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CONNECTING AGEING PEOPLE

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CONNNECTING AGEING PEOPLE

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Väestön ikärakenne on muuttumassa maailmanlaajuisesti sekä absoluuttisesti että suhteellisesti, kun ihmiset elävät pipidempään ja kokonaisväkimäärä kasvaa. Ikääntyvät ihmiset tarvitsevat palveluja myös tulevaisuudessa kuten nykyäänkin. Resurssit palvelujen tuottamiseen ovat kuitenkin rajalliset niin taloudellisesti kuin käytettävissä olevan henkilöstönkin osalta. Jotta palvelujen riittävyys voidaan turvata, on resurssit kohdennettava itse palvelun tuottamiseen ja aktivoitava palvelun tarvitsija toimimaan itse kulloisenkin palvelun hankkimiseksi. Yksi keino tähän on tuottaa sähköisesti käytettäviä palveluja, jolloin voidaan hyödyntää henkilökohtaista tietotekniikkaa.

Tavoitteena tässä työssä oli Nokia Oyj:n toimeksiannosta tutkia mitä keinoja on saada ikääntyvät ihmiset käyttämään tietoteknisiä laitteita, joilla palveluita voidaan käyttää ja hankkia itse toimien. Tarkastelun kohteena oli pääasiassa älypuhelin, joka toimii sekä henkilökohtaisena viestivälineenä että tarjoaa erilaisia hyödyllisiä elämistä helpottavia toimintoja. Lisäksi pyrittiin selvittämään millainen päätelaite sopii parhaiten laajalle käyttäjäryhmälle ja miten graafisen käyttöliittymän muokattavuus vaikuttaa erityisesti aloittelevan käyttäjän kokemukseen kosketusnäytöllisestä älypuhelimesta.

Työssä on tehty kaksi tutkimusta, joilla on pyritty selvittämään matkapuhelimen käyttäjien näkemyksiä tietoteknisistä päätelaitteista, palveluista ja niiden käytettävyydestä.
Kyselytutkimuksessa lähetettiin kyselylomake ikäihmisten tietotekniikkayhdistyksen yhteyshenkilölle, joka jakoi kyselyn eteenpäin yhdistyksen tutoreille. Haastattelututkimuksessa oli kohteena heterogeeninen ryhmä matkapuhelimen käyttäjiä, joille esitettiin myös kysymyksiä heidän käyttämistään päätelaitteista, palveluista sekä niiden käytettävyydestä. Kummaassakin tutkimuksessa oli myös osio, jossa voi kertoa edellä mainituihin asioihin liittyviä vapaamuotoisia näkemyksiä ja olettamuksia. Kummankin tutkimuksen vastauksia on käsitelty soveltuvilta osiltaan sekä tilastollisesti että vapaamuotoisena tekstinä, kvantitatiivisesti ja kvalitatiivisesti.

Tutkimusten ja kirjallisten lähteiden perusteella työssä todettiin, että meneillään olevan tietoteknisen muutoksen myötä myös ikääntyvät ihmiset tarvitsevat juuri heille sopivia päätelaitteita ja sähköisiä palveluja, joita tuottavat niin yhteiskunnalliset tahot kuin kaupallisetkin toimijat. Markkinoilla olevien laitteiden todettiin soveltuvan ikäihmisillekin varsinkin, jos käyttöliittymä on selkeä ja yksinkertainen sekä muokattavissa käyttäjän tilanteeseen ja kykyihin soveltuvaksi. Myös ikäihmisten välinen kanssakäyminen sähköisiä välineitä kuten älypuhelinta käyttäen todettiin tärkeäksi tekijäksi. Tietoteknisten laitteiden käytön aloittamisen ja niiden tehokkaan hyödyntämisen todettiin edellyttävän koulutusta ja ohjausta, joiden tuottajana tulisi olla niin riippumattomia toimijoita kuin kaupallisin periaattein toimivia yrityksiäkin.

CONNECTING AGEING PEOPLE

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Age structure of population is changing worldwide both absolutely and relatively when people live longer and the entire number of population grows all the time. Ageing people need services in the future as much as they do currently. Resources to produce services are restricted both by economic reasons and amount of human workforce executing duties. To ensure adequacy of necessary level and amount of services it is necessary to allocate resources into producing the service actually and activate the person needing the service to act her/himself to provide the service needed. One way to implement this activity is to offer services utilizing electronic communication and use them with personal information technology terminals.

Target in this thesis assigned by Nokia Corporation was to study which means there are to make ageing people to use information technology related devices which can enable them to use electronic services available and connect to societies acting in electronic networks. This thesis work concentrates mainly to smartphones which is both a personal device for communication and also a device enabling use of applications and features which facilitate daily tasks and life. There was also a target to study what kind of physical device is convenient for a large group of people commonly and also how configurability of user interface of a smartphone affects to novice user's experience on a smartphone equipped with touchpad.

There were two studies done to find out opinions of mobile phone users about terminals, services and usability of those.
The questionnaire study was sent to the contact person in information technology society of aged people who delivered it to tutors of the society. These people were asked relatively simple and short questions to ensure all of them assimilate things asked equally.
The second study was an interview study which was allocated to a heterogeneous group of older people using mobile phones. These people were also presented some demonstration devices to support their selections and to explain what kind of user interfaces are available in current smartphones.
Studies contained questions providing answers to be handled with statistical methods or as free form text with quantitative and qualitative methods.

Studies and literature sources of information proved that the ongoing information technology transition makes also the aged people need communication devices and electronic services which are offered by societal actors or commercial companies. It was also found important to make people deal with each other using an electronic communication device like smartphone. To make older people start using information technology devices and utilize them efficiently and safely presumes guidance and training offered by both independent actors and communities and also companies acting on commercial manners. Smartphones in market were found suitable for older people also if the user interface is clear and simple enough for novice users and configurable according to needs and abilities of the user.

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1   INTRODUCTION

The number of ageing people is growing both relatively and absolutely. (United Nations 2010). Defining ageing people as a group is not unambiguous and cannot be done just grounding on age (Fisk, Rogers, Charness, Czaja & Sharit, 2009, 8-9). Their needs in services are increasing alike, but resources available in services are not growing – they are even diminishing on many areas.

Ageing people are already a significant group of customers considering many commercial services, and their importance as customers is increasing all the time. People belonging to "baby boomers" age group are also an economically capable force with fair amount of property and income. They cannot be left without notice when designing products, services or physical things to consumers.

Currently most commercial products in market, especially many electronic devices, are designed in scope of people aged 20 to 40 years. Many of these products are difficult to use due to their complexity, insufficient ergonomics or conceptual matters (Keates, Clarkson. 2004, 85-95). For ageing people this kind of products may be impossible to use for physical, mental or even economic reasons. (Tiresias, 2013). Social pressure to keep in touch with the community is taking the focus to use of electrical communication both in services provided by the society and commercial companies as well as contacting other people.

Telecommunication devices designed to older people are mainly simple and capable to basic performance only, speech and short messages. These devices are designed to be simple to use with large keypad, large font in display and minimum configuration of functions. Appearance of this kind of senior phones may be considered stigmatizing. That is why many people really needing this kind of device do not want to use it, they want to use devices appearing equal to ones used by majority of users. (Apple 2013, Huawei 2013, Nokia 2013, Samsung 2013, Sony 2013, ZTE 2013).

It is possible to modify the user interface of the same physical device in a way that enables all users despite of their age, ability of eyesight or level of dexterity to use a smartphone successfully in their everyday communications. When the user is capable

of using a senior phone he/she can also use a smartphone when the user interface is configured according to the will and ability of the user. In practice this means large icons on the screen, unambiguous symbols, clear and large enough font, clear colors and understandable explanation of the functions. Having large text and icons means also large display, but on the other hand people do not want to have too big phone to carry in their pocket or handbag.

Device manufacturers is not the only group who should do something to take into account the older people. Many services used with a computer are very complex and the web pages difficult to read and see due to their small font, flickering buttons and awful usage of different colors. When using these services with a smartphone having smaller display than a computer, visual problems may culminate, if mobile usage of the application has not been taken into account.

Figure 1. A traditional senior phone

2   USER INTERFACE

User interface is the port between the user and the device to be used. It is the key character of a smartphone and needs special attention especially when the user is a person who is learning to use a new kind of device. For many products the user interface is an inborn or native character defined by the way of the usage. For example a hammer is quite an easy item to adopt without any earlier experience. A human being can grab the handle and hit a nail without an instruction manual. Most probably no one can use a mobile phone without guidance if it is shown to her/him the very first time. It is also a big change to start using a smartphone instead of a traditional mobile phone. The user interface of a smartphone is based on icons representing functions whilst in traditional phones functions are found in fixed menu structures appearing mostly with names.

In a smartphone the volume of the memory and the properties of the operating system make it possible to have many applications active at a time. Thus a smartphone is more like a computer, and in some applications even more effective than that.
These properties together with the restricted size of the display and the number of physical keys constitute a challenging playground, where all customers with fragmented ability and will to use the device should be taken into account. This is a great challenge and opportunity to device designers, operating system designers and application designers.

Figure 2. Too colorful screens for novice user

2.1 Display

Display is one of the most important elements in the phone user interface. The size of a display has increased from one row seven segment liquid crystal screens seen on first mobile phones to high definition color displays with up to 7 inch diameter.

In the first phones the display was only showing the numbers dialed and short names. Smartphones are used in very different way from the first mobiles: The display shows the view from camera, documents saved in memory, photos, videos and pages browsed from the Internet.

Usage of the display has changed totally and it has come closer to a computer. The performance of the display has increased tremendously, the number of pixels and colors is huge, and the frame rate is higher than a human eye can recognize. That has given designers an opportunity to gather huge amount of information on a display at a time.

2.2 Keyboard

Keypad was used in first phones only to dial a phone number or speed dial number of a recipient. There was no other function than voice connection in the early phones. Writing short messages needed more symbols than just numbers and letters: They had to be written by selecting them from a menu. More keys were needed to activate functions and moving the cursor on screen. Joystick and other positioning keys were needed with graphic display and scrolling menus. Some phones have a qwerty-keyboard, which makes it easier to write messages and using phone book. Especially older people or users with reduced dexterity find it handy to use when writing messages compared to keypad with numbers only. The size of keys is a very important matter in the older people's phone. Predictive text input makes it easier to write text with ITU-T-keypad (ITU 2013), but configuring correct settings is too difficult to many users.

Figure 3. Example of a device with quite clear keypad arrangement

2.3   Touch screen

Graphic user interface and growing display size brought the touch screens to the phones. When functions are shown as icons on the screen, it is logical to use those icons as buttons.

There are two main technologies to implement touch screen. A resistive touch screen is simple to implement but a capacitive one can support more functions and it can be used with one or more fingers. The most sophisticated touch screens can be used both with fingers and a pointer.

People are used to get some kind of response when they press a button to be sure something really happens. Pressing the touch screen foil on the display gives no feedback from that action. To make the user feel like pushing a real button a function causing a small movement to the device and feeling as a haptic response has been ceveloped. By using functions via touch screen the icons representing keys can be done big enough also for people with reduced ability of eyesight.
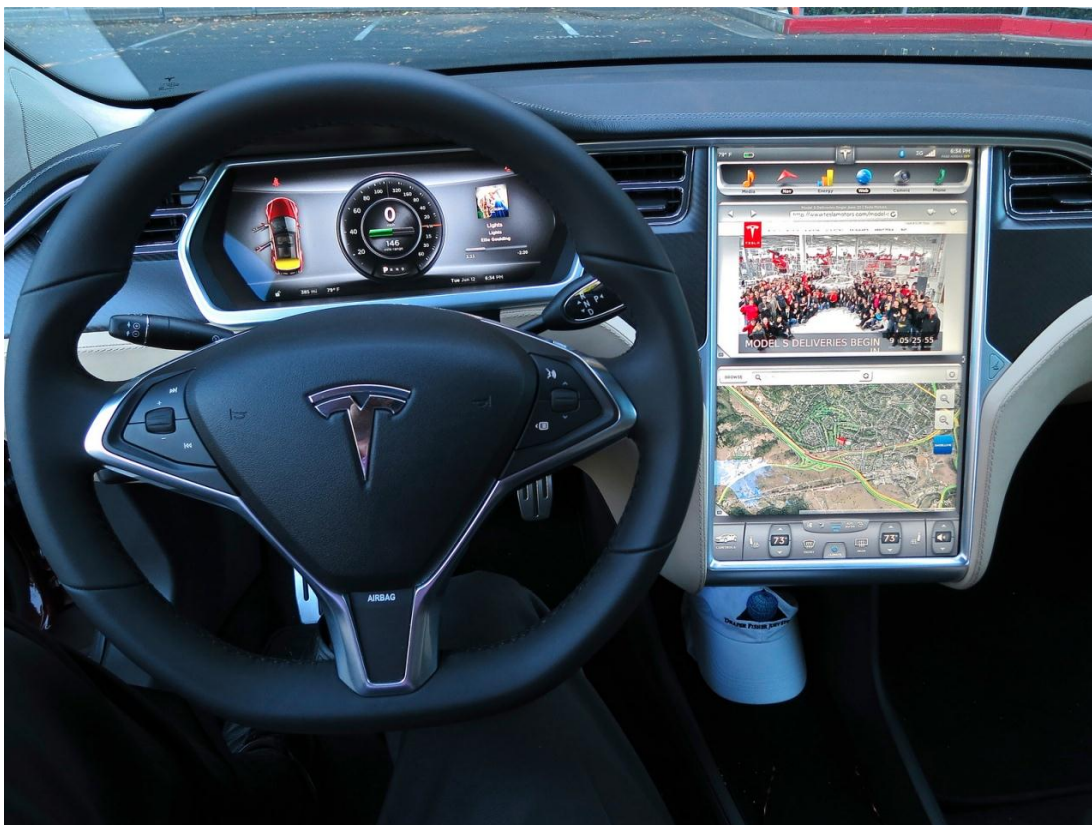
Figure 4. Touchscreens are everywhere

2.4   Audio devices

Audio is traditionally the most important character in a phone. Voice of the user is transferred from one place to another during audio call. Recordings can be played via a phone with a suitable application.

The phone can also be controlled by voice commands. There are also applications converting text, for example short messages or e-mails into voice. The user can be identified by his/her voice characters in some applications.

Figure 5. All kind of audio devices are available

2.5   Other UI-devices

In smartphones there are plenty of different kind of sensors collecting information from the environment and activities of the user. By using the information gathered, the phone can control itself to serve the user as he/she wants. Phone can also protect the user's senses and itself from failures caused by misuse.

The user can control the application running in the phone by turning the phone into different positions, which are recognized by position a sensor and an acceleration sensor. A camera or 3-D distance sensor can recognize movements the user makes with his/her hands.

It is possible to translate the language of the signs into text or spoken language, if there is enough computing power and a suitable application assembled in the phone. Sensors like barometer, thermometer and luxmeter gather information of air pressure, temperature and ambient light. A fingerprint sensor can be used to recognize the user to be authorized to use the device or have access to some files or applications. To-gether all these sensors can gather information from environment and the user to constitute an extensive view of how the user is performing. Various applications can be used to get all this information into usable form to configure statistics and progno-

sis how the user is and will be doing (DeWitte 2012). In some cases the phone can even make an alert if it concludes the user needs help.

Figure 6. Medical applications can be used with a smartphone

2.6 External input/output devices

Smartphones can be connected to external input/output devices with a cable like USB, or by wireless interface like Bluetooth using radio frequency. There are plenty of devices, which can be used with a smartphone: Keypads, joysticks, touchpads and any device having a driver installed to a phone and the application supporting that device.

A smartphone can be used like a computer with an external keypad and a display. Same applications and documents can be used in both environments, if they are compatible.

3   AGEING PEOPLE AS CONSUMERS

Ageing people are a growing group of consumers measured by number and economic importance. This phenomenon is seen all over the world, not only in Europe. In 2010 the percentage of aged population in Asia, North America and Europe was ranging from 6% to 16%. Estimation in year 2030 is that the percentage ranges from 16% to 29%. (United Nations 2010)

These people are living healthier and remain more active than the people we currently consider as seniors or ageing people. They want to stay in their homes and living environment as long as possible before they move to a place where their living is supported by personnel.

Ageing people have a huge power from markets point of view. They have a fair property of their own, money savings and adequate income to be used the way they want as long as they need a minimum amount of drugs and medical care. They also have time to use their money into services available for them. Ageing people are mostly very conscious about quality they expect from products and services due to their experience from all their lifetime so far (Rainie 2012, Sanneman, R-L, 2012).

3.1   Products and services

New products coming to market are often focused to some specific group of users mostly specified by age and the manner of usage. Products designed for older people are too often dull and stigmatize the user to be somehow restricted by his/her performance and thereby being unable to use similar devices as younger people. This makes people feel uncomfortable and think again whether to buy any product at all. (Doro 2013, Emporia 2013, Sura 2010, 1-2).

3.1.1 Smartphones for older adults

Buying a traditional mobile phone has not been a big challenge for anybody despite of customer's needs or abilities in economic, social or physical matters. Smartphone is very much a different case, if the customer wants to use also other services than just audio calls sending and receiving (Cellphones for senior citizens blog 2008).

There are a number of ecosystems provided by phone manufacturers, operating system manufacturers, service offering companies and non-commercial actors. Services offered are not usable in any other ecosystems, which means the customer has to make a selection between the ecosystems, and often with very little amount of experience based information. This gives the personnel in the shop a big responsibility to guide the customer to the right way in selection and also an opportunity to sell products, which give them the best commission and sales margin.

Due to the difference between a traditional phone and a smartphone usage, the personnel should be able to inform, what the customer can do with all the features and applications found in the phone and services available in the web. An important issue is, what it costs to use some services and how the price is comprised of the partial factors like data transmission, usage fee for the service provider and other more or less unclear immaterial commodities.

At the moment it is very difficult to compare what each supplier offers, because applications and services are not similar in the ecosystems. Operator driven shops mostly offer more than one ecosystem, but they might also have some of them with higher priority than others.

Generally the whole field of purchasing mobile phone devices, services and subscriber connections is going through a change, which makes the customer even more discomfiture. It is desirable that the dealers get their sales personnel trained well enough to make them objective professionals to help people choose correct terminal equipment for their needs.

It is obvious there is not enough time to give the customer any deep training session when purchasing the phone. This gives an opportunity to another service provider,

who teaches people to use their phones and services with reasonable price. This kind of service could be driven by a third sector actor employing younger people having good skills with computers and mobile devices. This is also one way to break the unemployment the young people are suffering in many countries.

There are researches done about how people use their phone and what kind of devices they use. According to Nielsen research in USA (Nielsen Statistics 2013) the number of older people using smartphone is growing faster than it was expected, which will most probably be the trend also elsewhere, in countries with adequate income among older people (Poeter 2012).

3.1.2 Services provided via network

There are a lot of services provided by network operators, device manufacturers, software application manufacturers, commercial service companies and public service actors, which are directed to a certain group of people. Some of them are there for accelerating selling of a certain device, like some games or free update of maps in location services. Some other services are not trying to sell anything but trying to keep people in touch with each other, and public services like healthcare. Most of the free services get their income from commercials shown on their web pages. People visiting pages with contents aligned with their interest, see the commercials and may be affected by them.

One of the most simple and commonly used services is paying bills in a banking service. It saves time and gives people freedom to pay their bills when they want. Usage of this kind of service is easy mainly due to simple web pages. Another commonly used service is to buy things in web shops. Almost anything can be found in shops around the world and comparing prices is easy. Most of the shops are reliable and do deliver things as ordered. People can also queue for tickets without standing in rain outside of a ticket office.

Social media is a service growing with high speed. Services like Facebook are quite easy to use and they give an opportunity to keep in touch with people who are living far away and thereby cannot physically visit each other as often as they would like to. This kind of services can create communities where people have similar interests. These communities may be so powerful that people get together also physically to meet each other and attend happenings or even arrange one of their own.

All of services described above can be used with a home computer. When people leave their apartment they will need a mobile communication device to get into these services: A smartphone is needed. Adopting a smartphone is easier if the user interface is similar to the one in a computer and the applications used are the same.
The salesperson in a shop is a in key role to find a suitable device to enable the use of the services the customer needs. Most of the services can be downloaded from the network but the customer has to find out how and where to get the software needed for the service.

3.1.3 Safety, Security and Privacy

Communication and data transfer via a mobile phone is very safe. However, there are certain things to take care of to prevent fraudulent usage of the device. Identification by a PIN-number and passwords to applications and services requires that the PIN-number needs to be kept only in the user's memory. It may also be useful to have blocking to very expensive services, if the device gets stolen or used by a person who wants to benefit from it financially by making the authorized user pay the bills caused by the unauthorized user.

In some services people are logged in with their own name and let other people know personal things which can be harmful to themselves or to their relationship to third party. Technical solutions can not protect the user if he/she delivers personal or some other way confidential information to parties who can use it harmfully against their interest. Some public actors are giving advice to older people how to act safely in network services (Mukanetti 2013).

There are attempts to snoop passwords from people to get their money with some illegal way especially in banking services. One way is to force the user to use a wrong web page and make him/her give the password to an unauthorized party. Sometimes this kind of pages may look very much like the original ones.

Authorizing the usage of some services may also be done with the mobile terminal itself. The most common way is a password entered to the device, but also a fingerprint sensor or identification of the user's iris can be used.
Using devices which are not looking like aimed to somehow physically restricted user group will make the user feel more self-confident and the people around will consider him/her capable of managing in the current environment.

3.1.4 Surviving in any environment

A smartphone is not just for voice calls established by a cellular network. It has many other non-cellular communication interfaces to transfer information from or to its surroundings. Knowing where the user or a certain place locates, is a growing area of business. People can travel to places where they have never been before and they can find what they are looking for. At the same time they can see what kind of services there are nearby.

It is possible to load money into a smartphone and pay things with it with suitable applications. One can get admittance to buildings, happenings, movies or any restricted areas by ordering tickets with a mobile device. It is also possible to have some membership cards downloaded into a smartphone and use those cards just like a traditional card or make the identification procedure electrically through a wireless interface.

Using a smartphone can give a lot of possibilities to act in an environment not known in advance, but it means that also the environment has to ready for it (European standards lifts 2013). Currently there are wireless LAN networks available for example in cafeterias for browsing in web. The possibilities to build a network of services used with a smartphone is huge (Kuopio.mobi 2013). There are enormous shopping

centers where location services are needed, but signals from satellites can not reach mobile terminals inside those buildings. A system inside the building is needed to give the user the information needed for location.

Figure 7. Navigating with a smartphone

3.2   Status provided by the personal things used

Any device or service used gives a person some kind of status, which can be unconscious or the user can be highly aware how other people react to that kind of product. A person can even try to get in to a community by getting a device similar to devices used by those in the community he or she is willing to get into.

Quite often some factors of the cultural or social background make people purchase certain kind of devices or services instead of selecting solutions which would be the most useful and worth money for them. The opinion and the consumer habits of the community drive also individual's habits of buying things and services. Sometimes those habits can be illogical, and things are bought just to keep the individual's status. This is seen quite clearly especially in communities of young people, who use certain kind of mobile devices: To keep in the community, one must have a certain type of phone and applications downloaded. Not only young but also older people buy an expensive mobile phone just because other people in the community have such devices. After their work career older people may have lost regular contacts to

stabile communities having similar hobbies or interest areas as they have. They may even be afraid of leaving communities. That is why they try to keep in getting into groups by letting the community to drive their behavior. It is an easy task for a vendor to sell an expensive device to a person who doesn't need it and can't use it, if the person feels buying is the only way to getting into something good.

Fortunately there are also information technology communities with competent people, who can guide older people to buy suitable devices and use them, like Mukanetti in Tampere (Mukanetti 2013).

Figure 8. A luxury phone with fine decoration

4 USABILITY OF THE SMARTPHONE

There is an incredible assortment of products and services to buy and use. Can all people use them equally regardless of their age, language, education or culture? Most probably the answer is "no". Phone manufacturers design their products according to guidelines provided by their marketing department to get the eligible customer group needs covered as well as possible. So far older people have been considered a not so important user group from business point of view. Most phones designed for older people have been designed typically by smaller companies offering phones just in one sector in their product range, which consists of various products focused for seniors. However, smartphones have become items which interest the older people especially in USA and other countries with relatively high income and good services accessible with smartphones.

4.1 Senior phones in market

Phones designed for older adults are quite easy to use and meet the targets customers have set for the in ease of use (Virkkunen 2012). Keypad printing is clear, numbers and other signs are big enough and easy to see. Keys are big enough to be hit correctly despite of dexterity of the user, and the keys make a real click when pushed. Display is quite large and items shown are clear and big enough also for users with lowered ability in eyesight. The voice is clear and loud enough to meet requirements set by a user with hearing loss. These phones are just for audio calls and text messages, and some of them have also alert functions. There is no data transfer function in these devices, which disables for example e-mail and web browsing. The display is often too small and the pixel count too low to be used for displaying web pages. The cameras have relatively low resolution cells and poor optics or are totally missing. There typically are no Non-cellular wireless connections like wireless LAN or Bluetooth. All these properties make senior phones very easy to use for sending or receiving audio calls or short messages but they also prevent using the phone for any other purpose.

Figure 9. A selection of senior phones in the market

There is often an emergency button in a senior phone to send an alert to a person who can help if an accident happens or the user has a fit. In some phones pressing the emergency button makes a call to emergency number 112 and it cannot be changed to another number (Virkkunen 2012, Purhonen 2011).

4.2   Research on usability

Phone manufacturers have obviously done much research to their product concepts before the final commercial products have been released in the market. People have been asked to give their opinion on their first expression and experience of the phone after a period of everyday use. This kind of research gives a lot of statistical information of a phone (Adage 2013).

The results of this type of research vary depending on the cultural and geographical issues of the usage environment. People like different colors, styles and other visual things, sound volume, cover materials and general appearance of the phone depending where they come from and what kind of device they used to have earlier.

The information gathered from a phone in this kind of studies is important to the forthcoming products by helping marketing and development departments to find the most important things to concentrate in design and usability.

Also independent actors perform some testing to the phones in market. Often to two or more devices belonging to similar categories in retail price and potential user groups are compared. Usually the devices tested are the newest and most the interesting products to get a lot of people interested in the research. The devices most probably suitable or designed for older people are rarely tested in this kind of media. Some basic senior phones were however presented in Tekniikan Maailma magazine (Ylönen & Herttua 2008, Ylönen, Backman & Herttua 2009, Ylönen 2011) and in Aamulehti (Virkkunen 2012), but no real smartphones for older adults in these articles either. New models with some more features are introduced about once a year (tekniikan Maailma 2011, Tekniikan Maailma 2012). However it was mentioned in the article of Aamulehti that there is no reason why an older adult could not use a smartphone instead of a traditional mobile phone.

Research made by manufacturers typically contains very confidential material which may have significant affect on sales volumes of a certain device or even the business of the whole company. Thus those research results are referred only on general level in this thesis work.

5   HOW TO CONNECT AGEING PEOPLE

There are lots of devices in the market, a number of competing slightly different operating systems and an enormous mass of services to be used with a wireless terminal.

Not many of these devices or services are clearly designed for people who are just starting to use them comfortable and without repetitive need to ask help or advice from somebody. It seems device manufacturers are not willing to make powerful terminals focused to beginners and those customers are not willing to buy them. This means that people should be able to start their career of a smartphone user with de-

vices already in the market. Those devices should be relatively easy to use for anybody as well at the first start as when using solutions available at service providers. Finding what is easy and usable for anybody is a large task. To get some kind of answer concerning the easiness of usability of a smartphone, this problem is divided into three more specific parts: The amount of information shown on display, outward appearance of a suitable phone, adopting a new device via tailored training. These focus areas were selected, because they can be researched with resources available and they give together a satisfying understanding of wholeness concerning the question.

5.1 The amount of information shown on display

The number of icons on display is a very important factor to a novice smart phone user to make her/him feel comfortable with the new device. As well the background picture on display affects the clarity of the user interface experienced by the user. The novice user must easily be able to find the application on the display, also the very first time.

5.2 Outward appearance of a suitable phone

People have many kind of needs and desires how to use their phone. Experience and habits what kind of device they have been using before affect a lot how easily they can adopt a new kind of device to their daily use. Mechanical properties like size, weight, form and friction of the surface material affect a lot to their selection. The question is whether there exists a single form or model which is acceptable for a large group of people with heterogeneous requirements and predilections.

5.3 Adopting a new device via tailored training

Getting used to a new kind of operating system and using a new device in everyday use effectively and with confident to user's own ability are an important threshold for any older customer who is about to buy a smart phone. Trainings and support for

phone usage provided by organizations constituted by well versed seniors or commercial service providers are in a key position to encourage older people to purchase a smart phone and use it.

6 INTERVIEW STUDY

To get information what kind of smartphones older people would like to have, an interview study was made among a group of consumers mostly belonging to older adults. The interview group was asked about their habits in using their phones and what are they expecting the phone manufacturers should do to meet their needs with future devices and what is the typical phone they prefer the best. The clarifying questions and answers were given to guide people not familiar with smartphones to understand what one can do with such a device and what is the added value given by such a terminal compared to a traditional mobile phone. Information how to modify a smartphone user interface to meet older people's needs was gathered from those answers. Participants were also asked whether they were given advice enough when purchasing their phone. The interview form is appendix 2.

6.1 Group to be interviewed

The group which was interviewed consisted of people aged from 48 years to 78 years. The average age was 64.5 years. There were 5 female and 8 male participants. The selection to group was done randomly, only the age was a meaningful criterion targeted to be over 50. The persons had different backgrounds and educations to get an average opinion. Nationality of all participants was Finnish, native language was Finnish and they were living in southern and western Finland.

6.2   Questions in the interview

People interviewed were asked the following questions

1) Do you use a mobile phone (yes/no)?

2) How long have you used a mobile phone (if yes in 1)?

3) What kind of phone do you have?

4) What is good in that phone?

5) What is not good in that phone?

6) On what grounds has that phone been selected?

7) Have you chosen that phone by yourself?

8) Did you get enough information about that phone when buying it?

9) Do you use a computer to access e-mail, social media, browsing (etc.)?

10) Do you think it would be possible to use a smartphone instead of computer to access services currently used with a computer?

11) What is the optimum form factor for a smartphone when using it (also in a use cases mentioned in question 10)? (Some phones were presented as examples; Nokia E7 (touch and qwerty keypad), Nokia 9300i (two displays and T9 + qwerty keypads), Nokia N90 (folding with two displays), Nokia N95 (sliding display T9 keypad), Nokia Lumia 800 (touch and virtual keypad), Toshiba pocket PC e830 (touch used with a pen)

12) What is the maximum amount of information seen on display at a time to keep the usability on decent level (number of icons)?

13) How would you like to input the text when needed? (virtual keypad on display, physical keypad integrated to device, external keypad)?

14) How large should the display size be when using the device instead of a computer?

15) How big may the device be to keep it easily portable?

16) Would you prefer use the touch with a pen or a finger?

17) Is there a need to have a physical switch to disable the touchpad (locking and status visible by position)?

18) How long time should the battery last without charging in normal use?

19) Anything else to about the features?

20) How much are you willing to pay for a smartphone?

21) How much are you willing to pay for using the phone per month?

6.3   Interviewing situation and execution

All participants were interviewed one by one in a peaceful environment. Time of the interview was not defined to let the person tell all the ideas and opinions he/she had concerning their current phone or smartphones generally. The properties of the example phones were described to make the participant understand why there are all those form factors available. The meaning of the user interface was described intimately to make the person conscious of the terminology used.

The participants of the interview were also told how and for what the interview material was going to be treated and collected, it will not be turned over to a third party and that all personal information is confidential.

Interviews were carried out on a timeframe from May 2012 to November 2012.

Figure 10. Devices used as model examples.

6.4   Results of the interview

The results of the interview are presented in a statistical form when relevant, otherwise in textual mode in the following sections. The comments, proposals and additional information gathered from participants are marked after each question.

Evaluation of which proposals could be implemented into devices to make the usage easier and what they require for software and hardware development, are presented in section 6.5.

6.4.1 Using a mobile phone

In this question participants were asked whether they use a mobile phone. Answers were divided as seen in table 1.

Table 1. Participants using mobile phone

Total answers	yes	no
13	13	0

It was found that all the participants used a mobile phone. Some of them had more than one phone in their use, for work and private purposes, and some special needs due to environmental factors. There was one person who switched her phone on only when she was going to call somebody or send a message, otherwise the phone was switched off, and her husband was taking care of the phone communication.

6.4.2 Time been using a phone

Participants were asked how long they have been using a mobile phone (if yes in question 1).

Table 2. Time the participants have been using a mobile phone

Years	Quantity	Share (%)
0-6	0	0
7	1	7.7
8	0	0
9	0	0
10	0	0

11	0	0
12	0	0
13	0	0
14	0	0
15	4	30.8
16	0	0
17	1	7.7
18	2	15.4
19	1	7.7
20	1	7.7
21	0	0
22	0	0
23	0	0
24	1	7.7
25 or more years	2	15.4
	Total: 13	100%

The average value for how long participants have been using a mobile phone is 17.9 years. Most of the participants had been using only GSM or newer generation phones, only those who needed a phone in their daily work had used also older generation phones like NMT900, NMT450 or ARP.

6.4.3 Phone brand and type

In the third question the participants were asked about their current phone. Results are shown in table 3.

Table 3. Phone brand and type

Brand	Type/Form factor	Quantity	More than one phone
Nokia	Basic/Monoblock	5	2
	Basic/Clamshell	2	
	Smartphone/Monoblock	3	2

Samsung	Basic/Monoblock	1	1
	Basic/Clamshell	1	0
Samsung	Smartphone/Monoblock		

It is seen that Nokia is the most popular brand among the participants. A traditional basic phone in a monoblock or a clamshell format is the most used type. When phone types and user ages were examined, it was seen that older people in this sample prefer traditional type of phones. The participants active in working life prefer the smartphones due to needs their work was requesting. For some people it is not possible to use a smartphone in their work because of its size and sensitivity to physical failures though they would need one. Five people in this sample had more than one mobile phone, one was for their personal needs and another typically for work purposes.

6.4.4 Positive properties of phones

Participants were asked about positive things and properties in their current phone. The number of properties was not limited.

Table 4. Positive properties in phones

Positive properties in current phone	Quantity
Simple (easy to use)	7
Applications generally	6
Durable mechanics	3
Physical keypad	4
Camera	4
Protective design, clamshell	3
Battery capacity, operation time after charging	5

It is seen that the easiness of use is the most important positive thing among the basic phone users and the smartphone users. Participants using smartphones told that applications with logical usability and visual clarity are perceived positive to be used.

All participants on some level liked physical keypad even if they used a smartphone with a touchpad. Mechanical durability was also a property that was found somewhat important especially among participants who work partially outdoors or need to move a lot with the phone in their pocket. A lid covering the display and the keypad was a loved property.

6.4.5 Negative properties of a phone

In the question 5 the participants were asked what is not so good in their current phone. The number of negative properties was not limited.

Table 5. The negative properties of a phone

What is not good	Quantity
Character visibility on keys	2
Battery lifetime	3
Too small display	1
Too many applications or features	2
Predictive text input	1
Errors when using touchpad	1
Difference in functions between phones	1
Slippery surface, easily dropping from hand or pocket	4
Nothing	2

The most disliked property of a phone was slippery outer surface which makes the phone easier to be dropped out from pocket or hand. Battery lifetime was found to be too short by some of the participants. Other negative properties were mostly related to keypad or display visibility, errors when hitting the touchpad by mistake or the phone predicting a wrong word when writing a message. The difference of the menu structure and functioning in different brand phones was found a troublesome property. Two participants did not find any negative properties in their phones.

6.4.6 Phone selection

In the question 6 the participants were asked based on what they had selected their current phone.

Table 6. Reasoning for phone selection

Criterion	Quantity
Affordable price	4
Brand, known good	4
Somebody adviced	3
Latest model	1
Company phone	2
Properties, applications	4
Received free from somebody	1

The most important criteria to choose a phone were brand, phone properties generally and an affordable pricing. Most of the people were advised or pressurized by someone to purchase a certain kind of device or just to buy a newer phone. Two participants were using a company phone and the selection had been done from a limited assortment. One of the participants using company phone had made the selection himself to get the latest model of a certain brand. Only one of the persons interviewed was using a phone received free, but almost all of them had an older phone in reserve.

6.4.7 Authority to select a phone

The participants were asked whether they had selected their phone themselves, and if not, who had.

Table 7. Authority in phone selection

Self chosen	Someone else	Together with someone	Authority to select
8	2	2	1(company phone)
	1(received)		

These results show that the phones were mostly selected by the users themselves. Some of the people were advised by their relatives or other influential persons, but only two of them conceded that the consultancy did affect to the selection. It was also found out that these older customers trust more to their relatives, especially their children, than salespersons in retail shops.

6.4.8 Information offered when purchasing a phone

Participants were asked whether they received enough information to make the most suitable selection for their use when purchasing their current phone.

Table 8. Source of information about the phone to be purchased

Yes	No	Information source
4		Similar phone as earlier
3		Salesperson
1		User's guide
1		Finding out properties and model in advance
	2	Salesperson was not competent or he/she was not asked
1	1	Usage was presented but properties were not known
1		Not purchased, the phone was received free

These answers show that most of the people interviewed had purchased the same kind of phone as they had been using earlier. In that case there is not so much need to get guidance for phone properties. Two of the participants were really unsatisfied with the knowledge of the salesperson they had been patronized. More common phenomenon was that the salesperson did not know enough about the device he/she was offering to the customer. This was clearly notified afterwards when somebody demonstrated how some properties were used and found in the phone. Reading the user guide is evaluated too slow, hard to understand or even humiliating.

6.4.9 Personal computer usage

In the question 9 participants were asked whether they use a personal computer, private or work purposes, and what they do with it.

Table 9. Personal computer usage

Yes	No	e-mail	Web browsing	Social media	Picture and video	Work
10		10	10	3	2	6
	3					

These answers show that ten of thirteen participants use computer to their tasks. Most common tasks are e-mail and web browsing. A computer is also widely needed for work related tasks regardless of the work people do. Participants who do not use a computer do not really need it for the time being, changes in bank or other services may change the situation in near future. However they already now have someone in their circle of acquaintances who takes care of their tasks obligatory to be performed with a computer.

6.4.10 Smartphone instead of computer

In the question 10 participants were asked whether they could use a smartphone to access some applications or services they currently use with a computer. They were advised to look the situation like they were able to use the smartphone equally to a computer.

Table 10. Using smartphone instead of computer

yes	No	Yes, if similar usage with smartphone and PC
8	3	2

This question caused a lot of discussion about smartphone usability. Eight participants were positively disposing to replace their computer with a smartphone in some tasks. Three people could find no reason why to use a smartphone for such tasks. One of them was more like to use computer instead of a smartphone due to small size

of the phone display. Two participants were willing to use a smartphone instead of a computer if the display is large enough and the usability by other means is equal or better than a computer. Participants with no experience of smartphones appraised similar usage of a computer and a portable mobile device to be a helpful thing when appropriating usage of known applications with a new kind of device. People with some experience of smartphone did not appraise the similarity such important. This question also highlighted a discussion about the size of the displays in smartphones and tablets and the evanescent difference between those two devices in principle.

6.4.11 Optimum form factor of a phone

The participants were asked what kind of a phone the prefer best. A number of phones and one pocket size computer were introduced to clarify what kind of form factors there are available. Properties of devices were presented to make participants understand pros and cons of the different kind of solutions.

To make the evaluation easier only one type of device was selected by each participant interviewed. Devices are shown in figure 10.

The devices introduced were:

- Nokia E7 (touch and qwerty keyboard). This device has touchpad for controlling when used in portrait position and sliding keypad closed. For activating applications menu there is a mechanical pushbutton below the display. Locking the display is performed with a sliding spring-loaded switch. There are also mechanical switches for power, volume level and camera.

- Nokia 9300i (two displays and T9-keypad + qwerty keyboard). This is a communicator type of device, meaning the hinge is on the longer side of the phone and the bigger display is meant to be used only in landscape position. When closed this device is very much like a traditional mobile phone with relatively small display and full T9 keypad.

- Nokia N90 (folding with two displays). This is a clamshell type of phone with hinge on shorter upper side of the device.

- Nokia N95 (double-sliding display T9-keypad). This is a phone with sliding display covering T9-keypad when closed.

- Nokia Lumia 800 (touch and virtual keypad). This is a device with no mechanical switches in front, all control is done with touchpad or three touch buttons below display. There are mechanical switches only for volume level and camera and a combined function button for power and locking.
- Toshiba Pocket PC e830 (touch used with a pen). In this device the main difference is that the touch pad is controlled with a special pen.

The participants were advised to make the selection just by the functional basis of the device, because most of the phones were quite old models. With technique available currently overall dimensions would be much smaller and display resolution higher with more colors.

Table 11. Favorite device models

Device	Votes
Nokia E7	0
Nokia 9300i	0
Nokia N90	0
Nokia N95	0
Nokia Lumia 800	6
Toshiba Pocket PC e830	0
Some else device	7
Can not define	0

Results of this question were very interesting and segmented. Lumia 800 as an example was the only device which was accepted as such. Even the side keys of it were criticized to be too protruding and too sensitive to use. Especially the lock switch was considered inconvenient and presses by accident were appropriated to be more than probable. One of participants evaluated Lumia 920 to be optimum device for him, display of Lumia 800 was considered too small for his needs. Three participants preferred a device with touchpad and some kind of lid protecting the display. The protective lid could be folding or sliding. One person was clearly keen on communicator type of a device added with touchpad. A pure clamshell type of phone was favorite form for one participant. There was also one person who appreciated a mon-

oblock basic phone to be best choice for him. This was because of his work demands and suspicion to durability of a smartphone with large display but also due to battery life time in daily use.

6.4.12 Amount of information shown on screen

In the question 12 participants were asked how much information there may be on the display at a time to keep the usability on decent level. On the other hand this question is also related to icon size and display size. Icons on Nokia E7 and Nokia Lumia 800 displays were introduced as examples to evaluate the size. Both devices were shown as they appear when taking out of sales package.

Table 12. Information on screen at a time

Icon size (mm)	Votes	Number of icons	Votes
8x8		3	
10x10		4	
12x12		5	
14x14	2	6	
16x16	3	7	
18x18	5	8	7
20x20	3	9	4
25x25		10	
Bigger		More	2

It was found that bigger icons are more informative than small. It is easier to acquire what the icon is for when there is text also. Maximum number of icons on display depends on display size, but it seems amount of icons from 6 to 8 is suitable on display with ca. 4 inch diameter, when the device display is introduced in portrait state. Icons were identified easily when their size was bigger than 16x16 millimeters, two participants were able to use the device with smaller icon size. Shape of the icon was not so important. Participants who had used a phone with touchpad could acquire

smaller icons than those who had used a traditional phone. It is obvious that having experience on graphical user interface it is easier to adopt touchpad usage.

Idea of the user to be capable to modify number of icons on display was found good by all persons. They were not told or introduced how the icons can be arranged with Windows 7.5 or Windows 8 operating system.

A simple background was rated better than some picture with multiple colors and shapes which cause uncertainty among novice users by making it more difficult to distinguish the icons from colorful background. More experienced users did not find the background to be such important when appraising visibility and usability of the icons.

Figure 11. Symbian Belle and Windows 7.5 icon structures

6.4.13 Text input

Participants were asked how they would like to input the text to the device. Writing with touchpad with/without keypad and keypad with physical keys were presented as alternatives.

Table 13. Text input to a mobile device

Touchpad	Touchpad + keypad	Physical keypad	Somehow else
6	4	3	0

Touchpad was the most popular way of typing as long as the area of each key is large enough to make a correct hit. Display size is a factor affecting a lot to selection. A bigger display can have also bigger keys to hit than smaller one, or a physical integrated keypad. Four participants considered best the combination of touchpad and physical keypad, and three participants liked to have a physical keypad only. One of participants was willing to have an external keypad. Obviously all participants did not fully understand the idea about how an external keypad can be used as an input device for the phone without being connected with some wire. During discussion on this topic it was occurred that most of these people are worried about the touchpad being hit by accident, and something happening without their will, causing some problems to their phone. Especially they were worried about making a big bill by using some high costing service in web.

It was also found that especially people currently using a traditional phone with a physical keypad found touchpad easier to use than they had imagined. Most of them got obviously interested about smartphones and touchpad as they realized those could be used more effortless than they had imagined in advance.

6.4.14 Display size

Participants were asked how large should the display size be when the smartphone is used instead of a computer. Size is defined by the diameter of the active area on display. Default orientation of the display during usage is landscape, like using a computer.

Table 14. Size of the display

Size / diameter (inch/mm)	Votes
2.5 / 64	
3 / 76	
3.5 / 89	

4 / 100	5
4.5 / 114	1
5 /125	1
5.5 / 140	
6 /152	1
6.5 / 165 or bigger	2

The bigger display was considered better than smaller one which was expected in this case. A display with four inch diameter was found large enough by five participants. Display sizes of four and a half, five and six inched got each one vote. Two participants considered the display could be as large as possible. This was actually the case considering all of the participants, but they were also thinking the phone size. Two participants rated a communicator style display arrangement to be the best alternative for them, inner display is for web browsing and other applications requiring a large display area, and the small one for calls. This kind of smartphone was found good by all participants when they realized it could be definitely smaller than the Nokia 9300i, which was shown as a demonstration device. One person could not give a comparable answer to this question because he was not willing to use a phone instead of a computer. Two participants considered portrait display to suit better for them.

6.4.15 Acceptable phone size

Participants were asked their opinion about the maximum size for a smartphone to be carried along nicely. Nokia Lumia 800 and Nokia E7 were used as references when evaluating the size, also the own phones of users were used to find size factors.
Finding absolute dimensions for length, width and thickness of an optimal device occurred to be very difficult for participants. There were more somehow relative terms how to describe the suitable size. Fitting into a pocket of a shirt or jacket was one of the most widely used specifications in this case. Table 15 defining size with numbers, is done mainly on basis of those relative definitions.

Table 15. Maximum size of the device

Maximum length (mm)	Votes	Maximum width (mm)	Votes	Maximum thickness (mm)	Votes
80		35		6	
90		40		7	
100	1	45		8	
110	1	50	2	9	
120	4	55	3	10	1
130	7	60	4	11	1
140		65	3	12	7
150		70	1	13	2
More		75		14	
		80		15	
		More		16	1
				17	
				More	1

The users prefer quite large devices but thickness should not be more than 13mm. However, participants found thicker devices to be better to handle especially during calls, and holding the device in their hand. It seems the design of the phone is affecting a lot to usability. Weight of the devices was found not so important issue, but devices having too high weight were considered uncomfortable to be carried in pocket. On the other hand, too light devices were found uncomfortable by means of the user not to be sure whether the device still is safely in the pocket. In free discussion it occurred people using smartphones know that the increasing of the weight is not proportional to size.

Generally, this question produced a lot of discussion about the dimensions and design of the phones. As a result, it was found that most people like the design that suits their hand. The back side of a phone should be a little roundish to conform the surface of user's hand. A worry about the grip to hold the phone in user's hand was also risen during discussion. Most participants were wondering why some devices are very slippery being in a risk to fall out from pocket accidentally.

6.4.16 Touch screen use

Participants were asked would they prefer to operate the touchscreen with pen or finger or both of them.

Table 16. Manners to use touchscreen

Finger	Pen	Both finger and pen
12	0	1(any material)

The touchscreen is used most likely with a finger. One person wanted to use the touchpad both with a finger and any device comparable to pen. People were worried about keeping the pen safe with the phone, and therefore the pen was considered uncomfortable to use. Eight participants considered it important that the touchpad can be used with gloves on also.

6.4.17 Touch screen inactivation

Participants were asked if a switch is needed for the touchpad locking, and whose position is clearly visible. The basis for this question occurs from feedback received from mobile phone users generally. Many persons using traditional phones are worried about touchpad being active unobserved. The case when the phone is in pocket or carrying bag during there is an incoming call, and the user is hitting the touchpad by accident is found inconvenient. To avoid that kind of situations there has been proposals to have a switch whose status is clearly visible and it also keeps touchpad locked until the switch is transposed to enable- position.

Table 17. Need of the lock switch for touchscreen

Switch is needed	Switch is not needed
13	0

The switch is considered to be a very important feature. Implementation of the switch is varying a lot from person to person mainly according to the way the people carry their phone. Two persons were satisfied with a push button and display indication as implemented in Lumia 920. Two participants considered a protective lid to be a suitable solution, in addition or parallel to the lock switch. All participants shared the opinion about some kind of lock function whose status is clearly recognizable by visual means. Also easiness of use is an important issue considering the locking and unlocking of the device.

6.4.18 Battery lifetime

Participants were asked how long time the battery of the phone should last in normal use without further charging.

Table 18. Battery lifetime

Hours	Votes	Notes
8 (working day)		
12 (working day + active free time)		
16 (Time awake)		
20 (On-call duty mode)		
24 (Day)	1	
36		
48 (two days)	1	
72 (Three days)	1	
96 (Four days)		
More	10	One week or more

These persons are used to demand quite long operating times from their phones. Traditional cellular phones consume significantly less power than the smartphones, which can clearly be seen from results in this case. People think that current consumption of phones gets lower every year by new models. This matter is not valid anymore, when it is about smartphones with large displays and very high performance. Many kind of wireless interfaces also consume power a lot. Some of the ap-

plications made by third parties are not optimized well enough to minimize the energy consumption or the performance is not optimized for all devices in market.

6.4.19 Features and properties

Participants were asked to tell free what kind of features they would prefer in their phones despite of they are possible to be implemented or not. Currently there are a number of wired and wireless communication interfaces in addition to cellular radio network interface, and a number of sensors to be used for additional functions to ease and amuse the phone user. Most of the time the processor inside the phone is in idle mode, and those times could be used for not so important secondary functions.

The properties, functions and ideas were found out:
- Easiness to use
- Durability
- Performance in harsh environment, reliability
- Good battery performance
- Good camera
- Maps, navigation, applications based on maps and location
- Suitable size and weight
- Ability to upgrade applications and latest operating system versions easily

Some individual things were also risen, like the essence that gives credibility in community, the phone can expose its location when required, and a hologram display. Two participants were only looking after basic functions, they thought they would not need any extra properties.

There were two expected things, which were not risen in discussion about this topic; service availability and support availability. It seems people trust their phones by the same token as they were used to do when they had basic phones in their use. Many persons also have a spare phone, if one device gets broken.

On the other hand, need of support was noticed when discussing about purchasing the phone, or trying to use some function or application. Persons in this group, except one person, were not aware of wholeness established by a smartphone or any other

comparable mobile device with all its applications and functions and the networks it can be connected to via multiple interfaces.

6.4.20 Cost of a phone

Participants were asked how much money they are willing to pay for a phone which they purchase themselves, and use personally. Some examples of smartphones with certain properties and performance were introduced to give basis for the pricing.

Table 19. Maximum price of the phone

Retail sales price (€) (including taxes)	Votes
50	
100	4
150	2
200	2
250	
300	3
400	
500	2
More	

These persons have very reasonable opinion of how much they are willing to pay for a smartphone fulfilling their needs. Pricing of some expensive devices is however considered irrational when properties of the device do not meet the image given by the amount of money used for purchase. Participants, who currently use a basic phone and do not necessarily need properties provided by a smartphone, give lower price for their device than those who need the phone and its properties in their work or hobbies, and who already use a smartphone. Two hundred Euros is some kind of limit for many users when choosing a phone. Only one person was willing to pay more for the latest model or new technology.

6.4.21 Phone cost per month

Participants were asked how much they are willing to pay for using the phone when they defray themselves. Cost division to voice calls, data transfer or application downloads was not done.

Table 20. Maximum sum of money to phone use per month

Cost per month (€)	Votes
5	
10	
15	1
20	4
25	
30	3
40	5
50	
More	

Most of participants told they are not willing to pay more for using a smartphone than using a traditional phone. Services to be used with the phone were not included into cost inquired. Obviously people are eager to know about new services and how they can be used but they also are very well aware that some of them may cost quite a lot of money. People were concerned about pricing of services, and how clearly those are on view. Currently many phone customers, in this group also, feel lack of confidence for service providers and even phone operators, about visibility and intelligibility concerning pricing of phone usage.

Generally, amounts of money people think they can pay for using the phone are relatively high, especially when compared to money they are willing to pay for a phone.

6.5 Conclusions of the interview study

People participating to this interview study were very eager to make their opinions heard. Obviously there is common interest also among older people to mobile communications and possibilities provided by it both in form of communication between people, and services available in the web.

The most surprising findings were done with the phone form factor people prefer the best. Currently most of the phones in the market equipped with a touchpad and a big display are designed equally for the target customer group of active people aged less than 30 years. According to this study older people like to have devices which look modern like the ones used by younger people. However, the concern risen in question seventeen about hitting the touchpad by accident, is an issue to do something about. Direction responsible of designing devices should take an action on this issue to make confident products to be appreciated by users having concerns about proper functionality of the touchpad in every situation.

One of the key targets in this interview study was to clarify whether current smartphones could be targeted also to older people just by making the user interface easily adjustable according to the customer needs. It was concluded that current models can meet also the requirements of the older customers. In Windows Phones the user interface can be personalized to meet the customer needs with a relatively low effort and the displays are large enough. The major and most critical issue for an older customer seems to be the beginning phase of the usage: The user interface and the functions are different from the ones he/she is used to have in his/her current device.

As long as the capability of the personnel in the retail shops is not high enough to support the novice user to purchase a suitable device, some kind of third party is needed to provide this kind of service. This can be done by a more experienced user, an association of a public utility or a commercial company. It is obvious that those are needed also when the user really starts to use the services available in the web.

7   QUESTIONNAIRE STUDY

A questionnaire study was carried out by sending a list of questions to the contact person of information technology society Mukanetti ry via e-mail. She delivered the questions to the group of tutors. Twelve persons of the group answered to this questionnaire during September 2012.

7.1   Target of the study

The group of participants consisted of older people with quite a lot of experience and personal interest with computers and communication devices in general. Due to this background the group was estimated to give a good reference to the things affecting procurement and usage of a personal mobile communication device, traditional one or a smartphone. When comparing the answers of this group to those given in the interview study, there were aimed to be seen both differing and overarching results concerning smartphones.

Both equalities and differences can give valuable information for device manufacturers, application designers and retailers to improve their performance to make mobile communication devices more widely used among older people.

7.2   Questions

There were thirteen questions in the list delivered to the participants. Some of the questions were similar to the ones used in the interview study. Some of the questions were explained with additional text to make sure everybody could understand the questions equally. It was also mentioned in the questionnaire form that the results and personal or any other confidential information is not delivered to a third party.

Numbering of the questions in the questionnaire is differing slightly from the list shown in this text. The questions are shown more clearly in the list shown here, and in a more simple written form, the but content of the questions is the same as in the questionnaire.

The questions are listed below:

1) Name or pseudonym of the participant
2) Gender
3) Age
4) How long have you been using a mobile phone?
5) Brand of your current phone
6) Type or model of your current phone
7) How satisfied are you with the phone?
8) What is positive in your phone?
9) What is negative in your phone?
10) How have you selected this phone?
11) Do you use a personal computer?
12) Could you think yourself using a smartphone instead of a computer for some tasks?
13) What is the maximum price you are willing to pay for a phone for your personal use?
14) What is the maximum price you are willing to pay for using a phone per month?
15) Is there a reason why you would not like to purchase or use a smartphone?
16) Do you have any ideas for the properties of a phone (also whimsical ones)?

It was relatively challenging to find a suitable form of questions for this questionnaire and make sure they are unambiguous enough to be understood and answered equally by each participant. Generally it was found, that making a questionnaire is more difficult than making an interview study, when there is no possibility to explain some issues to the participants.

After the study it can be seen, that there are a number of questions which should have been implemented to this questionnaire to get a better coverage of certain areas. However, it would have required the questionnaire to be changed into an interview study, but that was not possible due to timeframe and resources.

7.3   Results

There were twelve people participating to this questionnaire. Their ages varied from 65 to 76 years with average value of 68 years. There were ten females and two males in the group.

Time the participants had been using a mobile phone varied form seven years up to more than twenty years with average of fifteen years. Three participants did not answer to this question.

Table 21. Time the phone used

Time how long been using a mobile phone	Amount of participants answered
7	1
10	2
15	1
17	1
18	1
20	1
24	1

In the next questions the participants were asked about their current phone and its brand and type.

Table 22. Phone brand and type

Brand	Type (basic/smart)	The form of the design	Amount
Nokia	Basic	Monoblock	3
Nokia	Smartphone	Monoblock	6
Nokia	Basic	Clamshell	2
Doro	Basic	Clamshell	2
Sony	Smartphone	Monoblock	1
Samsung	Smartphone	Monoblock	1
ZTE	Smartphone	Monoblock	1

It was found that four participants had more than one phone in their use. There were participants having a basic phone and a smartphone and also two users with a smartphone and a senior phone.

Participants were asked how satisfied they are with their current phone. Textual rating was transferred by the person in charge into numerical value varying between zero and four, where zero means very unsatisfied and four means very satisfied.

Table 23. Satisfaction to current phone

Satisfaction level	0	1	2	3	4
Votes	0	0	1	2	9

The lowest score of satisfaction was given by a participant whose two phones were perceived to be too old. This is a quite a common phenomenon with a smartphone similar to computers, noticed as some kind of slowness caused by too low performance of the processor and low memory capacity when using the latest versions of some application programs. Also the throughput of cellular and other radio frequency interfaces is lower in older devices which is also perceived as slowliness when downloading something from the network. Generally, participants of this study were satisfied with their phones giving average score of 3.67.

In the question number eight the participants were asked what is positive with their current phone. The most common positive property in the phone was usability for both basic and smartphones. Here are all the positive properties mentioned listed.

- Easy to use
- Applications and functions
- Touchpad
- Connectivity
- Navigation, maps
- Design, size

Only one person did not find any positive properties in her phones. She also rated her current phones with very low scores in preceding question concerning satisfaction generally. According to these answers, the participants are well aware with the applications and properties of their phones and also use them frequently.

The next question was about negative properties of the phones. Four participants told there is nothing negative with their current phone. The most common negative property was battery performance, which was mostly related to smartphones with large display and high processor performance. The negative properties are listed here.

- Battery performance
- Text input using touchpad
- Too small keys
- Navigation acting in a strange way
- Missing navigation function
- Low memory
- Radio performance in weak field conditions
- Inconvenient calendar function

Most of the participants thought that they will manage better with troublesome properties if they get more practice and some advice for using them. Missing functions and too small keys can be corrected only by changing the device design.

In the question number ten the participants were asked, how they have selected this phone. There were nine participants who had chosen their phone by themselves. One person had asked consultation from a friend. One participant had received her phone from a grandchild, and one did not answer at all to this question. According to this answers, these people are well aware what kind of phone and which properties they want to have.

Next there was a question concerning personal computer usage. All twelve participants answered that they use a computer daily and most of them accentuated that they use it a lot. It is obvious that these people have to use a computer a lot as they are in a tutor position in their community.

In the question number twelve the participants were asked whether they could imagine themselves using a smartphone instead of a computer for performing some tasks they usually do with a computer. Only one of the participants answered "no" to this

question, and with supplement "so far". Four persons told that they are considering changing to a smartphone. There were five people giving answer "yes", and two persons who already were using a smartphone instead of a computer in some tasks. This shows there is an increasing demand for smartphones among older people also.

Participants were asked how much money they are willing to pay for a phone they purchase and use themselves. The results are shown in the table 24.

Table 24. The maximum amount of money to pay for a phone

Maximum phone price EUR	Votes
100	3
200	1
300	3
400	1
500	2

People who have a smartphone gave higher prices than those having a basic phone. The prices reported were relatively high compared to those usually thought by the general public. There were two participants who had not answered to this question at all.

In the question fourteen the participants were asked how much money per month they are willing to pay for using a phone. The results are shown in table 25.

Table 25. The maximum sum of money to pay for phone use per month

Maximum phone use pay per month EUR	Votes
10	1
15	3
25	1
30	1
40	3

According to these results these persons use their phones quite a lot. It became apparent, that people using smartphones are willing to pay more than the basic phones users. Three participants did not answer to this question.

Next the participants were asked whether there is any reason why they would not like to purchase or use a smartphone. It was emphasized in the questionnaire that all kind of reasons are interesting, whatever they are, or however participants have become aware of those issues.

There were six participants who answered there is no reason why not to purchase or start using a smartphone, or they already were using a smartphone. The other six persons found some reasons which are listed below.

- Prejudice against smartphone generally
- No need for such device
- High price
- High operating cost per month
- Short battery lifetime
- Suspicion of weak mechanical durability
- Sensitivity against moisture
- Touchpad is perceived tricky to use
- Beginning of the use is perceived inconvenient
- Missing training
- Insufficient guidance

In the free text there were a lot of reasons why people would not like to have a smartphone. Most of them were similar to reasons highlighted above.

The prejudice for touchpad and smartphones in general is linked to inadequate guidance and training, but also the price of the phone and the operating costs. People are also afraid to purchase a device which is both expensive and sensitive to mechanical and moisture related failures. There were suggestions about how older people could be primed to choose the right kind of device meeting their needs and guide them to use it safely and efficiently.

In the last question the participants were encouraged to tell what kind of properties they would prefer in their phones. They were guided to tell any ideas how whimsical they ever are. They were also asked, what kind of phone is their favorite.

Two participants could name the phone model they prefer best: Nokia Lumia 800 and Samsung Galaxy S2. One person nominated her Nokia Lumia 900 as her favorite with reservation concerning some properties. However, more generally a basic phone in a monoblock or clamshell form was the favorite for half of the participants, and the rest could not name any specific phone.

A number of properties were found in the free text concerning the features and the applications the participants would like to have in their phones. Those are listed below in order of appearance.

- Easy to use for calls and messages
- Large and clear display
- Large and informative keys
- Clear and loud enough sound in audio calls, played voices and signalling tones
- The user guide should be easy to use, especially concerning actual senior phones
- Good enough camera
- Navigation when moving by car or on foot
- Synchronization of the calendar and the phonebook
- Time related features like the alarm clock and the calendar reminders
- Easy to move files between the phone and the computer
- High volume internal memory capacity and an easily accessible memory card
- Possibility to download applications from web shops
- User changeable battery
- One button alarm for emergency
- User oriented support
- High quality and easily accessible service
- Guidance to select a right kind of phone and also training to use it

These features are very much the same as adult mobile phone users report in general regardless of age group they belong to. There was, however, emphasis on getting guidance in finding a right kind of device to meet one's needs and some training how to use the device safely and cost efficiently. One key alarm function was reported by one person only.

7.4   Conclusions of questionnaire study

According to these results, older adults with moderate or better experience with information technology devices are able and willing to use a smartphone in their daily use for various tasks. There are, however, issues they are concerned about and to which they want to have improvements. The topmost issue seems to be guidance and training. These people really know what is the advantage of improved knowledge concerning computers and mobile phones usage in daily tasks especially with older adults. Improvements are needed also to user guides and help for selecting a suitable device according to needs and abilities of the user.

Most of these people are rather satisfied with their phones and able to use them to meet their daily needs. On this basis they are also able to guide other people to use their devices efficiently, but also to find things which can be improved in phones, computers and services used with them. These people are a worthy group to be exploited when designing new products and services.

8   THE CONCLUSION ON THE STUDIES

On the grounds of results achieved from these two studies there can be found some answers to questions set in the problem section. The number of participants is relative small, which has to be taken into account when reviewing the results. There can be seen congruent issues concerning problems relative to smartphones among participants of both studies. The results of statistical study may be emphasized with this small amount of participants. Issues found can be used to make a study with more specified set of questions and bigger amount of participants if needed.

It was notified that using functional devices as models gives much more information in many questions than introducing dummy-devices. Real properties and scale of figures on display are seen correctly by the study participant which makes it much easier and more objective to set the questions asked similar to each person regardless of her/his experience about the issue under discussion.

8.1 Amount of information on display

Number of icons on phone display shown a time was not experienced as an insuperable issue when trying to use the smartphone with touchpad, as long as the display size is large enough, which means at least four inches in diameter. With smaller displays the size of the icons is more probably experienced as a restricting issue. Same issue has been found in a study concerning usability of web-sites via mobile devices. Contents shown on screen should be adjusted according to display size. (Nielsen, Budiu 2009, 15-18).

Checkered background makes it more difficult to detect icons and clarify what the icon presents as a function or application. This is especially noticed with novice users of smartphones and people with restricted eyesight.

With the devices presented to participants of interview study there were no problems when detecting icons and the function they represent. In questionnaire study there were neither appeared comments concerning the size of icons.

According to these results, it can be maintained that a device with approximately four inch display is accessible with eight icons shown in order of two by four at a time. This concerns novice users who are not yet familiar with graphical user interface or touchpad. Users with more experience can manage with much more icons. Graphics and textual information in icons is also experienced as an important issue detecting the content and function of the icon.

8.2 The outward appearance of the smartphone

Some issues concerning the outward appearance of a smartphone suitable for most of older people were found. Size of the display is a key factor with a number of issues concerning the usability in general, and usability of many applications in example navigation, web browsing and messaging. This is directly proportional to the item size seen on screen when using the application or feature.

The device should be mechanically robust and designed so that it can be easily held in hand in various positions. The surface should not be slippery to keep the device safely in the hand or in the pocket. A protective cover for display or at least an easily detectable and accessible key for locking the touchpad is also preferred necessary. Weight of the device should be reasonable to enable carrying it in the shirt pocket for example. Size of the display was noticed to be an important factor for all participants. It was rated high despite of the fact that most often a bigger display consists more pixels and thereby consumes more power than a small one. Design of the smartphone should be similar to devices used also by the younger people and not to betray the user to be a novice with phones or confined by factors caused by age.

8.3 Guidance and training

Almost without exception, the participants in both studies expressed their intent being interested in the smartphones regardless they used such a device or not. There is practically no reason why these people would not purchase and use a smartphone. There were however found limiting reasons, which could be treated with proper guidance and training.

Selecting a right kind of device was found problematic when there is not enough independent guidance available, or it is not found. Communities like Mukanetti are providing guidance for selecting a suitable phone, but it is not known by the general public or even people working with the phone retail sales or with the subscriber connection. It is obvious that this kind of communities cannot have resources to cover needs of all people willing to have guidance and training with information technolo-

gy devices, but they are in the key position showing how peer support can be executed.

There is clearly a demand for the commercial actors too, to make the older people familiar with the smartphones and services available with them. The device manufactures, the subscriber connection providers and the service providers should take an active role in educating the people into this kind of work. This could be a good opportunity for lately graduated technical people with good skills in the information technology to establish a business and give independent guidance and training for the older people according to their needs.

Figure 12. Peer guidance is an effective way to learn to use a phone

8.4   Further studies

The older people are emerging as an important group of consumers concerning smartphones and services used with them. The device manufacturers should make more studies to explore more precisely what kind of devices these people really want to have and what are the directions affecting to their decisions when making selection between the brands, operating systems and features provided by a smartphone.

The state institutions and the commercial companies offering services used with the smartphones should make studies in cooperation with the communities and any societies somehow involved to the senior citizens to make their services usable and accessible to the older people also.

The consumer group of older adults is currently in the key position to define what kind of devices and services there will be available in near future, and later, when the relative part of seniors in population is still growing. Those people should be listened when making decisions on how the information technology issues affect to our everyday life and ability to manage with more exiguous human resources.

9 THE GENERAL CONCLUSION

According to two these studies presented and information found in reference material (Fisk, Rogers, Charness, Czaja & Sharit, 2009, 241-246) it is obvious that there has to be done something to get the older people connected with the services offered by social factors or the commercial companies. People should also be connected to each other and their relatives. These two things support each other.

When older people consort between others or deal with somebody having expertise or experience on the information technology issues, they can discuss about smartphones or about social media instead of their complaints or other negative things. When people have devices equipped with those fine applications and features, they have to learn themselves to use them, otherwise they are useless. The beginning of learning could be in the societies where tutors learn and guide less experienced members to use their devices.

For the new devices and services, there could be commercial actors giving training for tutors who could communicate the information further to larger audience with suitable pace and level. The device manufacturers and the service offering directions should support this action, because the money invested into this activity will produce benefit in form of satisfied customers purchasing accessible and usable devices and services they like to use.

The responsibility to connect older people is not only for actors mentioned in text preceding, it is also a duty to all of us who already use the information technology in our everyday tasks.

Some day we will be the older adults.

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The questionnaire form:

Tällä kyselylomakkeella pyritään kartoittamaan ikäihmisten näkemyksiä puhelimista, ja erityisesti älypuhelimiin liittyvistä asioista.

Lomakkeeseen tulevat tiedot ovat luottamuksellisia eikä niitä anneta kolmannen osapuolen käyttöön. (ikä, nimi jne). Tilastoinnin vuoksi nämä tiedot ovat kuitenkin välttämättömiä.

Jos et tiedä jotain kysyttyä asiaa tai et halua vastata siihen, niin jätä kohta tyhjäksi.

<u>Kysymykset:</u>

1. Nimi tai nimimerkki

2. Ikä

3. Sukupuoli

4. Miten kauan olet käyttänyt matkapuhelinta? Millainen puhelin sinulla on käytössäsi?

5. Oletko tyytyväinen nykyiseen puhelimeesi?

6. Mitä hyvää on nykyisessä puhelimessasi?

7. Mitä huonoa on nykyisessä puhelimessasi?

8. Valitsitko itse nykyisen puhelimesi? Jos et, kuka valitsi / keneltä kysyit neuvoa valintaan?

9. Käytätkö tietokonetta? Kuinka usein?

10. Voisitko ajatella käyttäväsi älypuhelinta joihinkin tehtäviin, joita teet nyt tietokoneella?

11. Paljonko puhelin saa maksaa? Paljonko puhelimen käyttö saa maksaa /kuukausi?

12. Onko olemassa syitä, joiden vuoksi et halua hankkia tai käyttää älypuhelinta? Tähän voi laittaa aivan kaikenlaiset syyt, jotka tiedät, tai joista olet kuullut puhuttavan.

13. Tähän voit kirjata ominaisuuksia, joita haluaisit puhelimessa olevan. Kerro myös millainen on suosikkipuhelimesi malli.

    Kiitos vastauksistasi!

Kysymykseen 4. Lisäselvityksenä:

Perusluurilla tarkoitetaan tavallista matkapuhelinta, jossa on pienehkö näyttö ja tavallinen numeronäppäimistö.

Aukeava puhelin on "simpukka", joka on saranoitu siten että se aukeaa luuriksi ja näyttö ja näppäimistö tulevat näkyviin.

Pidemmältä sivulta saranoitu puhelin on kommunikaattori, joka suljettuna on kuin peruspuhelin ja avattuna siinä on isompi näyttö ja aakkosnäppäimistö.

Liukuvassa puhelimessa näppäimistö liukuu näkyviin näytön alta.

Liukuvassa/taittuvassa puhelimessa näppäimistö tulee esiin näytön alta ja näyttö taittuu yläreunastaan ylös käyttäjälle sopivampaan kulmaan.

Kosketusnäyttö voi toimia sormella tai erityisellä "kynällä".

The interview study form:

Käyttää (mobiili)puhelinta   k / e   (ja miten kauan käyttänyt):

Malli perinteinen / älypuhelin / merkki ja malli:

Mitä hyvää puhelimessa?

Mitä huonoa?

Millä perusteella ko laite valittu?

Valitsiko itse ko puhelimen?

Saiko ostotilanteessa tarpeeksi tietoa laitteen ominaisuuksista ja sen käyttämisestä?

Käyttääkö tietokonetta sähköposti/some/surffaus/muuta?

Voiko kuvitella käyttävänsä puhelinta joihinkin nyt tietokoneella suoritettaviin tehtäviin (mobiilisti)?

Millainen puhelin/pad olisi optimaalinen malliltaan/käyttöliittymältään ottaen huomioon edellisen?
(monoblock/fold/kommari/liukuri) käyttöliittymä; tatsi vai oikeat näppäimet vai sekä että (esimerkkeinä E7, 9300i, N90, N95, Lumia 800, Toshiba Pocket PC e830.

Paljonko informaatiota näytöllä saisi olla yhdellä kertaa, jotta käyttäminen olisi selkeää?(ikonit)

Miten haluaisi syöttää tekstiä, touch / fyysinen integroitu näppäimistö / irtonainen langaton näppäimistö?

Miten suuri näytön pitäisi olla, jotta siitä voisi lukea tekstin yhtä hyvin kuin PC:n näytöltä?

Miten suuri laite saa olla ilman että sen mukana kuljettaminen tai sen käyttäminen tuntuu hankalalta ?

Touchin käyttö, sormella vai tikulla vai molemmat?

Pitääkö touch saada deaktivoitua kytkimellä?

Miten pitkään akun tulisi kestää yhdellä latauksella normaalikäytössä?

Mitä muuta haluaisi sanoa laitteen ominaisuuksista?

Paljonko puhelin saa maksaa?

Paljonko puhelimen käyttö saa maksaa/kk?