the context. Another information exchange is *information-as-process*, which is the same as the process of being informed, and it links information-as-thing with information-as-knowledge. Additionally, it is possible to associate two informations-as-knowledge or two informations-as-thing; the first association causes the *process of cogitation* and the second *data processing* (Pintér, 2008).

According to the International Encyclopaedia of Information and Library Science, information is "best seen as holding the place in the spectrum between raw data and knowledge. Seen in this way, information is an assemblage of data in a comprehensible form capable of communication and use: facts to which

meaning has been attached." (Feather & Sturges, 2003). Nevertheless, for something to be information requires at least three assumptions of information: it must consist of data, it must be well-formed and has to be meaningful - General Definition of Information (GDI) (Brey & Hartz Søraker, 2009).

Information theory creates the fundamental limits of the communication system and provides rules for the construction of practical systems and is defined as measurement of information and its applications. It is a research field of communication, statistics and complexity. Many information researchers accept the standard definition that information is data which is used in decision making (Kennerley & Mason, 2008). This definition has several implications, one of which is that information is a relative quantity. It is relative to the situation, to the time at which the decision is made and to the decision-makers' background and history. What is of considerable importance in one situation is very possibly totally useless in another. What may be of considerable value to one decision-maker at one time may be useless to another decision maker at a different time or in a different situation. A second implication is that information and decision making are closely intertwined. Information is used only for decision making and decision makers have only the resources of information available to them (Gray, 2009).

Through the years there have been many characterizations of information, some narrow and others broad-oriented. Researchers have the uniform opinion that information is hard to define, but it can be categorized. Information also includes several characteristics; factual, analytical, subjective or objective, and can be found in primary, secondary or tertiary sources. Through the ages the type, quality and amount of information has changed; however, the human ability to process information has remained the same (Burkhardt, MacDonald, & Rathemacher, 2002). Knowing the type of information enables its identification and use. Factual information represents facts as well as a statement of a thing that exists, it is short, non-explanatory and often found in encyclopaedias as well as statistical information. Analytical information is the interpretation of factual information, in other words, analyses of facts: interrelations among, implications of and reasons for them. This kind of information is most often created by experts and it could be found in books. Subjective information is always understood from an individual point of view, and objective information is the opposite, understood from different points of views (The University of Rhode Island, 2013).

The source of information may vary; however, the farther away from the original source information is, the more likely it is to have been filtered, interpreted, condensed or otherwise changed. According to this, it is possible to recognize primary, secondary and tertiary sources of information. Primary information is information in its original form and at the moment when it first appears. The information could not appear in any context; therefore it could not be interpreted, filtered, or evaluated by anyone. Secondary information is

information explaining a primary or original source, which means that the information has been repackaged and removed from its original source. And tertiary information has been removed two times and represents a collection of primary and secondary sources (Burkhardt, MacDonald, & Rathemacher, 2002). Floridi (2004a) often raised the question, "What is the nature of information?" and claimed that the question itself illuminates the nature of computation, and it also opens up a problem in the philosophy of information, which involves the fundamental problems in computing (Floridi, 2004b). Researchers in general agree that without data there is no information; however, the relationship between data and information is still not totally clear (Brey & Hartz Søraker, 2008). Data is implemented in computers in binary form (1 or 0), Floridi (2004a) defined "datum" as "a lack of uniformity between two signs". Whenever discussing data, information and their representation, it is important to acknowledge the different levels of abstraction. For example, a physical object can be represented by a word or an image, or by a string of binary digits.

Ackoff (1989) was a systems theorist who defended the idea that the content of the human mind can be classified into five categories: data, information, knowledge, understanding, and wisdom (Figure 1). Rowley (2007) in Bernstein (2009) explained that the category "understanding " was later omitted from Ackoff's pyramid model, since it was not used in subsequent formulations.
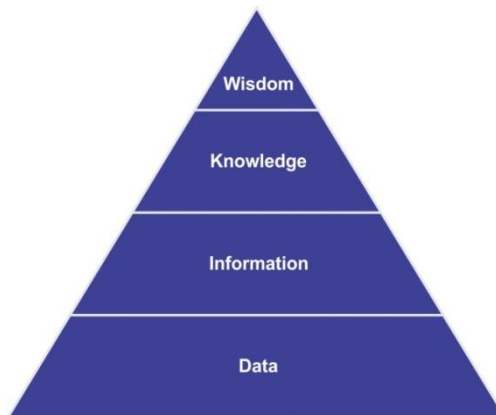
Source: Bernstein, 2009

Figure 1: The Data-Information-Knowledge-Wisdom Hierarchy as a Pyramid

Data represents symbols, whereas information is data that is processed to be useful and provides answers to "who", "what", "where", and "when" questions (Ackoff, 1989). Additionally, Bellinger, Castro, & Mills (2004) stated that data exists in a usable or non usable form and contains no value after its existence. Moreover, it does not have meaning in itself.

Information represents meaningful and valuable data; however, its meaning could be useful or useless, and in computer science, information is based on a relational database from the stored data (Bellinger, Castro, & Mills, 2004).

Knowledge consists of a collection of information, with the intent of being useful and providing answers to "how" questions. Additionally, knowledge is an application of data and information, and is a deterministic process. When a person memorizes information, this means that that person has amassed knowledge, which is useful for that person, but it does not provide for, in and of itself, an integration such as would infer further knowledge (Bellinger, Castro, & Mills, 2004).

According to Bellinger, Castro, & Mills (2004), *understanding* means an appreciation of "why" something happened and is the process by which a person is able to take existing knowledge and from the previously held knowledge synthesize new knowledge. It is an interpolative, probabilistic, cognitive and analytical process. However, there is a difference between understanding and knowledge, as there is a difference between "learning" and "memorizing". With understanding the information, people are able to undertake useful actions, since they can synthesize from previous information, new knowledge.

Ackoff (1989) stated that data, information, knowledge and understanding are categories which are connected to the past; therefore they are about what has been or what is known. The *wisdom* category is about the future, what is yet to come, since it incorporates vision and design. Wisdom represents the highest level because of the fact that future could be created on this basis, and is a process of evaluating individual understanding. However, achieving the level of wisdom is hard and individuals have to go successively through the other four categories (Bellinger, Castro, & Mills, 2004). Wisdom gives us understanding about previously misunderstood information. The previous four categories give answers to clear questions, but wisdom asks questions to which there are no easy answers, in some cases even no answer at all. Additionally, wisdom is the process by which individuals discern, or judge, between right and wrong, good and bad. According to Bellinger, Castro, & Mills (2004), "computers do not have, and will never have the ability to possess wisdom". They also defend the thinking that computers do not and will not possess a soul. Wisdom is a process possible only in humans, since it also requires as much heart as it requires mind.

The theoretical concept of the human mind presented above could be easily transferred into a practical interpretation in which elderly people represent an important part. Certainly, elderly people should not be excluded from information because of their age alone, since they possess knowledge which could have great benefit for society. With a proper transferability and visibility of information, the elderly could take part in lifelong ICT learning, which would

result in producing additional knowledge through understanding previously held knowledge.

In this study, an understanding of the hierarchical complexity of information is important, since it applies to any events in which information is organized. Information could be organized through humans and their biological systems, social organizations, non-human organisms, and machines (Lamport Commons, 2008). The hierarchical complexity of information is a broad concept, since it involves many tasks which can contain any kind of information. Within the hierarchical complexity of information, four basic terms are essential: orders, tasks, stage and performance. However, for this study it is essential to understand the meaning of tasks and performance, which are in my opinion the most important in the process of ICT adaptation by elderly people.

As a heterogeneous group, elderly people have varying needs and wants and therefore also behave in varying ways when seeking various kinds of information. They search for meanings which are relative to their current situations. In this study, the focus is mainly on the subjective characteristics of information and how information is understandable from the elderly's perspective. If the content of the human mind as presented before is classified into five categories, then for elderly people's ICT adaptation process, information and knowledge play the biggest role. Elderly people's perception of meaningful information later in the process of ICT adaptation causes the execution of appropriate tasks and performances. In other words, when elderly people recognize that particular information in relation to ICT is useful, this will probably lead to further actions toward ICT adaptation. However, concepts, tasks and performance are a part of this process from a theoretical as well as a practical point of view, and are also closely related. If tasks are in a correct sequential order and completed correctly, this is reflected in the elderly people's future performance. The difference is that tasks are the activity of organizing information, while performance is understood as the organization of information. Tasks additionally vary in their complexity in two ways; they are horizontal (involving classical information) or they are vertical (involving hierarchical organization of information). (Lamport Commons, 2008)

So it seems that elderly people's ICT adaptation process consists of various elements, and each element represents particular tasks which have to be performed by the elderly for a successful ICT adaptation. Tasks require the hierarchical organization of different actions; however, a successful ICT adaptation undoubtedly depends on elderly people's ability to perform the tasks required in a particular action. According to classical information theory (Shannon & Weaver, 1949), the successful execution of defined task depends on "yes-no" questions, thus horizontal classical information is built by the accumulation of bits of information about any event (Lamport Commons, 2008). In elderly people's ICT adaptation process, classical information theory is important before their acquaintance with computers, since it helps them

recognize the importance of skills. By contrast, vertical (hierarchical) information requires the organization of information in the form of action. This means that for elderly people to be able to adopt ICT, they have to learn and acquire less complex tasks before performing more complex tasks. Understanding various concepts of information is essential in creating opportunities or developing strategies for elderly people's adaptation to ICT.

Technology

Technology as a concept has its roots in ancient Greece, where the term was used to refer to skilled artists. Later in modern times, the term was used of artisans in the Middle Ages, in the preindustrial time of craft workers and in the industrial era of production specialists. Technology as seen today with its most objective features, such as equipment, procedures, machines etc., has largely obscured the ancient connection between technology and art (Hatch & Cunliffe, 2006).

Technology is often used as the generic term to encompass all the technologies people develop and use in their lives. The United Nations Education, Social and Cultural Organisation (1985), defines technology as:
"...the know-how and creative processes that may assist people to utilise tools, resources and systems to solve problems and to enhance control over the natural and made environment in an endeavour to improve the human condition". Within this statement, technology includes a purposeful use of knowledge, experience and resources to be able to create processes and products which could meet human needs. Technology is practically determined by those needs and wants; that is how it is developed and applied. In general, human beings judge the desirability of technological applications by their impact on health and well-being, lifestyle, economies and ecosystems (Technology Education Federation of Australia, 1999).

According to BusinessDictionary.com (2011), technology could be divided into five categories: tangible (e.g., blueprints, models, operating manuals, prototypes), intangible (e.g., consultancy, problem-solving, and training methods), high (I.e., "entirely or almost entirely automated and intelligent technology that manipulates ever finer matter and ever powerful forces"), intermediate (I.e., "semiautomated partially intelligent technology that manipulates refined matter and medium level forces") and low (I.e., "labor-intensive technology that manipulates only coarse or gross matter and weaker forces"). Using this categorization, the present study addresses technology as intangible means connected to innovative training methods which provide an efficient ICT adaptation process for the elderly.

To have an idea of what technology means and represents, it is necessary to study different theories and typologies of technology. Definitions of technology focus on knowledge and scientific aspects of innovation, material artefacts, various configurations of hardware and software, organization theories,

knowledge process, raw materials, tasks or techniques, etc. (Roberts & Grabowski, 1999). Modernists think of technology as a means which organizations use to convert inputs to outputs; moreover, for them it is not important whether those outputs are products or services. On the other hand, objectivist ontology and positivist epistemology lean toward the modern typologies of technology; however, from the deterministic perspective they are leaning toward contingency theorists who defend the idea that different technology types fall into different environments, which require different social structures and also have different effects on human actions (Hatch & Cunliffe, 2006). In this direction, symbolic interpretivists study how technologies are affected by processes of social construction, since they argue that technologies are shaped by cultural norms, power relations and various aspects of an organization's physical structure.

All technology involves systems for processing inputs by subsystems in interaction, which generate a set of desired or unwanted outputs. This process occurs within a context or environment. Effective systems use feedback and assessment systems during or at the end of the process to generate information about the achievement of the purpose for which the system was designed (UNESCO, 2011).

The world is changing and technology plays a big role in those changes. Computers as ultra-flexible machines are programmable for practically any task, capable of several functions essential for postmodern developments: robots, automatization, electronic networks supporting economy, databases and expert systems which supply knowledge economy, job creation, etc. (Conlon, 2000). Some postmodernists also think that technology allows authorities to monitor and control employees; what is more, they argue that technology imposes a discipline which allows an imbalance of power in organizational relationships, which means that managers control employees, but not the other way around. However, other postmodernists think that technology even creates a democratic world, by enabling people to organize and carry out their work globally (Hatch & Cunliffe, 2006).

According to Hatch & Cunliffe (2006), macro economists are focused on societies that use technologies to provide their members with things they need and desire. In contrast to macro economists, modernist organization theorists see technology as a more explicit concept, making it possible to see organizations from inside and observe the actual courses of events, and see how things are done in practice.

The above-mentioned interpretations of the concept of technology can generate confusion, so that it is important to define the level of technology analysis, namely: core technology, high technology and service technology. Core technology with its application at the unit and task levels of analysis refers to technologies which contribute to production, to technologies which indirectly maintain the production processes and to technologies which support the

organization's adaptation to its environment (Hatch & Cunliffe, 2006). The term high technology describes different aspects of computer-based technologies, such as lasers, satellite communications, and multimedia. However, it can also describe the products which use these technologies, and yet sometimes it can refer to the transformation processes that rely upon one or more of them. Additionally, high technology can also refer to innovative business in which technology is changing rapidly, and sometimes to the demands for computer literacy that high technology places on employees (Hatch & Cunliffe, 2006). And lastly, service technology is defined by its three main characteristics: its products are consumed as they are produced, are intangible and cannot be stored in inventory. To be more specific; each organization provides its customers information through the communication of messages, and that information is consumed at the same time it is produced. In this way, information has no tangible form and its value dissipates rapidly (Hatch & Cunliffe, 2006).

Roberts & Grabowski (1999) point out how debates about technology are limited only to descriptions and problems of technology and are less about issues associated with measuring or assessing technology. They acknowledge the impact technology has on organizations; therefore, the main focus should be on a descriptive view of technology and organizations should be monitored through a relational examination of both structures. Still, the fact is that organizations and technology are exposed to constant changes. Therefore many of the conceptions of technology already presented are inadequate. According to Huber (1984), organizations need to adopt advanced communication and computer technologies, improved decision-group technologies and structures, and decision process management. In contrast, Barley (1988) claims that technology affects work in three ways: by creating, generating and circumventing codes. This means that some technologies produce codes, as in medical imaging, some could generate codes as by-products, and some circumvent codes which serve as the occupation's source.

Early modernists produced typologies of technology which extended contingency theory based on how social structure was contingent on the choice of production methods and conditions in the environment. Organizational theorists Joan Woodward, James Thompson and Charles Perrow developed three typologies of technology: Woodward's, Thompson's and Perrow's typology.

Woodward designed a research study to find out which organizational arrangements produce the highest levels of performance. The results of her study showed that structure was in close relationship with performance, but only when the type of core technology was taken into account. Woodward's technical complexity scale is condensed into three core technology types: Unit or small batch; Large batch or mass production; Continuous processing (Hatch & Cunliffe, 2006; Sewell & Phillips, 2010).

Thompson's typology had a big impact on organization theory, for he stretched his typology of technology to include both manufacturing and service sector organizations. His theory of technology is also based on three general types: Long-linked technologies; Mediating technologies; Intensive technologies (Jelinek, 1977; Hatch & Cunliffe, 2006; Thompson, 2007).

Perrow's typology is characterized by the fact that he theorized technology from the task level of analysis. His theory arose by defining the variability and analysability of tasks, as well as from measures that he created to assess these two dimensions. Task variability is important, since it is measured by the number of exceptions to standard procedures in the application of the particular technology. On the other hand, task analysability is measured at the moment when an exception is encountered with known analytical methods. Perrow's typology is based on four technology types, which are derived from task variability and analysability in a two-by-two matrix: Routine technologies; Craft technologies; Engineering technologies; Nonroutine technology (Benibo, 2011).

Hatch & Cunliffe (2006) point out that all three typologies of technology are important, though they overlap in some areas. However, it is wise to consider all three to recognize six dimensions which describe technology: technical complexity, routineness of work, standardization of inputs/outputs, standardization of transformation processes, task variability and analysability.

On the other hand, Geum, Kang, Lee, & Park (2010) study the role of technology in product-service integration and propose three typologies of technology interface according to the level of technological participation: Technology as an enabler; Technology as a mediator; and Technology as a facilitator. Many authors claim that technology plays a crucial role for providing customer service after the product purchase, even more, technology also enables new ways of service transactions (Bitner, Brown, & Meuter, 2000; Froehle & Roth, 2004). When technology is an enabler, it provides direct means for integration; in other words, the product-service integration cannot be realized without technology interference. Technology as mediator means that technology provides indirect means: firstly, technology is applied to a product/service and then integration is performed by technology embedded in products/services. Technology as a facilitator provides, for instance, an interface or virtual space, which means that technology and product/service are independently applied to the product/service and help to achieve an effective integration. This type of technology provides an effective means of product/service communication (Geum, Kang, Lee, & Park, 2010).

For this study it is of fundamental importance to know the basics of the concept of technology, what it means and represents to society in a broader sense as well as to individuals in the narrow sense. Moreover, to be able to discuss the objectives of this concept in terms of how technology can affect the everyday life and QOL of individuals, it is necessary to study the history of technology development and the different theories and typologies of technology.

Only in this way can we draw parallels between the opportunities that technology offers and the capabilities of society and individuals to exploit it efficiently and appropriately.

2.2 QUALITY OF LIFE: CONCEPTS AND DIMENSIONS

Globally speaking, a better QOL of people is always a target of health and social care systems (World Health Organization, 2002); however, there is no consensus about the definition of the concept of QOL (Butler, 1997; Clark, 2004; Bowling, 2005; Holmes, 2005; Moons, Budts, & De Geest, 2006; Priebe & Fakhoury, 2008).

Despite the fact that as a concept, QOL was introduced in 1918 and was at that particular time mainly associated with people's standard of living (Ferriss, 2004; Zhao, Heath, & Forgue, 2005; Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006), it has been presented that it was Haas who offered, in 1960 (1999), a broader and more conceptual definition of the QOL. Haas associated QOL with a wide variety of domains, including psychological distress or well-being, cognitive, social, sexual, emotional ability, perception of personal health, and capability of performing daily activities (Stewart & King, 1994).

Thus, the concept of QOL started as an observation of the living conditions of people and was presented only as an objective indicator, but today it is observed mainly through the general level of well-being of people and as such also includes subjectively oriented components (Allardt, 1993; Sirgy, Michalos, Ferriss, Easterlin, Patrick, & Pavot, 2006). On the basis of previous research evidence, Rissanen (2013), for instance, has summarized various definitions and aspects of well-being on different levels in the context of elderly people. Furthermore, Rissanen associates these well-being aspects with the multidimensional concept of active ageing developed by WHO (the World Health Organization), and she points out the increasing demand for a holistic approach to well-being, since each individual constitutes a physical, mental and social entity in different environments.

Concepts of QOL
Another theoretical division behind the QOL is to look more deeply at the human needs and resources.

Human needs
Human needs are always some kind of motives of individuals and sometimes they are not easy to establish (Niemelä, 2004). It is commonly stated that people's basic needs could be classified as "security needs", "welfare needs", "identity needs" and "freedom needs" (Galtung, 1980). Since the theory of human needs is broad, only basic definitions of understanding the needs of humans will be presented, which I believe are essential for the present study.

Basic human needs are a personal motivation of what an individual desires to achieve and the basis of successful interaction. In life, people always learn from other people, and so it is essential for elderly people to build a self-conception and discover what they are capable of doing. However, because of a fear of doing new things, things which they do not know and are not familiar with, elderly people have difficulties and are thus discouraged. Because of this fear, they could be disabled in pursuing a vision of what is good for them. Therefore, in satisfying elderly people's needs, whether in ICT adaptation or any other action which would enrich their QOL, it is important to draw up a plan, then establish activities needed to implement that plan and finally identify the conditions enabling the activities to be carried out (Doyal & Gough, 1991). Still, to be able to carry out a plan to assure the most efficient ICT adaptation of the elderly, for instance, it is essential to know what wants, needs and additional values the elderly have in this particular respect.

According to Maslow (1970), each person has a hierarchy of values; emotional, cognitive, expressive and aesthetic needs. The physiological needs are the starting point of an individual's motivation and include needs such as breathing, food, water, sex, sleep, etc., (Poston, 2009; Ruud, 2011). Physiological needs are the basic needs and most fundamental of all needs. Therefore, if no needs are satisfied, the individual organism will be dominated by physiological needs and all other needs become simply non-existent. When physiological needs are relatively well satisfied, a new set of needs emerges, called safety needs, such as security, stability, dependency, protection, etc. The two most vulnerable groups of population are children and the elderly, and many times their safety is not discernible on the surface. Among the safety needs, a very important one is employment security, resources and morality. When both the aforementioned basic needs are fulfilled, there will emerge the needs for love and affection and belonging. There is not much information about the need for belonging, but here an individual's hunger for affectionate relationships with people in general will appear. When people feel that these needs are not satisfied, they want to attain such relationships more than anything else. One of the higher-level needs is the need for esteem, which all people in society have: we all desire self-respect, where desires are connected to strength, achievement, adequacy, competence, etc. There are also desires connected to the individual's reputation, status, fame and glory and dignity. Satisfaction of the self-esteem need is connected to feelings of self-confidence, worth, strength, capability. The thwarting of these needs will result in expressions of feelings of weakness and helplessness. The self-actualization need represents the highest level of needs. At this level, individuals differ from each other, because these needs vary from person to person. This need refers to the individual desire for self-fulfilment; in other words, a person wishes to become actualized as what she or he actually is. This kind of satisfaction usually remains dormant until some prior needs mentioned before are satisfied (Maslow, 1970).

What is more, a satisfied individual's wants and needs on the micro level reflect the individuals societal macro component (Bowling & Windsor, 2001) and they only contribute to the individual's well-being together (Economic glossary, 2011). In any case, QOL is a complex concept including various elements of physical, material, social and emotional well-being, and additionally, development and activity (Anderson, 2004 in Arun & Çakıroğlu Çevik, 2011) and their correlations will be mentioned more specifically later in this chapter.

Resources
On the other hand, QOL can be linked to the resources by which an individual can fulfil personal needs. As a matter of fact, sometimes the fulfilment of some needs is also a resource for fulfilling other needs, e.g., economic resourcism or good health status support. According to Foa's (Foa & Foa, 1974) resource-exchange theory, people exchange six main resources within relationships they are maintaining with other people: love (warmth, affection), status (respect, esteem), information (advice, knowledge), money, goods and services (work, labour). Combining psychological and economic theory into a single model, Gordon (1975) theorized that the mind classifies exchangeable resources into categories. Among the above-mentioned resources, love, status and information are psychological resources, and money, goods and services are economic resources that we can exchange.

Gordon (1975) additionally claims that resource categorization depends on the individual's evaluation and is based on cognitive structure as well as on experiences of a particular subject. However, for a person to be able to competently function in society, she or he has to be influenced by the possession and lack of resources.

The availability or non-availability of resources influences one's well-being, happiness, and satisfaction with personal relationships and social exchange, being more concrete; to be able to function effectively as a member of society depends on the possession of social capabilities and specific resources. Moreover, it is even necessary to know the extent to which needs for resources exist, and to what extent specific resources are possessed and used in social contexts (Stangl, 1989). The whole range of resources should be discussed within the assessment of QOL, especially because the level of QOL often depends on the possession of a particular resource (Foa & Foa, 1976). From the contextual background of the present study, ICT, if used properly, represents an extension of human capability and therefore a potential resource to improve elderly people's QOL.

Dimensions of QOL

Definitions of QOL
One way to define QOL is to split it into health-related QOL (HRQOL) and non-health-related QOL. While HRQOL covers the areas of life affected by changes

in health (Albert & Teresi, 2011) and as such is related to the functional status of the individual, mental health or emotional well-being, social inclusion, and symptom states (Jaschke, Singer, & Guyatt, 1989), non-health-related QOL covers areas of natural as well as created environment and personal resources (Albert & Teresi, 2011). As such, they affect the economic as well as the social status of individuals, and so it is essential to obtain information from health-related and non-health-related QOL aspects.

The width of the concept of QOL offers various definitions, though the most important are definitions recognizing the subjective components (personal empowerment perspective) of QOL, since they allow a multidimensional perception. Anderson (2004) in Arun & Çakıroğlu Çevik (2011) stated that QOL consists of many different elements; he additionally defined QOL as physical, material, social and emotional well-being, and as development and activity.

Due to the complexity of the QOL concept, there is also no agreement on how to define QOL in old age (Walker & Mollenkopf, 2007). However, it is agreed that the topic of QOL for elderly people covers various issues, such as the social, psychological, environmental, functional, health and family dimensions (Birren, Lubben, Rowe, & Deutchman, 1991; Steward & King, 1994; Noelker & Harel, 2001; Arun & Çakıroğlu Çevik, 2011). The degree of functional dependence of the elderly is closely related to the socioeconomic conditions, self-care capacity, and physical and mental health (de Souza Santos, Dantas, & Rodrigues Moreira, 2011). Those factors reflect the QOL of elderly people and contribute to the definition of the individual's perception of their situation in life. The individual's perception depends on contact with the culture and value system and is related to personal expectations, concerns and life objectives (Ricci et. al, 2005 in de Souza Santos, Dantas, & Rodrigues Moreira, 2011).

QOL in old age refers to research on successful, healthy and positive aging, and so the indicators used within such research are health status, psychological well-being and social support. However, when using these indicators, gender, race, ethnicity, age and disability differences are often overlooked. Nowadays a critical perspective is offered within the field of social gerontology research, which presents old age as a social construct which has three very essential implications for QOL in old age. First, concern over health and physical capacity, which seems to be more important to the elderly than to any other age group, but still the definition of good QOL for the elderly is similar to that for other age groups. Secondly, economic and social factors are as important as individual biological characteristics for QOL in old age. The third concern is that elderly people are human subjects with the right to identify their own meaning of QOL, and so they should be at the centre of the process of defining and measuring QOL (Walker, 2005; Walker & Mollenkopf, 2007).

Within the social dimension, Lawton's model includes behavioural competence, perceived QOL, environmental dimensions, and psychological well-being (Lawton, 1991). In this view, Lawton also stressed that QOL has

temporal dimensions, such as past experiences and future expectations, and Atchley (1991) later added the need of cues in the present that reinforce identity. Additionally, Svensson (1991) thinks that when evaluating their own QOL, people must engage in some form of autobiographical process to be able to evaluate and synthesize the meanings experienced so far. He continues that those who compose a successful synthesis most likely have a good QOL. On the other hand, Katz & Gurland (1991) defend a holistic concept which they call "an irreducible network of interwoven parts, encompassing the elders themselves (mind, body, and spirit), their animate and inanimate environment, their life experiences in time and space, and the functions or powers created by the interwoven parts". Another conceptual framework was proposed by Stewart & King (1994) and consists of 14 domains of QOL for elderly people: physical functioning, self-maintenance, usual activities, social functioning, sexual functioning and intimacy, psychological well-being and distress, cognitive functioning, pain and discomfort, energy/fatigue, sleep, self-esteem, sense of mastery, perceived health, and life satisfaction. They organized many of the stated domains into subcategories.

The present study is mostly based on the WHO definition, where QOL is described as a multidimensional concept (Baldwin, Godfrey, & Propper, 1990; Noll, 2004; Hajiran, 2006) and subjective experience (WHOQOL Group, 1993; Harrison, Juniper, & Mitchell-DiCenso, 1996; Haas, 1999; Bowling, 2003; Moons, Budts, & De Geest, 2006) and responsive to different life experiences (Farquhar, 1995; Anderson & Burckhardt, 1999; Haas, 1999; Niv & Kreitler, 2001; Dunn et al., 2006; Murphy, O'Shea, & Cooney, 2007). However, it also includes multisectoral and multidisciplinary perspectives and concepts (Padilla, Grant, & Ferrell, 1992), due to the fact that elderly people are one of the most vulnerable groups and have many age-related problems. Therefore, to understand the QOL of frail elderly people, multiple perspectives have to be taken into consideration (Cohn & Sugar, 1991).

Measurement of QOL
Historically, QOL has been observed as a complex abstract concept from the point of view of defining it; thus, it is most certainty also complex from the measurement point of view (Arnold, 1991). Since the variables of QOL are mostly dependent ones, they must be observed more or less indirectly. As the term QOL incorporates a variety of objective and subjective aspects in an individual's life, and there is also no theoretical model of what QOL constitutes of, all measures must approximate the understanding of those broad concepts. However, it is always essential to select a measure based upon the target population and the reason why the measurement is carried out. Additionally, for the effectiveness of the measurement tool it is essential to select concepts that most directly relate to the situation observed (Steward & King, 1994).

Researchers mostly use QOL measures with extensive subscales that assess a wide range of aspects of QOL, such as the sickness impact profile (SIP), the older Americans resources and services (OARS) Instrument, the RAND health status measurement, the quality of well-being (QWB) scale, the reintegration to normal living (RNL) Index, the city of hope medical center QOL survey, the perceived QOL (PQOL) scale, or the subjective well-being instrument for the chronically ill. Though various elements define QOL, as previously mentioned, the relative importance of these elements is still not fully clear and determined. Individual health status is obviously a key element included in many QOL instruments, but it is not clear whether the inclusion of these measures of health status reflects the most important elements or our ability to measure health status, as opposed to other variables included. In future, it would be important to determine the elements that are the most important in defining QOL (Arnold, 1991).

In measuring elderly people's QOL in this study, one of the possible solutions would be the RAND health status measures developed by John Ware. The measures were developed following four aspects of health status: physical health, mental health, social health and general health perceptions. Thus, in a global view, this measurement tool is appropriate, since it includes a variety of concepts, such as: physical functioning, mobility, depression, anxiety, loss of emotional control, loneliness, social contacts, role functioning etc. (Ware Jr, 1987), and some of those were also observed in the present study. However, it is understandable that any measurement tool would need to be adapted to ensure the measurement of the particular variables associated with elderly people's QOL after ICT interaction.

Various models of QOL have been developed which reflect personal values, preferences and expectations, and at the same time include life conditions (Young, 2008). One good example, reflecting personal values, preferences and expectations, is the QOL model developed by the University of Toronto, where researchers defined three life domains connected to an individual's values; being, belonging, becoming, each with three sub-domains (Table 2) (Raphael, Renwick, Brown, & Rootman, 1994). The researchers think that the individuals' QOL within the areas of Being, Belonging, and Becoming and their sub-domains results from two factors: importance and satisfaction. Thus, QOL consists of the relative importance of each particular dimension and it depends on the person's enjoyment of the particular dimension. In this way, the QOL of an individual person depends on an individual perspective at any time during their lives.

Table 2: Conceptual Framework of QOL

Being	Who one is
Physical Being	physical health personal hygiene nutrition exercise grooming and clothing general physical appearance
Psychological Being	psychological health and adjustment cognitions feelings self-esteem, self-concept and self-control
Spiritual Being	personal values personal standards of conduct spiritual beliefs
Belonging	**Connections with one's environments**
Physical Belonging	home workplace/school neighbourhood community
Social Belonging	intimate others family friends co-workers neighbourhood and community
Community Belonging	adequate income health and social services employment educational programs recreational programs community events and activities
Becoming	**Achieving personal goals, hopes, and aspirations**
Practical Becoming	domestic activities paid work school or volunteer activities seeing to health or social needs.
Leisure Becoming	activities that promote relaxation and stress reduction
Growth Becoming	activities that promote the maintenance or improvement of knowledge and skills adapting to change.

Source: Raphael, Renwick, Brown, & Rootman, 1994

Another example is a theoretical model developed by Lawton (1994), which includes four dimensions: behavioural competence (e.g., physical health, cognitive and functional capabilities, and social activities), psychological well-being, objective environment (e.g., social support) and perceived global QOL. The four dimensions of QOL overlap to a certain extent; "Behavioural competence" includes activities of daily living, instrumental activities of daily living, work, recreational activities, cognitive functioning and social behaviour, and all represent aspects of functioning which are strongly influenced by illness (e.g., dementia). According to Lawton (1994), "Psychological well-being" is "the weighted evaluated level of a person's competence and perceived quality in all domains of contemporary life", "Objective environment" includes social activities and support through social network, as well as material possessions, and "Domain-specific perceived QOL", is the degree of satisfaction with all important (life) domains, such as social functioning, leisure activities, living accommodation and income. The "Psychological well-being" and "Domain-specific perceived QOL" sectors present an individual subjective perception.

The above-mentioned QOL models are important for conceptual clarity, because differences in meaning can lead to differences in conclusions for research and in the practice of health care for elderly people (Ferrans, 1996). There are numerous specifications of what QOL means at the individual level, but there is no consensus on what QOL means at the operational level and even when considered as a universal construct (Rapley, 2003). In this chapter, the basic concepts of QOL are presented, which will support further understanding of the importance of the ICT engagement of elderly people and its influence on their QOL.

In this study, the subjectively oriented perception of QOL is essential, since it is connected to life experiences (Murphy & Murphy, 2006), such as happiness and general life satisfaction (Megens & van Meijel, 2006; Murphy & Murphy, 2006), and therefore represents an individual's micro component.

As mentioned before, QOL could be defined by looking at the satisfaction of individual wants and needs. As I see it, ICT could be a resource for the elderly to satisfy various needs on which their individual QOL depends. In the light of Maslow's five levels of needs previously presented, the perspectives of ICT for achieving this are huge. However, they mainly start from the second level, though I am aware that on some extreme occasions technology is also used on the first level of satisfying individual needs.

If human actions result from motivation, the question is why the elderly would be motivated to use ICT for a better QOL. One example of ICT use in a manner that affects elderly people's satisfaction and general QOL is through social interaction with other people, which could, on the other hand, result in increased physical activities as well as personal empowerment. Still, the elderly mainly act upon their previous experiences, and so their potential motivation for ICT use would also result from this. Furthermore, according to Peplau (1994),

the QOL is an individuals' perception of how experiences are sensed, observed, or recognized, and in the ICT adaptation process it is essential to present ICT as a potential resource for the QOL. The concept of QOL also includes "control over resources across the full spectrum of life domains and the ways in which people respond and feel about their lives in those domains" (Fahey, Nolan, & Whelan, 2003).

This study mainly concentrates on the consequences of elderly people's ICT interaction, such as getting friends and maintaining social networks, which later results in an improvement of the QOL of elderly people, mainly from the loneliness perspective. In this way, the elderly could be personally empowered, which would enable them to cooperate with and contribute to society and in this way co-create knowledge society. What is more, as a result of this study I believe that elderly people's physical, social and emotional well-being depends on their development of ICT skills and activities which have a potential impact on various aspects of QOL through ICT.

2.3 IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY ON ELDERLY PEOPLE'S QUALITY OF LIFE

In this chapter I mainly focus on previous research evidence of elderly people's use of ICT and its potential effect on their QOL. It seems that in the last few years, there has been an increased interest in the effect of ICT for active and healthy aging, in particular as a tool for elderly people to help maintain their QOL (Gilhooly, Gilhooly, & Jones, 2009). The outcomes of elderly people using computers and the internet could be classified into personal and social development. When the elderly gain new knowledge with using computers, they will have a better sense of efficacy and achievement, and this empowers personal development. A feeling of achievement is especially important for those elderly people who did not have a chance in the past to enrol in school education due to difficult personal or other circumstances (Ng, 2008).

ICTs have become an important medium through which people establish and maintain relationships and learn about themselves in various ways. People facilitate social links via communication channels and therefore have access to new and complex expressions of identity, and additionally have access to new ways of expression and communication, which extends their understanding of literacy well beyond the traditional one (Wyn, Cuervo, Woodman, & Stokes, 2005).

Many studies focus on the psychosocial and psychological effects of interactive computer and internet use (White et al., 2002; Adams, Stubbs, & Woods, 2005), as well as on the general impact of computer, internet and e-mail use on the social and emotional well-being of elderly people (Slegers, van Boxtel,

& Jolles, 2008; Koopman-Boyden & Reid, 2009), but only a few focus on the impact of computer and internet engagement on the QOL of elderly people.

Positive effects of ICT

A study by Nycyk & Redsell (2006) indicated that elderly people's interaction with ICT positively influences their **mental activity** and overall has a good impact on their **mental health stimulation**. Elderly people who use ICT feel much **more confident** and **less isolated** (Danowski & Sacks, 1980; Kim, 2008), experience **increased social support** and **social interaction** (Cody, Dunn, Hoppin, & Wendt, 1999), feel **more comfortable** with computers (Czaja, Guerrier, Nair, & Landauer, 1993), have **better cognitive abilities** and **independence** in daily living activities and show a **lower level of depression** (McConatha, McConatha, & Dermigny, 1994). These positive outcomes found in elderly people were later supported by a study by Osman, Poulson, & Nicolle (2005).

The **feeling of satisfaction** with the acquired skills also enabled participants to **contribute to the well-being** of others (Ng, 2008); what is more, Wyn, Cuervo, Woodman, & Stokes (2005) found that IT has the potential to **generate** important **knowledge** about the role that IT now plays in **enhancing** (or harming) people's **health and well-being** (Baltes, Lindenberger, & Staudinger, 1998; Armayones & Hernandez, 2007 in Hernandez-Encuentra, Pousada, & Gomez-Zuniga, 2009).

Hernandez-Encuentra, Pousada, & Gomez-Zuniga (2009) pointed out the importance of technology for meeting the **wishes** and **needs** of elderly people who use it. At the beginning of ICT engagement, the elderly have to feel **self-efficient** in performing ICT tasks, to be able to feel **self-esteemed** for future ICT use. When the elderly are comfortable with using computers, they will also be able to perform different tasks, and without a fear of breaking the computer they will be even more encouraged to use it for other purposes. For instance, they may cooperate in social networks, on-line forums etc., within which they would feel empowered and have good feelings of achievement. In this way, they will be able to explore many life opportunities, which were unknown to them before, and in general empower their lives (Armayones & Hernandez, 2007 in Hernandez-Encuentra, Pousada, & Gomez-Zuniga, 2009).

Negative effects of ICT

In addition to the positive impacts of ICT on elderly people's QOL, there are many negative consequences of ICT use or of spending too much time in front of the computer. Scientific papers (Richardson, Zorn, & Weaver, 2001; Grabianowski, 2011) identify categories of responses related to the negative consequences of computer use, such as physical problems, emotional problems, feelings of guilt, isolation, cost, security anxieties, depression, and potential effects on job performance.

Physical problems can occur when spending too much time in front of the computer; this could lead to repetitive stress injuries, neck-aches, backaches, and eyestrain (Richardson, Zorn, & Weaver, 2001). With excessive computer use, elderly people could withdraw into an artificial world, and playing games can make them place more emotional value on events within the virtual world than to things happening in their real lives, which may later result in **emotional problems** (Grabianowski, 2011). Additionally, if devoting too much time to work with computers, elderly people can experience **feelings of guilt**, since they do not spend time with their family, engage in physical activity etc. (Richardson, Zorn, & Weaver, 2001). Computer use can affect social relationships: the user can withdraw from friends and family with the purpose of spending more time on the computer, which can cause **isolation**. Even when the elderly spend time with their families and interact with friends, they can become irritable when away from the computer (Grabianowski, 2011). What is more, late-night computer use cuts into much-needed sleep time, and the resulting long-term sleep deprivation causes difficulties in concentration, drowsiness, and most of all a **depression** of the immune system (Grabianowski, 2011).

Despite the fact that ICT has various positive effects, some people consider that the **cost** of computer equipment could be a negative consequence at the beginning of ICT adaptation. However, during computer use there are fixed costs due to internet access, printing, upgrading software and hardware, and these should be carefully managed (Richardson, Zorn, & Weaver, 2001). ICT users should pay attention to **security anxieties**; frail elderly people are more exposed than younger internet and computer users. Threats such as credit card fraud, e-mail scams, anxieties about participating in chat-rooms, crashing computers, viruses, etc. are all negative consequences of using computers (Richardson, Zorn, & Weaver, 2001). The consequences of too much computer use, especially late-night use or inappropriate use at work, could negatively affect **job performance**, which could lead to job loss (Grabianowski, 2011).

Despite the above-mentioned positive and negative impacts of ICT on QOL Dickinson & Gregor (2006) expressed concerns about the implementation of a small number of research studies focusing on the impact of ICT on elderly people's QOL indicators. According to Gilhooly, Gilhooly, & Jones (2009), the studies have limitations, as they "received insufficient discussion in the original or have been overlooked by the authors of the secondary papers that cite them" or because of the small number of elderly people who participated in the pre- and post-intervention questionnaires. Many times the interpretation of research results is incorrect due to a non-critical evaluation of the study, and so studies are erroneously cited as showing a positive impact of computer interaction on the QOL of elderly people (Namazi & McClintic, 2003; Saunders, 2004; Segrist, 2004; Chaffin & Harlow, 2005).

Moreover, Dickinson & Gregor (2006) summarised some reasons for not being able to show the effect of ICT on the QOL of elderly people, such as incorrect generalisation of the research results, misattribution of causality, and difficulty of separating the effect of training from the support effects of computer use itself. According to Gilhooly, Gilhooly, & Jones (2009), there are three possible reasons for little research evidence showing the effect of ICT on the QOL of elderly people. The first reason they state is that the specific interventions in the research studies could not demonstrate an effect which could be measured. Secondly, according to their opinion, a high QOL is presented as positive, active and healthy aging, as happiness which could further affect elderly people's interest in using or learning ICT. They suggest that QOL should be seen either as an independent input variable or as a mediating variable at least. They also consider that generally speaking, QOL is often assumed in research to be a dependent variable. Thirdly, Gilhooly, Gilhooly, & Jones (2009) stated that technology is rapidly developing and elderly people are still in a minority as regards using it. Thus, it will be very hard to prove the effect of ICT on elderly people's QOL in a way that is statistically significant.

Nevertheless, there are many studies which show positive effects of learning to use computers or the internet on elderly people's particular QOL attributes (Carpenter & Buday, 2007; Fokkema & Knipscheer, 2007; Sum, Mathews, Hughes, & Campbell, 2008).

Figure 2 presents a summary of the potential positive and negative effects of ICT use which could affect elderly people's QOL.
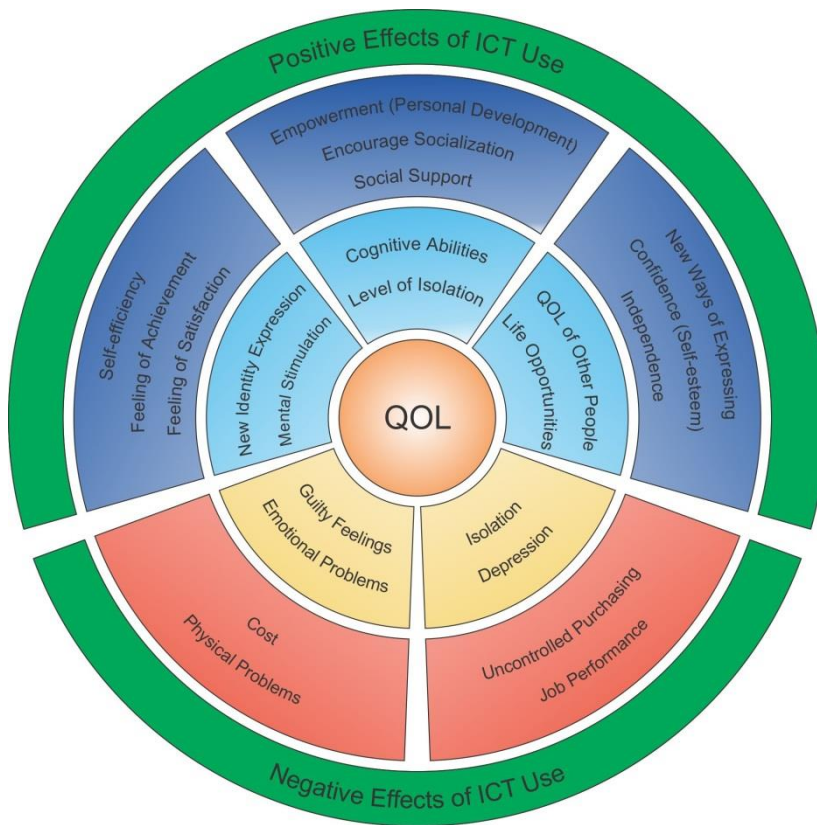
Figure 2: Positive and Negative Effects of ICT Use on QOL of Elderly People

Among these varied perspectives of ICT use by elderly people, the general viewpoint has offered us a powerful conceptual framework for the further research process. Since research studies imply many gaps in relation to the methodological approaches in examining the impact of ICT on elderly people's QOL, as well as in the interpretations of existing research studies, the conclusions of the effect of ICT intervention on specific indicators of QOL of elderly people within the present study will be presented cautiously.

2.4 CONCEPTUAL BACKGROUND OF THE STUDY

Despite the breadth of the current understanding of the QOL concept, in the present study elderly people's QOL is defined as individuals' subjective assumptions of their well-being, which depends on time as well as their life situations (Peplau, 1994).

At a very early stage of the research process I visualized a QOL definition connected to elderly people's ICT engagement, which at that time represented

broad thinking and ideas mainly connected to elderly people's health conditions, recreation activities, social interaction and lifelong learning. Those conclusions were partly born on the basis of scientific literature and project work connected only with elderly people and their ICT interaction. However, even now, when both concepts of QOL and ICT are clearer to me, the third concept, "elderly people", seems to be the most important part. According to the WHO definition an older or elderly person is someone who is cronologically aged 65, however this definition does not adapt well in some countries i.e. Africa, where many individuals do not have an official record of their birthdate. United Nations agreed that 60+ years is the cutoff when reffering to older population, but on the other hand in the UK already in 1875 defined an old age as "any age after 50" (World Health Organization, 2013). The fact is that the definition of elderly person is somewhat arbitraty, still the basis for a definition for an old age is many times associated with chronological ages, changes in social role (i.e. change in work patterns) and changes in capabilities (i.e. senility, change in physical characteristics) (Glascock & Feinman, 1980). Within addressing the study's four aims I performed four study phases within which I took the view that elderly person is a person aged 55+ (a group of elderly people are ranking between 55 and 93 years). Meaning that the group of elderly people is quite heterogeneous with different political, social, economic situations, as well as with different age-related concerns, chronic and potential functional declines. Furthermore, the elderly people are coming from different settings, regions and countries which in addition to the above mentioned cronological age or social/cultural/functional markers could at some point influence elderly people's capacity to use ICT.

Rather than concentrating separately on the concepts of QOL and ICT, it is essential to understand that the QOL of elderly people starts with meeting their wishes and needs, which brings me to the subjective indicators of QOL. It is only here that I can start developing ideas of how the concept of ICT could and should be incorporated into the QOL of elderly people.

For this study it is essential to understand how the different definitions of QOL could be combined with definitions of ICT. More specifically, to understand and conceptualize the basic theoretical concepts I have to return to an exploration of the intersection points of both concepts. As a result of the theoretical background, the conceptual background of this study was developed for two reasons; firstly, to clearly state the implications for the research process and secondly, to develop a specific definition of the QOL of elderly people which will be based on the ICT component.

In a broader context, ICT means **computer-based management of data**, and **technologies** within this context are **used for efficient and effective communication** with individuals, groups and societies, who are able to **create, store, process, retrieve** and **transmit information** (Prasad & Sreedevi, 2007). With ICT, elderly people have the opportunity for a **purposeful use of**

knowledge, experiences and **resources** to **satisfy** their **individual wants** and **needs**. Additionally, ICT offers added value to the **lifelong learning process** of elderly people, with which they are able to affect their own QOL. Moreover, elderly people have **individual choices** within the ICT concept regarding how to **use technological applications** so as to **affect their own QOL**.

In general, QOL is understood as a **multidimensional, multisectoral** and **multidisciplinary** concept (Baldwin, Godfrey, & Propper, 1990; Noll, 2004; Hajiran, 2006) within which the important domains from elderly people's perspective are **being, belonging** and **becoming** (Raphael, Renwick, Brown, & Rootman, 1994). Elderly people want to be recognized as physical beings, psychological beings and spiritual beings. As other generations, the elderly also want to feel they belong to the society or community within which they live, interact and work, but mostly they still want to achieve personal goals, hopes and aspirations. The present study takes into account only the **subjective indicators of QOL**, so that the main research is focused on elderly people's feelings, relationships, life experiences, happiness and life satisfaction. The subjective components are studied with the ICT intervention. Most importantly, QOL is based on **individual assumptions** and depends on **time and life situations**, describes the **individual satisfaction** of **wants** and **needs** which influence such factors as **health condition, recreation, learning opportunities** and **social interaction**. QOL is additionally described through the level of **independence**, which might be changed after ICT interaction.

The conceptual background of the study is presented in Figure 3, where the concepts of QOL and ICT are integrated in a society filled with different kinds of information. E-literate elderly people will become equal partners in **information society** and will be able to use ICT to empower their existing knowledge and transfer their wisdom to younger populations. In this way, elderly people are able to generate new knowledge, and co-create the **knowledge society**. Elderly people who are able to benefit from ICT to affect their own QOL become part of a broad information society and additionally are able to co-create the knowledge society.
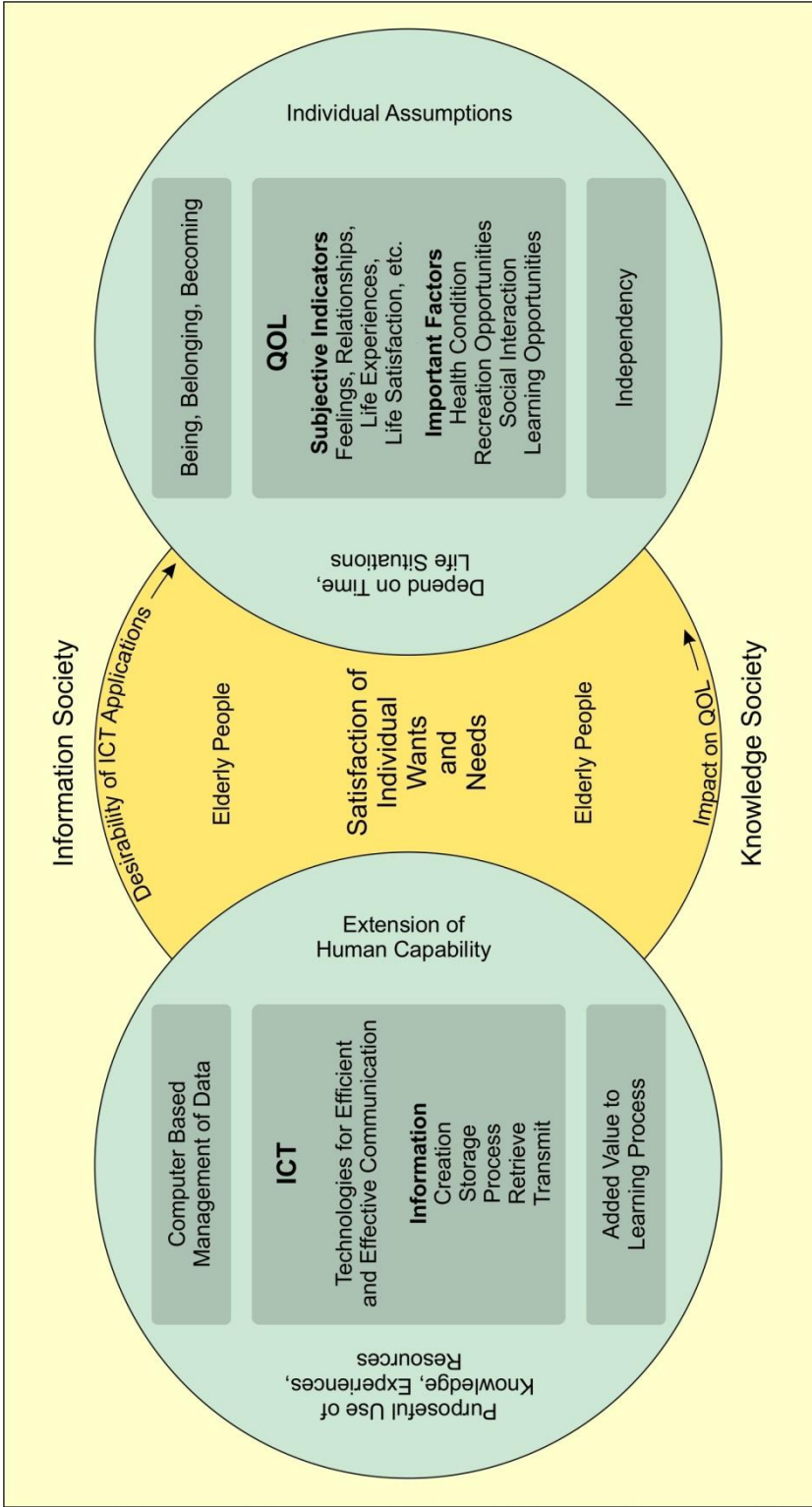
Figure 3: Conceptual Background of the Study

According to the conceptual background of this study, the concepts of **ICT** and **QOL** both cover the domain of **satisfying individual wants and needs**. From the QOL point of view, one of the aims of this study is to find out the elderly people's wishes and needs which would, on the one hand, affect their willingness to learn ICT and, on the other, represent the positive consequences of ICT interaction on their QOL. An important fact is that in the study, ICT represents an extension of human capability to satisfy individual wants and needs, which on the other hand could affect the QOL of individual persons if, at the same time, QOL is recognized and perceived as the satisfaction of the individual's wants and needs. In the segment of satisfaction of individual wants and needs, both concepts meet.

3 Purpose and aims of the study

The purpose of this study is to understand and support elderly people in their ICT engagement, through which they could become equal members of information and knowledge society and in this way, through personal empowerment affect their QOL.

In the research process I used background material from the social sciences and health and human services informatics, with the aim of finding connections between elderly people, technology and the effect of changes in social interaction through on-line forms of communication on indicators of QOL.

To be able to achieve the overall purpose, the study was divided into four aims:

- To analyse and describe previous scientific knowledge of ICT use by elderly people and to assess the factors which influence elderly people's ICT engagement (Article 1);
- To evaluate and analyse elderly people's willingness to adopt ICT in Austria, Ireland, Slovenia and the UK (Article 2);
- To evaluate correlations between ICT use and QOL from the perspective of loneliness in two cases (Finland and Slovenia) (Article 3);
- To develop and validate the "Model of Adaptation to ICT in Old Age" (Summary);

Figure 4 presents the main concepts of this study and their connections to the main aims and results of the study (Figure 4).
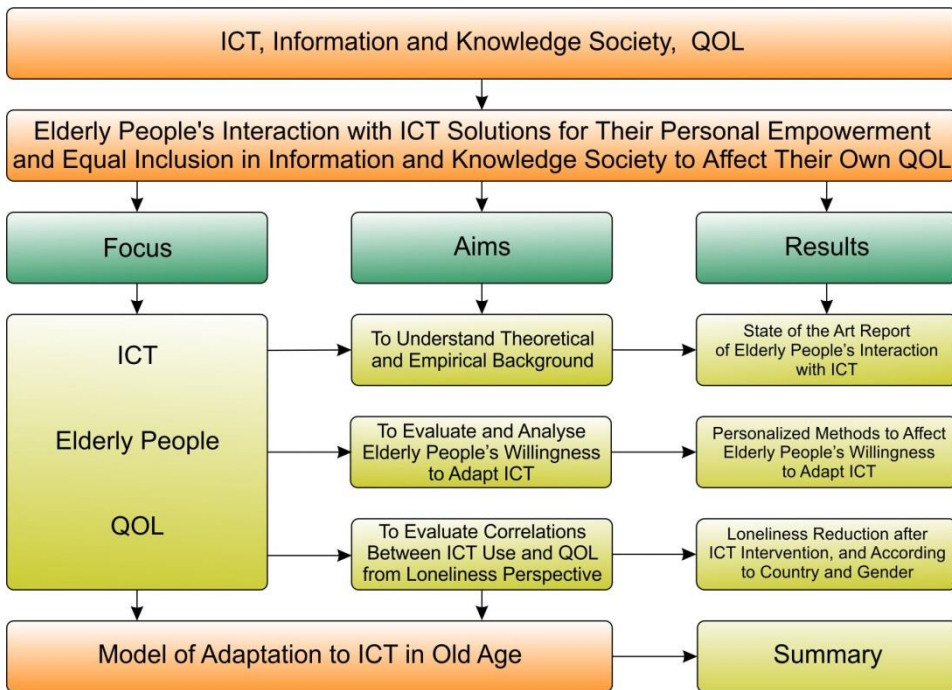
Figure 4: Framework for the Research Study

The main research idea is to find the best possible ways for the elderly to interact with ICT solutions through which they could become equal members of information as well as knowledge society and thus personally empowered. In this study, elderly people's empowerment is a process of increasing individuals' control by using ICT through which the elderly become more powerful. Elderly people's empowerment indeed affects societal and knowledge empowerment, which is a social process of creating community. Through ICT groups, societies could have control over the environment and decision making. According to the alternative theory of knowledge developed by Habermas (1971), people strive for liberation through their "emancipatory interest". For elderly people's ICT adaptation process, the emancipatory interest is important and closely related to the emancipative communication reason. Elderly people mainly use ICT for socializing with other people, through whom they can shape their identities, and consequently empower their lives and affect their QOL.

The study aims to stimulate further scientific debate about the possibilities of increasing the level of e-literacy among elderly people and of using the opportunities of ageing society in connection to ICT and resulting in a better QOL of elderly people. The results of this study and the model developed, supported by the recommendations, will assist in encouraging elderly people to learn and efficiently use ICT and in increasing e-literacy among them. However, a further aim will be to successfully implement the model, examine the effects of

its implementation and make necessary amendments which will later contribute to an even greater effectiveness of the ICT adaptation process of elderly people.

4 Methodology

4.1 DESIGN OF THE RESEARCH PROCESS

This study comes under the health and human services informatics paradigm, with elderly people as the main actors (Figure 5). During the ICT adaptation process, the elderly receive information on the context as well as on the technology, which they combine with their pre-existing knowledge in order to become competent and efficient ICT users. In this process, therefore, the elderly have to become active participants, as it is only in this way that they will be able to co-influence the development of technology, as well as have the power to influence the delivery of e-health and eInclusion services (Kyriazakos, 2011). In many respects, the present study is associated with the health and human services informatics paradigm, since it integrates technology into the lives of people who may, if using appropriate data and structures or models, positively affect their QOL. With technological availability as well as with the finding of suitable models of adapting to ICT, we can contribute to a quick, easy and effective ICT adaptation, which will surely encourage various e-health service providers to also extend currently available services to elderly people.
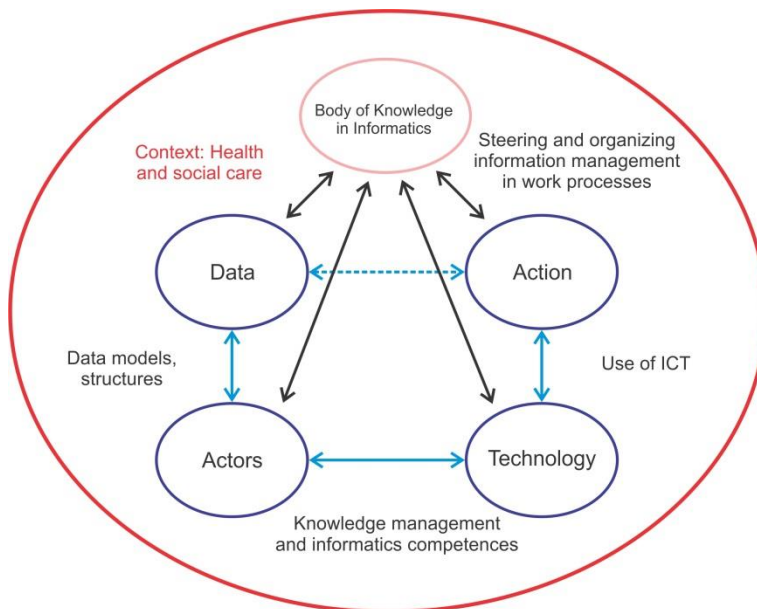
Source: Saranto & Kuusisto-Niemi, 2012

Figure 5: The Health and Human Services Informatics Paradigm

Within the research process (data collection and data analysis), various qualitative and quantitative research methods were used. In phase 1, a data content analysis using an interpretative hermeneutic approach was performed. Further, in phase 2, a single-point evaluation study was conducted to gather and analyse qualitative and quantitative data and finally, in phase 3, a longitudinal quasi-experimental study was carried out to understand the ICT use, attitudes toward ICT, benefits of, and barriers to the ICT use by elderly people. The content analysis of the first, second and third phase and the analysis of data obtained from the quantitative results present the background of the Model of Adaptation to ICT in Old Age developed in the study. The data acquired was evaluated in context to generate the initial theory for the model, based on four elements of the ICT adaptation process: Why would elderly people be willing to adopt ICT, Where in the community can elderly people get support for the ICT adaptation process, How can elderly people be empowered through lifelong learning and What are the outcomes of the ICT adaptation process for elderly people.

Figure 6 presents the design of the research process and shows the four research phases. In phase 1, content analysis was conducted, in phases 2 and 3, a quantitative research method with survey and experimental approach was used. Phase 4 included the development of a model, which was presented above, and the validation of the model, based on structured surveys and focus group discussions.

Conclusions and recommendations were prepared on the basis of a descriptive synthesis of the critical conclusions, mainly based on Habermas's philosophical theory of communicative action and theory of knowledge and human interests, with a view to exploring the issue of elderly people's empowerment with the use of ICT. However, it is essential to acknowledge that within this study, Habermas's early concept or preliminary definition of communicative action is taken into account, instead of the paradigm shift of the theory of communication action. The study applies Habermas's theory to a situation where the empowerment of elderly people is supported by transmitting and renewing knowledge in a process of achieving mutual understanding which later results in actions toward social integration.
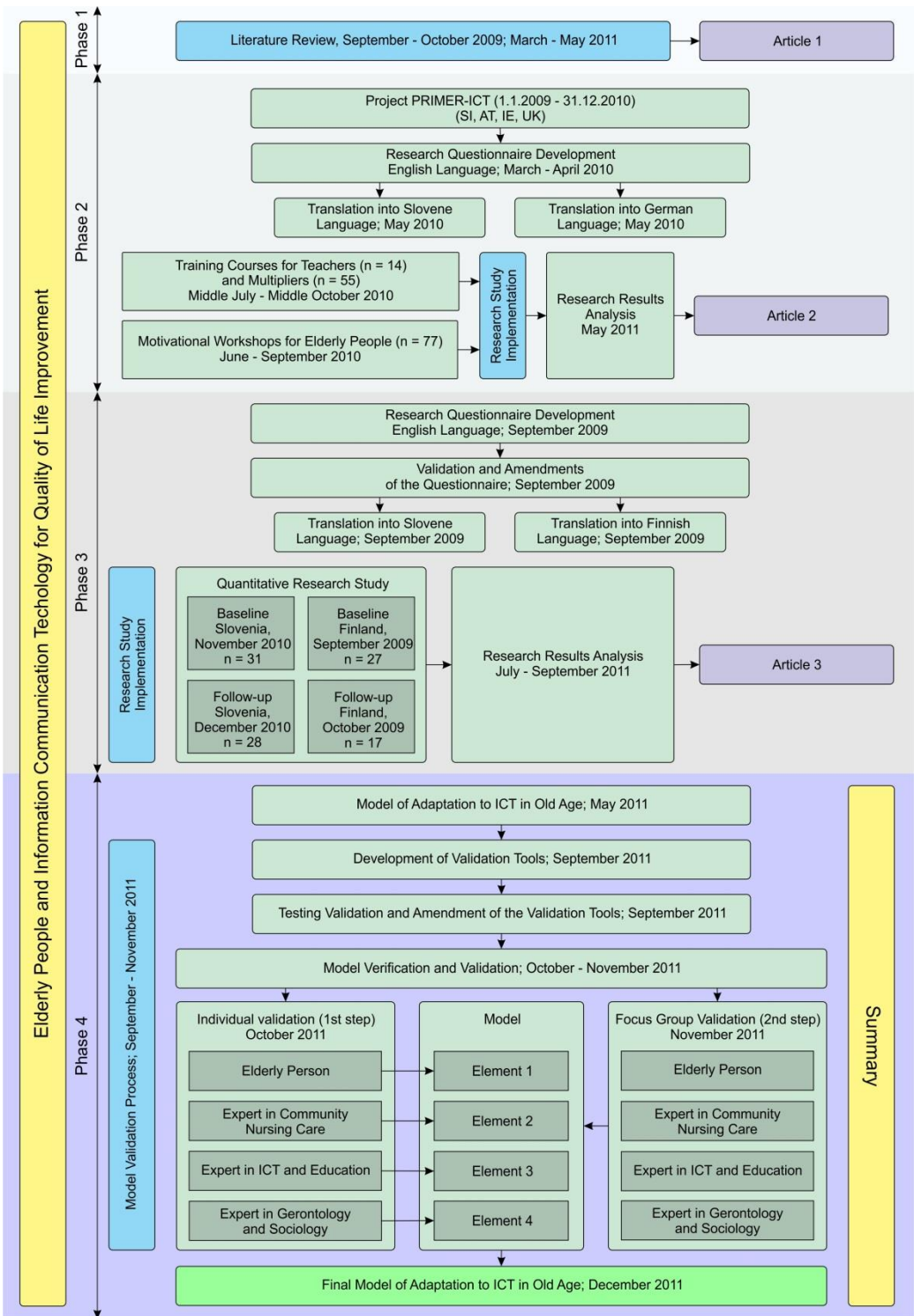
Figure 6: Design of the Research Process

4.2 PHASE 1 − INTEGRATED LITERATURE REVIEW

The aim of phase 1 was to understand the theoretical and empirical background of the ICT use, the attitudes toward ICT and the benefits of and barriers to the ICT use of elderly people. On the basis of two previously published literature reviews and a new, integrated literature review, parallels using the same criteria were drawn to discuss and present up-to-date knowledge on ICT use among elderly people. A comparison of the literature reviews establishes the currently known facts about computer use among the elderly and presents the necessary steps for future research on how to increase the computer engagement of elderly people toward a better QOL. However, the new, integrated literature review focused on the context and results of studies, rather than on the methodological approaches adopted in them. The integrated literature review provided an initial framework for understanding the ICT use of elderly people and the impact of ICT on elderly people's QOL, since the selected articles mainly discussed such themes as ICT use, attitudes toward ICT, benefits of and barriers to the use of ICT, and the psychological impact of ICT use.

The new integrated literature review search basically included seven databases: CINAHL (EBSCO), International Pharmaceutical Abstracts (IPA) (CSA), Medic, PsycINFO (OVID), PubMed, Emerald Journals (Emerald) and Science Direct (Elsevier), using the keywords older people, elderly, old, ageing, seniors, technology, computer, computer literacy, internet, quality of life, well-being, information, learning, education, attitudes, online socializing, online social network and independency. The inclusion criteria were as follows: English-language research papers which discuss elderly people aged 55+, papers which were accessible as full text articles and had applied IMRaD research methodology. When considering only the keywords, 132 articles were found; however, only 49 complied with the inclusion criteria.

The selected articles were analysed with the content analysis approach. For this reason I developed a summary table summarizing the most important information of each article, which included the following sections: number of research article, name of author/s, title of research article, name of publisher, methods of data collection, population/source of information, purpose of study, results/outcomes, and keywords. After a detailed study of each scientific article selected, the articles were classified according to the content included, such as ICT use, attitudes toward ICT, barriers to ICT use, benefits of ICT use, ICT education, QOL, psychological impact of ICT use. After an examination of the substantive links between all three literature reviews, a selection of topics related to ICT and elderly people was performed, and the results from the integrative, up-to-date literature review were interpreted (Article 1).

4.3 PHASE 2 – EVALUATION STUDY OF ELDERLY PEOPLE'S WILLINGNESS TO ADOPT ICT

The basic aim of phase 2 was to study ways of affecting elderly people's willingness to learn ICT skills by organizing demonstrational workshops within the project entitled "Promoting the improvement of elderly ICT skills and well-being by inter-generational and multi-sectoral education" (acronym PRIMER-ICT). The main purpose of the project was to develop an innovative teaching method to support elderly people's ICT adaptation process through an inter-generational and multi-sectoral approach to training, and to create ICT learning opportunities for elderly people, so that they could get acquainted with advanced technology with maximal tutoring support from groups of facilitators (teachers and multipliers). The elderly people's ICT adaptation process started with educating teachers (1st level) and multipliers (2nd level) who in the further process worked individually with elderly people (3rd level). Demonstrational workshops were organized with the purpose of positively influencing elderly people's willingness to learn ICT skills, which could later result in the most efficient ICT adaptation process for the elderly. This particular awareness-raising method can have a great impact on elderly people's ICT adaptation process, because of the possibility of transmitting the teachers' and multipliers' enthusiasm and attitude toward ICT directly to the elderly people and so increase their willingness to learn and acquire ICT skills.

During the demonstrational workshops, the teachers and multipliers worked individually with elderly people, using inquiry-based learning which was directed by the elderly and based on problem solving and critical thinking (Harris, 2003).

The study additionally gives important information about the appropriateness of an individual teaching method in lifelong learning for the elderly, which could result in increased effectiveness of the knowledge acquired, as well as in a successful ICT adaptation of the elderly.

Instruments
Within the study, two questionnaires were developed; the first one to measure elderly people's experiences from the demonstrational workshops and the second one to measure the teachers' and multipliers' experiences after the ICT training courses which they had to attend to be able to teach elderly people ICT skills on the 3rd level of the ICT adaptation process of the elderly.

For evaluating the demonstrational workshops, a questionnaire using a Likert-type scale was used to assess the quality of the workshops and included open-ended (n=7) and closed-ended (n=3) questions and a number of statements (n=9). Within the questionnaire, the elderly were asked to provide general demographic data, such as age, sex, current employment status and profession. Other questions focused on a general evaluation of workshop implementation,

participants' positive and negative feelings about the workshop, potential suggestions and recommendations for improving future workshop implementations. During the evaluation process, the project consortium provided help for the elderly by having the teachers and multipliers explain the questionnaire in detail and give additional information if needed.

The questionnaire developed to evaluate the ICT training courses for teachers and multipliers included open-ended (n=7) and closed-ended (n=4) questions and statements (n=14) evaluated on a Likert-type scale. The questions mainly focused on the demographic data of participants, evaluation of the quality of the course as preparation for future work with elderly people and the level of support during the course, course implementation, learning material, the individual's positive or negative perspectives about the training course, potential suggestions and recommendations for training course improvement. Additionally, participants were asked if the aims of the project were clearly and understandably presented before the course, as well as about their general feelings regarding the learning material and if the content discussion between facilitators and participants led to desired learning outcomes (Article 2).

Data Collection

Out of the 171 elderly people who participated in the demonstrational workshops, a total of 77 people participated in the evaluation of workshops organized to motivate the elderly to participate in ICT training courses. The majority of the elderly were retired and female, aged between 56 and 90 years. Since the definition of the term "elderly people" is not uniform across the European countries, we also included participants aged less than 65 years. Workshops for elderly people were organized in Slovenia, Austria, Ireland and the UK from June to September 2010 and were held in locations that would prove useful for the recruitment of potential elderly participants, such as care homes, elderly homes and community centres.

The demonstrational workshops were organized with the purpose of reaching as many elderly people as possible, and to inform them about the aims of the project PRIMER-ICT, to allow them to learn about advanced technology, the benefits offered by technology and the possibilities for participating in the training courses. Additional purposes of the workshops were to demonstrate the ICT learning material developed for elderly people and to motivate them to learn ICT skills. The workshops allowed the course material to be tested for applicability and robustness against a set of given criteria, such as ease of use, support to the participants within each training course, pacing of the course material and quality of the content developed. After each demonstrational workshop, the elderly were asked to participate in the workshop evaluation (Article 2).

Before the demonstrational workshops for elderly people, ICT training courses for teachers and multipliers were organized. In the evaluation of these

ICT training courses, 69 participants were involved, the majority of whom were female, from Austria, Slovenia, Ireland and the UK. The participants were aged between 18 and 59 years; half of them were employed and half were still studying. The employed participants worked mainly in the business sector, the health-care sector or the education sector, as volunteers, and in the technology sector. 14 participants from Austria, Ireland and the UK participated in the training courses for teachers and 55 participants from Austria, Ireland, Slovenia and the UK participated in the courses for multipliers.

The training courses for teachers lasted two days, and those for multipliers three days, and were implemented for teachers from June to early August 2010 and for multipliers from mid-July to mid-October 2010. Both groups were asked at the end of the ICT training courses to participate in a survey for course evaluation and possible improvements of the course material and/or organization and to give any general remarks for future implementation of ICT training courses (Article 2).

Data Analysis
The data on the elderly people's experiences from the demonstrational workshops were analysed by using frequencies, crosstabulations and correspondence analysis.

The statistical analyses of the teachers' and multipliers' quantitative data from the closed-ended answers were carried out mainly to examine three major themes: a) the use of the e-learning material developed, b) the effectiveness of support, discussion and interaction during the course in terms of a better understanding of the material and c) the impact and efficacy of discussion, interaction and support during the course as a condition for preparation for further work with elderly people. The author carried out descriptive analyses, frequencies and crosstabulations (Article 2).

4.4 PHASE 3 – QUASI EXPERIMENTAL RESEARCH SURVEY (FINLAND, SLOVENIA)

A survey was conducted among elderly people from two European countries; Finland and Slovenia. The starting point of the survey was the fact that loneliness is often a component of an inner desire to have closer connections to other people (Pritchard & Yalch, 2009). Therefore, to be able to measure the positive or negative effects of computer use, the participants were asked at the baseline and in the follow-up studies mainly about their general social activity. The main focus of the research questionnaires in phase 3 was to obtain outcome variables to determine the impact of the computer training course on the degree of the participants' self-reported loneliness, as well as demographic data.

The elderly reported the number of contacts maintained and developed, and especially about various online communication forms they used to socialize with others. The selection of the variables was based on the research questions, as well as on an assumed correlation of variables to the degree of loneliness of elderly people. This seemed an appropriate approach, since the loneliness variable was a dependent one in this study and through the analysis of the above-mentioned variables it was possible to summarize conclusions about the elderly people's level of loneliness before and after ICT intervention.

In addition, the baseline and follow-up studies included many other open- and closed-ended questions related to the QOL of elderly people, mostly connected to the psychological impact of ICT use, e.g., what kind of excitement people experienced before and after the computer training course, general satisfaction with living conditions from the physical as well as the financial perspective etc. (Article 3).

Instruments

The research study included two questionnaires. The first questionnaire, used at the baseline, included 73 questions: 9 open-ended, 54 closed-ended, and 10 open-closed-ended questions, while the second questionnaire included 96 questions: 10 open-ended, 69 closed-ended, and 17 open-closed-ended questions. However, for the present study the most important issue was to find connections between ICT and the QOL of elderly people, so the variables focusing on or in any way connected to the loneliness of elderly people were the most essential to this study.

Both research questionnaires were developed in three European languages (English, Finnish and Slovene), and before being administered, both questionnaires were tested by three older persons. On the basis of their feedback, some questions were eliminated and some re-written so as to be clearer. In both questionnaires, the questions were divided into three parts; the first part included questions related to background information (basic demographic data), the second part included questions related to the QOL of elderly people and the third part included questions relating to the QOL of elderly people in connection with ICT. While the first questionnaire used for the baseline study included general questions about the computer and internet use by the elderly, the second questionnaire used for the follow-up study included questions related to the maintaining and developing of social ties with other people through various online communication forms (Skype, e-mail), from which research knowledge related to the reduction of loneliness after the computer intervention was obtained.

Due to the fact that elderly people in Finland were more self-motivated to attend ICT training courses, there was no special sampling type or selection criteria. However, in Slovenia the elderly people were selected by caregivers from among interested residents according to their health status. Despite

different organizational settings, all the elderly participants filled in the same questionnaires developed during the study.

Data Collection

Data acquisition was conducted in Finland and in Slovenia. 58 elderly people (31 Slovenes and 27 Finns) participated in the baseline study and 45 elderly people (28 Slovenes and 17 Finns) in the follow-up study, all of whom were in good health both physically and mentally.

The majority of the elderly people in Finland applied spontaneously to participate in the ICT training courses organized by the Kuopio Community College via an internet page (http://kansalaisopisto.kuopio.fi/fi/etusivu/), and as a result of newspaper articles and TV and radio announcements. In Slovenia, all the elderly participants were recruited within the European project PRIMER-ICT via flyers, the project's web page (http://www.primer-ict.eu/), brochures and the demonstrational workshops organized to promote the ICT training courses. For this reason, the training courses in Finland were partly financed by the Finnish government and the City of Kuopio, and partly by the participants. In Slovenia, all training courses were organized in elderly homes in Maribor ('Danica Vogrinec Maribor' and 'Sunny home') and were fully financed by the Lifelong Learning Programme of the European Union.

The elderly people involved in the ICT training courses had little or no ICT knowledge, were in good health, were able to write, read, and speak. However, it was important that the elderly people had enough spare time which they could devote to learning ICT skills and to practicing the knowledge gained after each training session. The minimum age for inclusion in the study was 57 years. Due to unexpected health problems or other reasons, 22.42% of the participants dropped out of the courses, so that from the 58 participants recruited at the baseline, only 45 completed the ICT training courses.

The 3-week computer training courses included plenary sessions and many possibilities for discussion. At the beginning of the training course, the facilitators presented the aims, objectives and expected learning outcomes of the training courses. At the first training session in both countries, the participants slowly adjusted to using the computer, keyboard, mouse and other computer equipment. They also learned basic ICT skills (e.g., turning the computer on and off, logging on using individual credentials, and starting different applications). During the next sessions they learned how to use already gained ICT knowledge for searching useful information on the World Wide Web (e.g., reading health promotional web pages, searching for medical information, looking for social events, cooking tips, reading local newspapers, etc.). In Slovenia, the elderly people also reviewed the project PRIMER-ICT web page, participated in the web page forum, and used the Moodle learning environment which contained all the learning material for elderly people.

There was a difference in the didactical approach of facilitating the ICT training courses in the two countries. In Finland, the computer training courses were guided by one facilitator, who was responsible for a group of 10-15 participants, whereas in Slovenia the computer training courses were guided by multipliers, who worked individually with 1-2 older participant/s within a group of 5-8 elderly people. In both countries the computer training courses were organized once a week; in Finland in sessions of 4 hours and in Slovenia in sessions of 3 hours. The lessons included one long break and a few shorter breaks when needed. The computer training courses were organized in September and October 2009 in Finland and from November to December 2010 in Slovenia.

Data Analysis

For the statistical analysis I used the IBM SPSS Statistics 19 software and conducted descriptive statistics (frequencies, mean values) to analyse the demographic data as well as the level of e-literacy of the elderly people. Crosstabulations, Pearson's Chi-square test and the Mann-Whitney test were used to examine the difference between the level of loneliness before and after the computer intervention in both countries and the differences in the self-evaluated levels of loneliness of elderly people between the baseline and follow-up studies and separately for each gender. Additionally, the Mann-Whitney test was used to study the difference in the self-reported loneliness of elderly people who live alone or with their spouses/friends/children, and the difference between those who live in towns or in the country, as well as to evaluate variables closely connected to the QOL of elderly people (e.g., the frequency of feeling depressed, irritated, having poor appetite etc.). Spearman's bivariate correlations and correspondence analysis were run to study the correlations and associations between study variables connected to on-line forms of communication and their connection to the level of loneliness as well as their interconnections. On the basis of these findings, I was able to discuss their possible connections with the level of loneliness of elderly people.

All variables were checked for normal distribution, missing values and outliers. No data transformation procedures were considered necessary. The significance level of all statistical analyses was $p=0.05$ (Article 3).

4.5 PHASE 4 – MODEL DEVELOPMENT AND VALIDATION PROCESS

In phase 4, a model was developed and two validation processes were carried out; first the testing of the validation process and then the validation itself.

4.5.1 Model Development Process

The model development process is based on the concept of knowledge translation (KT), which is understood as a complex and multidimensional concept and demands a comprehensive understanding between methods, measurements, mechanisms and other factors influencing the individual or contextual levels (Sudsawad, 2007). The term was coined by the Canadian Institutes of Health Research and defined as the exchange, synthesis and ethically-sound application of knowledge within a system of interaction among researcher and potential users (Canadian Institute of Health Research, 2009). However, the development of the model within this study correlates more with the University of Toronto and WHO definitions of KT, which are based on synthesizing evidence-based information into the practice of health professionals to affect optimal health care outcomes (Canadian Institute of Health Research, 2011) and accelerating the benefits of global and local innovations for improving people's health (World Health Organization, 2006). According to Sudsawad (2007), the main characteristic of KT is the ability to create new knowledge to yield beneficial outcomes for society; Sudsawad furthermore defined KT as an interactive process between researchers who create new knowledge and those who use it. This definition closely relates to the model developed in this study, where the key principle is to meet the needs of elderly people in using ICT and on-line communication tools to affect their QOL (Phase 3).

Guided by existing research, the empirical findings summarized before, discussions with experts and previous project work, the need for a conceptual and practical understanding of the process of adaptation to ICT of elderly people was detected. Indeed, conceptual approaches to engaging elderly people with ICT exist (Phase 1), but there is no theoretical framework on this particular subject. My intention was to create a reality model which could be applied in practice as a whole, as well as implemented by segments in various environments where elderly people interact and socialize.

When developing the model for adaptation to ICT, the focus was on individuals and their motivated actions, which could be easily understood as social actions (Phase 2). The intention was to create a model which would represent the process of moving from what is learned through research to the practical application of such knowledge in a variety of practices and settings where elderly people live, work and socialize. The German sociologist Weber distinguished social action from social behaviour, but claimed that social action must be understood through the way in which individuals subjectively relate to one another (Ritzer, 2009). However, a study of social action must be based upon understanding the subjective meaning and purpose that the individual attaches to their actions (Calhoun, 2002).

The idea was to create a model which would be based on the previous research phases (Phase 1, Phase 2, and Phase 3) and would provide additional

information of elderly people's ICT engagement and in this way help create a more holistic picture of the ICT adaptation process as currently integrated in the research knowledge. For the development of this conceptual model and its content areas also other frameworks were used. This particular method was used to understand the specific components, chronological stages, and contextual factors that must be taken into account to facilitate a successful model implementation as well as to achieve the desired outcomes (Davis, 2005). However, to be able to understand the contextual factors that play an important role in elderly people's ICT adaptation process, I used a context-focused background framework, more specifically the Ottawa interactive model of research use developed by Logan and Graham (1998). The reason for using this model as a framework was that it represents a dynamic process of decisions and actions by different individuals depending separately on the model elements, and addresses existing evidence-based research knowledge and deals with its implementation in practice.

When developing the model I mainly focused on various barriers and issues recognized in the research articles in elderly people's interaction with ICT which affect their interaction with ICT. Those barriers are lack of motivation and of willingness to learn (Morris & Brading, 2007), lack of efficacy (Soyeon & Insoon, 2005), complexity of ICT (Kim, 2008), fear of technology (Hernandez-Encuentra, Pousada, & Gomez-Zuniga, 2009), frustration (Tak, Beck, & McMahon, 2007), inappropriate didactical approach in teaching ICT skills to the elderly, lack of support from family (Goodall, Ward, & Newman, 2010), etc. Through all the issues mentioned, my intention was to create a solid background for ICT adaptation with four concepts; Why, Where, How, and What. According to Graham & Logan (2004), when implementing the innovation barriers, assessments must be conducted on the innovation, potential adopters and practical environment. What is more, in this way the implementation is tailored to overcome the barriers and enhance the support needed. Since the above-mentioned concepts were recognized as barriers in the scientific literature, the model developed provides conceptual answers for the ICT adaptation process. The elements within the model provide answers on **why** elderly people should accept technology and learn ICT skills, **where** they should get support, **how**, within the lifelong learning process, the elderly could adapt to ICT in the most efficient way and **what** are the most important outcomes for elderly people. Outcomes were especially important since the elderly connect them to the level of self-perceived satisfaction of individual wants and needs. An additional background factor and important criterion within the model development process was the life span of the model, due to the fact that ICT is rapidly developing and the structure of society is changing. People are nowadays more educated, and so the conceptual framework of the elements included in the model was limited to a maximum period of 10 years.

Clarity about the nature of the model and its theoretical background highlights four areas which relate to elderly people's ICT adaptation process. **Willingness** was recognized as the most important area, where general objectives are focused toward elderly people's most efficient ICT adaptation for QOL improvement. Therefore, elderly people need to be willing to accept advanced technology; learn how to use it; and recognize and benefit from the use of it. After achieving the willingness of elderly people to learn ICT skills, it is necessary to provide an environment which could positively influence and support the elderly in the ICT adaptation process. This could be achieved through the **community** where the elderly person lives, with support from physicians, nurses, social workers, community institutions, services etc.; family members, or anyone close to the elderly person. Those are the individuals whom the elderly people trust the most and on whose help they count, and therefore they have the possibility to affect elderly people's willingness to learn ICT skills. Through the **lifelong learning** process, the elderly have the possibility to acquire the needed and desired ICT knowledge in an efficient learning environment, with computer equipment adjusted to their needs, and most of all, with appropriate facilitators who are capable of intergenerational collaboration and are familiar with organizing individualized learning courses supported by properly prepared and presented learning material and clearly defined learning units. Thus, what is very important in the ICT adaptation process is that elderly people recognize the **outcomes** which could result in an improved QOL through, for example, improved self-efficiency and self-esteem, increased social activities, personal empowerment, and an established feeling of achievement.

The model consists of a set of assumptions about the concepts of ICT, elderly people and QOL, and it provides a definition of the phenomenon of the adaptation of elderly people to ICT, as well as an analysis achieved by reducing certain known facts into more basic elements. It represents the structure of the real situation of elderly people's adaptation to ICT governed by certain specified principles. It can be used to explain the concept of ICT adaptation of elderly people, to those new to the subject, and particularly to individuals who are working with elderly people, as well as to elderly people themselves. The model sets out exactly what is meant by ICT adaptation, in clear and simple terms, and suggests directions for interaction between the various elements included in the model. It could also be accepted as a theoretical model because it could be considered an approximation of the essential elements of ICT adaptation which is useful for certain purposes. Moreover, it will be a useful tool for academic staff, lecturers, personal tutors, and any other practitioners involved in the care of elderly people.

4.5.2 Model Validation Process

The model was validated and analysed within this study and additional refinements are suggested for additional research. The model validation process

included the testing of the validation process followed by the validation itself. The validation process was tested to assure the clearness and intelligibility of the developed measurement tools and was carried out by two female experts in the fields of health and human services informatics and elderly care and management. The validators were 40 and 48 years old and were by their occupation a nurse and a manager. As only two persons were involved in testing the validation process, the process was carried out in three stages. At the first stage, each validator individually evaluated the designated element and gave feedback. At the second stage, both validators met as a focus group and discussed the model from a global perspective. At the third stage, the validators again individually evaluated the designated element. The element designated at stage three was not the same as that designated at stage one; however, the element designated at the first stage was amended according to the validators' recommendations. In this way, the validation process was tested specifically through all elements and generally within the model. On the basis of the validation process testing, some questions were rephrased to improve clarity; and some content clarifications were also needed.

After testing, the validation process was carried out in two stages. At the first stage, each validator (n=4) individually evaluated the designated element within the model, and at the second stage the validators (n=4) met as a focus group and validated the model from a general perspective.

In both cases the validation processes were executed gradually, due to the fact that an understanding of the elements included from the viewpoint of coherence and usefulness was essential for a contextual understanding of the model.

Instruments

Individual validation
For the validation of individual elements, four questionnaires were developed. The aims of the questionnaires used in the individual validation process were to evaluate elements within the Model of Adaptation to ICT in Old Age (Willingness, Community, Lifelong learning and Outcomes) from the viewpoint of the coherence and usefulness of particular elements and their content areas (Lund, 2001; Macal, 2005; Mörsky-Lindquist, 2006).
The document "Validation content and the questionnaire" included five sections as follows:
- Explanation of the validation process;
- Description of the data collection;
- Presentation of the element included in the Model of Adaptation to ICT in Old Age;
- Research questionnaire (three parts);
- References.

The research questionnaire included three parts: the first part included open-ended questions (n=6) related to evaluating the element and its content areas from the coherence point of view; the second part included open-ended questions (n=3) related to evaluating the element and its content areas from the usefulness point of view and the third part included questions, using a Likert-type scale (1=poor; 5=excellent), which was used to additionally assess the coherence and usefulness of the content areas within the element and included closed-ended (n=4) questions.

Focus group validation
The aim of the questionnaire developed for the focus group discussion was to evaluate the model and its elements and content areas from a holistic point of view by using SWOT analysis (Chapman, 1995; Valentin, 2001).

The document "Validation content and the questionnaire" included five sections as follows:
– Explanation of the validation process;
– Description of the data collection;
– Presentation of the Model of Adaptation to ICT in Old Age;
– Research questionnaire (SWOT) with a short explanation of the SWOT analysis;
– References.

The SWOT analysis tool consisted of four items: Strengths, Weaknesses, Opportunities and Threats, and each item included three open-ended questions. Additionally, the questionnaire included open-ended questions related to the life span of the model developed.

Data collection

Individual validation
The validation process was conducted by four persons from Slovenia (two women and two men); namely three experts in the fields of community nursing care, gerontological nursing care, sociology, ICT and education and by an older person who is not involved in ICT. The validators were aged 48, 54, 65 and 79 years and were by their occupation a community nurse, a full professor in computer science, a locksmith and a lecturer sociologist. The selection of the experts was based on the content areas included in the model and was performed by the author. The individual validation was carried out in October 2011. All validators were invited personally and informed that the results and conclusions would be used for research purposes only, and would only be handled by the author.

According to the content fields included in the model, experts were selected on the basis of three main criteria: at least 15 years of practical experience from the content area of the element to be validated, recent professional or scientific publications in fields connected to elderly people, such as gerontology, sociology, ICT, community nursing care, elderly people's lifelong learning education, and previous participation in project work connected to elderly people's adaptation to ICT. Each validator was beforehand asked how he/she would like to receive the material for the individual evaluation of the element, whether as a printed version or electronically. According to their wishes, each validator received email with the particular document or one printed copy of the validation questionnaire.

The validators validated the elements of the model as follows:
1. Older person (Element 1 - Willingness)
2. Expert in the field of community nursing care (Element 2 – Community)
3. Expert in the field of ICT and education (Element 3 – Lifelong learning)
4. Expert in the field of sociology and gerontology (Element 4 – Outcomes)

After reviewing the designated element, the validators were asked to fill in the validation questionnaire (electronic or paper version) and return the completed validation questionnaire to the author. The validation of the individual elements lasted from 1 to 3 hours. After receiving the validators' feedbacks from the validation of the individual elements, the author made the document available for the focus group discussion.

Focus group validation
After completing the individual validation of each designated element, the validators worked as a focus group. Before the focus group meeting, all validators were asked how they would like to receive the document of the model presentation for the further focus group discussion, whether as a printed or electronic version. The members of the focus group had to appoint one expert as the group leader, and since the validators appointed the leader before the focus group discussion, the author sent all received results from the individual element validations to the leader for a thorough examination of the results received. Additionally, the focus group leader prepared in advance key points for further discussion and collected the most important findings of the focus group discussion and sent them to the author. Additionally, all validators were asked for the permission to record the focus group discussion, so that each validator voluntarily signed the Consensus form, which enabled the author to record the discussion and later to use the recorded material for finalizing the model.

The focus group validation took place in November 2011 and the validation discussion lasted 1.5 hours. The aim of the focus group discussion was to

discuss in depth the model and its elements from a global, general perspective as well as from specific point of views. Each validator was entitled to express opinions on each of the 4 elements included in the model.

Data analysis

In analysing the data collected, an inductive qualitative content analysis and a basic descriptive quantitative analysis (mean values) were used.

The results from the first two parts of the research questionnaire used in the individual validation process and the results from the focus group discussion were analysed by an inductive qualitative content analysis, in which the coding is based on the theory of research findings. During the data analysis, the author studied in depth the data results and searched for themes to emerge from the data (Hsieh & Shannon, 2005). The results from the third part of the research questionnaire used in the individual validation process and the last question of the focus group questionnaire were analysed with a basic descriptive quantitative analysis (mean values).

5 Results

5.1 PHASE 1 – EVIDENCE-BASED KNOWLEDGE FROM PREVIOUS STUDIES

The aim of the integrated literature review was to find the most relevant previous research evidence on the ICT use of elderly people and to assess the factors which affect elderly people's ICT engagement. However, the literature review mainly focuses on the context and results of studies, rather than on the methodological approaches adopted in them. Additionally, this integrated literature review provided an initial framework for understanding the ICT use of elderly people.

The main themes found in the literature review were about the use of ICT, internet and computers, didactical approaches to ICT, education, attitudes toward ICT, benefits of and barriers to the use of ICT, and psychological impact of ICT on the QOL of elderly people.

Many research articles state that the purpose of ICT use is browsing the internet and sending and receiving e-mails (Nahm & Resnick, 2001; Selwyn, 2004; Koopman-Boyden & Reid, 2009), learning new things through lifelong learning programmes (Carpenter & Buday, 2007; Hernandez-Encuentra, Pousada, & Gomez-Zuniga, 2009; Bond, Burr, Wolf, & Feldt, 2010), searching for various types of information (Eastman & Iyer, 2004; Xie & Bugg, 2009), downloading software (Hernandez-Encuentra, Pousada, & Gomez-Zuniga, 2009). Additionally, the study by Hernandez-Encuentra, Pousada, & Gomez-Zuniga (2009) implies that elderly people use ICT for buying and selling purposes, sending free messages, participating in online forums, listening to radio online and reading newspapers.

Elderly people also have different attitudes toward ICT, both positive and negative. The positive attitudes detected were mainly connected with elderly people's enthusiasm (Dyck & Smither, 1994), being able to maintain the independence and confidence of elderly people (Tatnall & Lepa, 2003). On the other hand, the elderly experience fear and the threat that ICT will somehow destroy their everyday routine, lack of interest or willingness to learn new things in general (Hernandez-Encuentra, Pousada, & Gomez-Zuniga, 2009). Moreover, many elderly people are inflexible and often sceptic or doubtful when it comes to technology and its use. However, attitudes are closely connected to the lifestyles of elderly people, previous personal circumstances, education history, and the economic and social status of each individual (Li & Perkins, 2007).

The integrated literature review revealed many benefits connected to personal and social development (Ng, 2008), such as knowledge empowerment of the elderly (Kiel, 2005), established feeling of achievement (Ng, 2008), possibilities to maintain and develop social relationships (White & Weatherall, 2000; Adler, 2006; Koopman-Boyden & Reid, 2009), personal satisfaction (Bradley & Poppen, 2003), possibilities to contribute to the well-being of other people (Ng, 2008), different kinds for stimulation for elderly people (Tak, Beck, & McMahon, 2007). Additionally, the articles describe such benefits as saving money and time (Gatto & Tak, 2008) and also highlight elderly people's possibilities to prolong their independency (Tatnall & Lepa, 2003). Research evidence implies the importance of recognizing the benefits offered by ICT for the elderly to be able to benefit from advanced technology.

Parallel to benefits, different types of barriers were also detected, such as lack of efficiency, complexity and high costs of ICT equipment, fear of technology (Goodall, Ward, & Newman, 2010), and frustration (Gatto & Tak, 2008). Elderly people are also concerned about learning possibilities, such as lack of support during the learning process, ambiguous teaching instructions during computer training courses, unfamiliarity of ICT concepts, and too fast-paced instructions (Goodall, Ward, & Newman, 2010). My conclusion is that if the barriers are connected to ICT, elderly people have two options for coping with them: they can either overcome a particular barrier so as to acquire a particular ICT skill, or evade it with substitute computer equipment, for instance (Article 1).

It is obvious that there are many research articles dealing with elderly people and their ICT interaction. Nevertheless, research evidence mainly focuses on the various ways of ICT use among the elderly and their general ICT experiences, rather than on investigating the potential impact of ICT on elderly people's QOL. Through the research process it became evident that it is only during the past few years that elderly people have started to interact with ICT, making it understandable that the research focus was on general studies which bring added knowledge for further, more specific investigations. Although there are some studies which measure and interpret the impact of ICT on some variables of elderly people's QOL, the main problem concerns the methodology of the existing research studies. The studies are mainly based on a single, one-off measurement, which is why the conclusions are not as reliable as we would like them to be. Additionally, it was noticed that in many cases the sample size is small, the study population is homogeneous and the computer interventions are too short to see the effects of ICT on elderly people's QOL. For these reasons, it is impossible to draw conclusions or to generalize to a larger, more diverse population. Instead of studies focusing on measuring QOL variables as dependent, in future it would be better to focus on developing measurement tools with which it would be possible to measure loneliness, for instance, as an independent variable.

5.2 PHASE 2 – PERSONALIZED METHODS OF AFFECTING ELDERLY PEOPLE'S WILLINGNESS TO ADOPT ICT

The aim of the phase 2 was to study ways of influencing elderly people's willingness to learn ICT skills through organized demonstrational workshops, during which the elderly had maximal support from future ICT facilitators (teachers and multipliers). In particularly, the author was interested in finding out the impact of teachers' and multipliers' positive experiences from ICT training courses on elderly people's willingness to learn ICT skills and their motivation for future ICT engagement. The underlying hypothesis was that the teachers' and multipliers' attitude toward ICT may be reflected in elderly people's perception of ICT, therefore the author defined research questions in three categories: Use of e-learning materials and learning support by teachers and multipliers; Teachers' and multipliers' intergenerational understanding; and Motivation of elderly people to learn ICT skills.

Background of Participants
A total of 77 elderly people participated in evaluation of the workshops (55% of the participants dropped out); the majority of participants were retired and some were still working. 28.6% of the participants were male and 71.4% were female. The mean age of the participants was 76.78 years (Min=56 years; Max=90 years) and standard deviation was 8.15. 49.4% of the participants were from Ireland, 45.5% from Slovenia, 3.9% from Austria and 1.3% from the UK.

In the evaluation of the training courses for teachers and multipliers 69 participants were involved (46% of the participants dropped out) of which 58 were female (84.1%) and 11 were male (15.9%). The mean age of participants was 32.22 years (Min= 18 years; Max=59 years) and the standard deviation was 12.97. The majority of participants were still studying, however those who were employed worked mainly in the business sector (14.5%), the health-care sector (13%) or the education sector (11.6%), as volunteers (7.2%), and in the technology sector (2.9%). Participants originated from Austria, Ireland, Slovenia and the UK.

Motivation of elderly people for learning ICT skills
The statistical analysis of the data gathered from the elderly people who attended demonstrational workshops revealed a significant correlation between knowing and understanding the aims of the project PRIMER-ICT and an increased interest in future potential participation in the ICT training courses (p=0.00). Most elderly participants reported that the project aims were clear, and so they were also highly interested in participating in future ICT training courses organized for elderly people. Additionally, the study showed that elderly people who participated in the demonstrational workshops were more

interested in participating in the ICT training courses, regardless of whether they were employed or retired.

Another significant correlation was found between the extent of discussion and interaction possibilities during the workshops compared to the level of interest in participation in future training courses (p=0.00). In other words, if elderly people have the possibility to discuss and solve problems encountered and to get appropriate information, and are satisfied with the knowledge they receive, they are also more interested in future lifelong learning. This particular information is essential for this research study, since it clearly indicates that teachers and multipliers were successful in providing enough time for discussion and problem solving during the workshops which positively affected elderly people's willingness for future ICT engagement. To be able to affect elderly people's willingness for a future ICT adaptation process, teachers and multipliers had to use their intergenerational sensibility, a multisectoral approach and the ICT knowledge gained in previously organized ICT training courses. ICT training courses included enough possibilities for discussion and material with intergenerational issues to make them understand the needs and wishes of elderly people better.

Teachers' and Multipliers' Intergenerational Understanding and Learning Support

The data analysis of the ICT training courses for teachers and multipliers confirmed a significant correlation between the extent of possibilities for discussion and interaction during the course and the ability to develop a sense for intergenerational issues and to be more sensitized in and understand the elderly people better (p=0.01). The majority of teachers and multipliers stated that there were enough possibilities for discussion and interaction during the course and of this group, all except one stated that the course helped them to be more sensitized to intergenerational issues. Statistical significance was found between sufficient support during the course and the opinion that the course was a good preparation for future work with elderly people (p=0.00) and, additionally, a statistical significance between sufficient possibilities for discussion and interaction during the course and the opinion that the course was a good preparation for future work with the elderly (p=0.00).

Still, no statistically significant correlation was detected between elderly people's enjoyment and satisfaction with the workshop implementation and whether they would recommend the workshop to a friend (p=0.06), despite the fact that the teachers and multipliers who led demonstrational workshops were prepared beforehand for individual work with elderly people.

The present study has shown that a personalized approach to teaching ICT skills and motivation to learn ICT affects elderly people's willingness to learn ICT; however, individuals who are involved in elderly people's teaching/learning process need to clearly understand the learning material, the aims of the ICT

training courses, and above all, elderly people's needs and abilities. All these together enable a correct selection of motivational approaches as well as an effective knowledge transfer. Additionally, it is very important that during the process of encouraging the elderly to learn ICT skills there are enough possibilities for discussion and interaction between the elderly and the ICT training facilitators (teachers and multipliers). For this, both groups of facilitators need to understand intergenerational issues and establish sensitized feelings toward elderly people. Only in this way can elderly people efficiently adopt ICT and affect their own QOL (Article 2).

5.3 PHASE 3 – COMPARISON OF ELDERLY PEOPLE'S ICT EXPERIENCES IN FINLAND AND SLOVENIA

The aim of the study was to evaluate correlations between ICT use and QOL from the perspective of loneliness of elderly people in two European countries; Finland and Slovenia. Within the study I collected data about the level of elderly people's current ICT knowledge and experiences before and after an ICT intervention, to be able to explore the extent to which elderly people were able to use technology for communication with other people for improving their social inclusion, and consequently reducing the level of loneliness. For this reason, the elderly people were asked also to evaluate the level of self-reported loneliness at the baseline and in a follow-up study, which enabled me to make scientific conclusions of the impact of an ICT intervention on their QOL in relation to gender and place of residence (town or country) and according to their living arrangements (living alone or with spouses/friends/children). However, to gain a wider view, I additionally studied on-line forms of communication among elderly people and how those affect the social inclusion and level of loneliness of elderly people.

Background of Participants
The minimum age of participants before and after the ICT intervention in Finland was 58 years and maximum 80 years, though the mean age before the ICT intervention was 66.37 years (SD=5.76) and after it, 66.29 years (SD=6.57). In Slovenia, the minimum age of participants before and after the ICT intervention was 58 years and maximum 93 years; the mean age before the ICT intervention was 77.68 years (SD=8.30) and after it, 77.00 years (SD=8.30).

In both countries, there were more female participants included in the study; though, as seen from table 3, there are some country-specific differences, such as in people's retirement period and level of education. The living environment of some participants changed between the baseline and follow-up studies. At the baseline, 100% of the Finns lived in towns, as did the majority of Slovenes (96.8%). However, the situation changed before the follow-up study; as

apparently 5.9% of the Finns moved from towns to the country. The situation in Slovenia was the opposite: elderly people living in the country (3.2%) at the baseline had moved to towns by the time of the follow-up study.

Table 3: Demographic Data of Participants

Variable	Finland (N, baseline=27; N, follow-up=17)		Slovenia (N, baseline=31; N, follow-up=28)	
Age when retired	M= 58.70; SD=7.02		M=55.61; SD= 6.70	
Gender (%)				
Male	47.7%		33.9%	
Female	52.3%		66.1%	
	Baseline	**Follow-up**	**Baseline**	**Follow-up**
Age	M=66.37; SD=5.76	M=66.29; SD=6.57	M=77.68; SD=8.30	M=77.00; SD=8.30
Education (%)				
Vocational school	48.2	35.3	41.5	33.3
High school	7.4	17.6	51.7	59.3
2-year secondary edu.	25.9	29.4	3.4	3.7
3-year tertiary edu.	3.7	5.9	3.4%	3.7
4-year tertiary edu.	14.8	11.8		
Living environment (%)				
Town	100.0	94.1	96.8	100.0
Country	0.0	5.9	3.2	0.0
I am living (%)				
Alone	44.4	58.8	86.2	85.8
With a spouse	51.9	41.2	13.8	7.1
With children	3.7	0.0	0.0	0.0
With a friend	0.0	0.0	0.0	7.1
I live in (%)				
Apartment	77.3	62.5	0.0	0.0
House	22.7	31.2	0.0	0.0
Home for elderly	0.0	6.3	100.0	100.0
I live (%)				
Independent	96.2	100.0	77.4	89.3
Partially independent	3.8	0.0	12.9	7.1
Completely dependent	0.0	0.0	9.7	3.6

The majority of all elderly people in Slovenia lived alone, but between the baseline and follow-up studies there was a difference in the percentage of elderly people living with a spouse; this has been halved in the follow-up study. In Finland the percentage of people living alone increased from baseline to follow-up study by 14.4%, which resulted in a decreased percentage of people living with a spouse. Elderly people in Finland mostly live in their own apartment or house; while in Slovenia all elderly people live in homes for the elderly homes.

Additionally, the majority of elderly people in both countries live independently; the percentage of those living independently in Finland is higher in both studies than in Slovenia. The follow-up study actually showed that in Finland those who reported living partly independently (3.8%) at the baseline, had become totally independent by the follow-up. In the follow-up study in Slovenia, the percentage of elderly people living totally independently increased

by 11.9% (89.3% independence of living), which means that at the same time, the percentage of elderly people living partly or totally independently decreased (Table 3).

ICT Literacy of Elderly People

In Finland, 81.5% of the elderly people possessed a computer and 85.2% of the elderly had access to the internet, whereas only 6.5% of the Slovene elderly people possessed a computer, though 48.4% of them had internet access. More Finns already used the computer before participating in the computer training course (84.6%), while only 16.1% of Slovene elderly people had previous experience in using computers, which means that during the study, more Slovenes used it for the first time (88.9%) than did Finns (41.2%).

The majority of elderly people in both countries had not used the internet at the baseline (Finns, 52.6%; Slovenes, 83.3%) and used it for the first time during the study (Finns, 53.3%; Slovenes, 81.5%). The main activity carried out with the computer by Finns at the baseline was browsing the internet (68.4%), but at the follow-up study, the majority of the elderly used the computer to send e-mails (70%) and for writing text (70%), which increased from the baseline to the follow-up study. In both studies in Slovenia, the majority of the elderly reported their main activity to be browsing the internet; however, the percentage increased from baseline (80%) to follow-up (90%). The frequency of sending e-mails and writing text did not change, but there was a big change in participating in internet forums from the baseline (40%) to the follow-up study (0%), showing a marked decrease. Most elderly Finns used the internet 1 time per day, and the percentage even increased after the computer intervention. However, it is interesting that in Slovenia the use of the internet 1 time per day decreased from 80% to 9.5% on account of those who reported using the internet 1 time per week (52.4%).

In both countries, the elderly use the internet also for sending e-mails; the frequency of this particular activity by Finns is mostly 2 e-mails per week; however, the activity decreased between baseline and follow-up. In Slovenia it is very interesting that at the baseline, more elderly people reported sending up to 5 e-mails per week (66.7%), and fewer people sending up to 2 e-mails per week (33.3%). The situation at the follow-up is reverse: the majority of elderly people increased the activity of sending up to 2 e-mails per week (75%), while the number of those sending up to 5 e-mails per week decreased (25%). At the baseline, Finns reported as the main reason for internet use paying bills (50%) and lifelong learning (38.9%), and both activities even increased by the follow-up (70% paying bills; 40% lifelong learning).

Table 4: ICT Literacy of Elderly People

Variable	Finland (N, baseline=27; N, follow-up=17)		Slovenia (N, baseline=31; N, follow-up=28)	
	Baseline	**Follow-up**	**Baseline**	**Follow-up**
Ownership of computer (%)				
Yes	81.5		6.5	
No	18.5		93.5	
First use of a computer during the study (%)				
Yes		41.2		88.9
No		52.9		11.1
Do not use computer		5.9		0.0
Way of computer use (%) (several options possible)				
Browsing the internet	68.4	60.0	80.0	90.0
Sending electronic mails	63.2	70.0	40.0	40.9
Writing text	52.6	70.0	20.0	22.7
Participating in internet forums	5.3	10.0	40.0	0.0
Participating in social networks	5.3	0.0	0.0	4.5
Internet use during the study (%)				
Yes		53.3		81.5
No		46.7		18.5
Purpose of internet use (%) (several options possible)				
Paying bills	50.0	70.0	0.0	100.0
Lifelong learning	38.9	40.0	33.3	40.9
Being independent	27.8	10.0	16.7	0.0
Reading newspapers	22.2	20.0	66.7	45.5
Being connected to people	16.7	20.0	33.3	40.9
Conversation with family	16.7	20.0	33.3	27.3
Frequency of internet use (%)				
At least 1 time/day	66.7	70.0	80.0	9.5
At least 1 time/week	13.3	10.0	0.0	52.4
At least 1 time/month	6.7	10.0	0.0	0.0
Rare	13.3	10.0	20.0	38.1
Frequency of sending e-mails (%)				
Up to 2/week	84.6	63.6	33.3	75.0
Up to 5/week	7.7	36.4	66.7	25.0
Up to 15/week	7.7	0.0	0.0	0.0
Biggest fear about using computer (%) (several options possible)				
Lack of knowledge and skills	70.6		69.6	
Lack of technical support	47.1		13.0	
Not familiar with procedures	23.5		47.8	
Cost	0.0		21.7	

In Slovenia there are also some variations: at the baseline, the elderly reported the main reason to be reading newspapers; however, in the follow-up study all elderly Slovenes used the internet for paying bills. Additionally, the activity of being connected to people increased, and being able to socialize with family decreased in importance. In the same way as Finns, Slovenes used the internet at the baseline for the purpose of being independent; but in the follow-up study nobody at all reported this purpose.

Within the study, both groups of elderly people expressed their biggest fear to be the lack of knowledge and skills; additionally, Finns named the lack of technical support and unfamiliarity with ICT procedures, while Slovenes recognized as a big issue a fear of financial expenditure (Table 4).

Impact of ICT on Social Inclusion and Level of Loneliness

Elderly people in Finland and Slovenia mainly carry out activities related to their own well-being; however, there are some major differences in doing other daily activities. For instance, Finns put a lot of effort to housekeeping, carrying out activities related to their interests and helping children and their families, while Slovenes mainly carry out activities related to their interests and are members in associations for elderly people.

Generally speaking, elderly people in both countries do not feel lonely, and do feel that they are involved in society. Still, it is evident that in the follow-up study, Finns reported a lower level of self-perceived involvement in society than Slovenes, who were able to even increase the level of involvement in society. Finns are mainly involved in society through telephone conversations, visiting the theatre and other cultural events and also some (approx. 30%) through the internet. On the other hand, Slovenes socialize by visiting cultural events, participating in associations for elderly people and slightly less frequently through the internet (approx. 20%). Moreover, Finns reported having more friends than Slovenes, but by the follow-up study, Slovenes were able to get acquainted with more friends than Finns. There was also a difference in the elderly people's self-reported level of loneliness in the follow-up study: 40% of Finns and 84.6% of Slovenes reported that they felt less lonely because of the computer. However, the main reason for feeling less lonely according to Finns was that they could socialize with friends and family via the computer, while Slovenes stressed the possibility of having telephone conversations via mobile phone. On the basis of these results I would have expected that Finns would feel safer because of the computer compared to Slovenes, but the opposite turned out to be the case.

Table 5: Percentages of Variables Associated to the Level of Loneliness

Variable	Finland (N, baseline=27; N, follow-up=17)		Slovenia (N, baseline=31; N, follow-up=28)	
	Baseline	**Follow-up**	**Baseline**	**Follow-up**
Daily activities (%) (several options possible)				
Taking care of myself and my well-being	96.2	100.0	93.5	96.3
Housekeeping	69.2	64.7	3.2	7.4
Inclusion in activities of interest	65.4	64.7	80.6	88.9
Helping children and their families	42.3	58.8	9.7	14.8
Inclusion in Association for elderly	15.4	29.4	38.7	25.9
Inclusion in local community	7.7	0.0	3.2	14.8
Daily activities (%) (several options possible)				
Inclusion in activities in civil society	7.7	6.3	16.1	3.7
Honorary work	3.8	5.9	6.5	0.0
Counselling, teaching younger people	0.0	0.0	12.9	25.9
Feeling lonely (%)				
Yes	3.7		9.7	
No	96.3		90.3	
Less lonely because of ICT (%)				
Yes		40.0		84.6
No		60.0		15.4
Reasons for feeling less lonely (%) (several options possible)				
Socializing via computer		75.0		36.8
Telephone conversation		75.0		52.6
Visiting activities found via computer		50.0		26.3
Number of friends (%)	M=8.91; SD= 6.09	M=9.36; SD=6.31	M=7.07; SD=7.69	M=8.77; SD=8.45
Feeling safer because of computer (%)				
Yes		70.6		88.9
No		29.4		11.1
Ever participating in social networks (%)				
Yes	8.0	23.5	0.0	20.0
No	92.0	76.5	100.0	80.0
If no, would you like to get friends via social networks (%)				
Yes	15.0		69.0	
No	85.0		31.0	
Working with computer is a benefit (%)				
Yes		100.0		96.3
No		0.0		3.7
Benefits recognized in working with computer (%) (several options possible)				
Learning new things		71.4		80.0
Reading newspapers		50.0		53.8
Option to connect with family		35.7		53.8
Feeling less lonely		28.6		46.2

In both countries, the majority of the elderly were not a part of any social networks, but they increased this activity by the follow-up study. They mainly belong to the Facebook social network. The participants also showed a difference in their willingness to meet friends from social networks: the majority of Finns did not want to meet people in this way (85%), while Slovenes were open to this kind of acquaintance (69%). Those of the elderly who use social networks communicate mainly with females. Those who do participate in social networks mostly participate at least 1 time per week, but a minority participates several times per day.

When using a computer, more Slovenes reported this as positive excitement, since they can read newspapers, look at pictures and review content which they are interested in. In contrast, almost a majority of Finns reported that they do not have any special feelings about computer interaction; however, both groups recognized that working with computers is a great benefit for them. Both groups reported as benefits learning new things and reading newspapers. Compared to Finns, more Slovenes reported that connecting with family and feeling less lonely were of benefit to them (Table 5).

Table 5 presents a descriptive analysis of the variables which, in my opinion, allow conclusions to be made about the elderly people's level of loneliness. However, in this study the loneliness of elderly people was observed by a total of 25 variables, mainly connected to on-line forms of communication. Statistical significance was confirmed in the reduction of loneliness between the baseline and follow-up studies and according to gender (female). The elderly people who lived alone also reported a decrease in the level of loneliness between the baseline and follow-up studies (p=0.012), as did those living with a spouse (p=0.007). Additionally, those elderly people who lived in towns and participated in computer training courses reported a statistically significant reduction in their feeling of loneliness (p=0.003), in contrast to people living in the country, who did not report any differences (p=0.317). Apparently, elderly people living in institutional care have limited options for socializing; therefore computer training courses and ICT increased their possibilities of social inclusion, which positively affects the degree of loneliness.

Spearman's correlation tests found a positive correlation between the use of the internet for the purpose of loneliness reduction and the frequency of e-mail use (r=0.447; p=0.013). This could mean that elderly people use the internet for sending e-mails to reduce their level of loneliness. Additionally, it is evident from the results that elderly people use e-mail communication to stay connected with their families and friends, which could indicate a reduction of loneliness, though it was not possible to statistically confirm this (r=0.270; p=0.136). Additionally, a significant proportional correlation between the frequency of sending e-mails to maintain social networks (r=0.554; p=0.002), as well as to develop new ones (r=0.825; p=0.002) was found. A directly proportional significant correlation was found between e-mail use and the number of existing

friends (r=0.343; p=0.017), as well as between e-mail use and the number of friends made after the computer intervention (r=0.635; p=0.020). This would mean that the more friends elderly people have, the more social they are and therefore able to establish even more friendships online (r=0.575; p=0.025) (Article 3).

Because the baseline and follow-up studies included questions closely related to the QOL (e.g., number of healthy meals per day, frequency of feeling depressed, upset, irritated, poor appetite, troubles with indigestion, trouble with fatigue etc.) of elderly people, the author performed additional Mann-Whitney tests to find out eventual differences in the QOL variables between the baseline and follow-up studies. In Finland, the test showed a statistically significant difference between baseline and follow-up in the frequency of elderly people having poor appetite (p=0.004) and in the frequency of being irritated (p=0.05) in the past week. The elderly people reported fewer troubles in relation to poor appetite and fewer times of being irritated after the computer training courses. In Slovenia the author found a statistically significant difference between baseline and follow-up in the frequency of visiting social events (p=0.019), as well as in the frequency of having problems with indigestion (p=0.041). In the follow-up study, the elderly people reported fewer visits to social events, which could result from participating in the computer training courses. However, they also reported fewer problems with indigestion. The last-mentioned variable is especially important when discussing elderly people's QOL; however, the author cannot unilaterally claim that the change was due to the computer intervention.

5.4 PHASE 4 – MODEL DEVELOPMENT AND RESULTS OF VALIDATION PROCESS

5.4.1 Model of Adaptation to ICT in Old Age and Its Elements

The Model of Adaptation to ICT in Old Age developed in this study is a conceptual and practical model, since it faces on-going challenges of a rapid transfer of knowledge into clinical practice. The model is based on the author's theoretical background, previous knowledge and discussions with different experts within research projects in various fields connected to elderly people and ICT. Using the research results gathered, the author carried out an inductive content analysis focused mainly on the barriers to ICT use and elderly people's attitudes toward ICT, so as to identify aspects affecting the ICT adaptation process of elderly people. Furthermore, the model is based on deductive thinking based on the data gathered within the survey and a longitudinal research study, with the aim of getting a broader picture about the following elements: **Why** would the elderly learn ICT, **Where** can they get support, **How**

can they learn in the most efficient way and **What** does this mean to their lives in general and their QOL in particular.

The model includes information synthesized and presented in a 4-dimensional element structure, which could be observed independently for each element or as a whole. Each element consists of three content areas, which describe the most crucial parts of the ICT adaptation process of elderly people and are strongly connected to the evidence-based knowledge obtained through research phases 1-3.
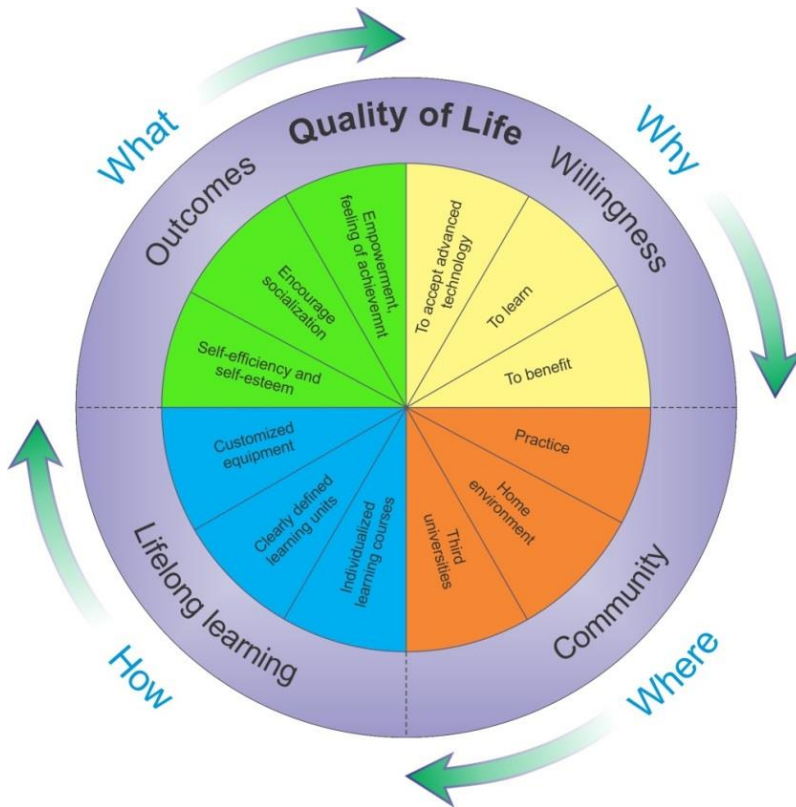

Figure 7: Model of Adaptation to ICT in Old Age, Based on Research Phases 1-3

The international survey during the study examined how ICT teachers and multipliers can contribute and support elderly people in their ICT engagement. Special emphasis was placed on the **"Willingness"** issue, due to our assumption that precisely this factor is the most important for elderly people in the stage of adaptation to the ICT. From the study it is also clear that discussion and interaction between the elderly and the ICT facilitators affect the level of elderly people's motivation to accept advanced technology, which provides further motivation for learning and also affects the success of the ICT adaptation. Additionally, more time for discussions during the ICT training provides possibilities for elderly people to understand why ICT could be a benefit for

them, or they can exploit ICT in a way to positively affect their social or economic status. Moreover, the elderly need to be willing to recognize the benefits of ICT engagement to be able to use advanced technology and thus gain opportunities to learn new things (Article 2).

Elderly people represent a major group in the **"Community"**, which is why communities need to provide the opportunities for elderly people's reintegration, through which they could give added value and contribute to societal prosperity. The integrated literature review revealed evidence-based knowledge for creating the "Community" element, which offers solutions to where the elderly can look for help and peer support (Article 1). However, it is also important for communities to identify options to help the elderly to recognize the importance of ICT with various promotional activities, as well as with giving, providing and ensuring the support needed in the early stages of ICT adaptation to continue the adaptation process (Article 2).

Each learning process depends on the learning materials developed, the didactical approach and the physical setting. In the learning process of elderly people, age-related issues need to be considered to ensure an effective ICT adaptation. Individualized learning units are the most important, due to the fact that elderly people may have lower motor and cognitive abilities. Elderly people may be insecure in the learning process, and so they need more time to adjust to the fact that they are learning new things, as also to the learning process itself. In phases 2 and 3 it was found that for elderly people, **"Lifelong learning"** is of essential importance, since it provides the possibilities to expand their social and economic perspectives with adapted teaching methods, equipment etc. (Article 2, Article 3). Moreover, for effective ICT adaptation it is necessary to provide customized equipment to enable conditions where the elderly can adopt ICT in the most effective way.

In the motivational workshops organized during the research, elderly people were acquainted with the benefits of ICT in general, the possibilities which ICT offers and also the e-learning materials developed within the project PRIMER-ICT. The study showed that in elderly people's ICT adaptation process, recognition of the **"Outcomes"** of the ICT interaction is very important (Article 2). In this process, elderly people slowly accept ICT as part of their lives, because working with computers gives them a feeling of self-efficiency, increases self-esteem, and gives them opportunities to socialize with family and friends, which consequently affects their QOL. In general, ICT could empower elderly people through providing a feeling of achievement. However, many elderly people lose their initial enthusiasm for ICT use after a while, when the formal learning process is over.

5.4.2 Validation of the Model of Adaptation to ICT in Old Age: Usefulness and Coherence

The validation process of the model was undertaken to show whether the model leads to the expected results. The main aim of the validation process was to establish objective evidence that the model consistently enables successful ICT adaptation of elderly people through its elements and content areas (U.S. FDA, 2009). The validation process was carefully planned to ensure that the process is adequately validated through two aspects, namely coherence and usefulness. Both aspects were selected by the author, since the main goal of the model was to be as practical as possible, as it was mainly based on evidence-based research knowledge.

In what follows, the results of the model validation process are presented gradually from the perspectives of coherence and usefulness. Coherence is marked by an orderly, logical connection and integration of diverse model elements and content areas within the elements (Merriam-Webster, Incorporated, 2012). On the other hand, the model and content areas have to achieve the level of quality of being of practical use to be assessed as useful (Dictionary.net, 2012). Tables dealing with each individually validated element of the model illustrate the most important statements of each validator and content analysis of the results. For clarity, the originally developed elements and final elements are distinguished from each other by indicating recommended changes in bold.

Validation of Element 1: Willingness (1st step)
Validation of the element "Willingness" was performed by an elderly person who is not ICT literate.

Coherence
The elderly person evaluated the element as an important aspect of the ICT adaptation process, since the willingness to use ICT is very important and in these times a necessity; the elderly need to use all possible resources which could improve their QOL. However, regarding the effect of content areas within the element, the elderly person considered that the more an individual knows, the more he or she is valued, and so all depends on the individual person.

Since learning occurs throughout life, it is essential to take advantage of ICT. Elderly people need to recognize the benefits of technology, for example, reading news, searching for various kinds of information, buying things, making conversation through Skype, but in those activities the elderly need to be careful so as not to spend too much time in front of the computer. It is true that elderly people are sometimes old-fashioned and not used to working with computers; however, when benefits are visible in such a way that the elderly can recognize them, they will also accept ICT.

According to the validator's opinion, all three content areas (To accept advanced technology, To learn, To benefit) coherently cover the areas needed for the most effective adaptation of elderly people to ICT. In addition, the content areas are clearly defined and describe the willingness to use ICT for a better QOL and also to raise the moral values of elderly people. At the beginning of the ICT learning process, many elderly people could be against ICT, computer and internet use because it might seem too complex and unnecessary in ordinary life. However, when elderly people recognize the opportunities of technology, they might change their opinion if they are willing to try to accept ICT in their lives. ICT offers access to information, which could provide a sort of safety, which is of essential importance to elderly people.

The elderly person evaluated that all content areas are important, and would not add any new ones, since all areas needed for elderly people's adaptation to ICT were included. By being willing to accept technological progress, elderly people could give their contribution to societal prosperity. The general objectives of the element are important, since they provide the background for an efficient adaptation to ICT in old age.

Usefulness

Within the second part, the elderly person evaluated the usefulness of the element "Willingness". The element could be useful in practice, though the success of the adaptation to ICT depends on each individual, how willing the elderly person is to accept technology. The content areas represent an excellent option for adding spice to life; an opportunity to maintain mental health, which is why the elderly person assessed the content areas as useful. Some aspects within the element are eternal and people continue to learn all their lives.

The life span of the element could be estimated at 10 years, though this depends on the pace of ICT development and the education of people in the future. It might happen that because of a higher level of knowledge in some years, people will be more motivated and willing to use ICT.

As the last part the elderly person evaluated the coherence and usefulness of the content areas (To accept advanced technology, To learn, To benefit) on a scale of 1 to 5 (1=poor; 5=excellent). The mean value of the evaluation was 4.5, and the feedback from the elderly person was positive regarding the proposed order of the content areas. It was also pointed out that the general objectives are applicable to 50% of the elderly, since the adaptation process depends on individual willingness to accept technology as a way of life.

From table 6 it is clear that there were no recommendations for improvements in the element, which is the reason why the element Willingness is not changed from its original structure in Figure 8.

Table 6: Main Recommendations for the Element "Willingness"

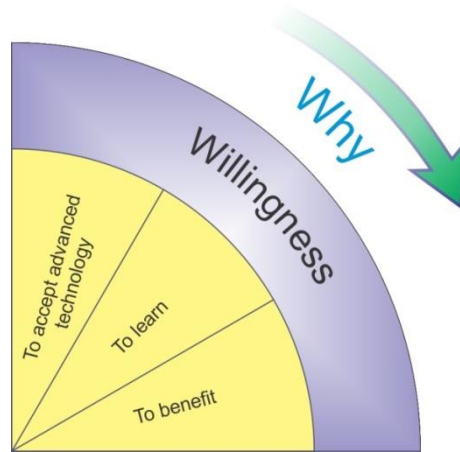| Concept	Importance	Recommendations for Improvement
Coherence	Raise moral values	N/A*
	Contribution to societal prosperity	N/A
Usefulness	Depends on individual	N/A
	Can add spice in life	N/A
	Some aspects are eternal, since people learn throughout their lives	N/A

*N/A – no answer

Figure 8: Element 1: Willingness and Final Element 1: Willingness

Validation of Element 2: Community (1st step)
The second element was evaluated by an expert in community nursing care.

Coherence
The importance of the element "Community" for elderly people's adaptation to ICT is very high, since elderly people desire to stay connected and involved in society. Their intention is to be useful and they do not want to be marginalized and live in what are called "age ghettos", and, according to the expert's opinion, they want to be involved in a society consisting of different generations.

According to the expert, all three content areas have a high impact on elderly people's adaptation to ICT, yet the most important content area is "Home environment", since the elderly wish to stay in their home environment for as long as possible and are therefore willing to do practically anything to ensure that. ICT offers many possibilities for a safe, comfortable and independent living of elderly people. The content areas within the element "Community" coherently cover the areas needed for an effective adaptation to

ICT of elderly people, because they enable a safe social network within which individuals can establish a feeling of safety and be connected to other people. However, the expert recommended the inclusion of associations for retired people, which represent the Association of Estates and as such include many elderly people. These associations organize social events and mutual cooperation; sometimes they even represent a strong political party with the main purpose of defending the social and health interests of retired people. Similarly, self-help groups and groups with the purpose of intergenerational cooperation arrange various activities, such as computer training courses for the elderly. In general, all content areas within the element are important. Even more importantly, all the stated general objectives of the element have an important role in the successful adaptation to ICT of elderly people.

Usefulness

Regarding the usefulness of the element "Community" for future practical implementations of the model, the expert stressed that it is evident that the element presents one of the foundations of quality ageing and therefore has a high level of usefulness for elderly people's adaptation to ICT. All three of the content areas included positively contribute to the QOL of elderly people; however, the most important one is again "Home environment".

Table 7: Main Recommendations for the Element "Community"

Concept	Importance	Recommendations for Improvement
Coherence	Prevent marginalization	N/A
	Content area "Home environment" provides possibilities for safe, comfortable and independent life	Content area "Home environment" represents the most important aspect within the element; therefore it should be in the first place within the element
	Community enables safe social network	Inclusion of content area "Associations for retired people"
Usefulness	The element presents the foundation of quality aging	N/A*

*N/A – no answer

Since ICT enables elderly people to improve social communication with the outside world as well as with family and friends, to have a better QOL, social support, life enrichment through lifelong learning, access to health information, citizens and local involvement, equal participation of elderly people in living and functioning in modern society, the expert evaluated the life span of the element to be 5 years.

The mean value (1=poor; 5=excellent) of the coherence and usefulness of the content areas within the element evaluated by a Likert-type scale was 5. No comments were provided.

Figure 9 presents the originally developed element "Community" and figure 10 the final element "Community". In the course of the validation process, changes and amendments were recommended and are stated in Table 7.

Figure 9: Element 2: Community

Figure 10: Final Element 2: Community

Validation of Element 3: Lifelong Learning (1st step)
The third element was evaluated by an expert in ICT and education.

Coherence
The expert evaluated the "Lifelong learning" element as very important, even essential, and a "natural" concept in elderly people's lives in general and especially in the technology adoption process. The learning concept for adopting ICT could have at least two important benefits for the elderly. According to the validator's opinion, ICT can first of all directly improve their QOL in many aspects, including communications, telehealth, travel, meeting everyday needs, etc., and secondly, ICT as a tool could empower/enable elderly people to engage in lifelong learning activities. Thus, it is essential for an ICT adoption model to include the concept of lifelong learning in its structure.

The validator pointed out the importance of acknowledging age-related capabilities, interests, limitations, education, etc., which means that individualized learning is the only successful paradigm for teaching the elderly in general and an absolute must for ICT adoption. Additionally, "Clearly defined learning units" was evaluated as a good concept for motivational activities in the beginning of courses, but it could also lead to a great disappointment for an elderly person, in case an individual is not able to achieve

the pre-specified goals. Indeed, "Individualized learning courses" could sometimes be in conflict with clearly defined learning units. Thus, in the expert's opinion, balanced flexible learning with just enough structure in combination with "just-in-time learning" would be an alternative method which should be taken into account. "Customized equipment" is an absolutely necessary part of elderly people's lifelong learning process in ICT adoption, and the computers used on courses should be customized to specific elderly needs. However, it is necessary to consider also the living environment of an elderly person and what kind of customized support for ICT use it can give to the individual in question.

All three content areas are coherent and in combination form a solid lifelong learning fundament for elderly people's ICT adoption. Nevertheless, what are called innovative pedagogy methods, such as problem-based learning, just-in-time learning or ubiquitous learning, if properly used, could improve the efficiency and effectiveness of elderly people's lifelong learning and ICT adoption process. Additionally, the expert recommends that the content area "Clearly defined learning units" should be restructured so as to assure a more flexible approach. In other words, it would be important to find out and analyze the needs of the elderly and then, on the basis of defined goals, develop clearly defined learning units to achieve the goals set up.

As regards the general objectives of the element as well as the content areas, it was recommended to add "Time management of course", due to the fact that some elderly people can be focused only short periods of time.

Usefulness

From the usefulness perspective, the expert stated that the element "Lifelong learning" is the only useful practical paradigm for elderly people's adaptation to ICT. Taking into account the proposition that the use of ICT has a positive effect on elderly people's QOL, there is no doubt that all three content areas have useful contributions to a successful practical implementation of lifelong learning and thus to an effective ICT adoption by elderly people. The expert additionally rated the usefulness of each content area and evaluated "Individualized learning courses" as by far the most useful, followed by "Customised equipment". "Clearly defined learning units" could be useful if the learning plan and learning pathways could be prepared and managed flexibly for each elderly person individually, which may not be too practical in real world implementations. Also, "Customised equipment" used during the courses could prove less than useful if the elderly are not able to use similar customized equipment in their everyday environment – thus, an eLearning environment including the participants' own equipment could be an alternative solution, and this was recommended by the expert.

Regarding the life span of the element, the expert stated that lifelong learning is in general a permanent solution, only its implementations will

change in the future. In a few years, the rapid development of ICT would provide more and more support to it, and ICT will also enable its automatic individualization, easy customization and flexibility, so that each elderly person will be able to define their own learning pathways and goals. According to the expert's opinion, in approximately 15 years, when the "after baby boom generation" will be 65+, lifelong learning will become a way of life.

Table 8: Main Recommendations for the Element "Lifelong learning"

Concept	Importance	Recommendations for Improvement
Coherence	Improve QOL (communications, telehealth, travel, meeting everyday needs, etc.) and empower elderly people to engage in lifelong learning activities	Innovative pedagogy methods, e.g., problem-based learning, just-in-time learning, ubiquitous learning, could improve the efficiency and effectiveness of elderly people's ICT adoption process
	Individualized learning is the successful paradigm	To include balanced flexible learning with "just in time learning"
	Clearly defined learning units is a good concept	Sometimes in conflict with elderly people's capabilities and expectations and could be big disappointment for an elderly person if pre-specified goals are not achieved
	Customized equipment is a necessary part of lifelong learning process	Equipment should be customized to specific needs, additionally living environment of an elderly person should be taken into account
	General objectives of the element are well stated and appropriate for lifelong learning of elderly people	To add "Time management of course", as elderly people can be focused only short periods of time
Usefulness	Element represents useful paradigm for ICT adaptation of elderly	Change of order of content areas; "Individualised learning courses" should be placed first, followed by "Customised equipment" and "Clearly defined learning units"

The changes and amendments generated during the validation process are summarized in table 8. Additionally, Figure 11 presents the originally developed element "Lifelong learning" and Figure 12 the final element "Lifelong learning".
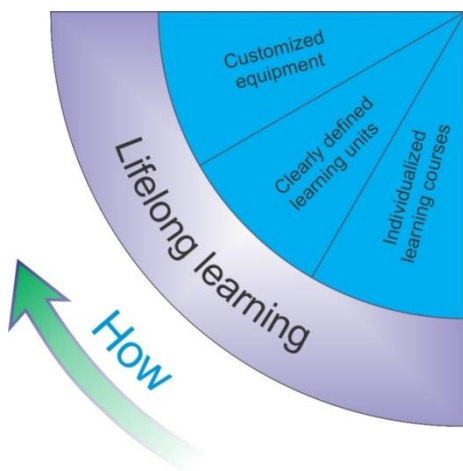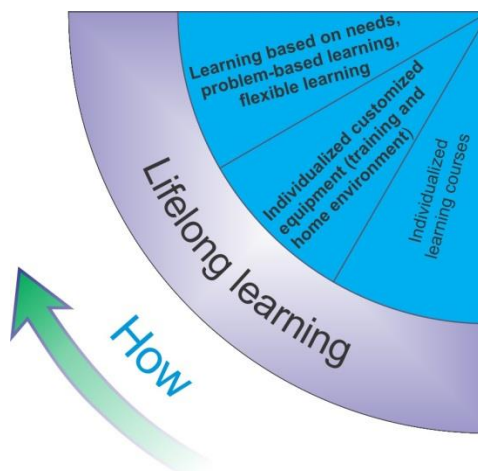

Figure 11: Element 3: Lifelong Learning   Figure 12: Final Element 3: Lifelong Learning

The mean value (1=poor; 5=excellent) of the coherence and usefulness of the content areas within the element, evaluated by using a Likert-type scale, was 3.25; however, the expert did not evaluate question two, related to the proposed order of the content areas. According to the expert's opinion, the order is not important; and all three content areas should be implemented concurrently for a successful lifelong learning implementation.

Validation of Element 4: Outcomes (1st step)
The fourth element was evaluated by an expert in sociology and gerontology.

Coherence
The expert evaluated the element as important from a general perspective, which means that it includes all necessary and expected effects. However, the expert recommended more visibility for the health and mental health outcomes of the ICT adaptation of elderly people, as well as expressing a need of a factor connected to the ICT training for elderly people to pursue an active working life. The content areas included coherently cover the fields needed for elderly people's ICT adaptation; thus, it must be recognized that the e-literacy of elderly people is in the hands of younger generations and so intergenerational coexistence is essential, since it can positively influence intergenerational collaboration in society at large.

Usefulness

The expert assessed the usefulness of the element for future implementation in practice as very high and the impact of the element as positive. However, elderly people must be aware not only of the positive effects of ICT adaptation, but also of the threats which ICT brings. The fact is that with ICT and on-line forms of communication, people are more exposed, and therefore vulnerable, to various criminal acts, for example.

Table 9 summarizes the main outcome recommendations according to which the originally developed element "Outcomes" (Figure 13) was amended (Figure 14).

Table 9: Main Recommendations for the Element "Outcomes"

Concept	Importance	Recommendations for improvement
Coherence	Content areas coherently cover fields needed for elderly people's ICT adaptation	Visibility of health and mental health outcome and the fact that training enables elderly people to pursue an active working life.
Usefulness	Positive effects of elderly people's ICT adaptation	Necessary to add threats which ICT brings, e.g., more exposed and vulnerable elderly people

Figure 13: Element 4: Outcomes   *Figure 14: Final Element 4: Outcomes*

The mean value (1=poor; 5=excellent) of the coherence and usefulness of the content areas within the element, evaluated by using a Likert-type scale, was 5. Elderly people are very cautious in adopting innovations, and so it is reasonable to expect that the knowledge and the effects of this element will be valid for at least 7 years.

An overall summary of the individual validation process is presented in table 10. In the second column of the table, the most important recommendations by each

expert (n=4) are presented, but to give a broader picture, the table also includes the mean values from the descriptive data analysis of the content areas evaluated, through the coherence and usefulness points of view.

Table 10: Recommendations for Content Area Improvements

Name of element	Recommended improvements	Mean value of coherence and usefulness of content areas*	Life span of element (years)
Willingness	N/A	4.5	10
Community	Content area "Home environment" should be moved to first position	5	5
	Inclusion of Associations for retired people		
Lifelong learning	Inclusion of innovative pedagogy methods, e.g., problem-based learning, flexible just-in-time learning, ubiquitous learning	3.25	15
	To find out and analyse elderly people's capabilities, expectations and then on the basis of defined goals form clearly defined learning units to achieve set goals		
	Besides equipment also living environment of an elderly person should be taken into account		
	Order of content areas: "Individualised learning courses", "Customised equipment" and "Clearly defined learning units"		
Outcomes	Inclusion of maintaining mental health aspect (mental stimulation)	5	7
	To add threats which ICT brings e.g., more exposed and vulnerable elderly people		

*The coherence and usefulness of the content areas were evaluated on a scale of 1 to 5, where 1 represented poor and 5 excellent evaluation;

The consequence of the rapid development of ICT is societal development, which means that each element needs to be critically discussed from the point of view of its life span, to be able to anticipate the approximate changes needed in the content areas and elements included. For this reason, the experts used their

professional experience to evaluate the approximate life span of each element; these are summarized in the fourth column of table 10.

Validation of the Model of Adaptation to ICT in Old Age (2ⁿᵈ step)

The focus group (n=4) evaluated the model, its elements (N=4) and content areas (N=12) from a general perspective, using SWOT analysis to evaluate the strategic position of the model by identifying its strengths, weaknesses, opportunities and threats. The SWOT goals were mainly focused to identify the model's general strengths and opportunities which would enable elderly people and health and social care professionals working with elderly people to have the necessary background at the beginning of the ICT adaptation process. However, to get a global picture of how the model could be used and implemented in various environments, it is necessary to recognize its weaknesses and threats, which could, in the short or longer term, prevent problems in the ICT adaptation process.

Strengths were evaluated so as to find out which attributes were helpful in reaching the aims of the model in terms of the structure of the elements and the content areas within each particular element. On the other hand, when looking for weaknesses, the evaluators tried to see which attributes were detrimental to reaching the aims of the model in terms of the structure of the elements and the content areas within each particular element. Opportunities were evaluated to find out which external conditions were helpful in achieving the goals of the model in terms of the element structure and the content areas within each particular element. Finally threats were evaluated to find out which external conditions were detrimental to achieving the goals of the model in terms of the element structure and the content areas within each particular element. The results are presented below.

Strengths

To begin with, the focus group evaluated the model from the viewpoint of its strengths and concluded that in general, the model is comprehensive, especially from the coherence perspective. The experts and the elderly person stated that the elements and content areas included comprehensively address such issues as why the elderly should learn ICT skills, where they can get support, how they can learn and acquire ICT skills in the most efficient way and what kind of outcomes the ICT adaptation brings to elderly people's QOL. Additionally, the group stated that all important content areas for elderly people's ICT adaptation are included and that the model is useful for practice.

Weaknesses

The focus group recommended a more flexible structure and the specification of certain content areas included mainly in the element "Lifelong learning", so that it would enable the individualization of the teaching process. In general, the

model covers all important and necessary areas needed for the efficient ICT adaptation of elderly people, though it is possible that not all future elderly users will perceive all the information the model brings. Therefore, the content areas within the element "Outcomes" should be made more specific, so that the most important outcomes become more visible; these include mental health, benefits for society due to the longer active life of elderly people, contacts with dispersed family members as a remedy against loneliness.

Additionally, for a wider practical applicability, the group recommended the preparation of a handbook or guidelines for using the model.

Opportunities

The members of the focus group stated that the model is useful and with minor modifications ready for practical implementation. Additionally, the focus group evaluated that all the elements included coherently cover all necessary contents which enable a coordinated implementation of the model for an efficient ICT adaptation process. The model represents a useful complement to the lives of elderly people and from a broader societal perspective, enables them a longer integration in working activities.

Threats

The focus group evaluated as a threat for the model implementation the potential neglect of intergenerational cooperation and recommended the inclusion of an individualized pedagogical approach with available networks of multipliers, teachers, and facilitators who will use appropriate learning material in the ICT adaptation process of the elderly. The model could also be feasible in a wider environment, since it supports actual access to ICT and elderly people's effective adaptation to ICT. Thus, material in various European languages should be available.

A potential threat recognized by the focus group was also that the model may not be used at all in practice, due to elderly people's distrust of the model in general or of ICT use, complexity of understanding the individual contexts included in the model, the wrong methodological approach when implementing individual elements within the ICT adaptation process and insufficient support during the implementation of the elements within the adaptation process.

5.4.3 Final Model of Adaptation to ICT in Old Age

Figure 15 presents the final Model of Adaptation to ICT in Old Age. The model provides added knowledge to the context studied and was developed on the basis of all four study phases. The model in general includes various intangible aspects of information, e.g., information as knowledge, which in this study is strictly connected to elderly people who gain the meaning of ICT from the particular context of each element individually, or from the model viewed from

global perspective. The model also represents a possibility of raising the awareness of elderly people, knowledge society, individuals, health and social care institutions dealing with elderly people for the efficient ICT adaptation of elderly people, within which a specific group is able to link specific information with information of knowledge.
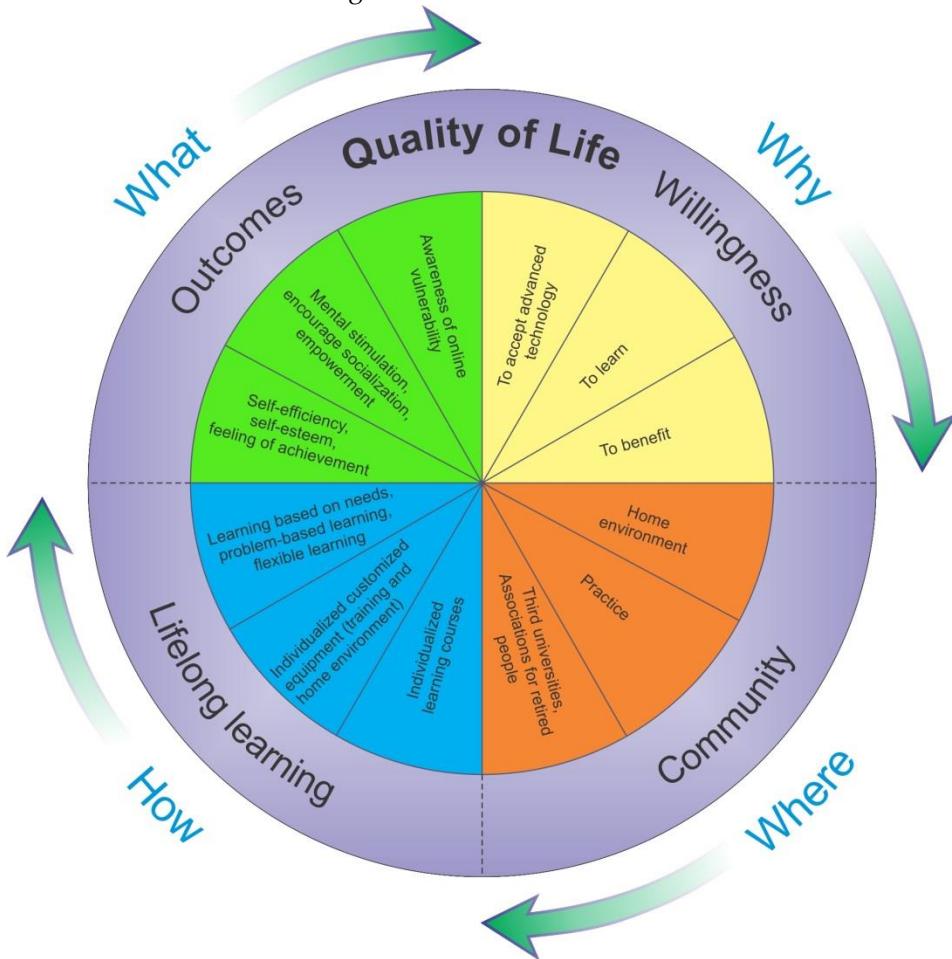

Figure 15: Final Model of Adaptation to ICT in Old Age

The model elements "Willingness", "Community", "Lifelong learning" and "Outcomes" appear directly or indirectly in various aspects in research papers, which is why these elements gradually became the red thread travelling through the research process. The element **"Willingness"** refers to elderly people's perception of ICT and acceptance of advanced technology, as well as to their willingness to learn in old age and benefit from technological advances. Within the willingness aspect, elderly people seek answers such as why acquiring ICT skills would be a good option for them. If the answers are not sufficient, the

elderly will not be properly motivated and willing to learn ICT skills in future or at the next stage.

The deductive thinking based on the results of the third phase provided the starting point and the umbrella for the inductive thinking on the results of the first phase, focusing on the most important aspects in elderly people's ICT adaptation process. The aspect of elderly people's willingness to adopt ICT provided me with the possibility of reaching the answers concerned with, on the one hand, influencing elderly people's willingness and motivation for successful adaptation to ICT and, on the other hand, with society and individuals around elderly people who are willing to support and accept elderly people who decide to adopt ICT. Elderly people who **accept advanced technology** are more motivated to learn ICT skills and will additionally be able to influence their learning process and outcomes. With accepting ICT, they will be more open to recognizing the opportunities and possibilities of new ways of interacting and perhaps in this way able to improve their general QOL. On the other hand, elderly people who are less comfortable and motivated to learn ICT skills will not be able to learn ICT if they will not accept the fact that with ICT they can facilitate their lives, save money, time etc. Only with the acceptance or at least recognition of ICT's impact will elderly people be able to learn and acquire computer skills which could affect their QOL in the long term.

Additionally, the elderly need to be **willing to learn again**; elderly people in old age are often not so much actively involved (mentally or physically). The reasons could depend on many things, e.g., earlier career, background, illnesses, health condition etc. However, this is partly society's fault, because elderly people are sometimes in general speech regarded as something unnecessary, and many times members of society do not recognize the values which the elderly represent. This being so, the elderly are often left behind and so feel unfulfilled, unnecessary, unhappy, lonely etc. The feeling that the elderly can learn new things with which they can positively influence their lives would make them look forward to the future, they would feel empowered, happy, less lonely, less depressed, more fulfilled etc. In this way the elderly could have more power to improve their lives.

It is also important for the elderly to recognize the importance of ICT in order **to benefit** from it. When motivating elderly people to learn ICT skills, they have to be properly motivated to recognize the benefits that come with it. Otherwise, they will not learn as efficiently as they could. Additionally, it is very important for their recognition of benefits to connect ICT to their current lifestyles, children, grandchildren, friends etc.; for example, they could replace telephone conversations with their families with Skype conversations and not only hear their family members, but also see them.

The **"Community"** element represents the second element and is focused on providing the most supporting environment for elderly people's ICT adaptation process. Within the first phase it was possible to find some studies discussing

the practice point of view of how health and social care professionals and people working and living with elderly people see elderly people's ICT adaptation, especially from the viewpoint of benefits and barriers, and how the community and individuals can support this process to improve the elderly people's QOL. Additionally, when evaluating and analysing elderly people's willingness to adopt ICT and how it can affect their QOL from the perspective of loneliness during phases two and three, I found that the home environment, health and social care units (practice), universities of the third age and associations for retired people are settings where elderly people meet and feel safe.

Since the majority of elderly people spend most of their time in their **home environment**, it plays a crucial role in the process of their ICT adaptation. The home environment is a place where elderly people feel most safe and comfortable; therefore, it can have a great impact on their activities, not only because it provides mental and physical support, but also because it influences their willingness to start interacting with ICT. Due to age-related problems, the elderly are in general less confident, and so the support of family members is essential; not only at the beginning of the learning process, but mostly during the learning process when various technical problems occur and elderly people need additional support. However, it is first necessary for elderly people's families, immediate family members and friends to recognize the importance of ICT engagement for an elderly person, which can lead to a quicker and more efficient ICT adaptation later on.

Another possibility to affect elderly people's willingness within the community are **health and social care units (practice), universities of the third age,** and **associations for retired people**, since all these represent environments where elderly people with similar interests meet occasionally or regularly. Generally speaking, **practices** can have great effect on elderly people's points of view. Elderly people are very often surrounded by health and social care professionals; and so, in elderly homes, institutional care, hospitals and health care centres the staff should support the elderly in learning ICT skills. In this way, the elderly would be able to benefit from various health and social services which are often offered only on-line, but can still provide suitable and sufficient information to meet elderly people's needs for the time being. In this way, both groups would benefit, as the elderly would get information sooner and could save time and money by using on-line services, and the practices could manage their responsibilities and duties more optimally.

Many active older adults in the 3rd age search for possibilities to learn, and so **universities of the third age** are also very important, since they offer many different courses to potential participants. In view of the fact that nowadays everything is connected to the ICT (on-line reading, writing written assignments etc.), universities of the third age should pay special attention to promoting properly the possibilities offered by ICT, especially to say that learning with ICT could be more efficient. In this way, I believe, many elderly people would visit

such institutions firstly to learn ICT and then, thanks to this acquired knowledge, would upgrade their general knowledge in other fields of interest. The **associations for retired people** could also have a big impact on elderly people's learning motivation, considering that those organizations organize a wide range of events, including different lifelong learning courses which are attended by different elderly people who can also influence and support each other when engaging in these activities.

The element **"Lifelong learning"** represents a content area important for the most effective acquisition of ICT skills. The selection of the content areas is based on the results of phases two and three in the study, within which I was able to analyse different pedagogical approaches to teaching elderly people to gain ICT skills, as well as a range of study materials. According to the results of phase two, elderly people can gain ICT skills most efficiently through **individualized learning courses**, i.e., in the learning process enough ICT facilitators have to be involved in a one-to-one pedagogical approach. Additionally, **individualized customized equipment** is essential, not only in general, but customized to an individual's need. Not all elderly people have a visual impairment, hearing impairment, or other age-related problems, and so elderly people who do not have age-related problems could be offended by too much customized equipment. However, those who need customized equipment do not only need it at the place where the learning takes place, but also in their home environment, to be able to practice. The third content area within the element is focused toward instructional methods most appropriate in adult learning and is strongly connected to the first content area. The study results indicate the importance of **finding, defining** and **analysing elderly people's wishes and needs** before an ICT training course and on this basis defining goals through which facilitators are able to prepare clearly defined learning units. The success in achieving set goals depends on an individual learning approach, which needs to include **problem-based learning** as well as **flexible learning**. However, it is essential to pay attention to time management of the learning process, due to the fact that some elderly people can be focused for only a short period of time.

The element **"Outcome"** reflects the most important outcomes for elderly people throughout the study phases, which are assumed to affect elderly people's QOL. However, the element includes positive effects, such as **self-efficacy, self-esteem, feeling of achievement**, and very importantly includes **mental stimulation** of elderly people and general **empowerment**. However, it also includes negative effects of ICT adaptation; for instance, the higher accessibility of on-line elderly people, who could become more exposed and more vulnerable to various criminal acts due to their use of ICT. Due to this fact, the model solution also covers this sensitive area, for the elderly to be **aware of online vulnerability** and the potential risks and threats of ICT engagement. In this way,

they can be properly prepared in advance to prevent or at least lower such risks which later could affect their QOL.

In general, the model represents the possibility for elderly people to influence their QOL with the support of technologies which provide efficient and effective communication on the one hand, while on the other hand, elderly people are able to purposefully use their knowledge and experiences to reintegrate into society. Moreover, ICT offers various kinds of information which elderly people are able to use, to create additional knowledge and in this way also influence the development of global knowledge society. Consciously or subconsciously, efforts to adopt ICT affect elderly people's QOL (positively or negatively), and so the most important thing is to inform elderly people about the pitfalls of the internet and web technologies, so that they could in some way control the effects of ICT on their QOL. ICT should represent opportunities to satisfy human needs (maintenance of social contacts), but it should also represent a possible resource to improve life situations, happiness, well-being, QOL etc. Within the model, both concepts were taken into consideration from four different aspects (why the technology is important and beneficial, where to get acquainted with the technology, how to learn to use technology and what kind of outcomes are possible after adopting the technology).

6 Discussion

6.1 VALIDITY AND RELIABILITY

Throughout the research process, three main concepts were studied: ICT, QOL and elderly people, and the connections between them. However, to be able to understand the foundation of the main concepts and to form our own opinion of their coherence, interaction and impact, it was necessary to conduct a theoretical in-depth study of the concepts Information, Technology, Information Society, Knowledge Society, elderly people, QOL and the impact of ICT on elderly people's QOL. During the second and third research phases, samples of participants were partly randomly selected, and stratified sampling was also used, due to the differences in how to apply to the computer training courses, settings etc. Additionally, in both phases non-standardized measurement tools were developed to measure:

– potential connection between positive experiences from ICT training courses gained by teachers and multipliers (ICT facilitators) and their ability to affect elderly people's willingness to learn ICT skills and motivate them for future participation in ICT training courses through motivational workshops;

– correlations between ICT use and QOL from the perspective of loneliness;

Within the *first phase*, an integrated literature review was conducted, within which the author had to form inclusion and exclusion criteria. The basic content validity refers to the selected keywords through which the author found studies to explain the theoretical foundation of the ICT engagement of elderly people. According to those keywords and the inclusion and exclusion criteria, 49 research articles were selected and analysed in detail with the content analysis approach. For this reason, a summary table was developed which summarized the most important information of each article.

To include only English language research papers which discuss elderly people aged 55+, are accessible only as full text articles and had applied the IMRaD methodology was a decision made strictly by author. Therefore it is possible that some papers in Finnish, Slovene or other languages may have been overlooked; however, the study was conducted internationally, which led to the need to include broader international theoretical backgrounds. The inclusion of research articles which discuss people at the ages of 55+ was decided on because the definition of the term "elderly people" is not uniform, and so evidence-based

research results were gathered from broad age groups which are not fully comparable. In addition, articles available only in abstract or discussion papers that had not applied the IMRaD methodology may also have been overlooked during the process and therefore the results may be incomplete.

In the *second phase*, two questionnaires developed within the project PRIMER-ICT were used to measure teachers' and multipliers' satisfaction with the ICT training courses implemented on the one hand, and on the other hand, to measure elderly people's satisfaction with the demonstrational workshops. Throughout the research process, the settings where the ICT training courses as well the demonstrational workshops were organized were similar, and for this reason no limitations were recognized in this segment.

However, some limitation were recognized: due to the lower participation rate on the ICT training courses especially for teachers, the anonymity of participants is limited. Furthermore, only 77 elderly people of total 171 participated in the evaluation of the workshops; meaning that there is possible bias of elderly participants involved in the evaluation process. Additionally, age of the elderly participants vary between 56 years and 90 years which suggests on the heterogeneity of the group from various perspectives i.e. variations in age-related concerns, chronic conditions, functional decline which may impact the individual's capabilities for ICT adaptation, social inclusion, level of e-literacy and possible impact on elderly people's QOL. Another limitation concerns the translation of the questionnaires, which were basically developed in the English language and later translated into Slovene and German. The results were again translated from Slovene and German into English. As the questionnaires included many open-ended questions, it may be that during the content analysis some of the answers were partly lost in translation.

Internal consistency indicates the ability of the instrument items to measure the same characteristics in different settings. However, it must be taken into consideration that within the demonstrational workshops or ICT training courses it is of essential importance to consider that different teaching methods and a different number of facilitators could result in different levels of encouragement for elderly people's future ICT engagement and the success rate of adaptation to ICT.

In the *third phase*, two non-standardized measurement instruments were developed to measure the general level of ICT use by elderly people, the QOL of the elderly and the QOL connected to ICT. The measurement tools were constructed so as to provide basic demographic information about the participants and their ICT literacy on the one hand, and information connected to the QOL on the other. The QOL variable, such as loneliness, was measured through various variables at the baseline and with a follow-up study. Since the integrated literature review was not complete while developing the measurement tools, it is possible that several relevant measurement tools related to elderly people, ICT and QOL may have been overlooked. This might not be

the best solution to measure the impact of ICT on elderly people's QOL; however it was decided on because of the time limits of the research process. On the other hand, it is also a fact that with these measurement tools it was not possible to measure the direct impact of ICT on elderly people's QOL. However, QOL is a concept not easy to measure since it includes several different indicators which need to be considered.

As regards theoretical reliability, it was very hard or even impossible to assure a measurement of the QOL concept which would deliver the exact same results, no matter how many times it was applied to random members of the same target group. In almost all cases, correlations between ICT use and QOL from the loneliness perspective were measured through dependable variables, which were based on self-reporting of the elderly people's feelings and are therefore less reliable from the theoretical than from the empirical point of view.

It is necesarry to mention the methodological considerations i.e. small sample size of elderly participants whose age ranged between 58 years to 93 years; meaning that participants may not be totally comparable with one another due to potential different age-related problems which consequently influence their functional and cognitive capabilities. In addition, the difference in recruitment strategies and sampling in Finland and Slovenia should be considered, as well as a short timespan (3 weeks of ICT training) between the baseline and the follow-up study.

Two general limitations of the research study was formed by the differences in lifestyles and living arrangements in Finland and Slovenia, especially as regards lifestyles of elderly people. Finns were much more active compared to Slovenes, but the fact that the ICT training courses were organized in two different settings (Community college and Elderly homes) must also be considered. The majority of elderly lived alone, however more Finns were living with a spouse, compared to Slovenes. Additionally, elderly participants at the baseline had different levels of previous ICT knowledge, as well as different attitudes toward ICT. One of the limitations was also that elderly people used different learning material and different didactical approaches were used when implementing the training courses. In Finland, the ICT training course was led by one facilitator, while in Slovenia the computer training courses were led by teachers and multipliers within the project PRIMER-ICT and a one-to-one teaching method was used. Therefore, the ICT courses in Slovenia were more individualized to the elderly people's needs and wishes.

A difference was visible also in the elderly people's motivation, as Slovenes were more motivated at the baseline, because their participation was part of project involvement, and therefore the elderly felt more enthusiastic and valued, while in Finland the elderly were self-motivated to participate in the ICT training courses.

Both research instruments were developed first in the English language and later translated into Finnish and Slovene. Regarding the language

differences, some questions might have been slightly different from the original version. The same issue occurs when translating open-ended questions from Finnish to English and Slovene and from Slovene to English. It was difficult to assign answers into categories that present the same meanings of the answers.

In the *fourth phase*, five validation measurement tools were developed, based on the theoretical background of previous validation procedures. The validation process was conducted in two steps, the first step including the validation of individual elements and the second including a validation of the model by a focus group. However, the validation process was tested in a slightly different manner, involving three steps. At the first step, two elements were validated individually, at the second step a validation by the focus group was conducted, and at the third step, an individual element validation was again performed. The validation of individual elements was done in two steps instead of one for two reasons: firstly, because only two Finnish experts were involved in testing the validation, and the reason for this decision was the limitations of time and resources (financial and human). Secondly, after the first validation of individual elements, the author amended the measurement tool according to the suggested recommendations; and so the second round already used an amended version of the measurement tool.

The validation process was conducted by 4 people, 3 experts in various fields and one elderly person. One limitation of the validation process is that all validators were from Slovenia, which means that the validation results might be different if experts and elderly people from other countries had been involved in the process. This might not be the best solution for the validation process; however, it was the author's decision due to constraints of time and resources (financial and human). The measurement tools were developed in English and translated into Slovene. Within the individual validation of the elements, two validators used the English version of the measurement tool, and two used the Slovenian version. However, the author received validation results of three individual elements in Slovenian and only one in English. Within the model validation by the focus group, the author sent the measurement tool to the group in English and Slovene; but the results returned to the author were compiled in Slovene. Therefore, limitations may have occurred during the translation of the measurement tool before the validation process, and also after the validation process while compiling the results. During the qualitative content analysis, some questions might have been understood in a slightly different way from the original version of the answered question, due to the language differences.

6.2 ETHICAL CONSIDERATIONS

The research study followed general ethical guidelines and ethical principles, and there were no special ethical problems. However, each phase inside the research process contained some general and some specific ethical considerations. Throughout the research phases, the author's intention was to develop a model for the most efficient ICT adaptation of elderly people and to be as objective as possible during the development process. Due to the author's active role as a researcher in this study and at the same time in a project which was part of this study, there could be some bias due to the author's own understanding of the topic examined. In general, it is necessary to raise an ethical consideration regarding the basic assumptions connected to the general purpose of this research, i.e., elderly people's adaption to ICT for their better QOL. Although many studies showed elderly people to be enthusiastic about technology, ICT education and use (Li & Perkins, 2007; Hill, Beynon-Davies, & Williams, 2008; Kim, 2008), there are elderly people who do not want to be in any way connected to ICT for various reasons (e.g., literacy problem in developing countries).

There are many research studies focusing on elderly people's ways of interacting with ICT; nevertheless, the author's ethical decision within *phase 1* was to find out if there are any research variations in two previously conducted literature reviews (Kim, 2008; Blaschke, Freddolino, & Mullen, 2009) as compared to the one conducted within this study. Additionally, the author's focus was to find out about the psychological impact of elderly people's ICT use.

Within the article selection process, one of the inclusion criteria was the use of IMRaD research methodology, which was especially important for the author from two perspectives. Due to the IMRaD methodology, it was easy to identify the procedures used in the research studies, and also to form interpretations of the results. The author's main concern was to treat the work of existing researchers accurately and fairly. In other words, the author tried to use the existing data objectively, respecting participants' original responses and presenting them in a way that they agreed it to be presented. Additionally, the author was especially attentive to observe if the research studies reviewed raised ethical questions which would need to be addressed when handling the results of the studies.

Since elderly people represent a heterogeneous group, it is ethical to raise the question whether the studies reviewed really present the actual situation concerning elderly people's use of ICT and its impact on their QOL. Probably, the most vulnerable elderly people never participated or will participate (for different reasons) in any research study, and so it is almost impossible to get a fully realistic picture of the situation.

The results of the integrated literature review are quite positive from the viewpoint of ICT use and attitudes toward ICT among elderly people; however,

it is true that most studies hail from the USA, where technology is more advanced and more widely implemented in health and social care practice, which is why people in general are more flexible and adaptable.

Phase 2 was conducted within the European project PRIMER-ICT, where the author was one of the main coordinators and a project researcher throughout the project duration. The author actively participated through the whole project development; on the one hand, in the creation and implementation of the on-line material, the development and implementation of an innovative teaching method for elderly people's ICT adaptation within ICT training courses organized during the project, and, on the other hand, as promoter and active participant in the demonstrational workshops where the main focus was to influence elderly people's enthusiasm and willingness to learn ICT skills.

During the organization of the ICT training courses, whether for future facilitators (teachers, multipliers) or elderly people, and the demonstrational workshops, the head researchers always informed all participants about the voluntary participation in the evaluation process. Additionally, participants were aware that they could opt out or refuse to continue with the research study any time and that the results would be used strictly for research purposes. The anonymity of all participants was also ensured.

Each project partner collected their own results and entered them in the database prepared by the Austrian partner, who was responsible for the work package entitled Quality assurance and evaluation. After entering the results into the database, the results were sent to the Austrian partner who later prepared reports (interim and final) of the work done within the work package. The Austrian partner gathered all the results into one database and later sent all results to all project partners. All results from the survey in phase 2 are therefore stored separately by each partner institution included in the project; nevertheless, access to the data and database are available only to the project team members.

Permissions to carry out all research studies within *phase 3* were obtained from the Kuopio Community College (Finland) and the elderly homes Danica Vogrinec Maribor and Sunny home (Slovenia). At each stage of the research implementation, the author was available to discuss the study and issues related to the data collection.

In both countries, the results of the baseline study were collected by the author. However, the follow-up study in Finland was carried out by an MSc student and in Slovenia by the facilitators (multipliers) who assisted elderly people during the ICT training courses. The results from both research studies (baseline and follow-up) are archived by the author, who is the only one with access to the results. All participants were informed that participation in the study was voluntary and the study results would be used strictly for research purposes. They were also aware that they could refuse or opt out from the

research study at any time. The anonymity of the elderly participants was also ensured.

Phase 4 includes the model creation and validation process. The experts in the fields of community nursing care, gerontological nursing care, sociology, ICT, education and the older person were personally invited by the author. All validators were informed that their participation was voluntary and that they could opt out of the validation process at any time. Additionally, the author informed the experts that the results and conclusions will be used only for research purposes, and all results will be handled only by the author. The anonymity of the validators could not be guaranteed, since they were chosen by the author of this study. At the validators' request, however, their names will not be disclosed.

For the purpose of the validation process the author provided written general instructions for all those included. The validation process was carried out without the author's participation or any kind of personal influence.

6.3 DISCUSSION OF THE FINDINGS

Elderly people in Europe represent 17.4% of the total population, and the percentage will even increase by 2020 (European Commission, 2011), yet this age group is often marginalized in various ways. Marginalization, in addition to age-related problems, further reduces the possibility of equal inclusion in society and as such causes heavy health conditions, such as loneliness, depression, anxiety etc. Therefore, it is necessary to look for solutions which will enable the social empowerment of elderly people. Moreover, socially empowered elderly people will be able to directly contribute added value to global society, which will be indirectly reflected in their welfare.

According to Rajendra & Patil (2012), technological developments have influence on society as well as on our individual lives; but still the fact is that many technological solutions, such as ICT and the internet are more available to the general population than they are to elderly people. The reasons for this situation vary from age-related problems, economic and social status, education, gender, attitudes toward ICT etc. (Gaßner & Conrad, 2010). However, this study showed that elderly people can be positively motivated for ICT use through a demonstration of the opportunities which ICT could offer to elderly people, in terms of positively affecting their QOL. Special attention needs to be focused on the awareness-raising demonstrational workshops which, according to this study, can have a statistically significant influence on elderly people's willingness to participate in ICT training courses.

According to the study results, motivating elderly people needs to start from assisting them to recognize the benefits of ICT, which was also supported by a study by Karavidas, Lim, & Katsikas (2005). However, it is also important

to maintain the elderly people's motivation during the ICT training. The study showed that although some elderly people had no previous ICT knowledge and were less active and living in institutional care, they showed a higher level of motivation and willingness to learn ICT skills, compared to peers who were more ICT literate, very active, and self-motivated to participate in the ICT training courses. Due to this fact, the more motivated elderly people were even more successful in affecting their own QOL, since they were somehow able to change their perspectives and attitudes toward ICT, and were willing to learn and recognized the benefits of ICT interaction. It can be inferred that motivation based on a group is more successful, lasts longer and provides better results in elderly people's ICT adaptation process than self-motivation, where elderly people are left to themselves after the ICT training courses. Taken together, the findings in this study raise not only the question of how to initially motivate elderly people to learn ICT skills, but also of how to achieve a state where elderly people will develop the motivation to learn after completing the ICT training course. According to Dyck & Smither (1996), it is possible to affect elderly people's attitudes toward learning computer skills, though it is not known how long the effects of those controlled experiences will last.

Many studies propose a variety of instructional methods which are designed especially for elderly people. It may be proved useful to have clearly stated learning objectives and well-defined learning units at the beginning of the ICT training course (Dunnett, 1998; Jones & Bayen, 1998; Crow, 2002; Mayhorn, Sronge, McLaughlin, & Rogers, 2004). However, the present study relates to Lawton's (2001) study, which implies that learning instructions designed according to elderly people's needs positively affect the learning results and could influence their attitudes toward ICT. Additionally, the results of this study and the model suggest that it might not be useful for all elderly people to have predefined learning units, as not all of them might ever achieve the learning goals set in advance, which could result in resistance to ICT use, lower self-confidence and no further ICT engagement. In order to achieve the desired results, the ICT adaptation process should be focused on problem-based learning, which means that the ICT training courses must contain elderly-centred pedagogy, in which they will learn through experiences of problem solving (Barbosa Neves & Amaro, 2012). The motivation for elderly people to learn ICT skills is mainly connected with meeting their wishes and needs, which are mainly directed to developing and maintaining social networks, due to their limited social life (White et al., 2002).

Through the research process it was recognized that many studies have dealt with various aspects of e-literacy of elderly people (Morris & Brading, 2007), but there is a lack of prior research on the topic of appropriately qualified individuals (ICT facilitators) who are mainly responsible for elderly people's successful ICT adaptation. In the present study it was clearly demonstrated that ICT facilitators (teachers and multipliers) need to be properly educated in ICT

and need to understand intergenerational issues to be able to motivate elderly people to learn ICT (Patricío & Osório, n.d.). Even more, it was proven that a personalized teaching method is essential when affecting elderly people's willingness to learn ICT, since each person has their own wants and needs when interacting with ICT.

The study documented different didactical methods used in two different settings of ICT training, which were not equally effective. The elderly people who participated in training courses with a one-to-one teaching method decreased their level of loneliness compared to those who participated in ICT training managed only by one ICT facilitator. Elderly people need opportunities to learn at their own pace, since in this way they are more confident in carrying out different tasks, which also positively affects their motivation to learn ICT. Additionally, the concept of intergenerational collaboration between elderly people and ICT facilitators proved very effective in achieving study goals set up beforehand, in contrast to the didactical approach recommended by Baldi (1997), who stated that adult-only classes are the best way for efficient ICT adaptation, due to the fact that elderly people might feel incompetent among younger participants.

The findings of this study suggest that elderly people can affect their QOL to a statistically significant extent, especially through reduction of the level of loneliness on the basis of ICT use. After completing ICT training courses, elderly people reported a lower level of loneliness, mostly through the use of on-line forms of communication (sending and receiving e-mail); though it is necessary to point out that the purpose of sending e-mails is not to stay connected with family and friends. It is possible that elderly people who were able to reduce the level of loneliness with on-line forms of communication have deep and frequent ties with their families; therefore they use this form of socializing only with people with whom they have more superficial social contacts. The positive associations between on-line forms of communications (e-mail) and decreased feelings of emotional loneliness were statistically proved also by more educated elderly people in a study by Fokkema & Knipscheer (2007). I am aware that there are more factors to a lower level of loneliness than simply ICT interaction, and I will discuss those below.

The study showed that elderly people who were less ICT literate, living in town alone or with a spouse, were able to decrease the level of loneliness after the computer interaction. Due to the use of different research methodologies, it is difficult to compare research results, but Fokkema & Knipscheer (2007) found a reduction of feelings of emotional loneliness in elderly people after ICT intervention. Elderly people participating in the ICT training courses in the present study came from different backgrounds, educational level, geographic areas and lifestyles and had different previous ICT knowledge. It was shown that elderly people with no knowledge in ICT were more enthusiastic and keen to learn how to use ICT and therefore reported lower levels of loneliness after

completing the ICT training course, compared to those who already used ICT in their everyday life and had probably lost their initial enthusiasm before even entering the ICT training course. Additionally, the study revealed that the reduction of loneliness depended on gender and education, which was partly previously confirmed by Fokkema & Knipscheer (2007), who have demonstrated a statistically significant decreased level of loneliness among elderly people who were better educated.

The greatest challenge of this study was to develop a theoretical and contextual model which would, on the one hand, promote elderly people's initial motivation and, on the other hand, on different social arenas consistently support elderly people's encouragement to use and adapt to ICT for a better QOL. The adaptation to ICT by elderly people is a complex process that involves various components, and the model represents one of the alternatives for successful ageing, by understanding the heterogeneity of outcomes of all four elements within the model, which can lead to better outcomes of the whole ICT adaptation process. The adaptation process represents an attempt to gradually adapt to ICT and highlights the prospects which are available in various environments where elderly people live and work, and could affect the extent of implementing the model in practice. Still, throughout the research process the author recognized two important aspects which may affect the model implementation and the ICT adaptation process. Firstly, ICT is not the perfect solution for all elderly people, since many of them see other opportunities for the maintenance of active aging and are completely ignorant about ICT use. Secondly, those elderly people who are open to ICT use must be aware of their own vulnerability while interacting with ICT. In this way, they could be prepared in advance and know how to react in cases of on-line abuse, which in turn affects their attitude toward future ICT use and consequently their QOL.

The potential for enhancing ICT use among elderly people resides in the community (Carpenter & Buday, 2007), and this fact was supported also within this study. However, it is still crucial to analyse the effect of community in the process of ICT adaptation. The findings from the data collected imply that the success of ICT adaptation depends on the setting where ICT training takes place. Elderly people living in institutional care located in towns (elderly homes), whether living alone or with a spouse, decreased their level of loneliness after ICT interaction; the frequency of being on-line affects loneliness, as was suggested also by Cotton, Anderson, & McCullough (2012). A possible explanation of this finding is that computer engagement could probably increase their independence, as well as increase the feeling of safety, compared to elderly people not living alone. The study revealed that elderly people living in institutional care have fewer friends due to being socially less active and in a way spatially restricted, and so computer engagement could open new perspectives in their lives, which could positively affect different aspects of their QOL and general well-being. Nor should we overlook the fact that elderly

people who live in institutional care (representing their home environment) live there for various reasons, such as disease, being left alone, not having a home, due to unexpected situations (accident) and are more receptive to any change that might positively affect their life.

No matter for what purpose e-literate elderly people will use computers, from this study it is obvious that the recognition of potential outcomes, such as lower level of loneliness, higher mental stimulation, personal empowerment, feeling of achievement, high level of self-esteem, has an impact on QOL indicators. At the beginning of the ICT adaptation, outcomes may represent motivation and at the end, a consequence of the ICT interaction. Taken all together, based on the outcomes of the ICT interaction it is possible to measure directly or indirectly the elderly people's QOL. If the ICT adaptation process of elderly people is gradual and includes all criteria by which they are able to learn ICT skills for their general empowerment, they will in the longer term be encouraged to explore ICT so as to positively affect their QOL. Although this research showed that the elderly people's level of loneliness could be reduced by computer training and subsequent ICT use, due to the fact that the level of loneliness was studied indirectly, it is not possible to unambiguously assert that this was the result of the ICT interaction.

The study contributes to the interdisciplinary field of health and human informatics, since it expands the existing knowledge on the aspect of elderly people's use of ICT for maintaining and developing social activities to reduce the level of loneliness. At the same time, the research findings contribute to the better understanding of elderly people's ICT engagement and perspectives of on-line forms of communication (access and transfer of information) which could affect the subjective indicators of elderly's QOL. Additionally, the study implies how elderly people in the process of ICT adaptation can become active members of society who are still capable of using and transferring their own knowledge and wisdom to empower knowledge in society. However, the health and social care professionals and others who work with elderly people need to adapt to the fact that the re-integration of elderly people provides both challenges and possibilities for the development of society.

This research process and the conceptual framework of the Model of Adaptation to ICT in Old Age developed during it made it possible to summarize the definition for elderly people's QOL and well-being in correlation with ICT as follows:

The level of QOL is associated with ICT and as such represents a multidimensional concept and a multisectoral and intergenerational process through which it is able to achieve a condition for satisfying individual wants and needs of becoming an equal member of society so as to empower knowledge society.

6.4 IMPLICATIONS OF THE MODEL OF ADAPTATION TO ICT IN OLD AGE

The Model of Adaptation to ICT in Old Age developed and validated during this study has implications on different fields from both an individual and an organizational perspective. The model can be used and implemented in areas associated with elderly people: health care, social care, home environment, various public or private associations, etc., since it generates knowledge, recommendations and guidelines for elderly people's adaptation to ICT for their better QOL. In light of these principles and values, as well as the research findings discussed in this study, the practical implications of the model are:

- **The implementation of the Model of Adaptation to ICT in Old Age has to be gradual.** Any change in elderly people's lives presents challenges for both, the elderly and the organizations supporting them. A successful implementation depends on appropriate management and guidance, because it changes elderly people's perspectives and lifestyles, as well as those of people close to them. The model presents a tool for health and social care professionals and others working with elderly people, for planning the ICT adaptation process in a way which will provide optimal support to elderly people during the process. By using the model, which is based on a gradual adaptation to ICT through various aspects, it is possible to improve the outcomes of the adaptation process.

- **The model challenges health and social care professionals and the community to think differently.** The model is of essential importance to health and social care staff working with elderly people in institutional care, where elderly people often are more isolated and lonely and do not have many options to socialize. Health and social care professionals and communities need to think "outside the box" when it comes to caring for elderly people. They need not only proper health care, but also opportunities to influence their lives so that they will live happy and satisfied. With ICT support, they could find new meaning in their lives, meet new friends, and also have the opportunity to socialize and have fun while learning with other elderly people in institutional care. The model highlights important aspects, such as the value of the community, society and lifelong learning for elderly people's adaptation to ICT, which should be taken into careful consideration since this study showed that the environment where the elderly live and learn ICT could affect their health and general QOL, which indirectly affects general societal prosperity. The model generates knowledge and experiences based on the studies performed, since it addresses different aspects of

ICT integration by elderly people. However, the study design and theoretical background provided relevant information about the ICT use as well as the attitudes toward ICT of elderly people. The knowledge generated in the model can provide solid reference for further research work and development in the field of efficient ICT adaptation of elderly people.

- **Family-centred support is the opportunity for elderly people to recognize, learn and accept ICT.** The model provides guidance to family members and friends who can support and help an elderly person to adopt ICT in their home environment. However, the most important thing is to achieve the elderly person's recognition that ICT could be an effective and useful tool especially since it can help maintain lives and affect the well-being of elderly people. The home environment, as much as various professionals and associations working with elderly people, need to support the process from mental and psychical viewpoint to ensure the necessary conditions for ICT adaptation, such as adaptable equipment and technical support if needed. A range of barriers are seen in the ICT adaptation process of elderly people, and so adequate environmental and technological resources and technical support for using ICT should be provided by people and organizations who initiate the adaptation process. Moreover, if the initiator for ICT adaptation is the elderly person, there is a greater chance of success, though the adaptation will not be achieved if there is not enough support from people whom the elderly trust.

- **Information about the model, appropriate education and professional ICT support need to be available to elderly people.** The ICT adaptation must start with promotional information about the benefits, opportunities and also threats which come with technology. Various kinds of information regarding ICT use and attitudes towards it are crucial in the process of affecting elderly people's willingness to learn and use ICT. Elderly people have different levels of ICT knowledge, which was confirmed in the present study, and what is more, they learn in different ways and at a different pace. Providing appropriate education with carefully planned teaching methods which will enable flexible and problem-based learning, based on elderly people's wants and needs, is essential. In the implementation stage it is important to provide a sufficient number of ICT facilitators who can work individually with elderly people and have different backgrounds. As found in the present study, it is useful to combine learning with intergenerational cooperation, which could even increase the efficiency of the learning process. It is also of essential importance to provide

elderly people with individualized customized computer equipment which will respond to the individual, and not use equipment customized for general use. The elderly experience different age-related problems: some have vision impairment, hearing impairment, and problems with motor functioning etc.; and so they do not want to be a subject of generalizations.

- **The societal implications of the model enable a reintegration into society and the working environment.** The model has also societal implications; for thanks to the ICT adaptation, elderly people are becoming a part of information society and are able to use different kinds of information for various purposes and thus empower their knowledge and their lives in general. Being able to exploit ICT for transferring knowledge and wisdom to younger generation, the elderly create, influence and contribute to knowledge society, which could later result in positive economic effects. For elderly people to be able to live healthy and experience happy aging, they have to feel empowered, self-efficient, self-esteemed, needed, and most importantly independent in their activities. Thus, healthy elderly people represent much smaller costs to society. Therefore, it is very important to utilize evidence-based knowledge in the model implementation process, thereby ensuring the acceptance of ICT by elderly people, and to provide necessary support in the elderly people's ICT adaptation process.

- **The health care implications of the model enable the improvement and financial sustainability of health care systems.** ICT proficient elderly people will have more social opportunities, which could positively reflect on their health and well-being. Healthier elderly people with fewer pathological conditions (e.g., depression, loneliness, isolation) reduce the long-term costs of health and social care, which affects the financial sustainability of national health care systems. On the other hand, more e-literate elderly people will be able to use various e-health services, which will also have to adjust their provision to elderly users.

6.5 SUGGESTIONS FOR FUTURE RESEARCH

Research on ageing is important because of demographic, economic, social, technological and political reasons (Tinker, 2011). Therefore, especially in Europe, many research agendas on ageing have been launched. One of these is the Futurage project, in which the research team developed specific research priorities identified by researchers and a wide range of stakeholders, policy

makers, practitioners, elderly people as well as scientists, and are mainly based on multidisciplinarity, diversity, use of technology, intergenerational cooperation, user engagement, a life-course perspective, a person-environment perspective and lifelong learning (Futurage, 2011). Within the stated major priority themes for future ageing research there are themes connected to maintaining mental health, social and community involvement, ageing well at home and in the community, age-related inequalities, etc., and all those themes are in some way connected to this study (Futurage, 2011).

Since the direct impact of ICT on elderly people's QOL is difficult to prove, it is necessary to develop appropriate measurement tools to measure this phenomenon (Chiungjung, 2010). Clearly, the QOL of elderly people cannot be reliably measured in a single, one-off measurement, so that measurements should be combined and systematically repeated. Moreover, future research actions still need to focus on longitudinal studies of elderly people's ICT use to be able to make more concrete conclusions of the ICT effects on QOL of elderly people. However, in those research studies, participants with diverse ethnic backgrounds, lower socio-economic status and lower educational level should not be overlooked.

In the future, systematic literature reviews focusing on searching the evidence-based practices of elderly people's ICT use and its impact on their QOL need to be conducted. However, special attention needs to be paid to the research methodology and measurement tools used in such studies, and the results have to be examined critically. The most significant factor with regard to QOL improvement is that quality is constantly monitored, measured and evaluated throughout the research process, and this could provide findings with meaningful conclusions.

The need for elderly people to become e-literate has been recognized; therefore, future research focus will be directed to research projects with the aim of providing opportunities for elderly people to efficiently adopt ICT by implementing the model developed here into practice. At the same time, it is necessary to find out the practical utility of the model and prepare amendments according to evidence-based knowledge.

The model developed and validated in this study presents a solid background for future research; but before actual implementation, the model needs to be additionally validated by different experts and elderly people from various countries. If the model is implemented internationally, this process is necessary, since people are different and have different general and cultural values, expectations, needs, wants etc. It is probable that the model even has to be amended in some aspects according to different ethnic groups of elderly people or according to the national culture.

However, the ICT engagement of elderly people could start by providing them with motivation to learn and gain new experiences. Thus, promotional activities are essential when influencing elderly people's willingness to learn.

Through events of this kind, elderly people can recognize the benefits, barriers and opportunities of ICT on the one hand, and on the other, they provide opportunities for researchers to conduct studies on motivation; factors that affect motivation and factors that motivate elderly people to learn and use ICT.

Future research should continue to explore elderly people's interest in ICT and factors affecting their attitudes toward ICT. From previous research it is evident that after a while, the elderly lose their initial enthusiasm, and so future studies should focus on finding what kind of support elderly people expect and need to continue to benefit from ICT in order to improve their QOL.

7 Recommendations for Best Practices

The findings within this study have important implications and recommendations for the future practice of elderly people's ICT adaptation. These recommendations are based on the validated Model of Adaptation to ICT in Old Age and are aimed primarily to positively affect elderly people's ICT adaptation process through the community, the private and public health care and other sectors currently working with, or for, elderly people. These recommendations may directly provide, or have the potential to provide, opportunities for elderly people to interact with advanced technology and highlight ways in which elderly people themselves, as well as other individuals and various public and private institutions, can encourage elderly people to use and adapt ICT to contribute towards improvements in the QOL of elderly people. The recommendations for practice are presented and explained through four important areas influencing elderly's ICT adaptation.

Recommendation for improving elderly people's willingness to adopt ICT
- *Raising awareness.* To influence elderly people's willingness and motivation to adopt ICT, it is of essential importance to initiate a public debate on the positive effects of ICT use, but it is also important to point out the negative sides of spending too much time with ICT. This can be implemented through general awareness-raising ICT activities among elderly people and campaigns concerning special impacts on elderly people's lives, specific information about how ICT could save money and time, assist in the working or living environment, particularly for elderly people with disabilities, using brochures, leaflets, posters and websites etc.
- *Promotional activities.* These could be arranged on the local, regional and national levels through the mass media, internet, senior clubs, universities of the third age, health and social care institutions associations for retired people and self-help groups.
- *Demonstrational workshops.* Through events of this type, the elderly could gain an impression of what ICT is offering without actual learning, but it might get their attention when they recognize the importance of e-literacy and its benefits. It is also recommended to include several

generations in such events, since they can exchange opinions and experiences in various ways and affect each other's lives.

- *Integrate ICT to elderly people's lifestyles.* Elderly people engage in various activities, e.g., shopping, paying bills, socializing, etc. If satisfying those needs were connected to ICT, the individuals' interest in learning ICT would also increase. When the elderly recognize that ICT knowledge and skills would allow everyday duties to be completed more efficiently, the personal motivation and willingness of elderly people to learn and adapt ICT would also increase.

Recommendations for community in the process of elderly people's ICT adaptation

- *Supporting networking initiatives.* To ensure ageing well at home, in the community and at work, the elderly need to exchange experiences and cooperation, especially between family members, friends, the areas of health and social care, and organisations working with elderly people. With ICT assistance, the elderly can enjoy a healthier and higher quality of daily life and also maintain a high degree of independence, autonomy and dignity. Additionally, through ICT the elderly can stay socially active and creative, and are able to access public and commercial services, thus improving QOL and reducing social isolation.

- *Inclusion of family members in the ICT learning process.* In the learning and ICT adaptation process, the elderly need different types of support (technical, emotional etc.) especially from family members, or people close to them. When people providing the support realize the importance of ICT in the elderly person's life, they will be motivated and positively influenced to provide efficient and effective support, since ICT could have a great impact on an elderly person's QOL.

- *Enabling multi-disciplinary communication between home environment and various professionals.* Nowadays, elderly people want to stay in their home environment as long as possible, and so family members often take care of the elderly person at home. With ICT support, the care of the elderly could be much easier; however, family members and health and social care teams should be able to communicate with each other in the most efficient and easiest way. This is especially important in rural areas, where health care is less accessible. Additionally, service units should adapt some services which elderly people need and which could be provided through easy use of ICT, such as collecting health care information, discussion forums, etc. In this way, health and social care workers would also be relieved and able to organize their daily activities in a more efficient way. New technology has changed the way in which we access information. Using the internet and e-mail has

increased the speed at which elderly people, their caregivers and health and social care professional can communicate and make decisions.

- *Promotion of elderly people's integration.* An efficient way of providing support to elderly people interested or potentially interested in ICT are associations, e.g., universities of the third age, associations for retired people, where elderly people get together and interact, seek opportunities to learn and socialize. During discussions the elderly influence each others' opinions and provide social support.

Recommendation for the lifelong learning process
- *Enabling a multidisciplinary and multigenerational teaching approach.* This should include enough facilitators, teachers or multipliers from various fields and different ages in the process of learning ICT skills.
- *Provision of individual learning courses.* The most suitable and efficient method of teaching elderly people how to use ICT is with a one-to-one teaching method, where the elderly can have constant support during the learning process.
- *Customized equipment.* For the most efficient adaptation to ICT of elderly people, they have to have the opportunity to use customized equipment; however, it is important to ensure that it is available precisely to those who need it. It is also important to ensure the availability of similar customized equipment in their home environment, which enables them to practice what they have learned during lessons.
- *Individualized teaching units.* For the most efficient ICT adaptation, the learning content should be based on individual needs and interests, since only in this way can the elderly achieve the pre-defined goals of the teaching unit. Elderly people wish to study for reasons of interest or personal enrichment, or they may wish to gain new qualifications to improve their employment prospects.
- *Innovative pedagogic methods, e.g., problem-based learning, flexible learning.* In this way, elderly people can develop flexible knowledge, self-directed learning, effective collaboration skills and intrinsic motivation for ICT learning.
- *Time management of the course.* Should be managed cautiously, due to the fact that elderly people might have difficulties in focusing for longer periods of time. It is important to plan 2-3 breaks during the ICT session for the elderly to be able to make notes, ask questions, exchange opinions with other participants and discuss what they have learned.

Recommendations for the visibility of outcomes
- *Visibility of benefits and opportunities.* When elderly people acquire ICT skills, they will experience benefits which were only recognized indirectly before their ICT interaction. Self-efficiency, self-esteem and

the feeling of achievement are the most important outcomes which affect elderly people's empowerment. Additionally, ICT can provide mental stimulation and help to preserve cognitive abilities, as well as preserve or even develop memory abilities. With ICT knowledge, the elderly are also able to be longer involved in the working environment.

- *Visibility of threats.* While ICT brings numerous benefits, the elderly also need to be aware of possible threats; for instance, too much time devoted to ICT could result in less socializing and face-to-face activities, so that pointing out this important issue is essential. Additionally, e-literate elderly people are more exposed to potential criminal acts, e.g., stealing identities, misusing banking accounts, hacking into computers, spreading a computer virus etc. If the elderly know about the potential threats, they can be more careful, not replying to suspicious e-mails, not giving personal details etc. The increased use of computers and electronic communication has led to fears about invasion of our privacy.

E-literacy has consequences for individuals as well as for society. ICT empowers elderly people to participate fully in the economy and society, to continue independent lifestyles and to enhance their QOL. A society with e-literate elderly people becomes not only information society, but also knowledge society. Elderly people contribute experiences and life wisdom, which they transfer to younger generations. However, an important segment of elderly people's adaptation to ICT is intergenerational coexistence, which positively affects intergenerational cooperation in society at large.

Moreover, to be able to realize the necessary actions mentioned above, two additional recommendations should be considered. There is a need to *encourage further research* on the above recommendations, which will provide an important prerequisite for improving policies in actions connected to elderly people and their ICT engagement. Additionally, in the context of developing adequate strategies for *securing sustainable funding*, it is essential to put the above recommendations into place and counteract the substantial costs generated to societies by elderly people who do not experience healthy and happy ageing.

In the future, demographic changes will remain a challenge to societies; however, this phenomenon offers various opportunities for the intergenerational development of communities and societies. This study has contributed to the understanding of elderly people's use of ICT, challenges of ICT-enabled learning, elderly people's needs and motivations for ICT engagement, and the potential effect of ICT on elderly people's QOL. Elderly people who have adopted ICT represent higher and added value to the community, as they are able to transfer their wisdom and knowledge to younger generations with the support of advanced technology and consequently, through personal empowerment, improve their QOL, stay healthier and more

active, maintain a high degree of independence and autonomy, enhance their mobility, improve access to personalised integrated social and health care services, and in general positively influence their own and other people's lives.

References

Ackoff, R. L. (1989). From Data to Wisdom. *Journal of Applied Systems Analysis, 16*, 3-9.

Adams, N., Stubbs, D., & Woods, V. (2005). Psychological barriers to Internet usage among older adults in the UK. *Medical Informatics and the Internet in Medicine, 30*(1), 3-17.

Adler, R. (2006). *Older Americans, broadband and the future of the Net', SeniorNet*. Retrieved April 16, 2011, from http://www.seniornet.org/research/SeniorNetNNPaper060606.pdf.

Afgan, N. H., & Carvalho, M. G. (2010, October 2). *The Knowledge Society: A Sustainability Paradigm*. Retrieved November 8, 2011, from http://cadmusjournal.org/article/knowledge-society-sustainability-paradigm#information.

Albert, S. M., & Teresi, J. A. (2011). *Novelguide*. Retrieved November 5, 2011, from Quality of life, definition and measurement: http://www.novelguide.com/a/discover/eoa_04/eoa_04_00344.html.

Allardt, E. (1993). Having, loving, being: An alternative to the Swedish model of welfare research. In M. Nussbaum, & A. Sen (Eds.), *The quality of life* (pp. 88–94). Oxford, UK: Clarendon.

Anderson, J., & van Weert, T. (2002). *Information and Communication Technology in Education.* (J. Anderson, & T. van Weert, Eds.) Paris: UNESCO.

Anderson, K., & Burckhardt, C. (1999). Conceptualization and measurement of quality of life as an outcome variable for health care intervention and research. *Journal of Advanced Nursing, 29*, 298–306.

Arnold, S. B. (1991). Measurement of quality of life in the frail elderly. In J. Birren, J. Lubben, J. Rowe, & D. Deutchman (Eds.), *The concept and measurement of quality of life in the frail elderly* (pp. 50-73). San Diego, CA: Academic Press.

Arun, Ö., & Çakıroğlu Çevik, A. (2011). Quality of Life in Ageing Societies: Italy, Portugal, and Turkey. *Educational Gerontology, 37*(11), 945-966.

Atchley, R. C. (1991). Influence of aging on perceptions and expressions of the self. In J. E. Birren, J. E. Lubben, J. C. Rowe, & D. E. Deutchman (Eds.), *The concept and measurement of quality of life in the frail elderly.* San Diego, CA: Academic Press.

Baldi, R. (1997). Training older adults to use the computer: Issues related to the workplace, attitudes, and training. *Educational Gerontology, 23*(5), 453-465.

Baldwin, S., Godfrey, C., & Propper, C. (1990). Introduction. In S. Baldwin, C. Godfrey, & C. Propper (Eds.), *Quality of life perspectives and policies* (pp. 1-6). New York, NY: Routledge.

Baltes, P., Lindenberger, U., & Staudinger, U. (1998). Life-span theory in developmental psychology. In R. Lerner (Ed.), *Handbook of child psychology: Vol 1. Theoretical models of human development* (pp. 1039-1143). New York: Wiley.

Barbosa Neves, B., & Amaro, F. (2012). *Too old for technology? How the elderly of Lisbon use and perceive ICT*. Retrieved from The Journal of Community Informatics: http://ci-journal.net/index.php/ciej/article/view/800/904.

Barley, S. (1988). Technology, power and the social organization of work: toward a pragmatic theory of skilling and deskilling. In P. Torbert, & S. Barley (Eds.), *Research in the Sociology of Organizations* (pp. 33-80). Beverly Hills, CA: SAGE Publications Ltd.

Bawden, D. (2008). Origins and Concepts of Digital Literacy. In C. Lankshear, & M. Knobel (Eds.), *Digital Literacies* (pp. 17-32). Peter Lang.

Bellinger, G., Castro, D., & Mills, A. (2004). *Systems Thinking*. Retrieved November 6, 2011, from Data, Information, Knowledge, and Wisdom: http://www.systems-thinking.org/dikw/dikw.htm.

Benibo, B. R. (2011). *CBS Interactive*. Retrieved April 25, 2012, from A technology-contingency framework for a productivity-oriented workforce diversity: http://findarticles.com/p/articles/mi_hb6698/is_n2_v62/ai_n28698475/.

Bernardi, F., Gonzales, J. J., & Requena, M. (2006). The Sociology of Social Structure. In C. D. Bryant, & D. L. Peck, *21st Century Sociology: A Reference Handbook* (pp. 162-170). Thousand Oaks, California: SAGE Publications, Inc.

Bernstein, J. H. (2009). The Data-Information-Knowledge-Wisdom Hierarchy and its Antithesis. *Second North American Symposium on Knowledge Organization* (pp. 68-75). Syracuse, NY: Syracuse University.

Bitner, M. J., Brown, S. W., & Meuter, M. L. (2000). Technology infusion in service encounters. *Journal of the Academy of Marketing Science, 28*(1), 138-149.

Birren, J. E., Lubben, J., Rowe, J. C., & Deutchman, D. E. (1991). *The concept and measurement of quality of life in the frail elderly.* (J. E. Birren, J. Lubben, J. C. Rowe, & D. E. Deutchman, Eds.) San Diego, CA: Academic Press.

Blaschke, C. M., Freddolino, P. P., & Mullen, E. E. (2009). Ageing and Technology: A Review of the Research Literature. *British Journal of Social Work, 39*, 641-656.

Bond, G. E., Burr, R. L., Wolf, F. M., & Feldt, K. (2010). The Effects of a Web-Based Intervention on Phychosocial Well-being Among Adults Aged 60 and Older With Diabetes: A Randomized Trial. *The Diabetes Educator, 36*, 446-456.

Bowling, A. (2003). Current state of the art in quality of life measurement. In Carr, A.J.; Higginson, I.J.; Robinson, P.G. (Ed.), *Quality of Life* (pp. 1-8). London, UK: BMJ Publishing Group.

Bowling, A. (2005). *Measuring health. A review of quality of life measurement scales* (3 ed.). Berkshire, UK: Open University Press.

Bowling, A., & Windsor, J. (2001). Towards the good life: A population survey of dimensions of quality of life. *Journal of Happiness Studies, 2*, 55–81.

Bradley, N., & Poppen, W. (2003). Assistive technology, computers and internet may decrease sense of isolation for homebound elderly and disabled persons. *Technology and Disability, 15*, 19–25.

Brennan, P. F., Moore, S. M., Bjornsdottir, G., Jones, J. V., & Rogers, M. (2001). HeartCare: an Internet-based information and support system for patient home recovery

after coronary artery bypass graft (CABG) surgery. *Journal of Advanced Nursing, 35*(5), 699-708.

Brey, P., & Hartz Søraker, J. (2008). *Philosophy of Computing and Information Technology*. Retrieved November 6, 2001, from Philosophy of Computing and Information Technology: http://www.idt.mdh.se/kurser/comphil/2011/PHILO-INFORM-TECHNO-20081023.pdf.

Brey, P., & Hartz Søraker, J. (2009). Philosophy of Computing and Information Technology. *Philosophy of Technology and Engineering Sciences, 14*, 1341-1407.

Buckland, M. (1991). *Information and Information Systems.* New York, Westport, Connecticut, London: Greenwood Press.

Burch, S. (2006, May 2006). *The Information Society/the Knowledge Society*. Retrieved November 7, 2011, from http://vecam.org/article517.html.

Burkhardt, J., MacDonald, M., & Rathemacher, A. (2002). *What is Information?* Retrieved November 6, 2011, from http://www.uri.edu/library/staff_pages/kinnie/lib120/info_prnt.html.

BusinessDictionary.com. (2011). *Technology*. Retrieved November 7, 2011, from Definition: http://www.businessdictionary.com/definition/technology.html.

Butler, R. N. (1997). Toward a definition of quality of life for an aging society. *Symposium Report, Sponsored by the International Longevity Center-USA and The Mission of the Dominican Republic to the UN*, 5–9. New York, NY.

Calhoun, C. J. (2002). *Classical Sociological Theory.* (C. Calhoun, J. Gerteis, J. Moody, S. Pfaff, K. Schmidt, & I. Virk, Eds.) Essex, UK: Blackwell Publishing.

Canadian Institute of Health Research. (2009, May 8). *About Knowledge Translation*. Retrieved February 8, 2012, from http://www.cihr-irsc.gc.ca/e/29418.html.

Canadian Institute of Health Research. (2011). *Knowledge Base*. Retrieved February 8, 2012, from http://ktclearinghouse.ca/knowledgebase.

Carpenter, B. D., & Buday, S. (2007). Computer use among older adults in a naturally occuring retirement community. *Computers in Human Behavior, 23*, 3012-3024.

Castells, M. (2001, January 7). *Rise of the Network Society: An Overview.* Retrieved November 8, 2011, from http://www.ucs.mun.ca/~brianl/academic/ma/Manuel_Castells_Rise_of_Network_Society.pdf.

Chaffin, A. J., & Harlow, S. D. (2005). Cognitive learning applied to older adult learners and technology. *Educational Gerontology, 31*(4), 301-329.

Chapman, A. (1995). *SWOT analysis*. Retrieved November 11, 2011, from SWOT analysis method and examples, with free SWOT template: http://www.businessballs.com/swotanalysisfreetemplate.htm#swot-analysis-matrix.

Chiungjung, H. (2010). Internet Use and Psychological Well-being: A Meta Analysis. *Cyberpsychology, Behavior, and Social Networking, 13*(3), 241-249.

Clark, E. (2004). Quality of life: a basis for clinical decision-making in community psychiatric care. *Journal of Psychiatric and Mental Health Nursing, 11*, 725-730.

Cody, M. J., Dunn, D., Hoppin, S., & Wendt, P. (1999). Silver surfers: Training and evaluation Internet use among older adult learners. *Communication Education, 48*(4), 269–86.

Cohn, J., & Sugar, J. A. (1991). Determinants of Quality of Life in Institutions: Perceptions of Frail Older Residents, Staff, and Families. In J. E. Birren, J. E. Lubben, J. Cichowlas Rowe, & D. E. Deutchman (Eds.), *The Concepts and Measurement of Quality of Life in the Frail Elderly* (pp. 28-49). London: Academic Press Limited.

Conlon, C. (2000). Visions of change: information technology, education and postmodernism. *British Journal of Educational Technology, 31*(2), 109-116.

Cotton, S. R., Anderson, W. A., & McCullough, B. M. (2012). The Impact of ICT Use on Loneliness and Contact with Others Among Older Adults. *Gerontechnology, 11*(2).

Crow, A. (2002). What's age got to do with it? Teaching older students in computer-aided classrooms. *Teaching English in the Two-year College, 27*(4), 400-406.

Czaja, S. J., Guerrier, J. H., Nair, S. N., & Landauer, T. K. (1993). Computer communication as an aid to independence for older adults'. *Behaviour and Information, 12*(4), 197–207.

Danowski, J. A., & Sacks, W. (1980). Computer communication and the elderly. *Experimental Aging Research, 6*(2), 125–35.

Davis, D. (2005). Quality, patient safety and the implementation of best evidence: Provinces in the country of knowledge translation. *Healthcare Quarterly, 8*, 128–131.

de Souza Santos, C. A., Dantas, E. E., & Rodrigues Moreira, M. H. (2011). Correlation of physical aptitude; functional capacity, corporal balance and quality of life (QoL) among elderly women submitted to a post-menopausal physical activities program. *Archives of Gerontology and Geriatrics, 53*, 344–349.

del Hoyo-Barbolla, E., Guillén, S., & Arredondo, M. T. (2009). ICT for Inclusion: Challenges and Opportunities for Bridging the ICT Divide. In M. Cabrera, & N. Malanowski, *Information and Communication Technologies for Active Ageing* (pp. 186-204). Amsterdam: IOS Press.

Dickinson, A., & Gregor, P. (2006). Computer use has no demonstrated impact on the well-being of older adults. *International Journal of Human-Computer Studies, 64*, 744-753.

Dictionary.net. (2012). *Usefulness*. Retrieved February 8, 2012, from http://definitions.dictionary.net/usefulness.

Doyal, L., & Gough, I. (1991). *A theory of human need*. London: The Macmillan press LtD.

Drucker, P. F. (1988). The coming of the new organisation. *Harvard Business Review, 66/1*, 39-48.

Dunn, J., Lynch, B., Rinaldis, M., Pakenham, K., McPherson, L., Neville, O., et al. (2006). Dimensions of quality of life and psychosocial variables most salient to colorectal cancer patients. *Psycho-Oncology, 15*, 20-30.

Dunnett, C. W. (1998). Senior citizens tackling technology. *Educational Media International, 35*(1), 9-12.

Dyck, J. L., & Smither, J. A. (1996). Older adults' acquisition of word processing: The contribution of cognitive abilities and computer anxiety. *Computers in human behavior, 12*, 107-119.

Dyck, J., & Smither, J. (1994). Age differences in computer anxiety: The role of computer experience, gender, and education. *Journal of Educational Computing Research, 10*(3), 239-248.

Eastman, J. K., & Iyer, R. (2004). The elderly's use and attitude towards the Internet. *Journal of Consumer Marketing, 21*(3), 208–20.

Economic glossary. (2011). *Economic Definition of Quality of Life*. Retrieved November 5, 2011, from http://glossary.econguru.com/economic-term/quality+of+life.

European Commission. (2011, November 30). *Population age structure by major age groups, 1990 and 2010*. Retrieved February 2012, 16, from http://epp.eurostat.ec.europa.eu/statistics_explained/index.php?title=File:Population_age_structure_by_major_age_groups,_1990_and_2010_(%25_of_the_total_population).png&filetimestamp=20111130143501.

Fahey, T., Nolan, B., & Whelan, C. (2003). *Monitoring quality of life in Europe.* Dublin: European Foundation for the Improvement of Living and Working Conditions.

Farquhar, M. (1995). Definitions of quality of life: a taxonomy. *Journal of Advanced Nursing, 22*, 502–508.

Feather, J., & Sturges, P. (Eds.). (2003). *International Encyclopedia of Information and Library Science.* London: Routledge.

Ferrans, C. E. (1996). Development of a conceptual model of quality of life. *Scholarly Inquiry for Nursing Practice, 10*(3), 293-304.

Ferriss, A. L. (2004). The quality of life concept in sociology. *American Sociologist, 35*(3), 37–51.

Floridi, L. (2004a). Information. In L. Floridi, *Philosophy of Computing and Information* (pp. 40-61). Cornwall, UK: Blackwell Publishing Ltd.

Floridi, L. (2004b). Open Problems in the Philosophy of Information. *Metaphilosophy, 35*(4), 554-582.

Foa, U. G., & Foa, E. B. (1976). Resource theory of social exchange. In J. Thibaut, J. Spence, & R. Carson (Eds.), *Contemporary topics in social psychology* (pp. 99-131). Morristown, N.J.: General Learning Press.

Foa, U., & Foa, E. (1974). *Societal structures of the mind.* Springfield, III.: Thomas.

Fokkema, T., & Knipscheer, K. (2007). Escape loneliness by going digital: A quantitative and qualitative evaluation of a Dutch experiment in using ECT to overcome loneliness among older adults. *Aging & Mental Health, 11*(5), 496-504.

Free On-line Dictionary of Computing. (2008, September 19). *Information and Communication Technology*. Retrieved November 6, 2011, from http://foldoc.org/Information+and+Communication+Technology.

Froehle, C. M., & Roth, A. V. (2004). New measurement scales for evaluating perceptions of the technology-mediated customer service experience. *Journal of Operation Management, 22*(1), 1-21.

Futurage. (2011). *A Road Map for Ageing Research.* Retrieved August 27, 2012, from http://futurage.group.shef.ac.uk/assets/files/Final%20road%20map/FUTURAGE

%20A%20Road%20Map%20for%20European%20Ageing%20Research%20-%20October%202011.pdf.

Galtung, J. (1980). The basic needs approach. In K. Ledere, J. Galtung, & D. Antal (Eds.), *Human needs. A contribution to the current debate.* Cambridge (MA): Oelgeschlager, Gunn and Hain.

Gaßner, K., & Conrad, M. (2010, March). *ICT enabled independent living for elderly. A status-quo analysis on products and the research landscape in the field of Ambient Assisted Living (AAL) in EU-27.* Berlin: Institute for Innovation and Technology. Retrieved from http://www.aal-deutschland.de/deutschland/dokumente/ict_for_elderly_webversion.pdf.

Gatto, S. L., & Tak, S. H. (2008). Computer, Internet, and E-mail Use Among Older Adults: Benefits and Barriers. *Educational Gerontology, 34*, 800-811.

Geum, Y., Kang, D., Lee, H., & Park, Y. (2010). Technology Interfaces in Product-Service Integration: Concept and Typology. *IEEE*, e7.

Gibson, C. (1991). A concept of empowerment. *Journal of Advanced Nursing, 16*, 354–361.

Gilhooly, M. L., Gilhooly, K. J., & Jones, R. B. (2009). Quality of Life: Conceptual Challenges in Exploring the Role of ICT in Active Ageing. In M. Cabrera, & N. Malanowski (Eds.), *Information and Communication Technologies for Active Ageing* (pp. 49-76). Amsterdam: OIS Press.

Glascock, A., & Feinman, S. (1980). A holocultural analysis of old age. *Comparative Social Research, 3*, 311-332.

Goodall, K., Ward, P., & Newman, L. (2010). Use of information and communication technology to provide health infromation: what do older migrants know, and what do they need to know. *Quality in Primary care, 18*, 27-32.

Gordon, R. M. (1975). *Effects of interpersonal and economic resources upon values and the quality of life.* Allentown, Pa: IAPT Press.

Gouldner, A. W. (1979, September). Talcott Parsons 1902-1979. *Theory & Society, 8*(2), 299-301.

Grabianowski, E. (2011). *How Computer Addiction Works*. Retrieved December 5, 2011, from HowStuffWorks, Inc.: http://computer.howstuffworks.com/internet/basics/computer-addiction2.htm.

Graham, K., & Logan, J. (2004). Using the Ottawa Model of Research Use to Implement a Skin Care Program. *Journal of Nursing Care Quality, 19*, 18–24.

Gray, R. M. (2009). *Entropy and Information Theory.* New York: Springer-Verlag.

Haas, B. (1999). Clarification and integration of similar quality of life concepts. *Journal of Nursing Scholarship, 31*, 215-220.

Habermas, J. (1971). *Knowledge and Human Interests.* Boston: Beacon Press.

Hajiran, H. (2006). Toward a quality of life theory: Net domestic product of happiness. *Social Indicators Research, 75*, 31–43.

Harris, B. (2003). *What are Some Different Teaching Methods?* Retrieved December 10, 2011, from http://www.wisegeek.com/what-are-some-different-teaching-methods.htm.

Harrison, M. B., Juniper, E. F., & Mitchell-DiCenso, A. (1996). Quality of life as an outcome measure in nursing research. "May you have a long and healthy life". *Canadian Journal of Nursing Research, 28*, 49-68.

Hatch, M. J., & Cunliffe, A. L. (2006). Technology. In M. J. Hatch, & A. L. Cunliffe, *Organization Theory; Modern, Symbolic, and Postmodern Perspectives* (Second ed., pp. 141-173). Oxford: Oxford University Press.

Hernandez-Encuentra, E., Pousada, M., & Gomez-Zuniga, B. (2009). ICT and older people: beyond usability. *Educational Gerontology, 35*, 226-245.

Heyn Billipp, S. (2001). The Psychosocial Impact of Interactive Computer Use Within a Vulnerable Elderly Population: A Report on a Randomized Prospective Trial in a Home Health Care Setting. *Public Health Nursing, 18*(2), 138-145.

Hill, R., Beynon-Davies, P., & Williams, M. D. (2008). Older people and internet engagement; Acknowledging social moderators of internet adoption, access and use. *Information Technology & People, 21*(3), 244-266.

Holmes, S. (2005). Assessing the quality of life – reality or impossible dream? A discussion paper. *International Journal of Nursing Studies, 42*, 493-501.

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277-1288.

Huber, G. P. (1984). The nature and design of the post-industrial organization. *Management Science, 30*(8), 928-951.

Jaschke, R., Singer, J., & Guyatt, G. H. (1989). Measurement of Health Status: Ascertaining the Minimal Clinically Important Difference. *Controlled Clinical Trials, 10*, 407-415.

Jelinek, M. (1977). Technology, Organizations, and Contingency. *The Academy of Management Review, 2*(1), 17-26.

Jones, B., & Bayen, U. (1998). Teaching older adults to use computers: Recommendations based on cognitive aging research. *Educational Gerontology, 24*, 675–689.

Karavidas, M., Lim, N. K., & Katsikas, S. L. (2005). The effects of computers on older adults users. *Computers in human behavior, 21*, 697-711.

Karvalics, L. Z. (2007, March-May). *Information Society – what is it exactly? (The meaning, history and conceptual framework of an expression).* Retrieved November 7, 2011, from http://www.ittk.hu/netis/doc/ISCB_eng/02_ZKL_final.pdf.

Katz, S., & Gurland, B. J. (1991). Science of quality of life in elders: Challenge and opportunity. In J. E. Birren, J. E. Lubben, J. C. Rowe, & D. E. Deutchman (Eds.), *The concept and measurement of quality of life in the frail elderly* (pp. 335–343). San Diego, CA: Academic Press.

Kelly, J. (2000, September 13). *Life on the Net/Education*. Retrieved November 6, 2011, from What the web is doing for schools: http://specials.ft.com/lifeonthenet/FT3NXTH03DC.html.

Kennerley, M., & Mason, S. (2008, February 15). *The Use of Information in Decision Making*. Retrieved April 25, 2012, from http://www.audit-commission.gov.uk/SiteCollectionDocuments/AuditCommissionReports/NationalStudies/Cranfield_Information_use_review.pdf.

Kieffer, C. (1984). Citizen empowerment: a developmental perspective. *Prevention in Human Services, 3*, 9-36.

Kiel, J. M. (2005). The digital divide: Internet and e-mail use by the elderly. *Medical Informatics and the Internet in Medicine, 30*(1), 19-23.

Kim, Y. S. (2008). Reviewing and Critiquing Computer Learning and Usage Among Older Adults. *Educational Gerontology, 34*, 709-735.

Kokkonen, K., Rissanen, S., & Hujala, A. (2012). The match between institutional elderly care management research and management challenges - a systematic literature review. *Health Research Policy and Systems, 10*(35).

Koopman-Boyden, P. G., & Reid, S. L. (2009). Internet/e-mail usage and well-being among 65-84 years olds in New Zealand: Policy implications. *Educational Gerontology, 35*, 990-107.

Kuokkanen, L., & Leino-Kilpi, H. (2000). Power and empowerment in nursing: three theoretical approaches. *Journal of Advanced Nursing, 31*(1), 235-241.

Kyriazakos, S. (2011). *Delivery of eHealth and eInclusion services for elderly people with mild dementia.* IEEE.

Lamport Commons, M. (2008). Introduction to the Model of Hierarchical Complexity and its Relationship to Postformal Action. *World Futures, 64*, 305-320.

Lawton, D. F. (2001). Older adults eager to explore cyberspace. *National Convention of the Association for Educational Communications and Technology.* Atlanta, GA.

Lawton, M. P. (1991). A multidimensional view of quality of life in frail elders. In J. E. Birren, J. E. Lubben, J. C. Rowe, & D. E. Deutchman (Eds.), *The concept and measurement of quality of life in the frail elderly* (pp. 3–27). San Diego, CA: Academic Press.

Lawton, M. P. (1994). Quality of life in Alzheimer disease. *Alzheimer Disease and Associated Disorders*, 8.

Li, Y. B., & Perkins, A. (2007). The impact of technological developments on the daily life of the elderly. *Technology in Society, 29*, 361-368.

Lindroos, P., & Pinkasov, M. (2003, December). *Science & Technology; OECD Science, Technology and Industry Directorate*. Retrieved January 24, 2012, from Information society: The ICT challenge: http://www.oecdobserver.org/news/fullstory.php/aid/1146/Information_society:_The_ICT_challenge.html.

Logan, J., Graham, & D., I. (1998). Toward a comprehensive interdisciplinary model of health care research use. *Science Communication, 20*, 227–246.

Lund, A. (2001, October). *Usability & User Experience*. Retrieved August 12, 2012, from Measuring Usability with the USE Questionnaire: http://www.stcsig.org/usability/newsletter/0110_measuring_with_use.html.

Macal, C. M. (2005, April 7-9). *Model Verification and Validation*. Retrieved November 10, 2011, from http://jtac.uchicago.edu/conferences/05/resources/V&V_macal_pres.pdf.

Maslow, A. H. (1970). *Motivation and personality.* New York: Harper and Row, Publishers, Inc.

Mayhorn, C., Sronge, A., McLaughlin, A., & Rogers, W. (2004). Older adults, computer training, and the systems approach: A formula for success. *Educational Gerontology, 30*, 185-203.

McCausland, L. (2012). From Dinner Table to Digital Tablet: Technology's Potential for Reducing Loneliness in Older Adults. *Journal of Psychosocial Nursing & Mental Health Services, 50*(5), 22-26.

McConatha, D., McConatha, J. T., & Dermigny, R. (1994). The use of interactive computer services to enhance the quality of life for long-term care residents. *The Gerontologist, 34*(4), 553–6.

Megens, Y., & van Meijel, B. (2006). Quality of life for long-stay patients of psychiatric hospitals: a literature study. *Journal of Psychiatric and Mental Health Nursing, 13*, 704-712.

Meischke, H., Eisenberg, M., Rowe, S., & Cagle, A. (2005). Do older adults use the Internet for information on heart attack? Results from a survey of seniors in King County, Washington. *Heart & Lung, 34*(1), 3-12.

Merriam-Webster, Incorporated. (2012). *Coherence*. Retrieved February 8, 2012, from http://www.merriam-webster.com/dictionary/coherence.

Mitcham, C. (2004). Philosophy of Information Technology. In L. Floridi, *Philosophy of Computing and Information* (pp. 327-336). Cornwall, UK: Blackwell Publishing Ltd.

Mogley, Z. W. (2011, April). *Looking at Communication Technologies Are and How They Affect Our Daily Lives and How They Affect Our Daily Lives*. Retrieved November 19, 2012, from http://www.studymode.com/essays/Looking-At-Communication-Technologies-Are-And-647163.html.

Moons, P., Budts, W., & De Geest, S. (2006). Critique on the conceptualisation of quality of life: A review and evaluation of different conceptual approaches. *International Journal of Nursing Studies, 43*, 891-901.

Moore, N. (1997). *The information society.* Retrieved November 8, 20011, from http://www.unesco.org/webworld/wirerpt/wirenglish/chap20.pdf.

Morris, A., & Brading, H. (2007). E-literacy and the grey digital divide: a review with recommendations. *Journal of Information Literacy, 1*(3), 13-28.

Morris, M., Ozanne, E., Miller, K., Santamaria, N., Pearce, A., Said, C., & Adair, B. B. (2012, May). *Smart technologies for older people a systematic literature review of smart technologies that promote health and wellbeing of older people living at home*. Retrieved October 5, 2012, from http://farseeingresearch.eu/wp-content/uploads/2012/07/MORRIS-Smart-technologies-for-older-people-MEG2.pdf.

Mörsky-Lindquist, A.-K. (2006). *Validation report.* Lohilahti: Noema-CMI Oy.

Muenz, R. (2007, March). *Aging and Demographic Change in European Societies: Main Trends and Alternative Policy Options*. Retrieved November 2, 2011, from http://www.monitoringris.org/documents/tools_reg/agingdemochange.pdf.

Murphy, H., & Murphy, E. (2006). Comparing quality of life using the World Health Organization Quality of Life Measure (WHOQOL-100) in a clinical and nonclinical sample: Exploring the role of self-esteem, self-efficacy and social functioning. *Journal of Mental Health, 15*, 289-300.

Murphy, K., O'Shea, E., & Cooney, A. (2007). Quality of life for older people living in long-stay settings in Ireland. *Journal of Clinical Nursing, 16*, 2167–2177.

Nahm, E.-S., & Resnick, B. (2001). Homebound Older Adults' Experiences With the Internet and E-mail. *Computers in Nursing, 19*(6), 257-263.

Namazi, K. H., & McClintic, M. (2003). Computer use among elderly persons in long-term care facilities. *Educational Gerontology, 29*, 535-550.

National Institute on Aging. (2007, March). *Why Population Aging Matters: A Global Perspective*. Retrieved November 2, 2011, from http://www.nia.nih.gov/NR/rdonlyres/9E91407E-CFE8-4903-9875-D5AA75BD1D50/0/WPAM.pdf.

Ng, C.-h. (2008). Motivation among older adults in learning computing technologies: A grounded model. *Educational Gerontology, 34*, 1-14.

Niemelä, P. (2004). Theory of Human Action - Basis to Analyse Social Work Theoretically. In P. Erath, B. Littlechild, & R. Vornanen (Eds.), *Social Work in Europe - Descriptions, Analysis and Theories* (pp. 161-175). Stassfurt: ISIS.

Niv, D., & Kreitler, S. (2001). Pain and quality of life. *Pain Practice, 1*, 150–161.

Noelker, L. S., & Harel, Z. (2001). Humanizing Long-Term Care: Forging a Link Between Quality of Care and Quality of Life . In L. S. Noelker, Z. Harel, L. S. Noelker, & Z. Harel (Eds.), *Linking quality of long-term care and quality of life* (pp. 3-26). New York: Springer Publishing Company.

Noll, H. (2004). Social indicators and quality of life research: Background, achievement and current trends. In N. Genov (Ed.), *Advances in sociological knowledge over half a century* (pp. 151-181). Wiesbaden, Germany: VS Verlag für Sozialwissenschaften.

Nycyk, M., & Redsell, M. (2006). The role of computer tuition in community health: A grounded theory approach. *Aging International, 31*, 296–308.

Okereke, G. C. (2009). *Information and Communications Technology*. Abuja: National Open University of Nigeria.

Osman, A., Poulson, D., & Nicolle, C. (2005). Introducing computers and the Internet to older users: Findings from the Care OnLine project. *Universal Access in the Information Society, 4*(1), 16–23.

Padilla, G., Grant, M., & Ferrell, B. (1992). Nursing research into quality of life. *Quality of Life Research, 1*, 341-348.

Parsons, T. (1968). *The Structure of Social Action: A study in social theory with special reference to a group of recent European writters.* New York: The Free Press.

Patrício, M. R., & Osório, A. (n.d.). *How can intergenerational learning with ICT help to strengthen intergenerational solidarity?* Retrieved February 10, 2013, from http://eloa2012.pedagogika-andragogika.com/uploads/2/4/0/1/2401961/patricio_osorio.pdf.

Peplau, H. (1994). Quality of life: an interpersonal perspective. *Nursing Science Quarterly, 7*, 10-15.

Pintér, R. (2008). Toward getting to know information society. In R. Pintér (Ed.), *Information Society From Theory to Political Practice* (pp. 11-28). Új Mandátum: Library of Congress Cataloging.

Poston, B. (2009). An Exercise in Personal Exploration: Maslow's Hierarchy of Needs. *The surgical technologist* , 347-353.

Prasad, P. N., & Sreedevi, V. (2007, May 4). Economic Empowerment of Women through Information Technology: A Case Study from an Indian State. *Journal of International Women" s Studies, 8*, 107-120. Retrieved February 10, 2013, from http://www.bridgew.edu/soas/jiws/may07/economicempowermentthroughit.pdf.

Priebe, S., & Fakhoury, W. (2008). Quality of life in Clinical handbook of schizophrenia. In K. Mueser, & D. Jeste (Eds.), *Clinical handbook of schizophrenia* (pp. 581-591). New York, USA: The Guilford Press.

Pritchard, M. E., & Yalch, K. L. (2009). Relationships among loneliness, interpersonal dependency, and disordered eating in young adults. *Personality and Individual Differences, 46*(3), 341–346.

Rajendra, P., & Patil, B. (2012). *Academia.edu*. Retrieved February 16, 2012, from Technological Advancementsand Its Impact on Humanity: http://mpkv.academia.edu/PratikButtePatil/Papers/309646/Technological_Advancements_and_Its_Impact_on_Humanity.

Raphael, D., Renwick, R., Brown, I., & Rootman, I. (1994). Quality of life indicators and health: Current status and emerging conceptions. *Social indicators research, 39*(1), 65-88.

Rapley, M. (2003). *Quality of Life Research A Critical Introduction.* London: SAGE Publications Ltd.

Retire at Home Services. (2010, April). *Digital Ageing: Computers and Seniors Today*. Retrieved November 17, 2011, from Four Myths About Seniors and Computers: http://choices.retireathome.com/pub.81/issue.1320.

Richardson, M., Zorn, T. E., & Weaver, K. (2001). *Seniors' Perspectives on the Barriers, Benefits and Negatives Consequences of Learning and Using Computers*. Retrieved December 5, 2011, from http://www.slis.indiana.edu/faculty/hrosenba/www/l574/pdf/richardson_seniornet.pdf.

Rissanen, S. (2013). Wellbeing and Environment - Concepts in the Elderly Care Home Context. In A. Hujala, S. Rissanen, S. Vihma, A. Hujala, S. Rissanen, & S. Vihma (Eds.), *Designing Wellbeing in Elderly Care Homes* (pp. 20-35). Helsinki: Aalto University publication series; Crossover.

Ritzer, G. (2009). *Contemporary Sociological Theory and Its Classical Roots: The Basics* (3 ed.). New York: McGraw-Hill Humanities/Social Sciences/Languages.

Ritzer, G., & Goodman, D. J. (2004). *Sociological Theory* (6 ed.). McGraw-Hill Humanities/Social Sciences/Languages.

Roberts, K. H., & Grabowski, M. (1999). Organizations, Technology and Structuring. In S. R. Clegg, C. Hardy, & W. R. Nord (Eds.), *Managing Organizations: Current Issues* (pp. 159-173). London: SAGE Publications Ltd.

Rowley, J. (2007). The wisdom hierarchy: Representations of the DIKW hierarchy. *Journal of Information Science, 33*, 163-180.

Russell, C., Campbell, A., & Hughes, I. (2008). Ageing, social capital and the Internet: Findings from an exploratory study of Australian "silver surfers". *Australasian Journal on Ageing, 27*(2), 78-82.

Ruud, M. (2011). Retrieved December 10, 2011, from Maslow's Hierarchy of Human Needs: http://maddieruud.hubpages.com/hub/Hierarchy_of_Needs.

Saranto, K., & Hovenga, E. J. (2004). Information literacy–what it is about? Literature review of the concept and the context. *International Journal of Medical Informatics, 73*(6), 503-513.

Saranto, K., & Kuusisto-Niemi, S. (2012). Experiences of the accreditation of the master's degree programme health and human services informatics. In Finnish Tiedonhallinnan koulutusohjelma arvioitavana – kokemuksia kansainvälisestä akkreditoinnista. *Finnish Journal of eHealth and eWelfare, 4*(2), 140-144.

Saunders, E. J. (2004). Maximizing computer use among the elderly in rural senior centers. *Educational Gerontology, 30*, 573-585.

Segrist, K. A. (2004). Attitudes of older adults toward a computer training program. *Educational Gerontology, 30*, 563-571.

Selwyn, N. (2004). The information aged: A qualitative study of older adults' use of information and communication technology. *Journal of Aging Studies, 18*, 369-384.

Sewell, G., & Phillips, N. (2010). Introduction: Joan Woodward and the study of organizations. In M. Lounsbury (Ed.), *Volume 29: Technology and Organization: Essays in Honour of Joan Woodward (Research in the Sociology of Organizations* (pp. 3-20). Bingley: Emerald Group Publishing Limited.

Shannon, C., & Weaver, W. (1949). *The Mathematical Theory of Communication.* Urbana: University of Illinois Press.

Shapira, N., Barak, A., & Gal, I. (2007). Promoting older adults' well-being through Internet training and use. *Aging & Mental Health, 11*(5), 477-484.

Sirgy, M. J., Michalos, A. C., Ferriss, A., Easterlin, R. A., Patrick, D., & Pavot, W. (2006). The quality-of-life (QOL) research movement: Past, present and future. *Social Indicators Research, 76*, 343–466.

Slegers, K., van Boxtel, M., & Jolles, J. (2008). Effects of Computer Training and Internet Usage on the Well-being and Quality of Life of Older Adults: A Randomized Controlled Study. *The Journals of Gerontology, 63B*(3), 176-184.

Soyeon, L., & Insoon, K. (2005). Everyday Life of Senior Women and the ICT. *Women's Studies Forum, 21*, 117.

Stangl, W. (1989). The structure of resource preferences. *Archiv für Psychologie, 141*, 139-153.

Steward, A. L., & King, A. C. (1994). Conceptualizing and Measuring Quality of Life in Older Populations. In R. P. Abeles, & H. C. Gift (Eds.), *Aging and Quality of Life* (pp. 27-54). New York: Springer Publishing Company, Inc.

Sudsawad, P. (2007). *Knowledge Translation: Introduction to Models, Strategies and Measures.* Austin, TX: University of Wisconsin-Madison.

Sum, S., Mathews, R., Hughes, I., & Campbell, A. (2008). Internet Use and Loneliness in Older Adults. *CyberPsychology & Behavior, 11*(2), 208-211.

Svensson, T. (1991). Intellectual exercise and quality of life in the frail elderly. In J. E. Birren, J. E. Lubben, J. C. Rowe, & D. E. Deutchman (Eds.), *The concept and measurement of quality of life in the frail elderly* (pp. 256–275). San Diego, CA: Academic Press.

Tak, S. H., Beck, C., & McMahon, E. (2007). Computer and Internet Access for Long-term Care Residents; Perceived Benefits and Barriers. *Journal of Gerontological Nursing*, 32-40.

Tatnall, A., & Lepa, J. (2003). The Internet, e-commerce and older people: an actor-network approach to researching reasons for adoption and use. *Logistics Information Management, 16*(1), 56-63.

Technology Education Federation of Australia. (1999, May). *What is technology education?* Retrieved November 7, 2011, from http://www.pa.ash.org.au/tefa/wite.html.

The University of Rhode Island. (2013, March 1). *What is information?* Retrieved from Characteristics of Information: http://uri.libguides.com/content.php?pid=380301&sid=3116447.

Thompson, J. D. (2007). Organizations in action; Social sciencebased of administrative theory . New Brunswick, New Jersey: Transaction Publishers.

Tinker, A. (2011, May 28). *Why ageing research is important.* Retrieved August 28, 2012, from ebook browse: http://ebookbrowse.com/why-ageing-research-is-important-prof-a-tinker-ppt-d129966223.

U.S. FDA. (2009, April 28). *Process Validation*. Retrieved February 8, 2012, from http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/PostmarketRequirements/QualitySystemsRegulations/MedicalDeviceQualitySystemsManual/ucm122439.htm.

UNESCO. (1985, November 18-22). *United Nations Educational Scientific and Cultural Organization*. Retrieved November 7, 2011, from International Symposium on the Teaching of Technology Within the Context of General Education: http://unesdoc.unesco.org/images/0008/000836/083648eb.pdf.

UNESCO. (2003). *From the information society to knowledge society*. Retrieved November 8, 2011, from http://www.abinia.org/information-society.pdf.

UNESCO. (2011). *What is Technology*. Retrieved November 7, 2011, from http://portal.unesco.org/education/en/file_download.php/e4a401dc5db3bafdb675cdab775cd305Technology+Guide+Unit+1.pdf.

Valentin, E. K. (2001). SWOT analyses from a resource-based view. *Journal of marketing Theory and Practice, Spring*, 54-69.

Walker, A. (2005). Quality of life in old age in Europe. In A. Walker (Ed.), *Growing older in Europe* (pp. 1–29). New York, NY: Open University Press.

Walker, A., & Mollenkopf, H. (2007). International and multidisciplinary perspectives on quality of life in old age. In H. Mollenkopf, & A. Walker (Eds.), *Quality of life in old age* (pp. 3–13). Dordrecht, The Netherlands: Springer.

Ware Jr, J. E. (1987). Standards for validating health measures: Definition and content. *Journal of Chronic Diseases, 40*(6), 473–480.

White, H., McConnell, E., Clipp, E., Branch, L., Sloane, R., Pieper, C., et al. (2002). A randomized controlled trial of the psychosocial impact of providing Internet training and access to older adults. *Aging & Mental Health, 6*(3), 213-221.

White, J., & Weatherall, A. (2000). A grounded theory analysis of older adults and information technology. *Educational Gerontology, 26*(4), 371–386.

Whitmar, A. (2011). *What Is the Meaning of Information Communication Technology?* Retrieved November 6, 2011, from http://www.ehow.com/about_5040951_meaning-information-communication-technology.html.

WHOQOL Group. (1993). Study protocol for the World Health Organization project to develop a Quality of Life assessment instrument (WHOQOL). *Quality of Life Research, 2,* 153-159.

World Health Organization. (2002, April). *Active Ageing A Policy Framework*. Retrieved November 4, 2011, from http://whqlibdoc.who.int/hq/2002/WHO_NMH_NPH_02.8.pdf.

World Health Organization. (2006). *Bridging the "Know–Do" Gap Meeting on Knowledge Translation in Global Health.* Retrieved February 8, 2012, from http://www.who.int/kms/WHO_EIP_KMS_2006_2.pdf.

World Health Organization. (2011a). *World Health Organization*. Retrieved November 2, 2011, from What is "active ageing"?: http://www.who.int/ageing/active_ageing/en/index.html.

World Health Organization. (2011b, September). *World Health Organization*. Retrieved November 2, 2011, from 10 facts on ageing and the life course: http://www.who.int/features/factfiles/ageing/en/index.html.

World Health Organization. (2011c). *Ageing*. Retrieved November 2, 2011, from http://www.who.int/topics/ageing/en.

World Health Organization. (2013). *Definition of an older or elderly person*. Retrieved June 20, 2013, from http://www.who.int/healthinfo/survey/ageingdefnolder/en/.

WSIS. (2003). *World Summit in the Information Society.* Geneva: WSIS.

Wyn, J., Cuervo, H., Woodman, D., & Stokes, H. (2005). *Young people, wellbeing and communication technologies.* Melbourne: Youth Research Centre, The University of Melbourne.

Xie, B., & Bugg, J. M. (2009). Public library computer training for older adults to access high-quality Internet health information. *Library & Information Science Research, 31,* 155-162.

Young, R. D. (2008, February 25). *Quality of Life Indicator Systems–Definitions, Methodologies, Uses, and Public Policy Decision Making*. Retrieved November 4, 2011, from http://www.ipspr.sc.edu/publication/Quality%20of%20Life.pdf.

Zhao, B., Heath, C. J., & Forgue, R. E. (2005). Quality of life and use of human services among households. *Consumer Interest Annual, 51,* 83–106.

Appendices

APPENDICE 1 – BASELINE QUESTIONNAIRE (11 pages)

GENERAL PART

1.   Age : _____ years

2.   Gender:
   - Male
   - Female

3.   Education:
   - Professional school
   - High school
   - 2 year Degree
   - 3 year Degree
   - 4 year Degree
   - Master of science
   - Doctor of philosophy

4.   Profession, which you were practising before the retirement:
   _____

5.   How old were you when you retired: _____

6.   Living environment at the moment:
   - Town
   - Countryside

7.   I am living:
   - Alone
   - With a spouse
   - With children
   - With friend/s

8.   I live in:
   - House
   - Apartment

- Home for elderly
- Other: _____

9. I live:
- Independent
- Partial independent, I need partial help
- Totally dependently, I need help from other people

QUALITY OF LIFE

10. What kind of daily activities are you performing (you can choose more than one option):
- Taking care of myself and my well being
- Housekeeping
- Helping children and their families
- Inclusion in the activities that you are interested in
- Inclusion in the Association for elderly people
- Inclusion in the local community
- Inclusion in different activities of the civil society
- Honorarium work
- Counselling, teaching young people
- Other:_____

11. In case you are working how much do you earn per year? _____ EUR

12. How much time do you devote to the physical activities (sport, dancing, walking etc.):
- Up to 10 minutes/day
- Up to 30 minutes/ day
- Up to 1 hour/ day
- More than 1 hour/day
- I am not active

13. If NOT, why:
- I am not interested
- I have health problems
- I don't have friends
- I don't have any possibility to be physically active
- I am not familiar with options for physical activities
- Other: _____

14. Do you feel lonely (isolated):
- YES
- NO

15. If YES, why:
    - Because of health problems
    - I am not mobile
    - I don't have friends, acquaintances
    - I don't have family
    - I don't have possibility for social gathering in the local community
    - Too few friends with a same age
    - Other: _____

16. How many friends do you have? _____ friends

17. How many face to face visits of your family per week do you have?
    - 1 time
    - 2 times
    - 3 times or more
    - Never

18. Who visit you (you can choose more option)?
    - Family members
    - Friends
    - Acquaintance
    - Volunteers from the local community
    - Health workers
    - Social workers
    - Visits from deacon
    - Other: _____

19. How many advices per day do you give to your friends, family members?
    - 1-2 advices
    - 3-4 advices
    - More than 5
    - I don't give advices

20. How many times per week do you meet your acquaintance, friends (personally, via telephone, via internet)?
    - 1 time
    - 2 times
    - 3 times
    - Up to 5 times
    - 6 times and more
    - Never

21.   How often did you visit your personal doctor within last year: _____

22.   How many different medicine you take each day: _____

23.   How many healthy meals per day do you have?
         • 1 meal
         • 2 meals
         • 3 meals

24.   Do you think that you are enough involved in the society?
         • YES
         • NO

25.   If YES, in which way do you involve yourself in the society and maintain social connections?
         • Going to the theatre
         • Visiting cultural shows
         • I am active in the Association for elderly people
         • Over the telephone
         • Over the internet (computer)
         • Other: _____

26.   If NO, do you know options of inclusion in the society?
         • YES
         • NO

27.   How many times per week do you visit social events?
         • 1 time
         • 2 times
         • 3 times
         • 4 times and more
         • Never

28.   In the past week, how often have you felt irritated?
         • All the time
         • Frequently
         • Some times
         • Never

29.   In the past week, how often have you had trouble with poor appetite, or inability to eat?
         • All the time
         • Often

- Several times
- Never

30. In the past week, how often have you had trouble with indigestion?
- All the time
- Often
- Several times
- Never

31. In the past week, how often have you found yourself really looking forward to things?
- All the time
- Often
- Several times
- Never

32. In the past week, how often have you had trouble with fatigue?
- All the time
- Often
- Several times
- Never

33. In the past week, how often have you been sad or depressed?
- All the time
- Often
- Several times
- Never

34. In the past week, how often have you been upset?
- All the time
- Often
- Several times
- Never

35. How satisfied are you with your home, considering the amount of privacy, your neighbours, security, etc.?
- Very satisfied
- Satisfied
- Dissatisfied
- Very dissatisfied

36. How adequate is your present income for your present needs?
- Very adequate

- Adequate
- Inadequate
- Very inadequate

37.   Are you worried about your future income covering the things you must have?
- Terribly worried
- Quite worried
- Slightly worried
- Not at all worried

38.   Can you get around town as you need for work, shopping, medical appointments, visiting, etc.?
- Can't get around at all
- With much difficulty
- With little difficulty
- With no difficulty

39.   Of the TV watching you did past week, how much time did you spend on really interesting programs?
- More than 20 hours
- 8-20 hours
- 1-7 hours
- None

40.   In the past week, how much time did you spend window shopping?
- More than 20 hours
- 8-20 hours
- 1-7 hours
- None

41.   In the past week, how much time did you spend on volunteer work?
- More than 20 hours
- 8-20 hours
- 1-7 hours
- None

42.   In the past month, have you had any alcohol to drink like beer, wine or anything else?
- YES
- NO

43. Have you had any problems controlling your alcohol consuming?
   - Very severe
   - A lot
   - A few
   - None

44. Do you smoke?
   - YES
   - NO

45. Do you need any help going to the toilet?
   - YES
   - NO

46. Do you need any help to get dressed?
   - YES
   - NO

47. Do you need help maintaining your personal hygiene?
   - YES
   - NO

QUALITY OF LIFE IN THE CONNECTION WITH THE INFORMATION COMMUNICATION TECHNOLOGY

48. Do you possess mobile phone?
   - YES
   - NO

49. Do you use?
   - Mobile phone
   - Stationary phone
   - Mobile and stationary phone
   - I don't use telephone

50. In case you use telephone, in which purpose do you use it (you can choose more options)?
   - Conversation
   - Sending text messages
   - Sending electronic messages (e-mails)
   - Taking and sending pictures
   - Other: _____

51. How often do you use telephone?
- Minimal 1 time per day
- 2-3 times per week
- 1 time per month
- Never

52. Do you have routine access to the internet?
- YES
- NO
- I DON'T KNOW

53. An information communication technology offers also video connection with other person (you can see the person you are talking with). Would you use the video connection, if your computer or telephone had this possibility?
- YES
- NO
- I DON'T KNOW

54. Would you use smart television for the communication with your relatives (the connection with the person you would like to talk is possible with just a simple touch on the screen with the picture of the person)?
- YES
- NO
- I DON'T KNOW

55. Would you like to have the mobile connection with your priest or other religious consultant?
- YES
- NO
- I DON'T KNOW

56. Would you allow your relatives to have video control over you and your residence that they could notice if there is something wrong with you?
- YES
- NO
- I DON'T KNOW

57. Are you familiar with the expression »information communication technology«?
- YES
- NO

58.   If YES, could you please describe what this expression represent to you?
        _____, _____, _____

59.   Do you possess a computer?
        • YES
        • NO

60.   Did you ever use computer?
        • YES
        • NO (if you have chosen this answer please continue with the question 64)

61.   If YES, for what purpose (you can thick more than one option)?
        • Professional
        • Educational
        • Private interest
        • Other: _____

62.   If YES, in which way (you can thick more than one option)?
        • Sending electronic mail
        • Writing text
        • Browsing on the World Wide Web (internet)
        • Participating in the internet forums
        • Participating in social networks
        • Other: _____

63.   If you are using computers for sending emails how many emails do you send per week?
        • To 2 per week
        • To 5 per week
        • To 15 per week
        • More than 15 per week

64.   If NO, would you like to learn computer skills?
        • YES
        • NO

65.   If YES, what is your biggest fear in using the computer?
        • Financial burden
        • Lack of knowledge and not skilled enough
        • Lack of technical support
        • Not familiar with the field
        • Eventual incapability (weak-sighted, not good in typing)

- Wrong execution of the procedures
- Other: _____

66. Do you know the express social networks?
    - YES
    - NO

67. If YES, what do you think this expression represents?
    _____, _____, _____

68. Do you use World Wide Web (internet)?
    - YES
    - NO (if you have chosen this answer please continue with the question 71)

69. If YES, how often do you use internet?
    - At least 1-time per day
    - At least 1-time per week
    - At least 1-time per month
    - Rare

70. If YES, what is your prime reason for using internet Choose only one option?
    - That I am connected with other people and in this way less lonely
    - Lifelong learning
    - Reading news papers
    - Conversation with my family, friends and acquaintances
    - Paying bills
    - Being independent
    - Other: _____

71. Were you ever a part of the social network (for instance Facebook)?
    - YES
    - NO

72. If YES, in which social networks did you cooperate:
    - Facebook
    - Netlog
    - Second life
    - Skype
    - Other: _____

73.   If NO, would you like to get friends in this way?
- YES
- NO

Would you like to add comments?

_____
_____

APPENDICE 2 – FOLLOW-UP QUESTIONNAIRE (14 pages)

Were you involved in the first research?   □ YES   □ NO   (mark please)

GENERAL PART

1.   Age : _____ years

2.   Gender:
   • Male
   • Female

3.   Education:
   • Professional school
   • High school
   • 2 year Degree
   • 3 year Degree
   • 4 year Degree
   • Master of science
   • Doctor of philosophy

4.   Profession, which you were practising before the retirement:
   _____

5.   How old were you when you retired: _____

6.   Living environment at the moment:
   • Town
   • Countryside

7.   I am living:
   • Alone
   • With partner
   • With children
   • With friend/s

8.   In case you are living with your spouse how long ago did you meet him/her?
   • Before 3-5 weeks
   • Before 3-5 months
   • 3 – 5 years ago
   • We are married more than 5 years

9. How did you meet?
   - Via friends
   - We visited the same interest activity
   - Via computer (Facebook)
   - Other: _____

10. I live in:
    - House
    - Apartment
    - Home for elderly
    - Other: _____

11. I live:
    - Independent
    - Partial independent, I need partial help
    - Totally dependently, I need help from other people

QUALITY OF LIFE

12. What kind of daily activities are you performing (you can choose more than one option):
    - Taking care of myself and my well being
    - Housekeeping
    - Helping children and their families
    - Inclusion in the activities that you are interested in
    - Inclusion in the Association for elderly people
    - Inclusion in the local community
    - Inclusion in different activities of the civil society
    - Honorarium work
    - Counselling, teaching young people
    - Other:_____

13. In case you are working how much do you earn per year? _____ EUR

14. Did you find any work which you could be interested in while cooperating in the research?
    - YES
    - NO

15. Did you search for the information about positive effects of physical activity within the cooperation in the research via computer?
    - YES
    - NO

16. If YES, did this effect to increase your physical activity?
    - YES (before the research I wasn't at all physically active, now I am physically active)
    - YES (before the research I was partly physically active, now I am physically active)
    - NO (before I wasn't physically active, I am not physically active)

17. How much time do you devote to the physical activities (sport, dancing, walking etc.)?
    - Up to 10 minutes/day
    - Up to 30 minutes/ day
    - Up to 1 hour/ day
    - More than 1 hour/week
    - I am not active

18. If NOT, why:
    - I am not interested
    - I have health problems
    - I don't have friends
    - I don't have any possibility to be physically active
    - I am not familiar with options for physical activities
    - Other: _____

19. Do you feel that you are less isolated because you are using the computer?
    - YES
    - NO

20. If YES, why do you feel less isolated?
    - I socialize with friends, family, grandchildren via computer, discussing things
    - Telephone conversation via mobile phone
    - I am visiting interest activities which I found via computer
    - Other: _____

21. If NO, why do you think you are still isolated?
    - Because of the health problems
    - I am not mobile
    - I don't have friends, acquaintances
    - I don't have family
    - I don't have possibility for social gathering in the local community
    - Too few friends with a same age
    - Other: _____

22.   How many friends do you have? _____ friends

23.   How many friends did you meet via computer (social networks as Skype) and you are maintaining electronic contacts with them? _____ friends

24.   How many face to face visits of your family per week do you have?
        • 1 time
        • 2 times
        • 3 times
        • Never

25.   Who visit you (you can choose more option)?
        • Family members
        • Friends
        • Acquaintance
        • Volunteers from the local community
        • Health workers
        • Social workers
        • Visits from deacon
        • Other: _____

26.   Do you connect with your relatives, friends via video programme Skype?
        • YES
        • NO

27.   If YES, how often?
        • At least 1 time per day
        • At least 1 time per week
        • 2-3 times per months

28.   How many advices per week do you give to your friends, family members?
        • 1-2 advices
        • 3-4 advices
        • More than 5
        • I don't give advices

29.   How many times per week do you meet your acquaintance, friends (personally, via telephone, via internet)?
        • 1 time
        • 2 times
        • 3 times

- Up to 5 times
- 6 times and more
- Never

30. Did you have any chance to advice young people since you are involved in the social networks, about questions that they may be interested in?
    - YES, I gave up to 5 advices per week
    - YES, I gave up to 5 advices per month
    - NO, I did not give any advices via social networking

31. How often did you visit your personal doctor within past 6 months: _____

32. Did you discuss your personal health with friends, acquaintances via social networks, Skype and had this influenced you in good way that you needed to perform less visits at doctor?
    - YES
    - NO

33. How many different medicine you take each day: _____

34. How many healthy meals per day do you have?
    - 1 meal
    - 2 meals
    - 3 meals

35. Do you think that you are enough involved in the society?
    - YES
    - NO

36. If YES, in which way do you involve yourself in the society and maintain social connections?
    - Going to the theatre
    - Visiting cultural shows
    - I am active in the Association for elderly people
    - Over the telephone
    - Over the internet (computer)
    - Other: _____

37. If NO, do you know options of inclusion in the society?
    - YES
    - NO

38.   How many times per week do you visit social events?
- 1 time
- 2 times
- times
- Never

39.   In the past week, how often have you felt irritated?
- All the time
- Often
- Several times
- Never

40.   In the past week, how often have you had trouble with poor appetite, or inability to eat?
- All the time
- Often
- Several times
- Never

41.   In the past week, how often have you had trouble with indigestion?
- All the time
- Often
- Several times
- Never

42.   In the past week, how often have you found yourself really looking forward to things?
- All the time
- Often
- Several times
- Never

43.   In the past week, how often have you had trouble with fatigue?
- All the time
- Often
- Several times
- Never

44.   In the past week, how often have you been sad or depressed?
- All the time
- Often
- Several times
- Never

45. In the past week, how often have you been upset?
   • All the time
   • Often
   • Several times
   • Never

46. What kind of excitement was that?
   • Positive excitement
   • Negative excitement
   • Negative and positive excitement

47. What was the reason for the excitement (you can choose more options)?
   • Working with the computer
   • The possibility to connect with my family, friends via social network (Facebook) and Skype
   • Writing electronic mails
   • Reading interesting articles
   • Fear of the computer
   • Other: _____

48. How satisfied are you with your home, considering the amount of privacy, your neighbours, security, etc.?
   • Very satisfied
   • Satisfied
   • Dissatisfied
   • Very dissatisfied

49. Do you feel any safer because of the computer, mobile devices or telephones?
   • YES
   • NO

50. How adequate is your present income for your present needs?
   • Very adequate
   • Adequate
   • Inadequate
   • Very inadequate

51. Are you worried about your future income covering the things you must have?
   • Terribly worried
   • Quite worried
   • Slightly worried

- Not at all worried

52. Can you get around town as you need for work, shopping, medical appointments, visiting, etc.?
    - Can't get around at all
    - With much difficulty
    - With little difficulty
    - With no difficulty

53. Of the TV watching you did past week, how much time did you spend on really interesting programs?
    - More than 20 hours
    - 8-20 hours
    - 1-7 hours
    - I did not watch television, I rather connect with people via computer and discuss about the interesting subjects

54. In the past week, how much time did you spend window shopping?
    - More than 20 hours
    - 8-20 hours
    - 1-7 hours
    - None

55. In the past week, how much time did you spend on volunteer work?
    - More than 20 hours
    - 8-20 hours
    - 1-7 hours
    - None

56. In the past month, have you had any alcohol to drink like beer, wine or anything else?
    - YES
    - NO

57. Have you had problems controlling your alcohol consuming?
    - Very severe
    - A lot
    - A few
    - None

58. Do you smoke?
    - YES
    - NO

59. Do you need any help going to the toilet?
    - YES
    - NO

60. Do you need any help to get dressed?
    - YES
    - NO

61. Do you need help maintaining your personal hygiene?
    - YES
    - NO

QUALITY OF LIFE IN THE CONNECTION WITH THE INFORMATION COMMUNICATION TECHNOLOGY

62. After the involvement into the research you use?
    - Mobile phone
    - Stationary phone
    - Mobile and stationary phone
    - I don't use telephone

63. In case you use telephone after your involvement into the research, in what purpose do you use it?
    - Conversation
    - Sending text messages
    - Sending electronic messages (e-mails)
    - Taking and sending pictures
    - Other: _____

64. How often do you use telephone?
    - Minimal 1 time per day
    - 2-3 times per week
    - 1 time per month
    - Never

65. Do you have routine access to the internet?
    - YES
    - NO
    - I DON'T KNOW

66. An information communication technology offers also video connection with other person (you can see the person you are talking with). Would you use the video connection, if your computer or telephone had this possibility?

- YES
- NO

67. Would you use smart television for the communication with your relatives (the connection with the person you would like to talk is possible with just a simple touch on the screen with the picture of the person)?
    - YES
    - NO

68. Would you like to have the mobile connection with your priest or other religious consultant?
    - YES
    - NO

69. Would you allow your relatives to have video control over you and your residence that they could notice if there is something wrong with you?
    - YES
    - NO

70. You are familiar with computers; would you define now the expression »information communication technology« differently as before in the first research? (If you were not a part of the first research please go to the question 71)
    - YES
    - NO

71. Could you please describe what expression »information communication technology« represent to you now?
    _____, _____, _____

72. Did you use the computer in this research for the first time?
    - YES
    - NO
    - Don't use the computer (If you have chosen this option please continue with the question 76)

73. If YES, for what purpose did you use the computer within this research (you can thick more than one option)?
    - Professional
    - Educational
    - Private interest
    - Collaboration in the social networks

- Conversations via programme Skype
- Other: _____

74. If YES, in which way (you can pick more than one option)?
- Sending electronic mail
- Writing text
- Browsing on the World Wide Web (internet)
- Participating in the internet forums
- Participating in social networks
- Other: _____

75. If you are using computers for sending emails how many emails do you send per week?
- To 2 per week
- To 5 per week
- To 15 per week
- More than 15 per week

76. If NO, what is the reason that you do not use computer?
- Too short introduction course
- Lack of knowledge and not skilled enough
- Lack of technical support
- Not familiar with the field
- Eventual incapability (weak-sighted, not good in typing)
- Wrong execution of the procedures
- Other: _____

77. In the scope of the research you got familiar with the social networks, what do you imagine under the expression »social networks« now?

   _____, _____, _____

78. Did you use World Wide Web (internet) within the research?
- YES
- NO (if you have chosen this answer please continue with the question 81)

79. If YES, how often did you use internet within the research?
- At least 1-time per day
- At least 1-time per week
- At least 1-time per month
- Rare

80. If YES, what is your prime reason for using internet? Choose only one option.
   - That I am connected with other people and in this way less lonely
   - Lifelong learning
   - Reading news papers
   - Conversation with my family, friends and acquaintances
   - Paying bills
   - Being independent
   - Other: _____

81. Did you cooperate in the social network (for instance Facebook)?
   - YES
   - NO

82. If YES, in which social networks did you cooperate:
   - Facebook
   - Netlog
   - Second life
   - Skype
   - Other: _____

83. How often did you collaborate in social networks?
   - More times per day
   - At least 1 time per day
   - At least 1 time per week
   - At least 1time per month
   - Never

84. With which gender did you mostly communicate?
   - With male
   - With female

85. Which activities did you mostly perform on Facebook?
   - Searching for friends
   - Reviewing pictures
   - Adding pictures into my profile
   - Writing comments to friends
   - Writing messages to friends
   - Other: _____

86. With whom did you usually bond via Facebook?
   - Family, children, grandchildren
   - Friends, acquaintance

- Spouse
- Strangers

87. Did you ever organize face to face meeting with somebody you met via social networks?
    - YES
    - NO

88. How do you feel when you are using the computer (between 1st and 4th option you can choose more options)?
    - Positive excited, because I can read newspapers, looking pictures and review the content which I am interested in
    - Positive excited because I will contact friends, family
    - Positive excited because I am able to call my friends and family via Skype for free
    - Positive excited, because I will write electronic email
    - I don't have any special feelings
    - Negative excitement

89. Do you think you have benefits and it is good for you because you use the computer?
    - YES
    - NO

90. If YES, why (you can choose more options)?
    - It gives me positive feeling and I feel less isolated
    - Offer me option to connect with my friends
    - I can learn new things
    - Option to read newspapers via computer
    - Other: _____

91. Would you buy grocery via computer and World Wide Web (bread, milk etc.)?
    - YES
    - NO
    - I DON'T KNOW

92. If YES, how often?
    - At least ones per day
    - At least ones per week
    - At least once per month

93.   Would you perform any bank activities via computer and World Wide Web?
- YES
- NO
- I DON'T KNOW

94.   If YES, how often?
- At least ones per day
- At least ones per week
- At least once per month

95.   If needed would you buy flight ticket via computer and World Wide Web?
- YES
- NO
- I DON'T KNOW

96.   If needed would you arrange any travel activities via computer and World Wide Web?
- YES
- NO
- I DON'T KNOW

Would you like to add comments?

_____
_____

APPENDICE 3 – INDIVIDUAL MODEL VALIDATION QUESTIONNAIRE (3 pages)

In continuation the instrument for individual validation of the elements "Willingness", "Community", "Lifelong learning" and "Outcomes" is presented.

On the basis of the proposed presented element [name of the element], we would like to kindly ask you to critically evaluate the element [name of the element] and its content areas [names of the content areas] from the coherence point of view. Please pay special attention on logic of the element [name of the element] and coherence of its content areas, order and consistency relationships of content areas.

COHERENCE (being clear and understandable)

1. How do you assess the importance of the element [name of the element] for the elderly people's adaptation to the ICT? Please observe the element [name of the element] from general perspective and explain your opinion.

    _____
    _____

2. What kind of affect the content areas [name of the content areas] within the element [name of the element] have on elderly people's ICT adaptation? Please observe the content areas from more specific point of view and explain your opinion.

    _____
    _____

3. Do you think that three content areas [name of the content areas] within the element [name of the element] coherently cover the areas needed for the ICT adaptation of elderly people? Here please focus only on existing content areas and please explain do they coherently cover areas needed for elderly's ICT adaptation.

    _____
    _____

4. In your opinion which content area/s within the element [name of the element] was/were not enough or not at all was/were taken into consideration and could be efficient for the ICT adaptation of elderly people? Here please indicate any content area which should be, according to your opinion, included in the element [name of the element] and at this point is/are not included. Please explain and indicate them.

    _____
    _____

5. In your opinion which content area/s within the element [name of the element] is insignificant within the model? Here you have to focus on existing content areas [name of the content areas] and please state according to your opinion any content area/s which does/do not belong within the element [name of the element] and at this point is/are included. Please explain.

_____
_____

6. How do you assess the general objectives (according to previously presented content, see page 5-7) of the element [name of the element] and its content areas [name of the content areas] for elderly peoples' ICT adaptation? Please explain.

_____
_____

Additionally, we would like to kindly ask you to critically evaluate the element [name of the element] and its content areas [name of the content areas] from the usefulness perspective. Please review the element [name of the element] and its content areas from the quality of having utility and especially practical worth or applicability point of view.

USEFULNESS
1. How do you assess the usefulness of the element [name of the element] for future implementation in the practice? Here you have to focus only on the element from the general perspective of the elderly people's adaptation to the ICT? Please do not yet focus on the content areas.

_____
_____

2. How do you assess the usefulness of the content areas [name of the content areas] within the element [name of the element] for the elderly people's quality of life improvement? Here please focus on perspectives of content areas for the quality of life improvement (if content area contributes positively or negatively to the quality of life).

_____
_____

3. In your opinion, if the Model is implemented into the practice, what is the duration of the element [name of the element]. Please specify period (e.g., 2, years, 5 years, 10, years etc.). Please take into the consideration rapid ICT development, society changes, people being increasingly educated etc.

_____

We would like to kindly ask you to again assess the coherence and usefulness of the content areas [name of the content areas] within the element [name of the element]. Please assess questions below on the scale 1 to 5 (1=poor; 5=excellent).

Does the proposed element [name of the element] complies with the content coherence between first [name of the content area], second [name of the content area] and third [name of the content area] content area within the element?

1   2   3   4   5

Does the proposed order of the content areas within the element [name of the element] adhere to the previously presented content (see page 5-7) of the element [name of the element]?

1   2   3   4   5

Are the content areas [name of the content areas] useful for the most efficient adaptation to the ICT by elderly people?

1   2   3   4   5

Are the general objectives within the element [name of the element] adaptable to the majority of elderly people?

1   2   3   4   5

APPENDICE 4 – FOCUS GROUP MODEL VALIDATION QUESTIONNAIRE (2 pages)

Members of validation team are asked to validate model by means of the SWOT analysis. The SWOT analysis is a tool which consists of 4 items:

S Strengths	Which attributes were helpful in reaching the aims of the Model in terms of structure of the elements and content areas within the particular element?
W Weaknesses	Which attributes were detrimental in reaching the aims of the Model in terms of structure of the elements and content areas within the particular element?
O Opportunities	Which external conditions were helpful in achieving the goals of the Model in terms of structure of the elements and content areas within the particular element?
T Threats	Which external conditions were detrimental in achieving the goals of the Model in terms of structure of the elements and content areas within the particular element?

Please use the SWOT analysis as a final conclusion/summary tool for "Model of Adaptation to ICT in Old Age" validation. This will be an enormous help in further development of the Model.

SWOT Analysis	
Strengths	Weaknesses
What are the most important strengths of the Model for elderly people's ICT adaptation?	What are the most important weaknesses of the Model for elderly people's ICT adaptation?
1. Concerning coherence of involved elements within the Model?	1. Concerning coherence of involved elements within the Model?
2. Concerning coherence of involved content areas included within the elements of the Model?	2. Concerning coherence of involved content areas included within the elements of the Model?

3. Concerning usefulness of the Model in practice?	3. Concerning usefulness of the Model in practice?
Opportunities	Threats
What are the most important opportunities of the Model for elderly people's ICT adaptation? 1. Concerning coherence of involved elements within the Model? 2. Concerning coherence of involved content areas included within the elements of the Model? 3. Concerning usefulness of the Model in practice?	What are the most important threats of the Model for elderly people's ICT adaptation? 1. Concerning coherence of involved elements within the Model? 2. Concerning coherence of involved content areas included within the elements of the Model? 3. Concerning usefulness of the Model in practice?

IMPORTANT:

In your opinion, if the Model is implemented into the practice, what will be the duration of the Model? Please specify period (e.g., 2, years, 5 years, 10, years etc.). Please take into the consideration rapid ICT development, society changes, people being increasingly educated etc.

_____

APPENDICE 5 – EVALUATION STUDY (3 pages)

Dear participant!

First of all, we want to thank you for your participation in one of the courses in the context of the project PRIMER-ICT. To assure the quality and to find ways for improvement we kindly ask you to answer the following questions at the end of the course.

Thank you!

1. I participated in a course for
- ☐ teachers
- ☐ multipliers

2. Please rate your agreement with the following statements:

	I fully agree	I agree somewha	I disagree somewha	I fully disagree
a) I enjoyed the course.	☐	☐	☐	☐
b) The course was time-consuming.	☐	☐	☐	☐
c) The course offered a comprehensive description of the project.	☐	☐	☐	☐
d) The aims of the project are clear to me.	☐	☐	☐	☐
Before, I was well informed about the objectives and contents of the course.	☐	☐	☐	☐
f) The course was diversified.	☐	☐	☐	☐
g) The course leader was well prepared.	☐	☐	☐	☐
h) There were enough possibilities for discussion and interaction.	☐	☐	☐	☐
i) The use of the e-learning material was difficult.	☐	☐	☐	☐
j) The course offered a balanced combination of e-learning and face-to-face-sessions.	☐	☐	☐	☐
k) During the course there was enough support.	☐	☐	☐	☐
l) The course helped me to be sensibilized for intergenerational issues.	☐	☐	☐	☐

m) The course was a good preparation for my future work with multipliers / elderly.	☐	☐	☐	☐
n) I would recommend the course to a friend.	☐	☐	☐	☐

2. What did you like about the course?

3. What did you dislike about the course?

4. How could we improve the course?

5. How did you learn about the course?

6. All in all, the course was:

7. Room for additional comments:

8. Demographic information

Age: _____

Sex: ☐ **female**   ☐ **male**

Are you working?   ☐ **yes**   ☐ **no**

If yes, what is your profession? _____

APPENDICE 6 – EVALUATION STUDY (ELDERLY PEOPLE)
(3 pages)

Dear participant!

First of all, we want to thank you for your interest in PRIMER-ICT and for participating in the demo workshop. To assure the quality of the event and to find ways for improvement we kindly ask you to answer the following questions.

Thank you!

1. Please rate your agreement with the following statements:

	I fully agree	I agree somewha	I disagree somewha	I fully disagree
a) I enjoyed the demo workshop.	☐	☐	☐	☐
b) The demo workshop stimulated me to participate in the project.	☐	☐	☐	☐
c) The project was presented in a comprehensive way.	☐	☐	☐	☐
d) The aims of the project are clear to me.	☐	☐	☐	☐
Before, I was well informed about the objectives and contents of the demo workshop.	☐	☐	☐	☐
f) The demo workshop was diversified.	☐	☐	☐	☐
The demo workshop leader was well prepared.	☐	☐	☐	☐
h) There were enough possibilities for discussion and interaction.	☐	☐	☐	☐
i) I would recommend the demo workshop to a friend.	☐	☐	☐	☐

2. What did you like about the demo workshop?

3. **What did you dislike about the demo workshop?**

4. **How could we improve the demo workshop?**

5. **How did you learn about the demo workshop?**

6. **All in all, the demo workshop was:**

7. **Room for additional comments:**

8. **Demographic information**

Age: _____

Sex: ☐ female   ☐ male

Are you working? ☐ yes   ☐ no

If yes, what is your profession? _____

Original Papers

The study is based on the following original papers, which are referred within the content of this thesis by their Arabic numerals from 1-3.

ELDERLY PEOPLE AND INFORMATION COMMUNICATION TECHNOLOGY (ICT): ISSUES, CHALLENGES AND OPPORTUNITIES FOR BETTER QUALITY OF LIFE
Blažun, H., Saranto, K., Rissanen, S., & Bobek, S. (2013). In M. M. Cruz-Cunha, I. M. Miranda, & P. Gonçalves (Eds.), Handbook of Research on ICTs and Management Systems for Improving Efficiency in Healthcare and Social Care (pp. 396-415). Hershey, PA: IGI Global.

EDUCATING TEACHERS AND MULTIPLIERS FOR FUTURE WORK WITH THE ELDERLY AND THE ROLE OF MOTIVATIONAL WORKSHOPS FOR THE ELDERLY'S FUTURE PARTICIPATION IN ICT TRAINING COURSES
Blažun, H., Saranto, K., & Vošner, J. (2013). *International Journal of Health Research and Innovation*, 1(1), 25-46.

IMPACT OF COMPUTER TRAINING COURSES ON REDUCTION OF LONELINESS OF OLDER PEOPLE IN FINLAND AND SLOVENIA
Blažun, H., Saranto, K., & Rissanen, S. (2012). *Computers in Human Behavior*, 28(4), 1202–1212.

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The summary additionally includes some previously unpublished material.

Helena Blažun

Elderly People's Quality of Life with Information and Communication Technology (ICT): Toward a Model of Adaptation to ICT in Old Age

This dissertation focuses on exploring the current state of information and communication technology (ICT) use by elderly people with the aim of understanding elderly people's needs in interaction with ICT solutions for their greater inclusion in information and knowledge society. ICT can help elderly people overcome isolation and loneliness and improve their quality of life (QOL), stay healthier and live independently for a longer time which enable them to remain active in their society. This dissertation expands the existing knowledge on the aspect of elderly people's use of ICT and proposes the model solution for the efficient ICT adaptation in old age and the definition of QOL in correlation with ICT.

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