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Studies on Inequalities in Information Society

Proceedings of the Conference,
Well-Being in the Information Society

WIS 2012

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STUDIES ON INEQUALITIES IN INFORMATION SOCIETY

Proceedings of the Conference
Well-Being in the Information Society

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Organized by

University of Turku (Turku School of Economics and Faculty of Medicine) and Baltic Region Healthy Cities Association (WHO Collaborating Centre for Healthy Cities and Urban Health in the Baltic Region) in cooperation with Turku Centre for Computer Science, Åbo Akademi University, Social Insurance Institution of Finland, and Turku University of Applied Science.

FOREWORD

The fourth event of the biannual Well-being in the information society (WIS) conference series will again this year call together inter-disciplinary scientists and practically oriented professionals to share results and experiences.

The conference series is established to discuss topics around health and well-being, information society and urban way of living. To the best of our knowledge the border crossing approach of the conference is unique, even in a worldwide perspective.

The importance of the special topic of this year, unequal access to information society resources, is continuously increasing. Here, especially two macro trends deserve to be mentioned, empowerment of individuals and the societal transition towards self-service. Regardless of personal attitudes of clients or professionals, individuals are expected to maintain or improve their life management, and by that support and promote their health and well-being. The trend can be criticized but all the same is going to be the mainstream of the near future. This puts pressure on individuals and also the service production, demanding good access to information society resources. On the other hand, the trend of transition towards self-service is not just satisfied by providing access to resources, but additionally demands a good readiness to use these resources. Almost nobody can just lean on support of others when taking care of daily matters. Due to the trend a whole new set of terminology has been created: e-health, e-business, e-service, e-government, you name it...

The previously mentioned information society resources form a key concept of the conference this year as well as the whole conference series. A common denominator of these resources is that they are only available through information technology. They comprise a variety of services including social media that all can be used for support and promotion of health and well-being.

Both trends put special pressure on individuals with some sort of sensory impairment. In order to take full advantage of modern computer user interfaces the user is expected to possess complete vision, hearing and motor coordination.

One important issue, however, is to understand that we all are in some way disabled. A simple example would be that we all are deaf and mute in 99% of the world's languages. Actions taken to improve the life of disabled are supportive also towards the life of "normal" people they very seldom if never are in a contradiction with the needs of the general population.

Information technology must not simply be regarded as a problem and challenge for the impaired but also as a potential provider of solutions, including individuals with disabilities. The function of conferences like WIS is to make demand and supply meet.

We recognize that the conference material might be perceived as sensitive by some living in the core of the topics discussed. We apologize already in advance, should such things occur.

However, initiation of discussion is one way to make changes happen, even in sensitive matters.

We want to express our gratitude to all those who have contributed to the organization and establishment of the conference this year. Authors and program committee members are in a central role, through contributing and further elaborating the scientific contents of the conference. A great number of individuals have contributed by personal work, and dozens of organizations have as well placed their resources and valuable time to the disposal of the conference organization even this year. Your number is too great to allow individual acknowledgement here, but we wish to thank you all very much!

An academic conference is like life itself: the key is to meet people and be in interaction with them. As this obviously is not always possible reading the proceedings is the second best option. In this we wish you educative and rewarding moments.

Reima Suomi
General Chair
WIS 2012

Sakari Suominen
Program Chair
WIS 2012

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KEYNOTE LECTURE

The Demographic Crisis in Care: Professionalism or Democratisation?

Kevin Carey

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Abstract: The demographic impact of longevity and its consequent substantial disability sub-set has coincided with a parallel decline in the birth rate and a catastrophic down-turn in public sector expenditure and disposable resources for philanthropic purposes. This calls for: a shift of public and private expenditure from youth and middle age to the elderly; a radical re-configuration of physical and social capital from professionals and institutions to community, domestic and volunteer services, including a shift from surgery and medicine to health; a transfer of provision from provider-defined goods and services to consumer choice; and a radical shift in taxation policy and social attitude.

1 Introduction

One of the most universal and persistent icons of civilisation is that of the personal encounter between the healer and the sufferer which has, over the centuries, morphed into the relationship between the patient and the doctor, the professional and the lay. And over the centuries, as the paradigm of service has become personal and professional, it has percolated down the social structure from the monarch with his magicians to the chaotic mother with her social worker. At the same time, alongside the human icon of the professional, we have poured massive capital into the physical icons of professionalism: charity headquarters, hospitals, asylums, institutes, schools, police stations and scores of other silos with their receptionists, HR directors, finance departments, processes and jargon. And the simple messages of this presentation that: all of this is about to come to an end; and very quickly; and that there is a choice between taxation and professionalisation on the one hand and self-help and the democratisation of services on the other.

But it should not have been a surprise. One of the most puzzling pieces of professional perversity I have ever encountered is the insistence on the part of pension fund actuaries that the default for their projections should be that the increase in longevity will 'correct' to zero by 2050 whereas all the evidence from 1850 onwards points in precisely the opposite direction. Perhaps this is a symptom of a wider inability to adjust process to changing data but, whatever the reason, it represents an alarming truth: that increased longevity was one of the most easily predictable demographic phenomena of the second half of the 20th Century, yet it seems to have taken almost everyone by surprise and, even more remarkable than the apparent ignorance of pub-

lic sector planners was the negligence of pension fund managers. Simple reasons are difficult to find, and although I generally deplore explanations which talk about a whole host of different factors, sparing the pundit from coming clean, my best guess is that there was a subtle combination of four major factors in the second half of the 20th Century which contributed to the policy sclerosis:

- A growing youth obsession
- The difficulty of understanding the paradigm shift of ageing
- A lack of professional interest in geriatrics; and, where some people did see the signs
- A recoil from the extent of the problem leading to immobility similar to that which confronts ecologists

1a) Youth. The symptoms of the irrational youth obsession are easily identified:

- A concentration of youth products when the maximum return comes from sales to those from 50-60 (fashion, food, consumer electronics)
- Youth dominated mass media, notably television, when the highest per capita hours of television are watched by people over 65
- Public and third sector expenditure patterns disproportionately in favour of youth over age, even taking account of calculations about the life span of beneficiaries.

1b) Demographics. For the record, here are the basic numbers from Eurostat:

In 2008:

- Female 82.4
- Male 76.4
- The number of people over 65 will rise from 17.5% now to 30% by 2060
- People over 80 will triple in the next half century

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Mortality_and_life_expectancy_statistics

Retirement after employment is no longer a few years of relatively low care life culminating in a rapid transformation from vigour to death.

1c) Professionalism and Geriatrics. The 20th Century's key professional interests in the age of social care, following on from Freud and Jung, have been centred round child development; interest in the decline of physical and mental facility have been much less marked. This emphasis was understandable during the demographic shift known as the post Second World war 'baby boom' but the trend far out-lived the demographic when those very babies in the boom needed a professional re-focus.

1d) Scale. But perhaps the biggest problem was the sclerosis arising from the scale of the problem. If you imagine a longevity framework in which 30 years of life after employment have to be funded by 40 years in employment, you can immediately see the impact of that on disposable income and the savings and/or insurance re-

quirement. Imagine the fall in living standards and the fall in consumption.

Along with this demographic there is a parallel and almost equally startling fall in fertility in the EU 27, only mitigated slightly among immigrants and the descendants of immigrants, population sectors whose presence is increasingly controversial in the EU.

- 2002 1.45 births per woman
- 2009 1.59 births per woman

There is no sign, without massive immigration, that the fertility rate will reach replacement levels in the 21st Century.

The final development which we need to take into account is the percentage of GDP spent by the public sector which has recently gone above 50% but is due to fall back to 45% in the next three years; but from then on I predict a steep fall as the mandate for increased taxation evaporates and the ability of governments to borrow is increasingly curtailed.

http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/National_accounts_%E2%80%93_GDP

This last point is critical because, although there are some honourable exceptions, notably in Scandinavia, the radical disjunction between the willingness to pay tax and demands on the public sector was increasingly mitigated after the economic crisis of the early 1990s by the ability of governments to borrow.

At the same time, it is clear that the service load required to enable older people to achieve a reasonable quality of life is far too great for the philanthropic sector. And so, in summary, unless people are prepared through taxation, insurance or other forms of saving to lower their standard of life during their working years, the problem is financially insoluble; and until that reformed behaviour takes root, we have a short- to medium-term problem in respect of people who are now 35 and over, people, in other words, with approximately 30 years to make provision for life after employment.

That, in short, is the bleak prospect of:

- Increased longevity
- Inadequate fertility for population replacement
- Decreased public sector budgets
- Philanthropic incapacity
- Contemporary reluctance to save or insure against old age

It is clear from this set of factors that the key change which is required - as is true in the case of deficit correction and ecological re-balancing - is a renewed acceptance that the best definition of civilisation is the capacity to delay gratification for a better long-term future. There could be no civilisation until first food storage and then other forms of saving became possible and, conversely, the use of credit was only made possible because of the planning which storage allowed. There is a whole different

lecture which I could give about consumerism, selfishness, instant gratification, the breakdown of solidarity, the ineffectiveness of education to influence moral choices, and so on, and I will briefly return to this theme at the end of my presentation, but I want to concentrate in the main on rational and achievable measures to mitigate the current 30-year crisis and to lay foundations for the longer term.

So in this presentation, I briefly want to discuss five issues:

- Expenditure on demographic groups
- Expenditure on physical and social capital
- The deployment of Cash and in kind social provision
- Lifestyle related taxation; and
- A new view of social Capital

2 Demographics and Expenditure

Apart from the natural biological equilibrium which reduces fertility as living standards rise, there are two other major contributory factors to population stagnation and decline:

- First, people perceive that rearing children is too expensive, imposing severe costs and restraints on lifestyle
- Except in some minority communities, the link between children and their provision for older family members which was a spur to breeding, has been broken

The state can do little about the first problem which arises out of gross materialism and individualism, although it could point to the relationship between small families and loneliness in old age; but, going with the grain of self-interest, it could make it possible for a high degree of hypothecated insurance to be retained within nominated family units so that the larger the family, the higher the chance of its older members doing well both in terms of income and direct care. The problem with hypothecation within families is that it reduces redistribution between the better and the worse off but, at the very least, the major EU economies with substantial 'under classes' need to look at the effectiveness of redistribution which forces citizens to make anonymous donations through a faceless arbitrator.

There is some evidence that economic incentives can be employed to increase the birth rate but this strategy will only work over a very long period.

The state should also radically simplify its modernist, teacher dominated education system which is far too expensive. We should now be past the crippling dichotomy of mothers staying at home versus expensive child care - either privately or publicly funded - and when we come to primary education it is time to recognise that we are loading far too much pressure onto young children and spending far too much on near useless formal education. A technology-based society requires a substantial degree of peer-to-peer learning and teaching and learning between generations. So far the education system has superimposed postmodernist technology-based learning and teach-

ing on top of the 20th Century modernist structure of fact acquisition through a professional closed shop. The whole, rigid system from pre-school to university should be radically simplified and diversified with minimum competence qualifications set as bench marks for age bands. We could then reap a technology dividend. Again, some will argue that this policy would directly affect redistributive strategies to the most disadvantaged but, again, the benefits of modernist education for this population segment requires close examination. There is an alarming quantity of data which says that formal education has failed problem families.

If we can de-professionalise large sectors of education it can be diverted to helping those with complex problems; and the same strategy should be adopted at the other end of the life span where meeting simple needs should be de-professionalised so that resources can be concentrated on complex cases.

3 Physical and Social Capital

The two major element of physical capital in care systems are buildings and professionals. If we look at the average European town we will see that it consists of a wide variety of institutions in their brick, stone or wood facilities with their own traditions, bureaucracies, jargons, standards, restricted practises, hierarchies and cost structures. WE rarely see a citizen advice point set up on a market stall. So far the rise of the internet has largely imposed extra costs on organisations which have built web sites in their anxiety not to lose ground to competitors rather than enabling them to cut costs. As with education, we are not reaping a dividend from the use of new systems. Except at the chronic end of the spectrum, professional care is over-elaborate and therefore over-priced.

Perhaps the most striking example of the problem is the surviving iconic status of hospitals, and the steady progression of medicalisation. For almost a century citizens have ranked taxation for health over taking personal responsibility but this trend cannot continue unchecked. The most significant example of medicalisation is childbirth which is not a disease or an abnormality but doctors and Drug companies have a vested interest in medicalisation, the most recent striking example of which is the move away from personal lifestyle control towards the universal prescription of statins. We will find as this presentation unfolds that time and again there is a choice between self-help and taxation.

One of the key capacities of digital technology is its ability to break down traditional dichotomies between the individual and the professional:

- Recording symptoms
- Internet searching
- Triage
- Online consultation
- Telehealth and Telecare
- Voluntarist and volunteer monitoring

Let me give you one example of the kind of flexibility which is now available in rela-

tion to the final point.

A person who is losing sight and suffers from mild dementia has the stark choice between going into town with a friend or staying at home.

If we combine navigation technology, a web camera and a call centre, the same person can go out alone but call if he gets lost or confused and ask to be navigated from his call position on to familiar ground, or even all the way home.

The most frequent objection to voluntarist monitoring, at home or in the street, is that this is a breach of personal privacy. What people usually compare is the level of voluntarist monitoring versus no monitoring instead of comparing voluntarist monitoring with nursing home or hospital occupation monitoring. In any case, one of the cultural distortions of the late 20th Century which we will have to put right is an obsession with privacy. The natural corollary of privacy is loneliness and isolation and in constructing voluntarist relations with volunteers rather than formal relations with professionals, we will have to become accustomed once again to the social, if not the physical village, which we all say is so much better than our modern isolation and the erosion of social capital.

In summary, if we are to provide the full range of professional care and medical services to those who need them most, either very young or very old, then we have to stop replicating the one-to-one professional-client relationship across the whole area of provision and replace it with a system of mutual support and triage which only refers on to professionals in the case of serious accident or the obvious inability of the peer system to resolve an issue.

In the end, it will come down to volunteering or taxation on the part of consumers, and professionals will have to concentrate on the complex and to switch in simple cases from being providers to brokers and facilitators.

4 Cash and In-Kind Provision

My acid test of where people stand politically is how they propose to handle poverty. My simple nostrum is that poor people need money rather than, say, vouchers, social workers, parenting classes, family planning counselling and all the rest of the paraphernalia which enables the middle classes to 'farm the poor' such that the people who really benefit from the current systems are well paid professionals and support staff in safe jobs in medicine, social care, special education, drug and alcohol counselling, social housing, parenting, community development and, of course, the criminal justice system.

The current modernist system calls upon professionals in their building silos to carve up the client group. This simply does not work with organisations dedicated to single issue disabilities or social problems when potential customers are multiply disabled or multiply disadvantaged; and it won't work with organisations dedicated to the elderly

if they are not equipped to deal with the more serious problems of ageing. The only really viable solution is to put the funding in the hands of users, careers and brokers - either in cash or in vouchers - so that they can purchase the services they need or simply spend the money to improve their lifestyle. They will, most likely, reduce their call on highly specialised services and cut costs where they can; that is not only natural, it is actually desirable. Again, I am looking towards a situation where we simplify and cost cut on the relatively routine in order to concentrate professional and financial resources on the most expensive and difficult cases.

This re-orientation from in kind to cash calls in turn, as does much of the rest of this presentation, for a radical re-appraisal not only of what people need - best defined by what they are prepared to purchase - but also of how we match levels of competence with delivery. Many years ago when I worked in Africa where there was only one eye doctor per million of population, we trained paramedics to perform cataract surgery against massive opposition from ophthalmologists in the city hospitals who said this would lead to a fall in standards but, of course, if you didn't get the surgery there wasn't a standard to fall. We need to analyse all our delivery requirements and pass what we can down the professional hierarchies, depositing a massive amount of work with non-professional modestly paid or volunteer workers.

In summary, we need to shift resources:

- From buildings to people
- From professionals to facilitators on modest pay or volunteers; and
- From in-kind services to cash or vouchers for people in need

5 Taxation

What counts is not chronological longevity but the number of years a person enjoys a reasonable quality of life but much of that lies in our own hands. There are, of course, genetic factors in how long we live and what we suffer from and we are all well aware of trauma, although its incidence is falling throughout the EU 27, but much of what happens to us is brought on by our lifestyle, moderating or exacerbating a propensity.

I am confident that in some countries that people will continue to take a very serious interest in their own lifestyle, being careful about such factors as food, alcohol, tobacco, drugs, exercise, sunlight, stress and socialisation but we have traditionally used the taxation system to effect social engineering and I think that it is time for us to consider a radical shift of policy.

We have already become accustomed to taxing petrol, alcohol and tobacco to reduce consumption but one of our high priorities now must be to agree a common food labelling regime which will then enable us to tax high fat, sugar and salt products. The more or less across-the-board taxation of food through value added tax is irrational in the context of wishing to improve the quality of life; we should tax fizzy drinks and burgers much more highly than apple juice and cabbage! The general libertarian argument that we should be allowed to eat and drink whatever we like is something of a

smoke screen because we will still have this freedom but we will have to pay a price for it, just as we have to for consuming tobacco. Behind this argument, however, there is a serious point which must be put into the policy mix: the general taxation system should not be used to rectify the results of negligence and known self-harm where the individual smoker or heavy drinker should take out insurance against the care they might need as a result of their lifestyle. The debate will then revolve, as it should, on what is known self-harm and what is the result of illness, a debate sharply focused in the area of narcotics: are drug addicts ill or are they knowingly self-harming. The answer is difficult but the debate cannot be avoided.

We should also make a radical shift in state provision and taxation away from buildings and professionals to people and communities. If there was any justification at all for forcing patients, customers or clients to travel for services to a central building the internet has surely made most of this building-based provision redundant. Most diagnostics can be undertaken through ambient or portable technologies, the current division between telephony and the internet will soon be overcome so that on-line shopping will combine a keyboard and a conversation, study can be undertaken at home with effective supervision and surveillance with children attending centres for a minimum of core time; and there should be financial incentives to boost the substantial cost saving through sharing spaces. In the little English village where I live:

- The adult library and the children's library, paid for by the same council, are less than 50 metres apart
- The youth centre is empty on weekdays and the school is empty the rest of the time
- The school, library and youth centre have different computer, maintenance and computer contracts
- There are no day centre facilities for older people

In calling for shared space and perforated services I am not trying to take us back to some golden age where everybody in the village knew everybody else but it is possible to reverse the situation whereby we pay a substantial amount of our income into a pooled fund where it is anonymously allocated by a faceless arbitrator. Some people quite coherently argue that the anonymous arbitrator favours the poor, the people we don't like, the stranger, the different, and that is why the public sector will have to be the supplier of last resort but technology now makes it possible to expand the level of peer-to-peer activity in philanthropy, banking, care and support.

6 Social Capital

But, behind all these interesting proposals there lies a problem to which I referred at the beginning, and that is the question of how we can shift our society from transfer payments capital accumulation to building social capital.

By far the most convincing argument here is not the moral but the economic. Transfer payments for capital accumulation in buildings and professionals have proved to be extremely expensive and are about to become unaffordable because of the combina-

tion of factors I mentioned at the beginning, the lack of the political will to pay higher taxes, debt and demographics. It should be a no brainer that it is much cheaper to watch your weight than to pay for hospital treatment through taxation but we still have a long way to go.

It is also much cheaper to look after your ageing mother in most cases than to pay high taxes for somebody else to look after her; but the political crunch arises when we end up doing both: we perceive that we are paying high taxes for social care but still end up looking after mother. At the other extreme, of course, the state naturally does not want the situation to arise where it reduces taxation and we can't be bothered to look after mother; so we need to have a growing sense of social obligation without unnecessary state control, a new contract between the citizen and the state on where the boundary lies between them. In the United Kingdom our Prime Minister David Cameron voiced this sentiment in his proposals for the "Big Society" in 2005 but when he came into office what he proposed became entangled with emergency and radical cuts in public expenditure so that the "Big Society" became a discredited slogan for public expenditure cuts. But he was still right. The third sector, consisting of charities and social enterprises funded by philanthropy and new forms of social investment should ask themselves whether, in an entrepreneurial environment, big government is their friend or their competitor.

There is no simple answer to these questions but we must begin to have rational discussions about social capital instead of simply discussing professional standards, benchmark provision, regulation and de-regulation and a supposed state obligation to be the supplier of services as well as the legislator and guarantor of last resort. Just because we remove a considerable quantity of state control and expenditure, allowing citizens to retain more money and control, this does not necessarily mean that it is deployed to form social capital.

Obstacles include:

- A degree of innate selfishness and free-loading, the thought that somebody else will bear the load
- There is also a serious issue with the late 20th Century obsession with privacy which plays back into the doctor/patient paradigm. As I said earlier, isolation is a corollary of privacy; and
- There are natural surges and setbacks which make a steady service difficult

Political commentators are beginning to detect a trend in the way that electorates are behaving. They say that we are all protesting against incumbents because of financial austerity but I do not draw the conventional conclusion that politicians are corrupt and/or incompetent; rather, I draw precisely the opposite conclusion that voters have been corrupted by lazy hedonism and are almost completely incompetent to make a rational assessment of the position in which we find ourselves. Greece is only an extreme case of people wanting prosperity without paying for it. This may sound like an extremely inauspicious background for the formation of social capital but I believe that the balance between taxation and socialisation is about to tip, not just because of self-interest but also because social action will be less onerous as we learn how to use

networks and how to operate sophisticated triage systems. The erosion reported by Robert Putnam* was, in my view, catching a trend at its nadir and there was also an element of sentimentality and nostalgia for the old ways; and so we will must think of social capital in new ways where the human contact is critical but not the sole means of effecting delivery.

7 Conclusion

There are, I think, three important conclusions to draw from my analysis:

- First, de-professionalisation and democratisation of mass, standard service delivery means re-deployment to the complex not redundancy
- The demographic won't go away and its pressure will increase rapidly so that it is beginning to share irreversible characteristics with our planetary ecology
- Public sector services are far too expensive and so the private sector, including charities, ought to ask whether it is a collaborator or a competitor.

The prospects are troubling as they always are the morning after a party when you wake up with a hangover and wonder what you said and did. Well, I was there and I've just told you what you said and did. So don't worry about yesterday, just concentrate on putting things right from now on.

FULL PAPERS

Patient Education as a Preventing Method of Surgical Site Infections (SSI) – A Literature Review

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Abstract. Surgical site infections are endangering patient safety and quality of care. They are easily preventable although most of the interventions are targeted on health care staff. Patient education emphasises patients role as suppressors of surgical site infections. A literature review was conducted to assess information of current empowering patient education for preventing surgical site infections. Only few patient education interventions were available, although they were effective. More research is needed about the content and quality of patient education for surgical patients from the infection control point of view.

Keywords. Patient education, wound infection, inpatients, review

1 Introduction

Epidemical infections and pandemics are endangering citizens health and wellbeing. Most of the preventive measurements are based on the vaccination with poor uptake [1]. Web-based patient education is effective on reducing the transmission of respiratory infections and pandemic [2]. Although more information of the web-based patient education's effectiveness on infection rates is needed [3]. One potential infection-rates are healthcare-associated infections (HAI) and specially surgical site infections (SSI) as being the most common HAI [4]. SSI are endangering patient safety [5] and lowering the quality of care [6]. The incidence of surgical site infections is approximately 5,6 per 100 surgical procedures [7]. Typically, the SSI are associated with higher mortality [8,4], prolonged hospital stays [9] and the resurgery [10] lowering the health-related quality of life [11]. The care of the SSI is increasing the usage of antibiotics [10] which leads to the antimicrobials resistance [4] burdening the society even more [8].

The prevention of the SSI can be done with better hygiene [13] where patients role is centric [14, 15] although it is quite dependable on the available guidance [12]. Patient education can be used to increase the involvement in own care by empowering patients [16,17]. This is not common in the infection control where the preventive measures in general are focused on the hospital staff [15], the surveillance of the infections

[14] and the care of environment [12]. Patient education is effective in lowering the cost of care [18] and improving the self-care [19]. It can also be an effective infection control measure [20,2,3]. Commonly the patient education is provided with written material [21,22] although the need for knowledge is not met[23]. Web-based patient education increases the patients involvement and strengthen's patients role [24] and lowers the cost of health care [25].

Educational interventions preventing HAI's are effective on the infection rates and specially the use of web-based methods are increasing with the technologically oriented society [26,27] thus none of the interventions are targeted in patients. No earlier reviews have been done about patient educational interventions related to SSI.

2 Method

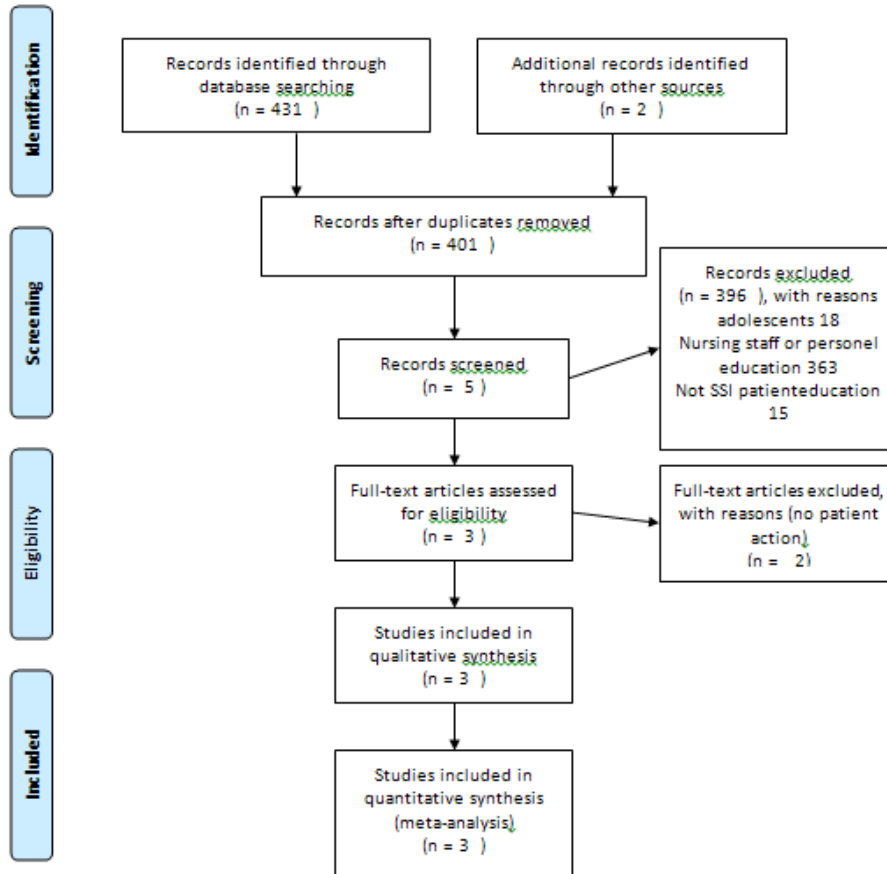
The aim of this review was to find patient educational interventions on surgical site infections. The research questions were 1) What kind of the patient educational methods are used? 2) What is the impact of the patient educational interventions for the incidence of SSI?

Systematic search was conducted on four international databases: PubMed (since 1948), Cinahl (since 1981), ERIC (since 1966), Cochrane Library (since 1993). Search terms were patient education, surgical site infetion and surgical patient. The search terms were used both singly and interchangeably. The queries were used for MeSH-terms and as free-text searches with cut off the word with * or \$. Our inclusion criteria was education targeted in patients. Exclusion criteria were patient education for adolescents or their parents. Inductive content analysis was used.

3 Results

Total of 431 articles were found and 7% of them were duplicates (n= 30). After screening the articles with title or/and abstract level were five articles assessed with full-text level. Most of the excluded articles handled about personnel or nursing staff education or their infection control measurements. Total of three (n=3) were evaluated.

Fig. 1. The PRISMA flow diagram of the review [28]



One of the studies have been done in Asia [29] and other two in the US [30, 31]. Two of them used randomization in study method [29, 31] and the third used quasi-experimental study design. The total number of patients were 1535 (=N).

Table 1. Analysed studies.

Authors	Aim	Method	Results
Merle, V., Marini, H., Rongère, J., Tavolacci, M.P., Scotté, M. & Czernichow, P. 2011.	To assess if written information about SSI in addition to oral information could influence patient satisfaction, recall of information and opinion regarding SSI	n=161 RCT, single-blinded	Written information did not improve recall of information. However it was associated with increased level of satisfaction.
Thu, L.T.A, Dibley, M.J., Nho, V.V., Archibald, L., Jarvis, W.R. & Sohn, A.H. 2007.	To lower the incidence of SSI by using alcohol-based hand sanitizer. To educate both nurses and patients with a poster, an educational brochure and hand hygiene training.	n=786 neurosurgical patients Quasi-experimental	SSI rates lowered, specially superficial SSI's Length of stay lowered Durations and use of antimicrobial medications lowered
Whitby, M., McLaws, M.L., Doindge, S. & Collopy, B. 2007.	To improve the validity of patient recognition of signs and symptoms of wound infection	n= 588 RCT	Pre-discharge education causes overdiagnose clinical features of wound infection.

All interventions used written educational method [29, 30, 31]. Written patient education was available in a brochure [29], booklet [30] or poster including illustrations [29]. Two of them were used pre-operatively [30, 31] and one of them as for standard care for the whole hospitalization time [29]. Patient education was provided by the nurses [30, 31] but also by the physicians [29]. Contents of the patient education from the infection control point of view was focused on the risk factors, symptoms, treatment and prevention of surgical site infections [30, 31]. Implementation of hand hygiene and hand rub was the main preventive measure [29, 30, 31].

Empowering patient education was effective in reducing surgical site infections by lowering the incidence of SSI with 54 % [29]. It also reduced the use of antibiotics and shortened the length of stay remarkably [29]. However, preoperative patient education on the SSI was linked to overdiagnose [30] and unqualified measurement [31]. Pre-operatively provided written education with oral patient education was associated with greater probability of judging SSI as always preventable [30] and better level of satisfaction [31].

4 Conclusions

Even though the interventions are effective the need to test various patient education methods is visible. Especially in information society new ways of multimedia solutions are needed to test as patient education tools as well as to learn more about citizens own actions role in infection preventing measurement. Web-based patient education models during swine-flu pandemic [2,3] showed the potential of improving infection control educational interventions.

The weakness of this literature is the lack of infection control education targeted in patients. In the future there is need to guide the context of the infection control patient education. Secondly there is need to develop and test models using information technology solutions.

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Current and Future Services for Blind and Visually Impaired People

A Report of the Brandenburg Association of Blind and Visually Impaired (BSVB) and its Cooperation Projects with the Brandenburg University of Technology

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Abstract. The Report shows how the association, researchers and experts from several different disciplines together analyse current problems of blind and visually impaired, deliver daily practical help and identify themes for research projects by anticipating future challenges.

Keywords: blind, visually impaired, services, future challenges

1 History of the association and basis of activities

The Brandenburg Association of Blind and visually Impaired was registered in 1990 with around 2500 official members. It has been built on the experience and memberships of the regional organizations of the Association of blind and visually impaired people in the former German Democratic Republic.

On 31st of December 2010 lived in Brandenburg 5962 blind inhabitants. The number of visually impaired people is not known since they are nowhere recorded. It could be about 20000 of visually impaired people living in Brandenburg. Most people, about two third, go blind in the older ages. We estimate that around 200 visually impaired children are living in Brandenburg that visit a school in their hometown. At the same time around 200 children are being educated in two specialized centers for early learning support. Most of them are visually and hearing impaired and have another severe handicap.

The BSVB currently comprises 930 ordinary and 142 corporate members. From the ordinary members 25 are deaf-blind or hard of hearing and 35 highly-blind with other severe disabilities. The members are organized into 32 regional groups in all districts and cities. Locally 160 volunteers are active members who are blind or visually impaired usually themselves. The average age of the members is 67 years.

We finance our work through membership fees, donations, fines, and projects. The BSVB is led by its state committee, which consists of 7 volunteer members.

2 Services offered for Blind and visually impaired people

Our office and point of consulting of the association is in Cottbus. We have five full-time employees in Cottbus of which two are active for the BSVB and the three remaining for the two integration services (IFD) which are being supported by the BSVB (on behalf of the Integration Office) since 1992. **Consultations** are every Tuesday from 9:00 to 12:00 and from 13.00 to 17.00 (or by appointment). From 13.00 to 17.00 we offer a telephone consultation. Every last Tuesday of the month there is a special consultation for the elderly that went blind very late.

Visits: New blinded people are being visited on the spot. Therefore, groups and individual interviews are being set up. In a year we drive around 25000-30000 km through the Brandenburg region.

Special aids and legal support: During the deliberations we offer aids available for everyday use. Applications can be filled on the spot. A legal services company (RBM) represents the interests of our members in court.

A member card of the German Association of Blind and Visually Impaired (DBSV) provides numerous benefits and discounts to members such as the purchase of audio books in the culture department store Dussmann in Berlin, hotel stays and the purchase of special aids.

A training initiative is being organized by the BSBV on a yearly basis to all volunteers and paid staff of the organization and takes place as a **scientific symposium**.

Addressing questions like diabetes and blindness, stroke and blindness, prevention and modern treatment methods of age-related macular degeneration is highly valued. **Patient forums** will give the opportunity to discuss issues related to ophthalmologists.

3 Regional and cross-border co-operation for improved services to blind people

The 10th Workshop for high school graduates of the Brandenburg School for blind and visually impaired took place in 2010 and was organized in cooperation with the regional universities, among them the University of Cottbus and the University of Potsdam. For this project the association was awarded a certificate of honor from Vattenfall in 2010.

Together with the University of Cottbus, the University of Zielona Gora in Poland and the Euro-region Neiße three meetings in 2010 for blind and visually impaired people from Poland and Germany have been organized.

Currently run activities together with the German Adult Education Centre (Deutsches Erwachsenen-Bildungswerk) in the framework of the nationwide training for "rehabilitation advisers" of the employment agencies. That aims at the promotion of employment for people with sensory disabilities in the open labor market. Another highlight is the "week of seeing", which has been held the 10th time last year. It stands under the motto: "What are we capable of despite visual impairment or blindness." In 2012 the German Association of Blind and Visually Impaired celebrates with a festival of encounter in Berlin the 100th anniversary of a nationwide self-aid organization for the blind.

The office and point of consulting of the BSVB offers courses to learn Braille and useful skills for living. We publish brochures and leaflets on specific topics. Particularly noteworthy is a CD that appears monthly in the Daisy format and contains 20 journals from all national associations as well as a youth magazine. All members receive this hearing magazine for free.

4 Current and future challenges

1. Specialized school and qualification offers for blind people:

The preservation of the School for the Blind and Visually Impaired in our region. With a special regional topic day "Towards inclusive education of blind and partially impaired children and young people" we invited policy representatives to support the school with lobbying and finances. There is a growing need of the school which is caused by so-called career changers. These are blind or visually impaired students that change to that school after 7th or 11th grades.

2. Financial support

Together with the German Disability Council we are committed to a nationally standardized disability allowance.

3. Safe mobility and public transport

The German Railway builds many railway stations in Brandenburg or modernizes them. All project companies submit the caption in Braille for auditing to the BSVB. Roundabouts make the mobility of blind people increasingly impossible. Shared Space is rejected by us.

- Electric cars cannot be heard. We require a solution similar to the one of the industry in the United States.

4. Information and communication facilitating social inclusion

For public events and exhibitions, like the German Gardening Show (Buga) 2015 in Brandenburg and Saxony-Anhalt we have developed together with the Disability Officer criteria for accessibility and information.

An important task is to secure also in the future the special integration services for blind and partially impaired people. While the German unemployment in general decreases for our clientele it increases. About 75% of blind and visually impaired people are unemployed. Only about 2% of visually impaired high school and technical college graduates find a permanent employment. Many young people are much too quickly pushed into retirement because of disability.

Future needs for research and development for blind and visually impaired people



Fig. 1. Future Needs for Research (Source: Own Source)

Present demographic developments will cause the need to offer effective support and assistance to an increasing part of the population. More and more elderly people will be affected by various kinds of disabilities, by blindness and visual impairments.

The report of the Brandenburg Association shows how researchers and the association together with experts from many disciplines analyse current problems of blind and visually impaired, deliver daily practical help and assistance and identify themes for research projects by anticipating future challenges. That helps to be prepared for the future and to meet the individual and social challenges together in an effective way.

The Protocol for Assessing How Virtual Support Enhances Physical Activity in People with Type II Diabetes Mellitus

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Abstract. The number of people with type II diabetes mellitus (DM type II) is increasing in every country. As a part of proper treatment of DM type II, regular physical activity is needed, since exercise improves glycaemic control. Even though the benefits of exercising are well-known, adherence to exercise seems to be less than optimal. The project in hand aims to investigate whether virtual community support is an effective way to increase physical activity in people with type II DM. This paper concentrates on presenting the protocol for testing and assessing the clinical outcomes as well as the user experiences of virtual community and support on enhancing the physical activity of people with type II DM.

Keywords: Virtual support, Diabetes Mellitus, Sports-Tracker Application

1 Introduction

The number of people with type II diabetes mellitus (DM type II) is increasing in every country (International Diabetes Federation 2011). As a part of proper treatment of DM type II regular physical activity is needed, since exercise improves glycaemic control (Boule et al. 2001, Sigal et al. 2007, Snowling et al. 2006) and decreases cardiovascular risk (Kirk et al. 2003) in people with DM type II. Thomas et al. (2009), in the Cochrane review about the exercise for type 2 diabetes mellitus, state that the effects of physical activity are conclusive: glycaemic control improves and glycated haemoglobin decreases, visceral adipose tissue and subcutaneous adipose tissue are reduced, plasma triglycerides decrease and insulin response is improved. Physical activity also aids in achieve weight loss and in maintaining it (Colberg et al. 2010). Low costs and the non-pharmacological nature of exercising enhances its therapeutic appeal. Even though the benefits of exercising are well-known, adherence to exercise seems to be less than optimal. Casey et al. (2010) reported that adults with DM type II require long-term monitoring and support for physical activity and exercise. New technology provides exciting and innovative ways to give exercise consultation and also enables easy formation of social networks and peer support groups.

Through new devices and applications, people may construct virtual social units with members who relate to one another as a group and interact in spite of geographic distance. These virtual communities usually share a goal or interest that provides the main reason for forming and maintaining the community. A virtual community is created through repeated and active member participation, access to shared resources, defined policies for the type and frequency of access and reciprocity of information, support and services. (Demiris 2006.) There have been great expectations on the benefits of the virtual, online support groups for patients.

One aim of an EU-funded project called eMedic is to investigate whether the virtual community support is an effective way to increase physical activity in people with type II DM. This paper concentrates on presenting the protocol for testing and assessing the clinical outcomes as well as the user experiences of the virtual community and support on enhancing the physical activity of people type II DM.

2 Objectives

The main aim of the study is to investigate whether virtual support is an effective way to increase physical activity in people with type II DM.

The aim of the study is further divided to research questions:

1. How does belonging to a virtual community enhance the frequency and duration of aerobic training in patients with type II DM?
2. How does belonging to a virtual community enhance aerobic training motivation experiences of type II DM patients?
3. How do the users experience the usability of the Sports Tracker application?

In this paper, the protocol for getting answers to these questions is presented in order to test and improve the method through scientific discussions with diversified specialists.

3 Virtual support in enhancing physical activity – research protocol

3.1 Method

Evaluation of the effectiveness of the virtual community support (Sports Tracker application) for increasing physical activity in patients with type II DM will be conducted with clinical randomised trials that will include a control group having standard care and an experimental group having experimental treatment (Burns & Grove 2001). In the control group, the participants will use a standard activity diary to monitor and self-report their physical activity and in the experimental group, the participants will use the Sports Tracker application to monitor their physical activity and share it in the virtual community with the peer support group. The test phase with the

patients will take six months in both experimental and control groups.

People with type II DM, who are willing to participate in the study and do not have any complications (for example foot ulcers) preventing aerobic exercise or the usage of a mobile phone (for example a serious vision problem), will be included in the study. A power analysis will be done in order to estimate the effect size.

Participants will be randomised in two groups. The primary outcome measures will be the frequency and number of sport activities and aerobic performance (Table 1). This information concerning the experimental group will be gathered directly from the Sports Tracker application and the control group will mark their activities into a manual activity diary. HbA1c will be measured in every third month in order to monitor patients' blood glucose values. Aerobic performance will be tested by a two kilometre walking test and the body mass index (BMI) will be used for assessing the changes in weight. These tests will be done before and after the trial.

Table 1. The data acquisition procedure

Outcome variables	Indicator	
Number and duration of sport activities	Experimental group Sports Tracker application (GPS, time)	Control group Activity diary (self-reported) (GPS, time)
Aerobic performance	2 kilometre walking test	
Blood sugar value	HbA1c (blood test)	
BMI	weight	

Before the experiment, there will be a pilot with six patients. In the pilot the procedure of the experimental group will be tested; there will be no control group.

The interviews concerning the physical training motivation and usability of the monitoring tools and methods will both be conducted after the test-line period.

3.2 Tools and applications used in research

The application used in the experiment will be Sports Tracker, which is a free app available for Android, iPhone, Windows Phone, Nokia N9 and Nokia Symbian devices. It is said to be an easy and fun training application that helps people train better and connects them with each other. Through the application it is possible to track and analyse exercises and share workouts and photos with friends and other similar-minded people via the Sports Tracker community, Facebook and Twitter. Those who

will take part to the experiment will be equipped with a proper phone with GPS and acceleration sensor.

The use of the application will be carefully taught by a multidisciplinary group of students from Turku University of Applied Sciences. The same group also arranges the support to the users during the test phase.

3.3 Performing the clinical trial with DM II patients

In clinical trials, the researchers are responsible for protecting the rights of the human research subjects. The human rights that need to be protected in research are: right to self-determination, right to privacy, right to anonymity and confidentiality, right to fair treatment and protection from discomfort and harm. (Burns & Grove 2001.)

The patient selection will be done purposively. Diabetes nurses and doctors from the participating municipalities will inform the patients about the possibility to take part in this research. Volunteered participants will be well informed about the study and an informed consent will be signed by every participant. Participants' privacy and anonymity will be guaranteed by recommending that participants use some other user name than their own name in their communications on virtual communities. All information gathered from the participants will be carefully saved and destroyed after the research is over. Participating in this study will not affect patients' care in any way. Participants may benefit from this study by having more support for their physical exercising and thus better control of their disease.

4 Conclusions

There might be many risks that should be taken into account before the trial. Outstandingly careful attention should be paid to patient selection and patient guidance. Otherwise during the trial months there might be a risk to patient loss.

Because many of the participants may not be acquainted with the use of modern mobile devices i.e. the smartphone and the ICT application related to this, the preparation for teaching the use as well as for offering constant help should be thorough.

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VIRTU Channel as a Service Model to Support Coping at Home at Old Age

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Abstract: The EU-funded VIRTU-project (Virtual Elderly Care Services on the Baltic Islands) has developed a new virtual service model. The focus has been in the service model development to enhance the possibilities of independent living, increase the safety and quality of life and to increase social interaction of the elderly. The services are delivered via broadband and touch screen device placed users' homes. The old and fragile users have the service delivered to their homes and they have a way to fulfill different needs such as a need to different types of social interaction, cultural experiences or a need to support one's physical capacity. This article represents the common service model and five different descriptions of the local content production in the municipalities to fulfill the varying service needs of the elderly.

Key words: service model, elderly, independent living, social interaction

1 Introduction

All the western societies are facing a change in the demographic features in upcoming decades. The dependency ratio in Finland will rapidly increase in a few decades; as the dependency ratio was 50,3 at the end of 2008, it will rise up to 70,5 by the year 2026 [1] which sets the public services to face a great challenge. Not only the amount of old people but also the availability of registered nurses and other social- and health care professionals will be a challenge in the following decades.

The functional status and the quality of life of the elderly have increased in the past decades. However, the functional capacity of the elderly and the oldest old has become an increasingly important determinant of the need for care and help. According to the results over 90% of people aged 65 to 74 but only half of those aged 85 years or over managed dressing and undressing without difficulties [2]. The self-reported func-

tional status has increased in aged 55 and over and in both sexes over 20 years. The increased functional status is evident up till 74 years, but 75 years and older seem declined [3].

As the physical capacity is the determining factor in performing the activities in daily living, the other dimensions of functional capacity are strongly included in the ability to cope at home. The social and psychosocial features effect on the perception of inclusion and security which are the determinants of good aging. The meaningful social relationships and interaction as a whole are important in the well-being and health of human beings [4], [24]. According to a Finnish study nearly 5 % of the 75 years and over suffer from loneliness on regular basis [5]. The migration to cities leaves the elderly in rural areas without the support of social networks. The worst situation in terms of quality of life is among the elderly with functional deficits and social isolation.

This future phenomenon of expanding number of elderly sets needs to develop new, innovative service solutions to support health and well-being of the aged. The present service model for aged in municipal health services is structured strongly on the institutional care. The focus in the development work is increasingly aiming at preventive care and to enhance the elderly home delivered services [6]. The municipalities are trying to survive with growing service needs and limited human resources.

Universities of Applied Science Novia, Laurea and Åland and Saaremaa development Center in Estonia have worked with Turku University of Applied Science, which coordinates the EU-funded VIRTU-project (Virtual Elderly Care Services on the Baltic Islands) to develop a new virtual service model. The development work has been produced in cooperation with the partners in the municipalities in Åland, in Estonia and in Finland. The focus has been in the service model development to enhance the possibilities of independent living, increase the safety and quality of life and to increase social interaction of the elderly.

The Universities of Applied Science (UAS) produce with students of various fields interactive activities which comprise varying contents according to the students' specialties. The future nurses, occupational therapists, sositionoms, physiotherapists and hospitality managers produce interactive services consisting for example information on health related issues, physical exercises, discussions, quizzes or information on healthy nutrition. The technology enables the users to contact each other outside the professional leaded activities.

In addition to the UAS leaded activity production the municipal partners produce their own activities or services according to the local needs. Virtual doctor appointments are produced in various municipalities in the Archipelago of the Finnish Gulf, telerehabilitation of discharged patients is on agenda in a few municipalities and Åland together with Novia UAS has used the device to educate the health care professionals in rural areas. The future vision is that Universities produce the interactive, preventive

services for wide user groups and each community would produce more specified and tailored service contents aimed to specific user groups according to local needs assessment.

The VIRTU-project, funded by Central Baltic Interreg IV A-program, developed a virtual service model to be tested in municipalities as one solution to the renewal of the service supply. The meaning of the interactive, real-time broadband served communication channel is not to replace the humane person-to-person services but to have an instrument to widen the services production and to guarantee the availability of some home delivered services in the future. The following chapters will clarify the contents of the common service model arranged by the Universities of Applied Sciences (UAS) in Turku, Vantaa and Åland and Saaremaa development center. The article will also describe the tailored services developed in the municipality level to guarantee the services in rural areas.

2 Common service model

The VIRTU channel is a new kind of social media and well-being service for elderly. The main partners in the development work are the two Universities of Applied Sciences in Turku (TUAS and Novia), in Vantaa (Laurea) and in Åland. In Addition the Saaremaa development center is the responsible partner in Estonia.

The VIRTU project aims to promote the social life of elderly living in the archipelago or other remote areas. The purpose is to create and maintain social relations and to prevent loneliness. Loneliness can be considered as a great risk to the individual's ability to function and independence at home. The VIRTU project develops preventive working methods and practices. Another key objective is to increase the service availability and safety of the elderly. Preventive services promote well-being and further self-fulfillment and a desire to learn. The virtual connection to services can be considered as a remote access service but it also enables to locally reach many services and fulfill conventional services. The third key objective is the networking of different actors in a way that enables concrete benefits for the technology users. This requires the collection of empirical data and a dialogue between various groups of professionals – including professionals from different fields. Technology also requires adequate employee orientation. Municipality employees participate in the project planning meeting and workshops.

Aforementioned objectives require the renewal of the service system. Virtual technology calls for new working methods and practices from service providers. In VIRTU project, empirical knowledge of usage of virtual technology can be obtained from the views of elderly users as well as of professionals and experts. Elderly participation plays an important role in the development of services. The aim is to increase the impact with limited resources which means added value to customers. The effect can be seen in elevated customer satisfaction and employee well-being at work.

In institutionalizing the service model, a long-term goal is to connect the virtual services to the municipal service system. Through VIRTU project we obtain information on the possibilities to extend from social and health care services to other service areas, which can be seen as a challenge. The necessary technology and operating models are in place but economic issues still require solutions.

Majority of the activity contents are produced in the studios of Universities of Applied Sciences. Activity contents aim to support elderly users, create and maintain social relations and promote health. Elderly need an opportunity to participate in different group activities according to their own personal abilities and desires. VIRTU activities are an important forum to listening to others.

The VIRTU activities are interactive conversations, information about different walks of life and issues and services – friends, information and entertainment. The role of health promotion plays an integral role in the activities made by the students of health and well-being sciences. Activity content is strongly affected by user feedback and desires.

3 The virtual services organized in municipalities

Virtual doctor appointments

City of Parainen has developed with Novia University of Applied Sciences in Turku virtual home visits for inhabitants in the island of Iniö in the Turunmaa archipelago. There is a need for this type of virtual service, since distances are long and the Finnish climate is such that new solutions have to be developed in order to guarantee access to health care for everyone, regardless of geographic location. A doctor and a community health nurse on the island of Iniö have participated in the planning of this form of service. New technology enables this virtual and interactive contact to the inhabitants of the outer archipelago. The distances are long and travelling is time demanding all year long. The community health nurse has a great responsibility in evaluating the need for care among the inhabitants in the islands. The doctor appointments are arranged in Iniö twice a month, which means that all the other days the nurse needs to consult the doctor by telephone if needed. VIRTU-channel enables the community health nurse to consult the doctor virtually, while the patient is present. The doctor is able to discuss with the patient and give instructions for proper care. If the nurse needs to suture a wound, she is able to use VIRTU-channel to consult the doctor for proper instructions. The possibility to consult the doctor virtually increases to the safety of the patient. The alternative way of for example suturing the wound would be in the nearest ER unit, which may take a long time due to ferry trips.

There are elderly people who live alone in the archipelago area, and in many cases they may be the only person on the island. At some points of the year due to extreme

and various weather conditions the nurse or other health care professional are not able to make home visits physically. This may cause tremendous challenges regarding the safety and security of the elderly. To relieve this problem VIRTU-project has established these virtual connections between elderly and healthcare professionals. The community health nurse or home care worker can contact the patient by VIRTU channel every day, all year round.

This virtual contact between patient and doctor is established via touch screen functioning PC. The connection requires a password from both parties and the connection is secured to ensure the confidentiality of the patient. The functionality of the technology may pose a challenge due to technical problems despite the fact that network connections have steadily improved in the outer archipelago. Another, greater challenge is to integrate this new form of service as part of the daily routines of the health care personnel. The integration requires lots of work in the organizations to achieve virtual services as a natural addition to already existing practices.

Education for the professionals in rural areas

E-learning, net based, web based learning and interactive education are some terms used to describe forms of remote education via computer or other technical device. Learning is no longer bound to space and time. More and more net based educations are used in schools and universities around the world. [23.] When educating caring and nursing professionals web-based education is used widely in universities and also in nursing programs. Today every educational organization has its own web portal. Also the net is used for every day purpose to find knowledge concerning health issues [7], [8]. For professionals there are national portals, guidebooks for nurses and nursing problems [e.g. 25, 26]. A national web based portal for distributing knowledge about elderly care is planned in Sweden [22].

In the VIRTU-project the technical devices that is used for elder interactive contact to nursing homes and the universities, was also used for educational purpose. Staff in caring and social work in Swedish speaking municipalities and nursing homes were invited to participate in educative lectures from the Applied Science Universities at Åland and Åbo. The caring homes were independent small institutions run by the local municipalities in the Åland and Åbo archipelago.

The pedagogic method used in the web-based education was the dialogue pedagogic described by Freire [9]. The educational frame work was based on experiential learning methodology [10]. The main characteristics of experiential learning were the emphasis on action; the participants encouraged to reflect on their experience, and a clarifying approach which was adopted by the facilitator. It aimed to learn from experience, and to share knowledge and experience from within the group of participants (learners) and facilitators [11]. The participants in the web-based education activities were of different kind of health workers such as nursing auxiliaries, social workers and official health and social leaders. The participants learned by active involvement in

the learning process. In the experiential learning approach, learning is not a process by, which facts are ‘tacked on’ to the person, nor is the person ‘filled with knowledge’ [11].

In the web-based education the following topics have been offered meeting with persons of dementia in the elderly care, change, a resource-strengthening and health promoted caring. The subjects have been discussed by the participants mirrored at problems, extracted the essences of the problems, and aims and strategies has been set in order to solve the problems raised in the sessions.

All together 47 participants have attended the sessions. Included in the web-based education activities during this year will be a pharmacist, a fire chef and dental hygienist by requests from the personnel. The facilitators were situated at the Universities of Applied Sciences. The personnel were gathered round the devises in the nursing homes. For 45 minutes after lunch and before the afternoon coffee break when the elderly was resting. Both flipchart and PowerPoint material were used.

Among the strengths of education at a distance was cost-effectiveness. As often few training opportunities were offered for these professionals that were living and working in rural areas. Few had in general a possibility to participate in education or seminars offered at the mainland. Firstly because of transportation difficulties and long distances, secondly due to lacking resources to replacing staff. Although there is a barrier between the facilitator and the participants –the screen-, a dialogue is well motivated through the possibility to be close despite of the distance [c.f. 12]. This shows that dialogue pedagogy is possible and called for. Dialogue education is a good candidate to implement interactive teaching that encourages participation and deep learning.

Physiotherapy on VIRTU-channel

The functional capacity is one remarkable feature in coping at activities of daily living. However, exercising muscle strength among the elderly is still rare, which leads to the fact that only 4 % of the men and 5 % women are physically active enough in terms of national recommendations. The fifth of all over 65 years do not exercise at all [13]. Due to the demographic changes mentioned earlier the need of rehabilitation services as well as health promotion procedures for physical capacity will expand tremendously. Especially resources for the preventive actions to support the functional status of the elderly are too limited at the moment.

The VIRTU-channel, which is based on videoconferencing method, enables the therapist in the health care center and the patient at home to realize the actual therapy online. The therapy may consist of exercises of muscle strength, balance, coordination or exercises to increase cardio-vascular capacity. The physiotherapist gives the instructions by using vision and voice which is a challenge for the therapists as their professional identity lies greatly on manual guidance. Also the mixed therapy se-

quence where as a part of the therapy sessions are delivered virtually and some by physical home visits, are a considerable way to enhance the sufficiency of physiotherapy services. In addition the assistance of home care nurses in the rehabilitation session by integrating their visits at the therapy time would be an option.

Telerehabilitation is suitable especially for elderly whose functional capacity is diminished and the travelling to health care facilities cause great physical strain. Intensive and progressive rehabilitation for prevention of falls and fall caused injuries is efficient and cost-effective [14]. The content and intensity of the therapy should be adopted according to the needs of the patient. Telerehabilitation enables the home delivered rehabilitation to be more sensible for the provider, if the rehabilitation patient requires is frequent, several times a week but the duration of one session is short. A frail old person with a low functional status is an example of this rehabilitation patient group.

Rehabilitation via videoconferencing device is a potential rehabilitation method to increase patients' functional capacity at home environment. The group exercise activities have been tested in a few projects in Finland [see 15, 16] and individual rehabilitation in KASTE-project [17]. VIRTU-channel has produced physiotherapeutic group activities run by Turku Universities of Applied Science, and there are plans in the municipalities to begin the individual therapy sessions. Telerehabilitation needs new pilot projects to investigate the virtual therapeutic methods and to implement deeper the need for home delivered rehabilitation services. Furthermore, there is an urgent need for new scientific studies to clarify the patient selection criteria and to investigate the cost-utility relations.

Estonian cases

Foundation Kuressaare Hoolekanne in Estonia is offering supported living service. This is a special care service offered to clients with mental disorder for better coping with everyday life. This Estonian case will represent how the VIRTU channel is integrated into daily routines of two different clients.

The first patient, who has a diagnosed schizophrenia, is living in this support home. Due to the sickness the client has lost ability to cope with daily living conventional operations like managing with money in shops or preparing porridge for breakfast. She gets assistance of one half time worker. The treatment protocol requires that the medication is taken at fixed times, but the patient has difficulties in recalling the right time. She needs not only reminder, but also supervision after the medication and this is done by VIRTU channel. At assigned times the social worker is calling via VIRTU to remind the patient for taking the medication. The device is placed into the client's room so that the camera shows the procedure of putting the pill into mouth. The client adopted the new service with VIRTU device quickly and she is often calling to social worker if she happens to be late. In addition the client's personal caregiver is in contact with the client in the evenings from her personal computer at home, using VIRTU

PC-client interface. The client has also an opportunity to watch in the VIRTU channel concerts and events happening in Kuressaare Day Care Centre.

VIRTU device is relieving burden of care givers who are taking care of patients with mental disorder. Depending on a case the service need may be several days in a week or every day. Some of the visits may be done by VIRTU device, since the visual contact gives more information than the traditional phone calls. At this point it is not clear, which patients with mental disorders could use these virtual care services. Every client has pros and cons, and every case must be evaluated individually.

One form of virtual home services is the virtual visits of family members. The second example of Estonian case is elderly man living in Leisi, who is in contact with his daughter every day via VIRTU device. After the main news in the evening the disabled person tells about his daily routines and worries to his daughter in Kuressaare. These regular conversations are enhancing the safety of both of them. The risk of degeneration of mental processes and depression is high if there is a lack of social support and loneliness, as stated previously. In this particular case the communication abilities have been improved due to regular conversations. This is implemented as enhanced recalling abilities and the in the creation of sentences. VIRTU channel offers the possibility to be in contact with close persons, to give overview of his needs, feelings, health condition and general situation. Feeling the continuous interest and contact secures client's coping with everyday life.

In a wide perspective, the VIRTU services are communication enabling services. Communication with other people is one way to reflect one's personality, have positive feelings and support the meaning of life. If a person is lacking communication, feeling of interest and supporting shoulder, one may feel loneliness, helpless and insecurity. The communication enabling services are one key in prevention of mental disorders.

Virtual coffee breaks

The elderly in the VIRTU-project have an opportunity to participate in diversified interactive activities nearly every day. The elderly can also use the activity channel for their own purposes at any time. They are able to take advantage of this possibility for example on the weekends when they have their own "virtual coffee break". During that break, the elderly on their own initiative discuss and share thoughts and experiences in different themes. In addition to these common meetings in the activity channel (multi-point-connections), some VIRTU users communicate with each other via one-to-one videophone calls (point-to-point connections) several times a week. Typically the users first get to know each other in multi-point-connection activities. Afterwards as the usage gets familiar they are prepared to use private point-to-point-connections as well. Point-to-point-connections are mainly used in the evenings and on weekends as there are no project-driven activities to join. One-to-one videophone calls are utilized also between the users and relatives and between the users and pro-

professionals. VIRTU-channel makes communication easy and accessible. The personnel of the home care unit or doctors, for example, make point-to-point calls to specific users on the basis of appointments. This replaces some of the actual physical home visits. Implementation of well-being technology requires much from employees and experts, including e.g. user group motivation and guidance. Thus this point-to-point interaction plays an important role in the implementation of the technology as well. [18.]

Mokka and Neuvonen [19] suggest that the creation of well-being can only be done by providing the citizens with new ways of participation. Well-being studies have shown that relations between people, communities and networks have an increasing role in the economic, mental and physical well-being. In addition to facilitating the access to services, the most important task of the VIRTU-channel is to support clients' social interaction and fellowship. Multi-point and point-to-point connections can be viewed from the perspective of social support and peer support. Social support is one form of interaction that is found to have many positive effects on human well-being, the quality of life and ability to cope with difficulties. Peer support is based on a voluntary interaction between people in similar life situation. It is not professional guidance, but a genuine understanding and experience sharing [20].

Groups can create a sense of community, care, support, approval and assistance. The group also reduces depression and loneliness, and increases self-confidence and a sense of dignity [21]. Active participation in the multi-point and point-to-point connections supports the users' ability to function and survival in everyday life. Previous studies have shown that utilization of technology can encourage the individual's activity [15]. The technology allows the elderly living at home to participate in creating of a new, activating and an interactive virtual community. This virtual community and point-to-point-connections produce a sense of security: users become worried, if someone is "off-line" too long.

4 Conclusion

The technology is evidently merging into the services of elderly to support independent living at home environment. The home bound elderly due to the limits in the functional capacity are in a situation where the social interaction with peers and relatives is diminished. The VIRTU-channel brings the social network into the homes of the elderly and increases the social interaction and widens the possibilities to social life. On the perspective of municipal services the VIRTU-channel creates new model for service delivery. The health care services for elderly living in rural areas including the archipelago area are more reachable and accessible when delivered virtually. However, this service model is not to replace the conventional services but to be an additional way for service delivery. The virtual doctor appointments, virtual home care visits and telerehabilitation are important development areas to ensure accessible, equal and patient tailored services to all inhabitants in the different geographic areas.

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Monitoring of health inequalities for better evidence-based policy interventions

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Abstract: Social differences in health are found almost universally between groups with different education, income, living in different areas of the city or the country. Those differences are rapidly growing, and they are pervasive throughout the world. They are apparent in all developed countries, including those with highly developed welfare systems. Most of the European countries have national health policies and programmes, however, in order to ensure their successful implementation, the local action is needed. Municipalities acknowledge this fact and take the action to overcome the challenges. This paper presents two examples from European cities, in Latvia, Norway and Russian Federation on their efforts to tackle the health inequalities by health monitoring of the citizens and evidence-based policy interventions developed upon the results of the health monitoring.

Key words: health inequalities, determinants of health, health monitoring, policy making, health survey, HEPRO model, HEPROGRESS, PYLL, Healthier People

1 Introduction - Health inequalities as great public health challenges

Inequality in health is a difference between social groups e.g. in frequency of diseases, unhealthy behaviours, frequency of using health care services and consequences of poor health for daily life, work and participation in the society.

Those differences are rapidly growing, and they are pervasive throughout the world. They are apparent in all developed countries, including those with highly developed welfare systems.

Social differences in health are found almost universally between groups with different education, income, living in different areas of the city or the country. Statistics show that those with lower socio-economic status have the most unfavourable health situation compared to the better-off groups. The inequalities are found inside the countries (for example 12-year difference in life expectancy between different regions in Norway) and between the countries (OECD average life expectancy rate is 70 years but the countries' average varies greatly).

2 Monitoring of health inequalities

Role of cities and municipalities in health promotion is growing as a result of speeding urbanisation, decentralisation and recent law regulations that make the cities responsible for tackling current public health challenges. Most of the European countries have national health policies and programmes, however, in order to ensure their successful implementation, the local action is needed. Municipalities acknowledge this fact and take the action to overcome the challenges. WHO Healthy Cities programme promotes strategic city planning for health and evidence-based health interventions. The paper presents two projects, currently under implementation, which follow the strategic approach. Baltic Region Healthy Cities Association, located in Turku, Finland, is a partner in both of them.

2.1 HEPROGRESS project

Europe is faced with changes in its population structure with an increasing proportion of elderly people. In addition, many countries, including Latvia, are hard hit by the financial crisis. This forces municipalities and regions in Europe to think of their health policies along different lines. To solve Europe's health problems, it is important that the focus on treating sick people is supplemented with preventive work and health promotion to keep people out of the treatment systems as long as possible. To achieve effective public health work, it is important to have regular and good health surveys visualising where efforts should be made and how the development of the public health over time can be followed. The health survey is a crucial part of HEPROGRESS: Reducing health related social and gender inequalities and barriers to social and economic participation - Evidence based local policies, interventions and empowerment planning, carried out by Latvian and Norwegian municipalities from Vidzeme Region and Østfold Region.

Big health inequalities can be observed in Vidzeme Region (Latvia) and Østfold Region (Norway), and they are increasing. The project works towards effective public health interventions, capacity building of politicians and city planners and empowerment of inhabitants. HEPROGRESS focuses on how local communities and services can prevent or reduce the marginalization effects of poor health in relation to: healthy ageing, marginalisation in work life and reduction of number of school drop-outs.

HEPROGRESS is based upon the following philosophy:

- Social inequalities in health can only be reduced if those who control the social determinants of health have sufficient expertise and motivation.
- Reducing social inequalities in health requires good and strong long term leadership and cooperation with other actors.
- To succeed in reducing the social inequalities in health in Østfold and Vidzeme health in all policies are crucial.
- Health inequalities is unfair and cannot be accepted.

2.1.1 HEPROGRESS health survey

As a crucial part of HEPROGRESS a health survey has been carried out in participating municipalities. The survey is based on the HEPRO-study, conducted in 2006 in 27 municipalities from 6 countries around the Baltic Sea. The results have been used locally for reporting, public health planning and policymaking. At the time, about 34,000 Europeans in 6 different countries participated. Later other European surveys have used the HEPRO-model. More than 50.000 Europeans have so far answered the questions. HEPROGRESS builds on experiences from HEPRO.

More than 20.000 inhabitants in Østfold and around 5.000 inhabitants in Vidzeme took part in the HEPROGRESS survey. The survey will give municipalities participating in the project information about following areas: marginalisation, handling and mastering, social participation, self-experienced health and life quality, health, disease and sufferings, environment related resources, individual resources, environment related harmful and risk factors in the vicinity, harmful and risk factors to people.

Purposes of the type of survey to be conducted in the project are:

1. Providing a holistic view of health and quality of life in a local geographic area.
2. A health profile is mainly a tool for practical purposes, not a research tool.
3. The health profile intends to identify the strengths and weaknesses of a local community.
4. The health profile is meant to identify groups with special needs.
5. The health profile is a basis for making priorities in the planning process.
6. The health profile is meant to indicate the potential for change and development.
7. The health profile is meant to be a tool for formulating goals.
8. It can be used for benchmarking (comparisons to identify best practice) and evaluating policies and services.
9. It provides information to democratic decision processes, which can help to make questions of health and welfare visible to the inhabitants.

TNS Gallup was hired to collect the data. Østfold County College and University of Riga will be responsible for analysis of the outcomes. The tentative results from Norway were revealed in the beginning of May 2012 when they were presented on the Second Conference on Health Inequalities, organized as a part of HEPROGRESS project on 14-15 May 2012 in Sarpsborg, Norway.

2.2.2 Interventions based on the HEPROGRESS data

The HEPROGRESS project addresses the following issues:

- Social gap in poor health,
- Social exclusion and lack of participation and political influence,
- Lack of occupational and economic sustainability,
- The process of healthy ageing,
- Social and gender inequalities in a life course perspective.

The aim of the project is to develop a catalogue of and consensus building around interventions and policies to tackle inequalities in health in the areas of focus. This will be done after analysis of the results of the HEPROGRESS survey. Inventory and analyses of existing governmental policies, structures, interventions and measures for

tackling inequalities in health, primarily on regional and local levels will also be created.

Head of The Public Health Programme - the regional public health partnership in the Østfold County - Aase Rennesund is of the opinion that the knowledge to determine where to perform preventive work and health promotion is needed. HEPROGRESS survey is one of several tools that can be used to observe changes in people's health. The survey will result in all the municipalities receiving local information to help them in the planning of their services to the population.

When using the data from Health Profile for planning of interventions, following must be taken into account:

- priorities of the political system in country, region, municipality;
- setting the goal-oriented efforts – discussion on goals, socio-economic problems;
- target population of interventions;
- potentials for changes and development;
- biggest gaps existing in the municipality, region, country;
- comparison between countries and social groups;
- evaluation of the efforts taken so far;
- existing boundaries and resources available;
- deep analysis of the provided data.

After receiving the results the municipalities will be challenged to find their own ways and means to tackle the health inequalities in their region.

During the Second Conference on Health Inequalities, organized as a part of HEPROGRESS project on 14-15 May 2012 in Sarpsborg, Norway, the preliminary results of the survey for three municipalities were presented. Those municipalities were Sarpsborg, Moss, Hobøl. In regard to e.g. daily smoking, physical activity and general assessment of health, brought the strong confirmation of the fact, that the health inequalities exist in Østfold – people with higher education and higher socio-economic status smoke less, move more and are more satisfied with their health than those with lower education and lower socio-economic status. At the same time, there are no big differences between municipalities. The following steps of using the HEPROGRESS survey data for planning of policy interventions are: finalisation of the survey data analysis, creating a report that will be communicated to the local decision-makers, strategic planning for interventions. This will be done until closure of the project in November 2012.

HEPROGRESS project is financed through a grant from the European Union's Programme for Employment and Social Solidarity - PROGRESS (2007-2013). The project is implemented from December 2010 until November 2012.

HEPROGRESS project consortium consists of: Østfold County Council (Lead Partner), Østfoldhelsen, Moss municipality, Hobøl municipality, Østfold University College, Volda University College, University of Latvia, Amata municipality, Vidzeme Planning Region in Latvia and Baltic Region Healthy Cities Association.

2.2 Healthier People

The project Healthier People – Management of Change through Monitoring and Action contributes to the reduction of premature mortality of preventable causes in St

Petersburg and in North-West Russia by supporting the institutional capacity building and networking of key stakeholders in the field of health and social protection.

The specific objectives of the project are:

- 1) To measure the number of Potential Years of Life Lost (PYLL) in the pilot area;
- 2) To improve methods for the "management of change" locally and regionally;
- 3) To strengthen the understanding of the importance of "healthy choices" locally and regionally.

The project monitors the health situation of the target region by screening the death certificates in a city and calculating the Potential Years of Life Lost (PYLL) by the use of specific methodology.

2.2.1 PYLL methodology

The calculation of PYLL is based on the basic cause of death in the statistics on causes of death, using the international classification of diseases by the World Health Organization, ICD-10. Basic causes of death have been collected in 28 classes in the research data. Internationally, the mortality statistics can be considered among the most comparable ones, although the procedures of registering and classifying causes of death differ in different countries.

The PYLL analysis conducted at the beginning of the project (April – June 2012) will test the application of previously developed protocols for the calculation of either national and/or regional PYLL rates and the interpretation of the quantitative and qualitative results. The latter includes chronological and cross-national comparisons among selected geographical areas. As a result, a precise plan for the on-going calculation of PYLL rates will be developed in a way that this protocol produces national and/or regional data which is comparable to the relevant data from elsewhere. This will support the institutional capacity building, decision making and policy formulation of the local decision makers in St Petersburg.

In order to make the PYLL calculation for a given population information about mortality data for the population in question and for each death during the time period is needed. Following information must be provided: 1) Date of birth, 2) Date of death, 3) Gender (male/female), 4) Cause of death according to ICD-10 as precisely as possible. Additionally for the same population and same years the population data of the same target population by gender (male/female) and by population groups categorized in groups is needed: 1) 0 year olds (under 1 year) 2) 1-4 year olds, 3) 5-9 year olds 4) etc. until last category 65-69 year olds. Information must be provided in a computerised version. Based on that data 84 tables illustrating 28 causes of years of preventable causes of avoidable premature mortality are created, and as much as possible reference for the monitored region in general presented in this connection. This data collected and analysed form a basis for the further work on strategic public health policy intervention.

The PYLL analysis and the presentation to the policy makers and general public has a potential to motivate the politicians to take the action. There are effective intervention policies available, if political will is strong enough to implement them and citizens to accept them. This is where the properly done monitoring can have an im-

pact on the situation in a municipality and contribute to decrease of preventable death in Kalininsky District and in Russia.

In order to establish the calculation of PYLL national and/or regional rates in Russia, Russian experts need to be trained by the project experts. In the training of the Russian experts, three groups of experts need to be addressed:

- Medical professionals in charge of death registers (especially the definition of the cause of death) and the epidemiological professionals;
- Statistical professionals in charge of the death register and the storing and analyses of the register;
- Computer programming specialists and those capable of biostatistics.

As a result, a precise plan for the on-going calculation of PYLL rates for the district in particular (and for multiplication in other districts, cities, and bigger regions) will be developed in a way that this protocol produces population based data which is comparable to the OECD existing ones.

In setting up the PYLL programme and analytical work – when the death registry is available – reliable and computerized, the data is calculated for the Kalininsky population (505 000) as a whole and separately for males and females. The results of the Kalininsky district PYLL rates will be compared with the chronological changes in Russia and St Petersburg and selected other countries/regions (at least three). The comparative study will provide the local health experts with the sense of applicability of the cause specific rates of premature deaths in the planning of health promotion, prevention and treatment programs, as well as with the sense of evaluation of the past programs.

This will provide a solid basis for elaboration of a strategic intervention plan and good motivation for the implementation action. The methodology will provide an opportunity to regularly monitor the process, and also allows comparing the development vis-à-vis neighbouring reference areas in Russia and internationally.

2.2.2 Utilizing the PYLL data for policy interventions in Kalininsky District

Calculating and analysing the PYLL data can be used as a tool for tackling the core problem of public health strategic planning and therefore benefit: 1) the decision makers who constitute the laws and regulations, 2) practitioners who implement those laws, and 3) the general public. PYLL analysis done within the framework of the Healthier People project will certainly present – and help to understand – that some core problems of Russian public health are preventable. PYLL also allows calculating the cost of abandoning public health interventions to the economy of the municipality, region or the country. This may motivate the decision makers to invest in prevention work.

After the PYLL analysis is done in Kalininsky District, the national and regional experts and health care managers, health care administrators and political leaders in Russia will be involved in the process of formulation of a strategic intervention plan for tackling the non-communicable diseases epidemics in Kalininsky District and in St Petersburg. For the Russian economic experts and the decision-makers, the com-

parative study will provide a new sight and understanding to the phenomena of the losses of human capital due to premature deaths in Russia.

The process of forming a strategic intervention plan is an essential element of the Healthier People project and use of PYLL methodology in general. When PYLL calculations have been made, the results need to be explained and discussed to those sector leaders and other branches of administration, whose involvement will be paramount to tackle the problems and bring real change in solving problems causing premature avoidable deaths and diseases. Public discussions have proven to be highly valued among those involved and helped in their motivation and management of change. Moreover, they enhance intersectoral collaboration and commitment of other sectors beyond health. Media involvement has also proven to be beneficial and media advocacy will be done continuously during the project. The process enables to create new atmosphere of trust between administrators, politicians, the media, and the public.

After the strategic intervention plan with practical intervention strategies and action will be formulated, second phase of the project – Management of change and strengthening the understanding of the importance of “healthy choices” both in policy and in life style - will start. The main aim of this phase is to improve methods for managing the change locally and regionally – to establish a precedent of successful influence of non-state actors to state policy in improvement of health on a level of Kalininsky district.

The project is implemented by the consortium of the following partners: Lappeenranta University of Technology (Lead Partner), Baltic Region Healthy Cities Association, Tallinn University, NGO Development Centre and University of Eastern Finland. The University is responsible for conducting the PYLL analysis in Kalininsky District. Local authorities from Kalininsky District as well as those from St Petersburg (e.g. Public Health Care Committee) are involved in the project. The project is co-funded by European Union.

2.3 Baltic Region Healthy Cities Association

Baltic Region Healthy Cities Association, based in Turku, Finland, aims at increasing the awareness of local governments to take health as a central part in the decision making process in municipalities. Since 2002 the Association operates as World Health Organization Collaboration Centre for Healthy Cities and Urban health in the Baltic Region. The WHO Healthy Cities movement promotes comprehensive and systematic policy and planning for health. It emphasizes participatory governance and the social, economic and environmental determinants of health and seeks to build a local level movement for health promotion.

Benchmarking between the members from Healthy Cities is promoted and new cities, networks and programmes are invited to join. Baltic Region Healthy Cities Association cooperates with health promotion experts and participates in health promotion projects.

Baltic Region Healthy Cities Association was founded in 1998 to promote health conditions in urban areas in the Baltic Region and to support WHO policies, which concentrate on urban health issues.

Members of Baltic Region Healthy Cities Association are University of Turku, Åbo Akademi University, City of Turku and Social Insurance Institute of Finland. Their expertise is used in the work of the Association. The Association develops, maintains and strengthens knowledge in health and well-being promotion in the cities of the Baltic Region.

3 Conclusions

Both projects described above, show that the municipalities have a strong power and great opportunities to take the actions in order to tackle the rising health inequalities. They are able to establish a solid partnership with research organizations (universities, colleges, analytical institutions) in order to carry out the studies that reveal the facts about the health situation in municipalities. The methodologies used vary: from the general population surveys to the statistical analysis of the death certificates. The results are reported to the local authorities and followed by recommendations for the evidence-based policy interventions on the local level. What is important, the approach bases on the stakeholder involvement philosophy, and includes the consultations with several sectors, non-governmental organizations and inhabitants when elaborating the action plans. HEPROGRESS as well as Healthier People are pilot projects of their kind. If successful, they may serve as examples of what municipalities can do to tackle the health inequalities.

Phone Model Based Remote Home Automation Controller for Blind/Visually Impaired

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Abstract. The approach presented in this article utilizes a standard, generic mobile phone as a communicator item to remotely control various home automation tasks, mimicking the self-service “call-center” and providing a voice dialog based HCI mode. This low-cost, flexible multimodal approach combines the dynamic speech recognition and synthesis possibilities of a remote PC serving as an automation controller. The design, architecture, control algorithm and initial evaluation by blindfolded users (both on accuracy and usability) are presented in the text.

Keywords: speech recognition, phone based control, automation for visually impaired

1 Introduction

The visual impairment is a major health issue which is unequally distributed and supported among the WHO regions. Worldwide, the number of people visually impaired is estimated to be 285 million, 39 million of whom are blind, with uncertainties of 10 – 20%. People 50 years and older are mostly affected and represent 65% and 82% of visually impaired [1]. The living and well-being of the disabled including the visually impaired is on the priority lists in the policies of EU and most civilized countries. Robotic and automation technology solutions for today and for the future help these people to live better, safer and longer.

Home Automation industry is growing rapidly and by design should provide the support and assistance for the elderly and the disabled (especially those who live alone) still complying to various household standards and convenience of usage [2]. The usage of speech recognition technologies is one of the possible solutions [3]. Mobile and wireless technologies can be used to realize navigation systems in intelligent environments [4]. A sensor-based multimodal platforms can be trained to recognize the activities of an elderly person [5] providing an important element of care and support environment.

Speech technologies are currently considered to be essential for providing general purpose interfacing besides providing accessibility for the people who are visually impaired. Even more - in the state-of-the art of the accessibility field, the speech communication channel is considered as one of the most important modality to bene-

fit the blind and low vision persons [6]. Modern technologies utilized in home automation systems can offer extensive possibilities to improve the individual's life. Most older and disabled people problems with the usability of typical technology-centered solutions and avoid that technology, leaving speech recognition and TTS suitable for creation of user friendly interfaces, even if a large effort is required for adaptation, from the design of the user and system interfaces, to the installation of devices [7]. Modern speech recognition technologies allow the imitation of human-human dialogs in the human-machine communications, allowing a human operator to concentrate on various tasks through spoken dialogue [8].

The overall need for access to low-cost assistive technologies by utilizing standard devices is clear. A lot of special purpose commercial devices are specialized for few functions, are usually not networked, are expensive and difficult to sustain. The visually impaired have limited access to the world of mobile technologies so the UI must overcome limitations of reliance on visual display and lack of audio and tactile feedback. Studies such as [9] confirmed that such devices can enhance the capabilities of visually impaired users of handheld mobile devices showing a huge promise for an improved accessibility to blind people on the go [10]. The results of the survey on current state and future needs of visually impaired mobile phone users showed [11] that many visually impaired users were making use of speech technologies to access the internet services. Alternatively such devices combined with GPS could also add the freedom of movement [12] by providing location-based services and talking map software.

The approach presented in this article utilizes a standard, generic mobile phone as a communicator item to remotely control various home automation tasks, mimicking the self-service "call-center" and providing a voice dialog based HCI mode. Naturally the main carrier of I/O is sound supplemented by a touch interface (or buttons on older phones) for additional I/O features. This low-cost, flexible approach combines the dynamic speech recognition and synthesis possibilities of a remote PC (accessible via a regular or VoIP phone call) serving as an no learning curve automation controller (utilizing the inexpensive USB HW relay interface) for visually disabled (and not only) people.

2 The Concept

Home automation systems are integrated in many homes to meet the needs of comfort, security and efficiency of the residents. Mobile electronic devices such as tablets and smart phones can provide location independent access to the internet [13]. Home automation frameworks [14] includes the automation of various tasks such as control of energy and resource consumption, lighting and climate, security, entertainment systems and supervision of home environment [15].

Controlling homes using phones is not a super novelty but has its advantages along with the rising number of the phones sold worldwide. The affiliated home control interfaces can control each home appliance's full functionality and are consistent with the phone's other interfaces [16]. The concept of the multimodal approach is illu-

strated in figure 1. The use of the existing I/O interfaces provided by a typical modern phone (video camera, speech input and touch screen) were selected and combined with a Microsoft Office Communications Server (OCS) tools for remote processing and running proprietary control algorithms. The communications could be done either by a GSM data session (voice call with OTA services) or by typical SIP based VoIP capabilities provided by the OCS platform. The remote server hardware connected to the Phidgets USB interface and relay block allowed to model the control of connected home devices.



Fig. 1. A concept of the multimodal approach

3 The Implementation

On the client side the goal was to provide as natural and familiar as possible user interface so in the end it was decided not to modify a call system for voice and touch calls, and use a video call system for those sessions where video processing was necessary. Basically all input operations (not processing) were done on the client side so a typical smartphone interaction model was used (fig. 2) allowing a natural, familiar and user friendly call HCI modeling.

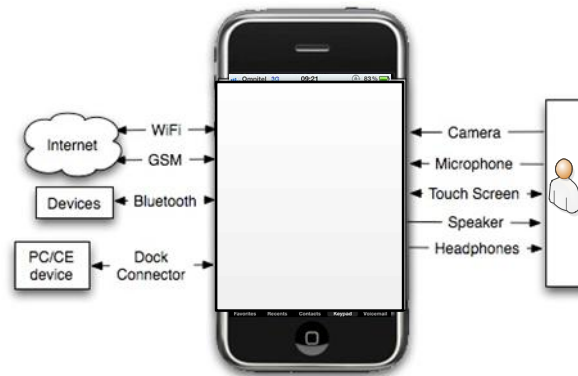


Fig. 2. A typical smartphone interaction model was implemented on a client side

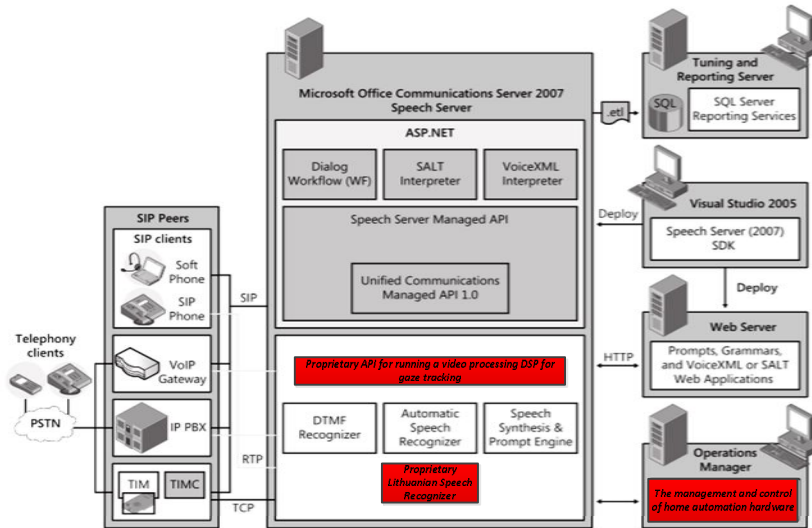


Fig. 3. A server side architecture (added components in Italic font)

A server side architecture based on an original UCMA architecture [17] with added proprietary components is illustrated in figure 3. The overall framework was left unmodified (MS does not provide a source code) so additional functional features (shown in red) had to be added in program code via separate hooks. A special part of the code was added as a service for home automation hardware management and control, allowing the “translation” of the interpreted input commands into actions for connected home devices.

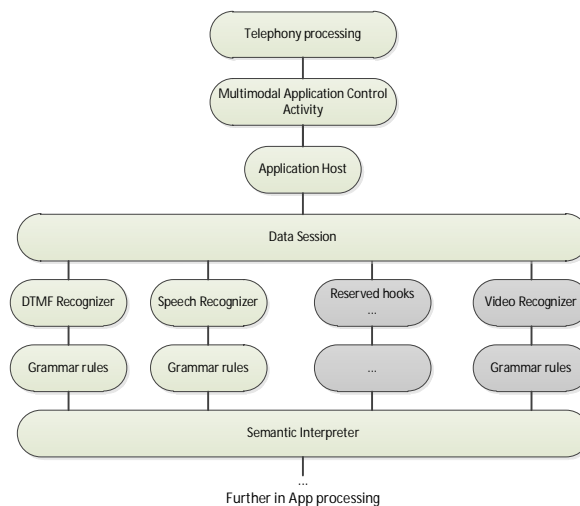


Fig. 4. A server side API object model

An advantage of this approach was that the processing of all I/Os (shown on the left) was done automatically by a server requiring no further programming thus allowing the use of the closed-source commercial telephony hardware (Cisco/Acculab in this case).

A simplified server side multimodal API object model shown in Figure 4 was implemented on a typical UCMA model with the additional hooks reserved for additional components such as video processing and automation hardware controls (not shown). At the top of the hierarchy is a *Multimodal Application Control* Activity object, which has an *Application Host* property (as well as others not shown in the illustration), which in turn has a *Data Session* property. The properties on the *Data Session* object are *Dtmf Recognizer*, *Speech Recognizer*, and *Video Recognizer*. These properties are references to instances of the *Dtmf Recognizer*, customized *Speech Recognizer*, and proprietary *Video DSP* classes. An application can use these *Data Session* properties to access the members of these classes. Each of the *Recognizer* objects has a *Grammar rules* property, which is a collection of *Grammar* objects that can be used by the Recognizer. Each *Grammar* object contains one or more rules that a recognizer can use to extract semantic meaning from user input. The results of the grammars are parsed in *Semantic Interpreter*, and the perceived values are used in further in App processing and finally for issuing the automation tasks.

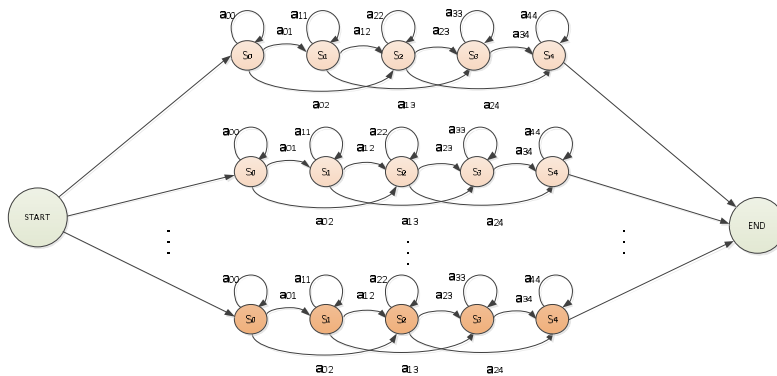


Fig. 5. A classic HMM based model used for the word recognition [18]

The system framework was added a proprietary isolated word Lithuanian recognition engine build using an HTK toolkit, as no manufactures provide Lithuanian speech recognition features. To build a recognizer capable of speaker independent recognition of Lithuanian voice commands a simple HMM model (shown in figure 5) consisting of all word models Λ_v and extended by two virtual states (start / end) was used along with the Viterbi algorithm to perform the maximum likelihood classification [18]. Classic Viterbi iteration and backtracking procedure was performed for all states $s_{(\theta,v)}$ for all HMMs: Λ_v and time indices: $t = 0, 1, \dots, (T_X - 1)$. The last path recombination for the virtual time index T_X was performed to terminate the Viterbi algorithm by doing the optimization and backtracking:

$$\delta(s_{end}, T_X) = \max_{(i, v) \in \Xi(s_{end})} \{\delta(s_{(i,v)}, (T_X - 1))\} \quad (1)$$

$$\psi(s_{end}, T_X) = \arg \max_{(i, v) \in \Xi(s_{end})} \{\delta(s_{(i,v)}, (T_X - 1))\} \quad (2)$$

In the above v is the index of a word from $\psi(s_{end}, T_X)$ containing the best path from all possible word ends to s_{end} and considering the maximum likelihood approach is the target of classification.

The Lithuanian TTS engine was implemented for some dynamic information feedback via voice. A system natively allows the additional companion audio (beeps, informational prompts, etc.) for the blind / visually impaired.

While in reality a recognizer was capable of recognizing only the isolated commands a proven approach was to also employ OCS built-in tools to allow more natural dialogs. Two HMI schemes were developed (see figure 6): the first simulating the *natural conversion*; the other – (in principle faster) allowing a direct control (i.e. standard remote controller principle “I do this *action* for that *purpose*”).

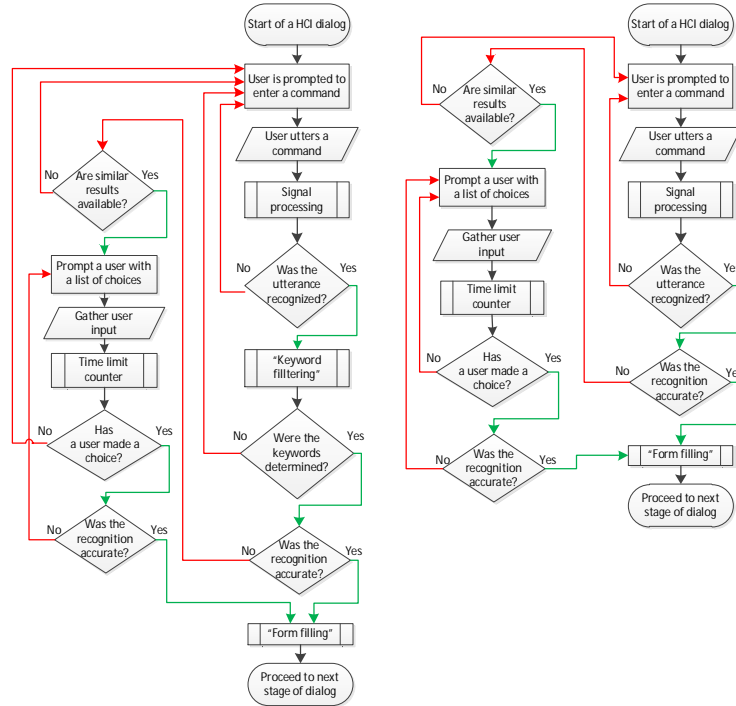


Fig. 6. HMI models used (“keyword spotting” on the left, “isolated commands” on the right)

The first HMI model (shown on the left) was set to allow the processing of natural speech allowing the use of naturally sounding commands (i.e. “I want to set up the temperature to 30 degrees Celsius”). The speech recognition grammars were configured to run in keyword (the important words with a specific semantic value) spotting

mode. The keyword picking was done by a built-in recognition tools as previous experiments on multilingual features proved it quite capable to recognize the Lithuanian words [19]. This way a user can speak naturally and a system only catches the important words (in this case “temperature” and “30 degrees”), sends them to Lithuanian recognizer, assigns the appropriate semantic values and passes for further processing and finally jumps to a next stage in dialog. So in principle after a person utters a command, the input signal is processed and the word is checked against the recognition vocabulary if such a command is possible. If so – the confidence value of the recognized phrase is measured and if it is high enough the semantic value is used in further processing. In case of an unclear recognition (system sees a few choices as similar) an n-best strategy sub-algorithm might be powered and a user might be offered not to repeat the phrase, but to choose between the ones offered to him (the most similar results). The biggest advantage of this approach over the isolated words – is the added naturalness, while still maintaining (hopefully) the high enough recognition accuracy.

The second HMI model (shown on the right) basically differs only in the dialog flow working in simpler “ping-pong menu” principle (i.e. “Say the action you want”. –“Set temperature”, “How many degrees?”, –“30”).

4 Experimental Setup and Evaluation

The hardware of this experimented consisted of a server built on a typical Intel Xeon platform running Microsoft UCMA Speech Server software as well as 128 channel Acculab digital telephony board connected to Cisco 2800 router provided by a local mobile operator Omnitel for a GSM access. Home automation part was implemented using a phidgets USB interface (connected to a server PC) and compatible relay block sending signals to the connected home devices. A Nokia C5 mobile phone with Jawbone bluetooth headset was used as a client device.



Fig. 7. A guide wire system to mimic the navigational capabilities of real blind person.

The speech based remote control system was tested on 10 people (students and professors, age from 22 to 38, 3 females, 7 males) with a goal to compare the performance (time wise), clarity of the interface (the naturalness of the HCI dialog flow),

overall usability rating (subjectively), and naturally the overall recognition accuracy. Since none of our 10 test subjects were really visually impaired they have been blind-folded and a guide wire system (see figure 7) was devised to somewhat mimic the augmented navigation capabilities of a real visually disabled person. 5 tasks, ranging in difficulty were presented to each of the participants. The starting point was a table in the middle of the room (~15 m²). The first task was to turn on the fan on the table, the second – to navigate and turn on (or off) the light switch; the third – navigate back to the table, turn on the music (press play button), and set a chosen (from 1 to 10) track; the fourth – navigate to the heater, turn it on and set to 1/3 of the scale (making it necessary to find the range of a dial); the fifth – find a security console and enter a 4 digit pin code using a keypad (the center key (number 5) had an indentation on it).

Prior the experimentation all users were instructed and familiarized with the system. Before doing the manual control tests they were allowed to try to complete a task a few times, as real blind people are also familiarized by third parties with their living environments. The following parameters were measured: a) the speech recognition accuracy; b) the time-frame necessary to complete the task using speech controller (both HMI dialog models) and manually; c) the subjective user evaluation of the HCI interface (in hope on further improving the effectiveness of HMI dialog).

The results of speech recognition accuracy are displayed in figure 8. Each user was asked to pronounce each command 10 times. Users were briefed about the dialog models (knowing what to expect from the interaction).

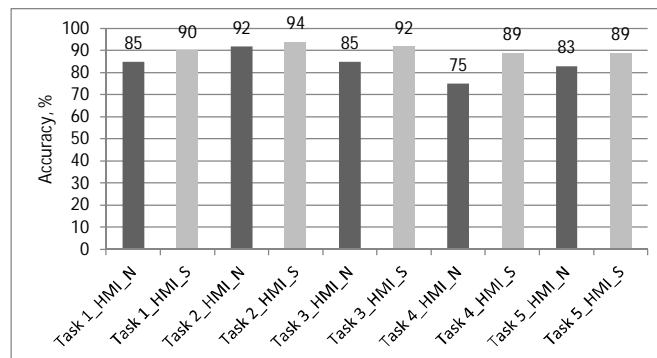


Fig. 8. Results of the speech recognition accuracy

The performance of the recognizer was mostly limited by our proprietary Lithuanian ASR engine. The average recognition accuracy for “natural” dialog models was 84,0 % and 90,8 % for “simple commands”. This trend was noticeable for all tasks, both for the “natural” dialog mode and for the “simple commands” mode. This has to do with the architecture of our implementation, as in principle the engine only supports a small vocabulary. The keyword spotting (out of the whole naturally sounding sentence) part was implemented using speech server tools, while the picked out keywords were sent to a Lithuanian recognizer for further processing. A limitation this method has is the speed of pronunciation, as to pick up the keywords reliably the user

has to speak clearly. The tasks with less semantic information were recognized somewhat better, typically by a few percent.

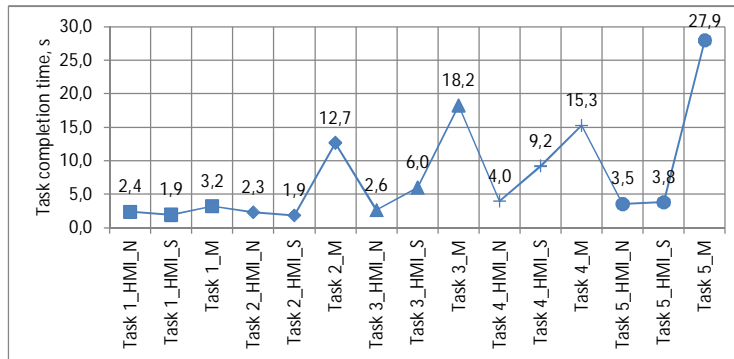


Fig. 9. Time-frame necessary to complete the task

After the speech recognition experiments all participants were asked to repeat the task manually: finding and flicking switches, entering numbers, setting dials, etc. The time comparison charts are offered in figure 9. The times for speech controller were measured during the speech recognition experiment (the task time-frame was measured from the system pick-up (dialog start) to the successful recognition of a final command). The times for the manual mode of control were measured by a automation HW clock (a start/reset contacts was always set manually, a stop contact was automatically set by a relay when a user successfully completes a task). As one could expect the automated tasks were executed much faster: on average 3,0 s and 4,6 s for speech based control (“natural” vs “simple menus”), and 15,5 s for manual control. The more complicated tasks were executed a bit faster in “natural” speech mode as the user had to “navigate” trough menus in the “simple command” mode (2,4 s vs 1,9 s). The vice versa was noticed for the less complicated tasks (3,4 s vs 6,3 s). In manual mode the most difficult (time consuming) task was entering pass code, this took on average 27,9 seconds (users had trouble figuring which button to press to enter a correct sequence).

Finally all the users were asked to subjectively evaluate the system, rating from 0 (worst) to 10 (best) the overall usability in current build (not imaginably ideal) conditions. The averaged results of the survey are presented in figure 10. The preliminary results have shown that the majority of users preferred the automated solution over the manual control. The natural dialog based control scheme was rated on average at 7,8/10, the more simple and less natural but more accurately recognized single command mode was rated at 8,1/10, while the manual mode was rated worst at 3,3/10. Naturally some of the results would differ if the tests were done by really blind people as they have much better perception of the environments than the non-disabled people do. But generally this technology has its advantages due to simplicity in use (really is just mimicking a telephone conversation) and ease of implementation. As the points on where to improve, the users mostly noted a “not good enough” Lithuanian recognition accuracy level and the low intelligence of the “natural dialog” mode since the

commands still had to be spoken according to some basic rule set and not as freely as in everyday conversation (this was the main reason why the majority preferred the more simple dialog mode). Another problem was that most our users were young, technically very educated and were expecting Apple Siri level of intelligence in our system, though we think the real target audience (blind personnel) would cope better with this system as they are more used to such simple software and hardware solutions.

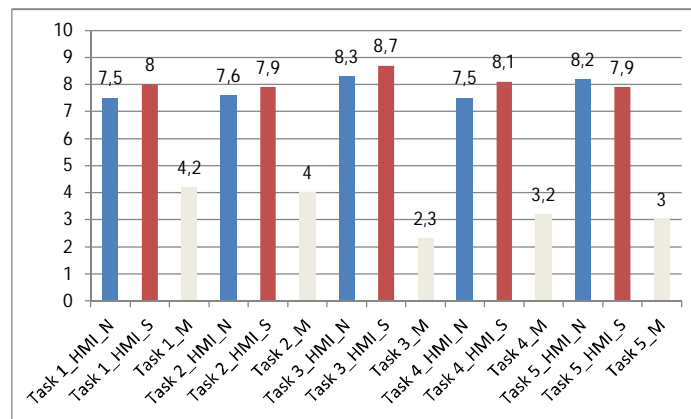


Fig. 10. The averaged results of the usability survey

5 Conclusions

A standard, generic mobile phone, usable by blind and visually impaired people, in principle could be used as a communicator item to remotely control various home automation tasks, mimicking the self-service “call-center” and providing a voice dialog based HCI mode, while supplementing a system by a touch interface (or buttons) for additional I/O features.

A performance of such systems is often limited by that of the recognizer implemented. The average recognition accuracy of the Lithuanian ASR used for “natural” dialog models was 84,0 % and 90,8 % for “simple commands”. This trend was noticeable for all tasks, and for both dialog modes provided. The tasks with less semantic information to process were recognized somewhat better, typically by more than a few percent. As expected the automated tasks were executed much faster: on average 3,0 s and 4,6 s for speech based control (“natural” vs “simple menus”), and 15,5 s for manual control. The more complicated tasks were executed a bit faster in “natural” speech mode as the user had to “navigate” through menus in the “simple command” mode (2,4 s vs 1,9 s). The vice versa was noticed for the less complicated tasks (3,4 s vs 6,3 s).

The preliminary results of a usability survey have shown that the majority of users preferred the automated solution over the manual control. The voice based control

schemes were rated on average at 8,0/10 and the blindfolded control was rated at a very low acceptance level of 3,3/10.

In general this technology has its advantages due to the simplicity in use and implementation and it could be further improved with a better quality recognizer and semantic engine, as well as a dialog management system allowing users to speak in a more natural way and to execute the more complex tasks.

Acknowledgment

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Housing and Communality in Sustainable Urban Planning

– Services for Housing and Wellbeing

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Abstract: Consumer behavior is key to the impact that society has on the environment as consumer choices of products and services have direct and indirect impacts on the environment, as well as on personal and collective wellbeing. This study aims to investigate a new kind of sustainable services for housing and wellbeing in the urban planning. The investigated case in this research focused on the users of the services (demand) and the service provides (supply) at a certain pilot area in downtown Helsinki. The results of this research show that residential living is differentiating when working, health care, education, and consuming are coming part of the housing. Residents are becoming customers. As a conclusion, we argue that areal serviceability plays an important role in the sustainability of a neighborhood.

Keywords: sustainability, services, communality, housing and wellbeing

1 Introduction

Sustainability is commonly defined as long-term maintenance of wellbeing that contains environmental, economic, and social aspects [1]. In the context of housing, a great deal of effort has been put into developing and investigating both environmental and economical solutions. This has its effects in urban planning in terms of considering the environmental impacts of the buildings in general. However, the social aspects have got less attention.

Consumer behavior is key to the impact that society has on the environment as consumer choices of products and services have direct and indirect impacts on the environment, as well as on personal (and collective) wellbeing. A collaborative community learning, sharing and exploring new approaches towards sustainable lifestyles is a part of sustainable development and social sustainability. This part of ecosystem in the context of housing means those services that support environmental friendly behavior.

This paper aims to investigate a new kind of sustainable services for housing and wellbeing in the urban planning. The structure of the paper is following: First, the

overview of housing trends, wellbeing, housing and sustainability are presented. The next chapter is about former studies in the area. The third chapter is about an empirical study conducted and the results are discussed as a part of the conclusions and recommendations.

1.1 Insights to Housing Trends

The current global trends are affecting customers' housing preferences. The trends that we have found significant are slow living, de-growth and homing as well as increased focus on sustainability.

Slow living refers to the phenomenon where customers enjoy doing homely tasks peacefully, avoiding stress and hurry. This trend also emphasizes that we can dedicate more time in travelling and that there are alternatives to daily traffic jams.

The degrowth trend seeks content living excluding the pursuit of economically growth. This trend advocates the downscaling of production and consumption. After degrowth at the individual level, degrowth is achieved by voluntary simplicity.

Homing emphasizes enjoying spending time at home and with family and friends. Homing includes also the feeling of joy that a person experiences when engaging in their own crafts project.

1.2 Wellbeing, Housing and Sustainability

From the individual point of view, wellbeing is a many-sided concept that includes experiencing high levels of pleasant moods, low levels of negative emotions and moods, and high satisfaction [2]. Human wellbeing naturally necessitates also a physically healthy environment. It is clear that wellbeing and social sustainability are interacting in many ways and on many levels even inasmuch that both concepts are partly overlapping.

According to Dempsey [3], sustainable communities are related to the collective aspect of social life. She defines five inter-related measurable aspects of community sustainability, which are

- Social interaction / social networks in the community
- Participation in collective groups and networks in the community
- Community stability
- Pride/sense of place
- Safety and security

Today, the first two of these aspects are taking advantage of new virtual means and services. An individual's community is not any more only his or her local neighbor-

hood but is created by individual choices made in the Internet. The local corner shop can be found today in the Internet and the customer's preferences are directing the customers' choices more than the location of service provider.

Cuthill [4] argues that social sustainability entails four components which have specific roles in social sustainability. These are that:

- Social capital provides a theoretical starting point for social sustainability;
- Social infrastructure provides an operational perspective;
- Social justice and equity provides an ethical imperative; and
- Engaged governance provides a methodology for working together.

In this research, we are interested in the second component, the social infrastructure. The social infrastructure includes in addition of the hard infrastructure such as school and health buildings the soft infrastructure. The soft infrastructure might include both provision of community services that respond to the identified needs of communities and building the capacity of citizens and community groups to work together with governments for a sustainable community. [4]

In our previous research [5] we found out that the components of wellbeing indicators and the targets of urban sustainable housing are connected and interacting both in the physical and the social context. The components of wellbeing indicators that are interacting with housing can be clustered into five groups: Quality and healthiness of life, sustainable consumption choices, possibility to community based life, daily travelling, and emissions and ecological footprint. These clusters of components can be social or physical by nature. (Table 1). In addition, also virtual solutions for services are arising all the time.

Table 1 Nature of wellbeing components linked to sustainable housing

	Social	Physical
Quality and healthiness of life	X	X
Sustainable consumption choices	X	
Possibility of community based living	X	
Daily travelling	X	X
Emission and ecological footprint		X

In sustainable housing materials, air condition and other physical conditions are aimed to be as healthy as possible. Investing to a sustainable house is a customer's consumption choice that is based on sustainable consuming values. Sustainable hous-

ing and co-housing aim to provide possibilities for residents to share tasks and household work and to develop social contacts. Sustainable housing is aiming to diminish the cost of commuting by location or by other solutions like car-share possibilities. Sustainable housing is also supporting pedestrianized traffic. All the planning of sustainable housing is aiming to reduce the ecological footprint of housing. Sustainable communal housing seems to increase the individual wellbeing measured by these studied indexes. Also the subjective experiences support that.

1.3 Services as Part of Social Sustainability

It is evident that in the future, urban societies demand more services from public, private and third sector in order to maintain social sustainability. In this research project, the following dynamic phenomena were found that will in the future determine the housing sector's service business area. These are

- Changes in consumption, customer oriented service design
- Changes in customership, interactivity
- Societal changes, re-distribution of responsibility from society to private sector
- Changes in work life, working in different places
- Changes in buildings, new demands
- Changes in healthcare, results of ageing
- Changes in business, globalization
- Changes in technology, new user oriented applications

It is important to develop products and services that can be adapted to new demands of sustainable housing in the housing sector and industry. Those demands are linked to capabilities to plan housing together with future residents and to improved knowledge of healthy and sustainable materials and to developing quality of construction techniques. The demand of services linked to the sustainably built environment and housing is in a state of change. The demand of wellbeing services and services facilitating the everyday life is slowly but surely growing. In this project, the business concepts of services supporting social sustainability and sustainable everyday life were developed and tested.

2 Methods and Data Gathering

The empirical data were collected from a case study in 2010. The business partners were a telecommunications and ICT service company; a large listed trading sector company, a construction company operating around Baltic area and a public limited liability company specializing in housing rental services. The research partners were from Aalto University's School of Art and Design and a research partner in cooperation was from the MIT University's MIT House_n consortium.

The case study focused on the users of the services (demand) and the service providers

(supply) at a certain pilot area in downtown Helsinki. The case brought together relevant industry actors for providing the new services by creating new interdisciplinary service products and networks. The methods used were co-creating workshops with users and stakeholders, user-centred design methods and personas as well as (Delphi) interviews, user journey and literature studies.

These seven tested service concepts were connected to four themes: Easy Living, Home improvement, Sustainability, and Social sharing. The concepts were described by properties such as idea, usage, business benefits, and realizer. Concepts and their properties likewise the physical or social natures of these services are described in Table 2.

Table 2 Service concepts

Concept	Quality and healthiness of life	Sustainable consumption choices	Possibility of community based living	Daily travelling	Emission and ecological footprint
Menu/Party/Green Box	A box with meal proposal, recipe and ingredients or a box with a ready party dinner	Product is made of local and organic food			
Common spaces and integrated logistics and activities services			There are common spaces in the neighborhood that enable community happenings	Children's activities like sports and music lessons are organized at the school so there is no need for extra travelling	There are common spaces to rent in the neighborhood for special occasions so there is no need for guest room in every flat
Refurnishing, home improvement, room space design like furnishing the balcony	Maintenance of home and its parts				

Communitarity, resident business	A possibility to be productive and a part of society also outside the work life		A local system to exchange individual services like cultivating vegetable for other residents		
Energy services, responsive housing		Timely information motivates energy efficiency			Ubiquitous home controller system that informs inhabitants of their energy consumption
Recycling service platform		A game in social media teaching the right recycling methods and giving local advice			
Local eco-angle		An individual helping neighbors in social media to make sustainable choices			

These service concepts were verified by a questionnaire with 21 correct/incorrect statements and with an open question. The open question asked to describe the most important practicalities that are facilitating the everyday life. The questionnaire was realized with help of a local neighborhood Internet portal. There were 63 acceptable answers. Respondents divided in to groups as follows

- Men (19) – Women (41)
- Under 45 years (37) – over 45 years (21)
- Single (12) – Families (48)

This case studied was based on areal serviceability. This concept was meant to facilitate the everyday life of individuals and organizations by offering integrated virtual and physical services. In the pilot in downtown Helsinki, essential developing points were producing local media content, local happenings, collaboration of local producers and local service point. The platform of this concept was a digital operational environment and a local drop-in centre.

Examples of scenario statements:

1. The new generation of consumers is more radical and influential in their choices, and are not necessarily interested in meeting the provider of goods in person.
2. Moving into a new area involves a long period of preparation and settling in. People want to feel at home already before they move. There is demand for goods and services that make this experience possible.
3. Energy awareness and sustainability become more integrated to everyday choice making.
4. The living areas will be built around themes: arts and history music, business, and ecology. This kind of a positive image is an asset to the area.
5. For family homes, the childcare provider dominates the service offering. The day care centre becomes a whole family centre.

3 Results

From the service point of view, the results of the verification of the concepts show that 60 per cent of the men and 55 per cent of the women valued high availability of services when choosing their future neighborhood. 38 per cent of families valued the sense of community but the other groups valued it less. The environmental friendliness of the neighborhood was valued by 31 per cent of the families. The answers of the open question showed that the practicalities facilitating the everyday life were communality, good public transport connections, and services.

The results of this research show that residential living is differentiating when working, health care, education, and consuming are coming part of the housing. Residents are becoming customers. It is important to understand that they have different expectations and demands on urban environments and on the services that they will consume in their living environment. The number of services needed is linked to the level of satisfaction that the residents' living environment is offering. If the residents' living environment cannot fulfill all the residents' needs, they require more services to recompense for the lack of satisfaction.

4 Conclusions

As a conclusion, we argue that areal serviceability plays an important role in the sustainability of a neighborhood. For the environmental sustainability, services are an important way of education and motivation. Residents are often willing for example to invest on energy efficiency or recycle if these acts do not complicate their everyday life [6]. Services can offer an effortless way to residents to behave environmentally friendly. From the point of view of economical sustainability, areal serviceability offers security that the value of the neighborhood remains or grows. From the point of view of social sustainability, services offer better quality of life and build equality between individuals.

An official strategy in Finnish urban planning is to create sustainable areas. Regulations and building codes today pay attention mainly to the environmental friendliness and energy efficiency of construction. Urban planning in cities seeks to create areas with good public transport connections and high quality architecture. But how to define and plan social sustainable housing? Based on the results of this research, it is important to take into consideration global wellbeing trends like slow living, de-growth and homing in planning and to enable their fulfillment in the built environment. These trends aim to improve the quality of everyday life and they aim to shape the residents' preferences of easy and stress free living. Authorities cannot create communality but planning and regulations can support the emergence of services supporting social sustainability. In addition to physical planning, a virtual local service platform for the future area should be designed. Even if such a platform can be realized in many different ways in the future it is useful to have a functioning one already when first new inhabitants and services are moving to a new area. Such a virtual platform creates a sense of affinity among the inhabitants and the other stakeholders on the area and helps the inhabitants and services to become rooted.

Measuring the wellbeing and social sustainability of an area is a complicated task. Several national indexes have been developed but implementing them on an areal level is not possible without consequential simplifications. Thus, this study suggest that already in the areal planning phase the components of wellbeing indicators interacting with housing, quality and healthiness of life, sustainable consumption choices, possibility to community based life, daily travelling and emissions and ecological footprint would direct the physical planning.

The outcomes also offer a potential input for discussions on the objectives of communality and wellbeing. The results support increased awareness and understanding of the wellbeing of the urban areas. The proposed framework for areal communality and wellbeing is utilized in designing new housing areas and furthermore in responding to changes in existing areas.

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Information System Implementation Model and Observations

Case Health Care, Social Services and Other Service Processes in Smaller Municipalities

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Abstract. Public sector in Finland is under heavy pressure to get more efficient and customer oriented. Information systems and their development is one possibility to improve municipalities' own processes and their service offering to the inhabitants. In this study we investigated what is the status of Information Systems in municipal governance and architecture management. The situation with systems landscape and architecture is, based on our findings, very scattered and municipals do not make their decisions, for example outsourcing decisions, in a systematic way.

Based on those findings, especially in small municipalities, we created a model, which municipal ICT responsible professionals can follow-up and use when improving their architectures and system landscape to be better planned and managed, also with lower costs.

Keywords: Public sector, information systems, architecture, modeling, outsourcing

1 Introduction

1.1 Agenda

The country of Finland, with current population of 5.4 million, consists of 336 municipalities. These are larger cities and smaller countryside villages. As the figures reveal, the majority of the municipalities are quite small in size. However, each is required to deliver the basic social and communal services to the inhabitants.

The social and communal services are supported with information technology (IT) enablers. The IT capabilities in the municipalities vary. The municipalities are independent in their decision making and IT services are both local and outsourced. The government encourages for co-operation between the municipalities and for nationally provided services.

In the County of Central Finland, as part of a public sector strategy creation work in autumn 2010 (Hyvönen et al. 2011), the county wide service process and IT services status were analysed. The results showed several opportunities for improvement and development.

Single municipalities in the Central Finland County are in a challenging situation. Costs need to be kept under control, process and service continuity needs to be ensured, the government presents new requirements. Shared services as those in health care provided by the central hospital require compatibility in processes and in IT. Municipalities need to maintain and improve the service processes and related IT systems and services with quite limited (operative) resources and knowledge and experience.

1.2 Research questions

This paper builds on two parallel tracks and on an analysis, presented in figure 1. The first track builds foundation from existing literature and models and proposes a method for the smaller municipalities to use in their coming decisions and implementations of information systems. The second track provides data and analysis of the current situation of information systems in the municipalities in the County of Central Finland. The analysis with findings and conclusions compares the current situation against the proposed model and proposes practical next steps.

By building on the assumptions that

- smaller municipalities are quite heterogeneous in comparison with each other, in the area of service processes; and
- smaller municipalities are guided, even forced towards more common information systems (IS) and technology (IT) to support the service processes;

the research questions of this study are:

- What are the key elements and capabilities in planning an implementation of an IS which a smaller municipality should consider? With special focus in decision making regarding the implementation.
- In which of these key elements the municipalities have biggest challenges and gaps?
- How can the municipalities overcome the challenges and gaps in practice when new IS implementation needs arise?

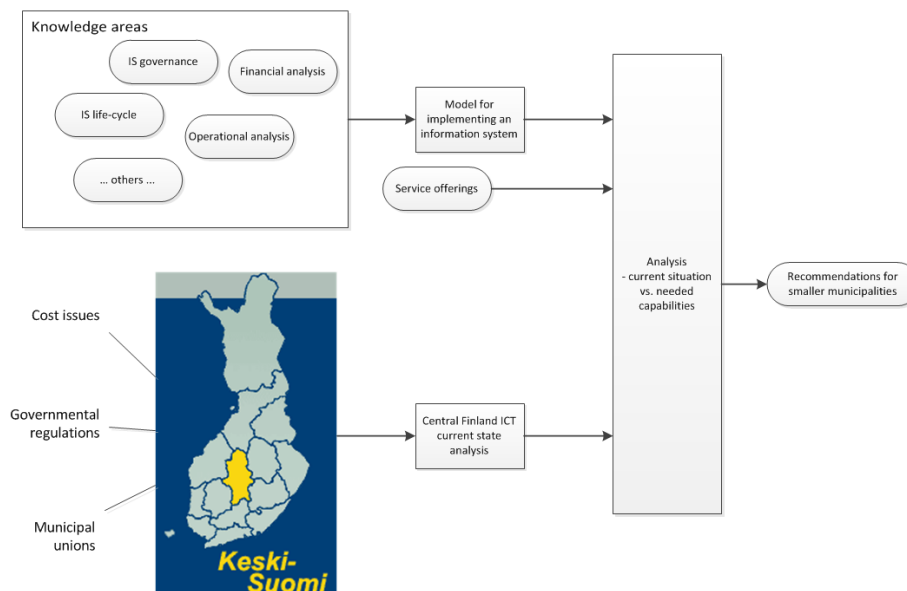


Fig. 1. The leading idea of the study

In the context of this study the term small municipality refers to 22 out of 23 municipalities in the county of Central Finland which are smaller in size than the city of Jyväskylä. Largest municipality in this class is Jämsä with 22 621 inhabitants (Väestörekisterikeskus 2011). In comparison to national level this definition of a small municipality refers to 293 municipalities (87%) of the total of 336. The small municipalities cover 37% of the total national population of 5,4 million.

2 Underlying theoretical framework

2.1 IT outsourcing

IT outsourcing has several definitions. In this study IT outsourcing is scoped to include the services which are sourced from external sources for the organization. In some cases outsourcing is usable when certain support functions can be delivered faster, with better quality or cheaper than own functions are able to do that. If tasks in question are not organization's core competences then those tasks are candidates for being contracted out (Lankford et al 1999).

Traditionally the key reason to outsource IS has been cost efficiency and savings. However during the last decade reasons have been more linked to strategy, availability for new technologies, competencies or speed. (Dibbern, Goles, Hirschheim, Jayatilaka, 2004).

Transactional Cost Theory (Williamson 1985) defines three dimensions why IT outsourcing happens. Those are transactions frequency, specificity, uncertainty. The

biggest reason to cause uncertainty is lacking information. In case a decision maker could know and handle all the available information the contract could cover all the coming issues. The longer is the contract the more uncertainty there is.

Information Systems (IS) have been created and operated traditionally by company internal IT organizations. Willcocks et al (2004) describes a model which is called “Do-IT-Yourself” (DIY). The potential benefit in this model is to keep easier control over IS but the risk with this model is that competency development is not developing and cost efficiency is not gained because of increased legacy. During the last two decades the outsourcing trends have been growing. The first outsourcing cases were mainly IT operations, such as computing, but Kodak Eastman started a new trend in outsourcing in 1989. IS outsourcing has been transforming to wider form and especially after year 2000 the entire business of business processes has been growing rapidly. For example Business Process Outsourcing (BPO) grew more than 25 percent per annum during 2002–2003 in the United Kingdom (Willcocks et al 2004) and that trend has been continuing.

2.2 Information system as a work system

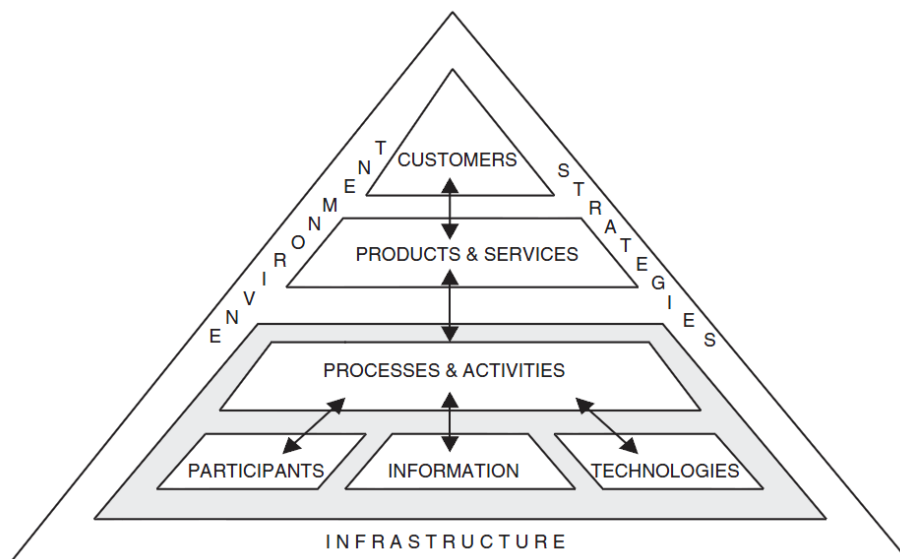


Fig. 2. The Information System structure (from Alter 2008)

The information system (IS) concept used in this paper as a foundation is built on the elements provided by Alter (2008). In Alter’s model the information system is regarded as a case of a work system. The figure 2 presents the different elements of an information system, which are

- customers: the people who are satisfied with the information what the system produces
- products and services: the (value adding) product of the IS
- processes and activities: descriptions of how products and services are created
- participants: people with adequate skills who act as operators of the system
- information: the data in the system
- technologies: tools and applications of the system
- infrastructure: the generic information technology elements and networks
- environment: usually the organization where the system is placed and located
- strategies: provide guidelines and business level requirements for the system

2.3 Information system governance and life-cycle

A governance model provides a structure for linking the strategic management of information system with the business objectives of the organization, including the investment decisions.

A widely used framework in IS governance is COBIT (by ISACA) for establishing a set of information technology (IT) controls for different organizations' professionals to use. The COBIT model connects business objectives with information technology strategic levels, which are realized through IT development and operational domains. The COBIT framework is aligned with more detailed methodologies, such as ITIL (itSMF 2007), PMBOK (PMI 2008), CMMI and TOGAF (OpenGroup 2010).

Life Cycle Costing (LCC) refers to total cost of ownership. This way of calculating and estimating costs cumulating over investment life time refers often to total cost of ownership (TCO). This approach offers methods to estimate also other costs than capital costs of acquisition, such as maintenance, operations, ramp down and also business interrelationships to avoid the situation or errors in calculation, where low development costs may lead to high life time costs, e.g. in maintenance. LCC takes account of timing of cost flows and also includes cost risks (Norris 2001). Because it is critical but complex to calculate benefits during outsourcing life-cycle, some methods have been developed. PENG model (Dahlgren et al 2002) support decision making by calculating gross benefits, including direct, indirect and difficult valued costs are compared to of benefits. The calculated net benefit is the key to make the right decision.

Several models have been created for IS life-cycle management. In a model by Alter (2008) the basic structure of the life-cycle is iterative, containing phases from initiation, through development and implementation, to operation and maintenance. New needs for re-design will re-start the cycle.

For managing a portfolio of Information Systems, both design and operations, the IT Infrastructure Library ITIL provides a widely adopted iterative life-cycle model (itSMF 2007). The life-cycle evolves through stages of strategy to design, to transition, to operation. Each of the stages and the whole life-cycle has a built-in continual improvement element.

2.4 Information system requirements

Since strategies are the directions for business operations and the supporting activities in an organization, the existence and development of services enabled with the information systems should derive from these strategies. Referring to Heikkilä et al. (2011) the key requirements for the different service components in an information system can be defined in a logical way, in two main phases. These successive phases are (1) the analysis of the business model and (2) a closer operational analysis for each service component. Figure 3 highlights the key elements of these two phases.

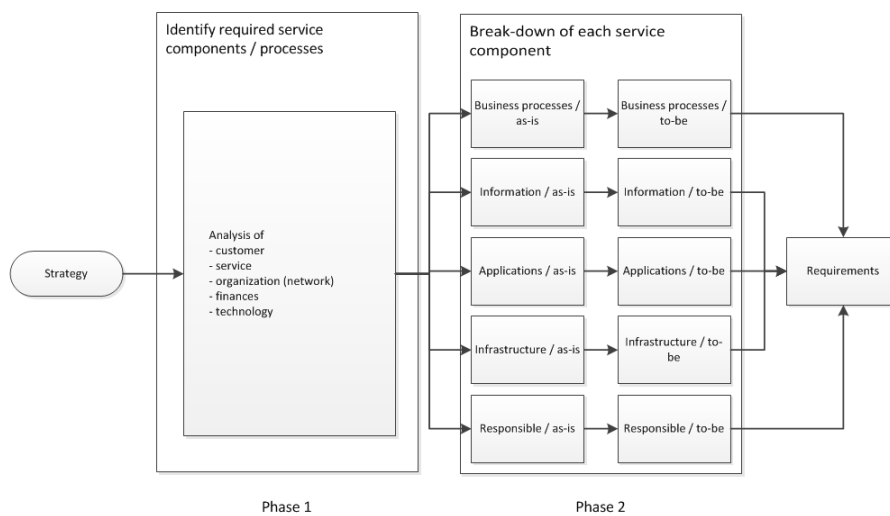


Fig. 3. IS requirements derived from the organization's strategy

The business model analysis of the strategy derives answers to a set of key questions. The analysis is made from a customer orientation view and covers the areas of

- customer
- service
- organization (network)
- finances
- technology

This is done by defining and breaking down the strategic elements into manageable targets and needs. From IS perspective the definition of required processes forms the basis for IS development and for IS delivery.

Our focus is in the service definition. For each business or customer segment a question of "What are the service components for the customer segment?" will be answered. In addition, across all customer segments, common service component needs will be recognized and noted.

In the operational analysis, each of the recognized service components will be analyzed for the current as-is and the required to-be status. Each service component is broken down in further detail levels of analysis, as shown in the table 1.

RESOURCE ORIENTATION	Service component A		Service component B		Key Performance Indicators
	As-is	To-be	As-is	To-be	
Business processes	What processes there are?	What processes there should be?	What processes there are?	What processes there should be?	Metrics for measuring the success in terms of strategic goals
Applications	What applications are used?	What applications are needed?	What applications are used?	What applications are needed?	Metrics for measuring the success in terms of strategic goals
Information	What information is available?	What information is required?	What information is available?	What information is required?	Metrics for measuring the success in terms of strategic goals
Hardware	What hardware/infra is available?	What hardware/infra is required?	What hardware/infra is available?	What hardware/infra is required?	Metrics for measuring the success in terms of strategic goals
Organisation	Who is responsible?	Who should be responsible?	Who is responsible?	Who should be responsible?	Metrics for measuring the success in terms of strategic goals

Table 1. Service component break-down (from Heikkilä et al. 2011)

The analysis levels actually define the layers of a typical Enterprise Architecture, such as TOGAF (Hirvonen 2005, OpenGroup 2010), with some enhancement to sociotechnical areas in form of roles and responsibilities. The analysis also provides the requirements for further planning and definition work. The further work can utilize delivery methods such as EA Grid by Pulkkinen and Hirvonen (2005), and operational methods of project management as described in the next chapter.

2.5 Information system projects

Project mode is a typical working mode for implementing an IS (Standish 1995). This chapter shortly describes the characteristics of project work with focus on IS cases. The model builds on the reference from the Project Management Institute (PMI 2008).

Figure 4 presents typical core phases of a project. A project, by nature, is a temporary arrangement organized to achieve a set of target. Traditionally the focus in projects has been in the execution, in the “hard” back-end. However, nowadays the criticality of the “soft” front-end is gaining increasing importance (Morris 2010). Front-end is the initiating and planning part of the project where different options and analysis are evaluated and the readiness for actual execution is prepared. The front-end focuses in ensuring that the right projects will end up being executed, thinking of “doing the right things”. This phase of a project can be quite fuzzy since options can be many and risks difficult to evaluate.

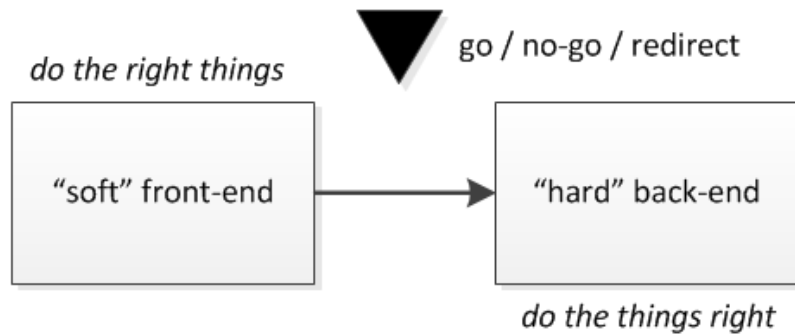


Fig. 4. Core phases of a project

The back-end execution phase (Figure 5) focuses in management of the actual delivery of the project, in the most effective and reliable way possible, thinking of “doing the things right”. Problems will arise during the project execution, new possibilities will emerge, changes will happen. These will need to be handled, thus the plans and specifications will need to be maintained accordingly and the project work managed.

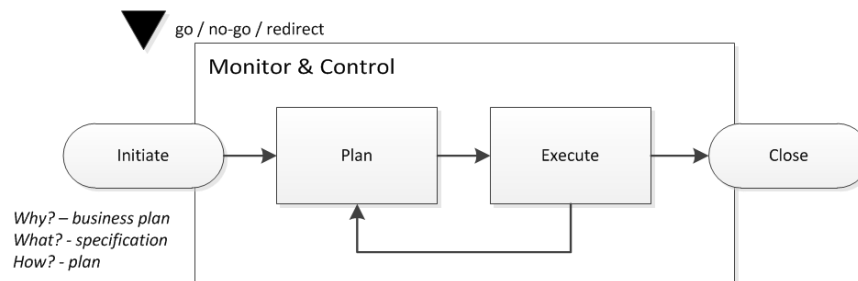


Fig. 5. Back-end of a typical project

As in any typical IT project, some critical areas require special caution to ensure project success (Johnson 2006, Standish 1995). Proper user involvement is essential in understanding the needs of the final end users and in preparing the users for the coming new system. Support and sponsorship from the executive management is critical in order to succeed in the project in general. The reason and need for the project needs to be identified, understandable and shared. The correct requirements need to be identified and the scope of the project shall be limited to fulfilling the requirements with optimized effort.

3 The empirical case study

In the study we researched 23 municipalities in Central Finland.

Multiple case study method (Järvinen P 2004) was chosen while collecting data. In our project we had no or little control over the phenomenon. Yin has described in his book (Yin 2011) that case study is a suitable approach when the key questions are “how” and “why”. Both of these questions are valid to our study and to the targeted model creation.

3.1 Case Central Finland municipal ICT

3.1.1 Research process

We decided to use the eight step model by Eisenhard (1989) to be able to create a model to support our hypothesis in a systematic way. Firstly, we created initial research questions in broad terms. The second step was to define whether to include all the 23 municipalities or part of them. With help of our sponsor in the county, we ended up to include all 23 municipalities. The third step was to choose right protocols, a list of questions with criteria for interviews. As a fourth step an e-mail data collection questionnaire was created about municipals used applications for supporting the service processes. Step number five was to choose interviewees. In order to get wide enough data, interviewees were chosen to be municipals responsible IT manager or a person who was in other role but in charge of IT. After finding the right interviewees, researchers entered the field and most of the interviews were done face to face. For two municipalities the information was collected by using e-mail. Information about the applications was collected and reviewed by email. The collected data is qualitative and based on the answers of interviewed persons. In addition, IT application information was collected by using a form. Email was used as the primary means for collecting the data and reviewing it. Step number six was to analyze data using spreadsheets. The criterias and priorities to choose the most relevant findings were agreed between researchers based on their findings. When having data, we analyzed that and step seven was for shaping hypothesis and in step eight we searched articles and literature for finding the relevant existing theories. The last step was to close the study and finalize our paper.

3.1.2 Case data

Operational and financial data of the interviews was collected on a template including 78 questions. All the questions were defined and planned in beforehand to widely answer “why” and “how” a municipality has structured its IS. The questions are in MS-Excel spreadsheet format and the results were entered to the same document. When all the interviews were done, the results were analyzed using spreadsheets and a collection sheet was produced.

The collecting of the service processes and IT applications data was smoothened beforehand in face-to-face interview meetings by discussing, reasoning and motivat-

ing. The actual data was collected by distributing system data questions on an Excel spreadsheet. The data was transferred to an Access database, normalized and sent back to the municipalities for inspection. Different reports of the data were created and distributed to the participants for feedback.

In collecting the system data the focus was in identifying the applications which were acting as enablers in a number of service process areas. In addition general IT infrastructure information was requested, as well as information of possible external parties providing the service or support. The municipalities were also requested to list on-going or planned implementation projects.

The service process areas were selected as listed below. The list originates from a survey made by Sitra, the Finnish Innovation Fund (Sitra 2010), with an aim of compatibility in collected data.

- municipal office
- daycare
- school system
- technical services
- social services
- health care
- senior citizen services
- library system
- payroll services
- financial services
- desktop publishing
- electronic transactions
- other services

3.1.3 Summary of data

Operational and financial data

Finnish municipalities spending in their ICT (information and communications technology) is low with the ICT cost percentage of 0.92 % of their budgeted revenue while the average spending in most companies is three percent of their revenue per annum on ICT. Our study shows that 84% of the municipalities' annual spendings are directed to operating and maintaining the current systems. Municipalities can invest only 16% of their yearly ICT cost budget on developing new information systems, which is on very low considering high need to develop the municipal processes further.

Service processes and IT applications

The primary data exploited out of the collected IT system data was the application data. The IT system data was viewed with connection to the number of systems in the county and with connection to the size of the population in the municipality. The col-

lected general infrastructure data was not utilized. The result of collected development project data can be summarized with a conclusion that the municipalities had development projects of their own, and typically not shared with other municipalities.

No of systems	Application	Cov of population	Service process	No of systems	Application	Cov of population	Service process
22	KuntaNet	117700	technical services	1	GIS	10800	technical services
18	Aurora	221200	library system	1	Facta	20200	technical services
18	Pro Economica	108400	financial services	1	Exchange	2600	other services
15	ProConsona	85300	social services	1	- unknown -	22900	library system
15	Primus	226800	school system	1	Apache, Joomla, MySql	20200	desktop publishing
13	Pegasos	69100	payroll services	1	Economia	20200	financial services
10	Wilma	86500	school system	1	Elisa HelpNET	2300	other services
9	Dynasty	85300	municipal office	1	Kassapankki	20200	financial services
9	Effica	205300	health care	1	Comp	129600	financial services
9	ProConsona	70100	daycare	1	Langaton Vaihde	2300	other services
8	Basware	331200	financial services	1	Basware	3400	payroll services
8	Effica	190800	senior citizen services	1	Basware	3000	health care
7	Kurre	157600	school system	1	AGS	20200	financial services
6	Abilita Vesihuolto	30200	technical services	1	- unknown -	3400	technical services
6	Pegasos	39700	health care	1	Impressio	5500	desktop publishing
6	MapInfo	24200	technical services	1	Sharepoint	129600	municipal office
5	Effica	180500	social services	1	SecretNet	20200	financial services
4	ProCapita	18400	school system	1	SAP	129600	payroll services
4	Pegasos	18200	senior citizen services	1	SSL VPN	7200	electronic transactions
4	KuntaToimisto	147700	municipal office	1	Titania	10700	daycare
4	Effica	165700	daycare	1	Pro Economica	5100	payroll services
4	Peda.net	30100	school system	1	ProConsona	5100	health care
4	CMS	10000	desktop publishing	1	Titania	4000	social services
3	ProConsona	36400	senior citizen services	1	Titania	800	payroll services
3	iManager	22500	desktop publishing	1	PlaNet	129600	technical services
3	Xcity	159000	technical services	1	- unknown -	1900	municipal office
3	Web-sivusto	139700	electronic transactions	1	Persona Regime	9200	payroll services
3	Pro Excellenta	34400	payroll services	1	Koululiitu	20200	school system
2	Pegasos	6300	financial services	1	Typo3	10800	desktop publishing
2	SAP	135100	financial services	1	Pala	20200	payroll services
2	Titania	3600	other services	1	WinHIT	22900	health care
2	Vesikanta	25900	technical services	1	Workflow	9200	other services
2	Koki kiinteistöpito	30900	technical services	1	Palvelukassa	129600	financial services
2	Effica	28400	other services	1	Mediatri	20200	health care
2	Web-sivusto	26300	desktop publishing	1	Media Cabinet	1600	desktop publishing
1	Jamix	2300	other services	1	Lotus Notes	129600	other services
1	Intime plus	9200	financial services	1	LIS	22900	other services
1	- unknown -	10800	electronic transactions	1	Sonet	20200	financial services
1	Facta	2300	other services	1	DL	5100	technical services
1	Prime	129600	desktop publishing	1	Personec	129600	payroll services
1	JD-Kustannuslaskenta	129600	technical services				

Table 2. IT applications in the County of Central Finland

The Table 2 presents the summary of the IT application data. For each Application two score values are presented. The Number of systems is a simple sum of occurrences for the application in the county. The same application can be in use in several service process areas and therefore the name of the application can appear several times in the table. Coverage of population sums up, for each occurrence, the size of the population in the respective municipality. This way the coverage describes the size of the population within which the application is in use. Service processes list the processes which the application supports.

Primary target for collecting the system data and analysis was to gain first time, even rough, understanding of the current situation across the county. The service pro-

cesses were assumed to be similar in municipalities since majority of the processes originate from legislation requirements.

Since the fields in the data collection table consisted primarily of free form fields were the names of the applications delivered in a variety of forms. This led to interpretation of the names and this led to using quite generic application names. Version differences and configuration variants were not studied – that can be done in the next phases of the study where a limited set of service processes may be studied in more detail. This interpretation led to lower granularity of the data, but the big picture in understanding the current situation was achieved.

The service process and application data presents that the variety of applications is large even when the underlying service process needs were very much the same. Another finding is that in the majority of cases the municipalities manage and operate the applications and underlying information technology by themselves, not sharing the service and its cost with another municipality.

4 Findings

This chapter presents the findings and consequent conclusions, based on the theoretical framework of chapter 2 and on the case study results of chapter 3.

4.1 Findings from the empirical case study

To build basis for answering the research questions the relevant key findings are presented here.

The overall findings of the case study in the area of operational and financial data show that ICT resourcing is not a strategic focus area for municipalities. We found in our study that only three of the 23 municipalities have clearly mandated professional in position, which is for managing and leading information systems in municipality. In smaller municipalities we did not get evidence that this kind of managing position exists. With this low level of resourcing the focus of the ICT professionals is very operative and is in installing and supporting the infrastructure and applications. Decisions to supply ICT solutions are done by other persons than ICT persons in a small municipality.

The other finding is related to investments for ICT in municipalities. The average investment to develop compared to operations is only 12 percent of the ICT budget. With that 12 percent investment municipals have to also execute the mandatory requests for changes, which they receive from government offices or ministries. The average of ICT investment is very low, only 0.92% of the overall budget. This is very low compared to e.g. with industry standard 3.5 - 4.5% of the total budget. This low level of ICT investment does not allow any bigger development steps in one municipality alone.

Only 3 of 23 municipalities have some documentation of their system landscape. We found architecture descriptions only in three bigger municipalities. These documentations were mainly lists of systems - architecture objectives descriptions did not

exists where e.g. integrations would have been documented. This kind of architecture documentation is a resource demanding effort and that is one reason why that had not been done. In one municipality ICT planner stated: “We do not have time to do any documentation, all the information is in my head”.

Though municipalities admit, that their processes should be very similar ones, they have only few common and shared applications in use. Those shared applications are such where some external from municipality is leading the function. One very well working application was for libraries but that is very small area. The largest one is for social and healthcare where regional healthcare organization has expanded their common application for social and healthcare processes during the last years.

The service process and application data presents that the variety of applications is large even when the underlying service process needs were very much the same. More than half of the different applications in use are used only in one municipality. In these cases supporting the service process area with a shared application would require change of application. The applications which are in use in several municipalities are still mostly local installations. With these applications the sharing of services could take place without a major tool change.

Only one municipality had done total outsourcing amongst the smaller 22 municipalities. They did not have any IT people in their organization. There were seven which had outsourced the main part of their infrastructure (incl. networks and servers). The rest had both applications and infrastructure operations hosted in-house. Some of the municipalities, especially in northern part of the county, had negotiated agreements with suppliers commonly but the rest had done outsourcing activities separately.

In our interviews with municipalities we did not find roadmaps or plans for the future, i.e. for 3-5 years. This kind of planning was remarkably missing in small municipalities. Also life-cycle cost management or planning was missing, according to our findings, which makes a systematic planning and fact-based outsourcing decisions difficult.

4.2 Method for smaller municipalities

The first research questions is “What are the key elements and capabilities in planning an implementation of an IS which a smaller municipality should consider? With special focus in decision making regarding the implementation.” To answer the question a method was created by pulling together from the theoretical framework of the chapter 2, focusing in the areas of findings of the case study of chapter 3.

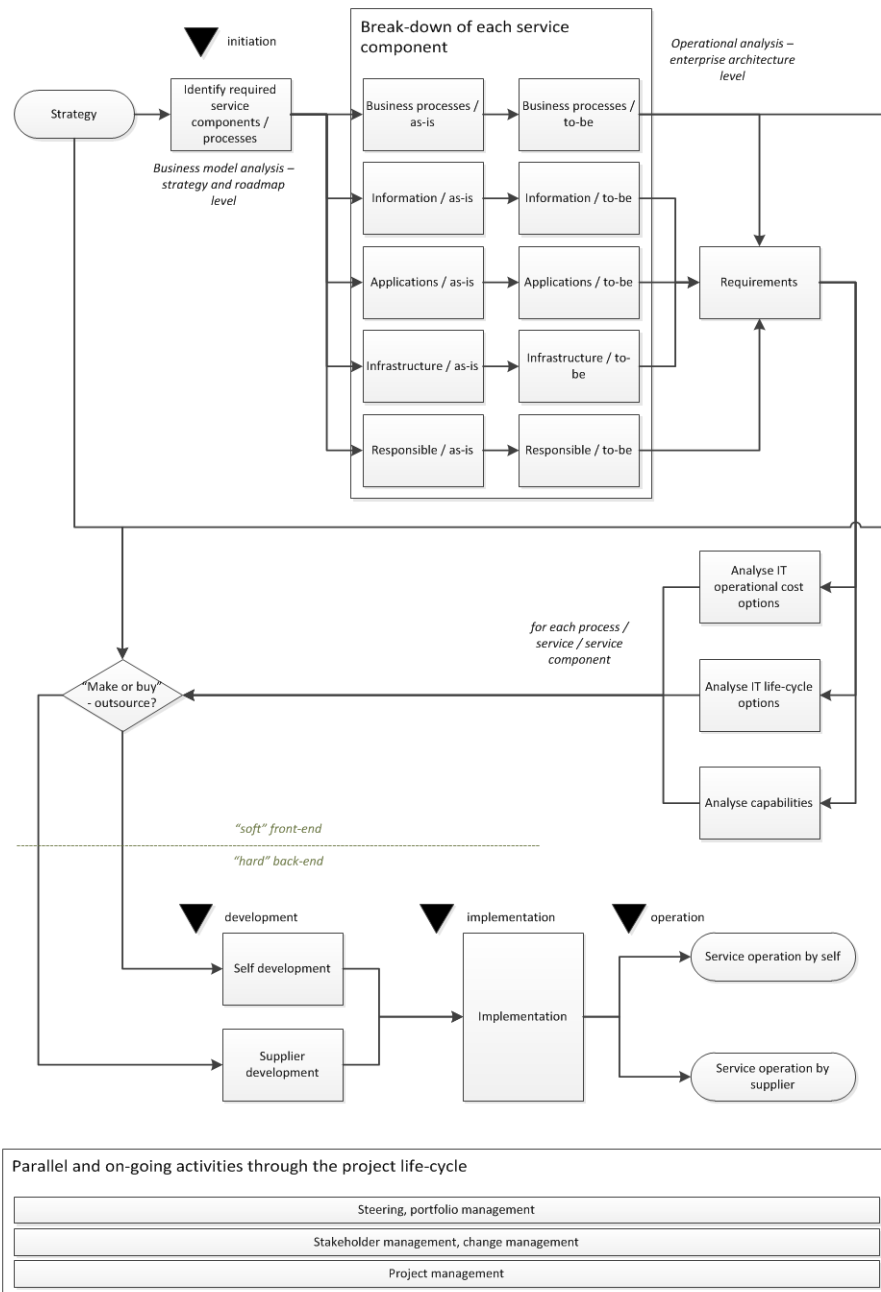


Fig. 6. Model for municipal Information System creation

The figure 6 presents the model which is created by summing up the previous chapters. The model is targeted for smaller municipalities, to provide one possible and practical way for identifying, selecting and implementing an information system.

The model proposes key activities needed in implementing an information system, leading from the organization's strategy to all the way through to the operation and use of the system. Key decision making points are identified and presented.

Parallel to the key activities lays a set of continuous activities. These have on-going characteristics; they are needed throughout the whole life-cycle of the information system creation. These activities include such activities as steering and portfolio management for the governance of the municipal IS.

The model builds on the assumption that needs for information systems raise from the organizations' strategies and support the organization's enterprise architecture (EA). Business model is a description of the strategy in practice. First step is to identify or review the required services and service components which are needed to support and realize the business model. Once identified, the service elements are broken down and analyzed. The analysis is made for the current state (as-is) and for the targeted state (to-be). The analysis areas are those of typical enterprise architecture, with additional emphasis in the people area for roles and responsibilities.

High-level requirements for the information system are derived from the enterprise architecture break-down analysis. The next step is to find out the mode of service creation and operation: "make or buy", that is whether to outsource (large or small) parts of the service creation and/or operation or not. The decision has a connection to the organization's strategy and to the nature of the business processes the information system is expected to support and enable. The analysis covers areas from IT operational cost perspective, across the whole life-cycle of the service, including as-is analysis and to-be calculations linked to strategic roadmap of the services.

According to the outsourcing decision the development of the system will be performed by the organization itself, by a supplier, or as a combination of these. Implementation can be supported by external parties but is always central for the organization itself; therefore the organization has the primary role in implementation. Service operation can be delivered, again, by the organization itself, by a service provider, or as a combination of these.

The IS creation projects or programmes can be several in an organization at a given time. The on-going projects form a portfolio which can be managed as an entity, ensuring resources and adequate management attention.

4.3 Findings in comparison to the proposed method

The second research question is "In which of these key elements the municipalities have biggest challenges and gaps?" The key elements refer to the model presented in the previous chapter. To answer the question the key elements are compared with the findings in the small municipalities.

The model builds on the strategy of the organization as the starting point in creating a new IS or updating a current one. The strategy is supported with a holistic system architecture and with an implementation roadmap. In the smaller municipalities,

according to the evidence discovered, these elements were not tied together, not all existing and primarily the strategy and related decision making dealt with single and separate IS decisions. Decision making focuses in budgetary decisions, holistic service process decisions are rare. IS development budget in general was minimal in the municipalities, as well as the management time allocated for it.

Evidence for enhanced requirements identification and development was not discovered. Typically the high level needs for the IS were identified and the details were worked out by the supplier and during the implementation work. Primarily the high level needs were governmental regulations.

Proper cost analysis from budgeting perspective was typically done covering the implementation and use costs of the IS. However, make or buy decisions were typically dictated by the very limited available own resources – thus pushing the decisions in the direction of subcontracting. Also since the holistic architecture and respective development roadmap were scarce was the cost analysis done quite narrow-sighted. Capability to study possible co-operation with other municipalities was typically very limited although exceptions existed and co-operation was done in form of shared services.

According to received information majority of the IS development and deployment work was done with a subcontractor or by the subcontractor. The range of subcontractors was wide, from international players to very local shops. This leads into losing ownership of critical information to the subcontractors and increases the challenges in managing the holistic architecture and related implementation roadmap.

The service operation phase was supplied both by the subcontractors and by the own organization and staff. In a typical case the first tier support was provided by the own staff and the second tier by a subcontractor or the application supplier. The evidence showed some but quite limited co-operation across several municipalities in sharing the service operation effort and cost.

4.4 Recommendations

The third research question is “How can the municipalities overcome the challenges and gaps, in practice, when new IS implementation needs arise?” Based on the findings and on the proposed operational model the following key points are suggested as focal points when improvements in IS implementations in the municipalities are considered.

The proposed model provides one solution for the whole chain of main events in the development and deployment chain. The municipalities can consider using the model very much as it is or adopt selected elements which are missing from their current practices.

In addition the following key points should be considered:

- high-level holistic architectures and development roadmaps – to better understand the big picture and connections across all the service processes
- in the IS requirements consider also the other municipalities – enable for the benefits of larger and shared systems

- consider the life-cycle costs in decisions of make-or-buy and co-operation – to improve cost structure
- consider co-operation with the other municipalities in general – to minimize re-inventing the wheel, to utilize the existing learnings and experiences

5 Discussion

The target was a practical study of the information systems in the smaller municipalities in the County of Central Finland. This was done from the systems point-of-view as well as from the operational and managerial views. Based on the findings and supported with a theoretical framework a practical but high-level model for operations was proposed. The current status of the IS operations in the municipalities was compared with the model and a recommendations were proposed.

The first research question of “What are the key elements and capabilities in planning an implementation of an IS which a smaller municipality should consider? With special focus in decision making regarding the implementation” was answered with the proposed management model. The model presents all the key elements and the related capabilities. The structure and the key elements of the model can be challenged and other options can be presented. However, we claim that the proposed model is practical, covering and feasible for use. It also provides all parties who are using it a shared language and process as a building block in co-operation.

The second research question is “In which of these key elements the municipalities have biggest challenges and gaps?” Gaps and challenges were identified by comparing the proposed model with the actual findings. These identified gaps were the bridge to the third research question of “How can the municipalities overcome the challenges and gaps in practice when new IS implementation needs arise?” As a solution a proposal of using the model was put on the table with some additional recommendations.

The studied topic and the proposed solutions are significant for the municipalities. The expectations for improved and lower cost operations are mounting up. An increase in co-operation is expected and therefore enhanced skills in managing IS development and a supporting model with shared language are needed. The academic significance of this study lies in applying a number of theories into one practice, thus testing the theories and recognizing potential new research areas.

The study was the very first of its kind in the county. The study was done as part of defining the ICT strategy for public sector. The current state of IS systems and operations was unknown and the first sweep in getting some overall understanding was needed. The results and data are numerous without a great detail but general understanding and a basis for further studies was reached. The study was a success and fully supported the strategy work and its approval.

Topics for possible further studies are several. The proposed model can be tested in practice in a selected service process area and validated and improved. The study can provide a current state analysis supporting planning of further co-operation across municipalities, covering areas such as architectures, roadmaps and life-cycle costs.

The model and the theories can provide tools for this work and the theories and their applications can be tested and reported.

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Information Society Adaptations for the Sensory Impaired

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Abstract. Most of the information available nowadays is obtainable fairly easily for majority of people. However, not everyone is able to follow that information quite so straightforwardly. That is the reason we need technical solutions and aids for ensuring the equality of everyone to the sources of information in the society. In this way we can support the individual in daily life and thus also assist with the continuous information flow. This also presents the persons with technology customised for their purposes and avoiding the user interfaces that might prove difficult to use for a person with sensory impairment, even though it might be quite easy to operate when the person has fully functional hearing and sight. This study discusses both state-of-the-art in technical devices as well as future vistas of how the ultimately equal information society would look like and the various means to reach the goal.

Keywords. information society, impairment, adaptation

1 Introduction

Most of the information available nowadays is obtainable fairly easily for majority of people. However, not everyone is able to follow that information quite so straightforwardly. That is the reason we need technical solutions and aids for ensuring the equality of everyone to the sources of information in the society. Different technical aids have thus been developed for this purpose. There are specialised aids for the visually impaired as well as for the hearing impaired people to provide these groups equality to obtain information in different formats, such as spoken information flow (radio, tv, podcasts) or written documents (announcements, forms, official texts, etc.).

For example when a sign language user needs to know what is written on a document in a foreign language it is possible for this person to book an interpreter for a translation of that document. It will then be a translation of that document, but since sign language does not have a written form the function of a written document will be lost. The purpose of a written document is to be stable and unchanging [4]. Each translation of that same document will be slightly different based on the interpreter or the circumstances. That is why there is a need for an automated process, which will

result in exactly the same translation of that document every time [13]. Even though the translation provides the information contained in the particular document, the function of a written document will be lost. By an automated process the information would be stable and unchanging independent of the circumstances and thus the default properties of a written document would remain constant. More precisely, the automated process would reduce the changes in parameters or would remove some of the variables that could lead to different results when the automated process is iterated.

There is, however, a continuing need for more automated data processing and conversion applications. In this study, the state-of-the-art of language technology applications as well as the future development needs are discussed. The possibility to use specialised usability testing groups is also discussed here.

2 State-of-the-art of technical aids – an example

There are specialised technical aids developed for specialised tasks such as scanning of text documents, either to text format to be downloaded onto a computer or to reading the text out loud. These technical aids, however, are mostly operable in English or German languages (such as Optilect® or AbISee® devices for automatic document reading).

Even though the technical aids, e.g. text scanners, would be capable of operating with English or German languages, the differences on text parameters, such as background versus text colour contrast, different font faces, text layout on the page, pages including both text and pictures and so on might result in differences in the output of the text scanner. When the text scanner is used by a sighted individual, these parameters in scanned result can fairly easily be taken into account, but when the user has a visual impairment, the usability of that particular device will be diminished. Moreover, the visually impaired individual might not have a priori knowledge of the contents on the page, whether it contains text or pictures.

Furthermore, there are only a limited amount of aids for the users needing Finnish language output for example when reading the information written in various documents received through post every day. That results in inequality amongst users based on their native language. There might be a more limited set of devices available for a language with less speakers. This inequality is common in several types of speaking software user interfaces.

An example where the device is working more properly might be a special document reader device that in the first stage scans documents onto an internal memory and then converts the text into sound, and in the second stage reads out the end result of the scanning to the person using the device. These devices have basically a camera to read in the text, a button to press when the reading should be done, but in some devices it might the capture process might be automatic. They read the text out loud but the output can also be transferred as a text file via a USB device or an SD memory

card (Secure Digital memory card) and then fed into the computer speaking software. Yet similar disadvantages to what was described previously have been noted in speaking document reader devices as well. In this stage, however, these devices are most often usable only in English or German languages.

Another example comes from computer generated gesture animation. The so-called talking head –applications develop facial expressions in connection to the acoustic information they receive. This has been developed into a Skype® extension software called EyePhone (SynFace, 2006). It is available free of charge and it is designed for getting the visual cues for speech when the other party does not have a web camera or when the connection is not fast or of a good enough quality for a video conference call. Using this type of extension to a VoIP software provides a hearing-impaired person with the visual cues for similar-sounding acoustic information. These visual cues are called visemes [6] [3] [11]. Some of the late deafened adults base their speech perception solely on visemes. This is often referred as speech reading or lip-reading. There are several classes for lip reading (for example <http://www.lipreading.net/>).

3 Development of language technology applications

Written language is generalised, invariant and offline – you can refer back to written documents and the documents are the same to everyone. These two main aspects might be the very reason writing has been developed. This is why writing is one of the most widely used formats for input within language applications. This again relates to the variability in both sign and speech as inputs for language applications. On the other hand, both speech and sign by default are online and highly variable and not the least because of individual differences, and this needs to be taken into account when designing language technology applications with input methods as variable as speech, not to mention sign language.

The ultimate goal for sign-to-speech interfaces is to provide a possible solution for the communication barrier between signers and speakers. There are difficulties in communication whenever there is more than one language being used within the conversation. This barrier is even harder to overcome when the languages used within the conversation use different modalities, i.e. auditory vs. visual. There is also a lack of public information to the signers. It is most often provided either via teletext applications and subtitling on a tv more generally, or by one-to-one basis via sign language interpreters. Teletext and subtitling require high literacy skills from the end user and furthermore, sign language interpreting services are not accessible 24h a day. There is a need for interpreting in an emergency, but at the moment the system is not yet fully functioning. Further development for sign applications is needed for providing general information for the signers. Sign applications would also support equality between signers and speakers when it comes to access to information. These sign applications would diminish the need for document interpreting, as described on the second page of this article, and thus would release the interpreting for other

situations where sign applications are not feasible to use. For example nowadays there are announcements on train stations about delays, current disruptions and track and platform changes for the departing trains. Sign language users cannot access this information by any means at the moment, since there are no subtitling facilities not to mention sign avatars available on the train stations and platforms.

4 Assessment of future needs for different groups

There are two approaches for assessing the future needs for the technical aids and devices. The academics and scientists are equipped with the knowledge on what has been done, both in development and production of actual devices. Scientists are also (or at least they should be) aware on what areas still need to be concentrated on and which areas lack devices that would have assets to individuals with different disabilities, be they hearing, sight or physical impairment. Different disability groups have different needs for the technical aids with regards to information society. For example the impairment in question can affect either the input or output method to the device [22]. But by default these devices should include some form of language technology module in them.

The best professionals for the assessment of future needs for different groups would be the end users in that specific group. And very often the development stage proceeds via end user questionnaires and interviews. However, this is very often an unused source of information, and thus, more flexible and innovative ways of presenting end users with questionnaires with flexibility of using different input and output methods should be studied more [5], [10].

5 Individuality and its effect on language technology applications

The different areas of research within language technology relate differently to individual features in speech. The applications fall into three different groups in this: in the first group individuality is present but the applications are not able to cope with it that well. In this case, individuality can be used as a parameter for evaluating the applications. This is done by means of word-error rate or, in more general terms, string error rate [12]. The second group of applications acknowledges individuality to be present and the applications are also able to cope with it on some level. The third group of applications is regarding individuality as an asset, something that the applications are able to benefit from.

When talking to each other, we are predefined to search for and benefit from and adapt to individual differences in speech. Moreover we use individual markers for intelligibility, too – it is often easier to understand persons we know well, especially in noisy situations. That is, we benefit from the memory traces of the individual speech markers of that particular person. But when talking with a computer the need

of individual features in speech is nonexistent, see for example [8], [19]. Synthetic speech can be and is seen as intelligible without any naturalness of the signal whatsoever (on sine wave speech, please see [17] among others). This form of synthetic speech is used in talking computers (screen reader solutions) for the visually-impaired users. These software products include NuanceTalks, Microsoft Narrator, Jaws and Supernova. These are also somewhat flexible as they can also be used for reading aloud the characters you write into your documents. Some of these software solutions also include magnification facilities such as SuperNova.

Whatever the application we are concerned with, the first steps in development should be aimed at the unanimous perceptual spaces. These are areas that all of us are unanimous of the category it represents. This is related to the innate human ability to categorise signals and items into categories. In other words, we are able to decide which items are similar and which are not. In more general terms our perception of the world is categorical. Categorical perception as such is a general phenomenon, which has been studied in various fields of human perception, such as in object [2] and vision [15] perception. Ability to categorise things develops very early on in infants and the basics of the categorisation ability are also present in other species (for a review see e.g. [1]).

A generally available language technology application with default settings is most often encoded into coping with these unanimous general perceptual spaces. When it comes to adapting the application into something custom-made, specifically adapted for the person using it, by that time the application should also be able to cope with the so-called grey areas within perceptual spaces, that is the individual features in the perceptual spaces of the individual in question. The customization might involve adapting to ways of speaking (speech recognition), hearing status (speech output features), adapting to typing errors (language-specific string frequency information), different application input methods (gesture-based commands, see [21]; eye-track based commands, see [18] and so on).

When designing an interface for signers, the same principles as mentioned above have to be taken into account using the visual channel. This would involve, for example in sign recognition task, tracking of an articulator (for example a hand), tracking of movement envelopes (as defined by [23]), annotating movement envelopes and comparing the annotated movement envelopes with the movement-based sign lexicon (sign recognition). There are various projects around the world involved in sign recognition, but these most often are limited to a small set of lexicon [14][20] and [7] or are more interested in gesture recognition [9] [16], which bears the same principles as sign recognition, but is often more robust than what is needed in sign recognition tasks.

6 Future vistas

In the future it could be possible for example to search for information by signing to a computer which would then recognise what has been signed (sign recognition),

convert that into e.g. a Boolean search (sign-to-text conversion), get results in e.g. text format and then convert those results into a signed avatar input (text-to-sign conversion), which would then be provided to the person searching for information as a signed utterance (sign synthesis and avatar modelling). This is not to say that the signers would not be able to look for information using e.g. written Finnish, but it is always most natural to use your own native language for information search and retrieval, much more so than any foreign language. And furthermore, who knows, maybe in the future it would be possible to write sign languages. The above-stated scenario would also be possible to implement using spoken document retrieval procedure; only that speech would be replaced with signing as the input method.

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Elderly Icelanders and Their Relatives: Preferences for Forms of Information and Problems Experienced when Seeking Information

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Abstract. The paper presents a qualitative study with the overall aim of investigating the informal support at information behavior that relatives of elderly Icelanders, who are still living in their own homes, provide them with and possible problems confronting both groups. The paper presents findings about the participants preferences regarding the form and means of gathering information, their use of information technology, as well as problems that they experienced while seeking information. The focus is on three main topics of information: health information, information about financial aid, and information about formal support from the state or the municipality. The findings show that the participants preferred verbal information as well as printed information. The relatives of the elderly sought digital information but this was uncommon among the elderly. The findings further indicate that information about the formal support and financial aid that elderly can apply for is not adequate presented.

Keywords: Elderly, information behavior, relatives.

1 Introduction

With the proportion of elderly people rapidly growing in Western countries [14], [22] it has become crucial to explore how the welfare society can provide for their quality of life and support their prospects for active participation in society. Being able to access and make use of information about health and other aspects of daily living is important in this respect. Although many elderly people are able to care for themselves into old age, others become dependent on formal support from the public sector as well as informal support, particularly from their close relatives [6], [10].

The paper will present an exploratory study where the overall aim is to investigate the informal support at information behavior that relatives of elderly Icelanders, who are still living in their own homes, provide them with and possible problems confronting both groups. Information behavior has been described as an encompassing and multifaceted concept comprising all human interaction with information, namely acknowledgement of a need for information, seeking it, either on purpose or by opportunistic discovery, and using it [21]. Little knowledge exists on how relatives of elder-

ly people support their information behavior and thereby add to their quality of life and it is vital to gain more knowledge on it.

The society is responsible for guaranteeing all citizens adequate access to information, through the means best suited for them. Today information is increasingly being disseminated digitally. The elderly generation did, however, not grow up with computers or digital access to information and is not as accustomed to it as younger people [17]. Although elderly people will gradually become more familiar with seeking information digitally, information technology develops quickly and the skills that people possess today may not be of significance after some years. Among the barriers that elderly people deal with is that they experience more problems at understanding and learning new information as they grow older [3]. There are also indications that elderly people may face various other information barriers. In a study of older people who belong to the Swedish-speaking minority in Finland, Eriksson-Backa [4] has e.g. found that they considered health information to be contradictory and confusing, had problems interpreting it and worries because they felt that they did not have enough health care information. Furthermore, older people sometimes have communication barriers such as problems with the visual and auditory presentation of information [22]. Thus, the use of information technology is becoming increasingly more important for elderly people to be able to take an active part in the society but at the same time it is also necessary to seek a wider understanding of their information behavior and how it can be supported.

Previous reporting from the present study have focused on findings about the importance of opportunistic discovery of information by both the elderly and their relatives [11], of elderly peoples information needs and their experience as receivers of informal information support from their relatives [12], as well as the nature of the relatives information behavior and how they experienced their role as informal information supporters of the elderly [13]. The findings indicate that the relatives present elderly people with various assistance, including support at seeking information, providing them with useful information without being asked for it, as well as help at interpreting the information [11-13].

The paper will present findings about elderly peoples and their relatives' preferences regarding the form and means of gathering information, their use of information technology, as well as the problems that they experienced while seeking information. The focus will be on three main topics of information that were identified by comparing findings from the interviews with the elderly and their relatives, that is health information, information about financial aid and information about formal support from the state or the elderly municipality [13]. Formal support can include assistance with cleaning, driving service, home delivery of meals, help with bathing or administering medications. The paper will address the following questions:

- By what means and in what form do elderly people and their relatives prefer to get information?
- How do the elderly and their relatives use information technology to gather information?

- What are the main problems of the elderly and their relatives when trying to gather information?

2 Methods

To determine the factors related to the information behavior of elderly people and how their relatives supported it a qualitative study using grounded theory was conducted. Although qualitative methods do not allow generalization the methods are considered useful in better understanding phenomena about which little is yet known [19]. In this study open-ended interviews were conducted with a group of elderly people and their relatives. The qualitative interview seeks to describe the meanings of central themes in the life world of the participants, and how they make sense of their daily life experiences [7]. Furthermore, researchers, attempt to interpret the social reality emerging from the interviews [1].

A convenience sample was used, and participants recruited through the assistance of gatekeepers who had contacts within the local communities and initiated contact between the researcher and participants. Twenty-nine people participated, fourteen elderly and fifteen relatives. The elderly people were still living in their own homes; nine were women and five men, at the age of 70 to 90, with 11 of them aged 75 years or older. The relatives were fourteen people; nine women and six men, aged 37 to 74. Most of them were children of the elderly but there were also examples of their children-in-law, an elderly spouse and in one case a grandchild that participated in providing support. The participants' backgrounds varied as to education, work experience and residence, with some of them living in the capital area of Iceland, some in country towns and some in a rural area.

As soon as an interview had been conducted, the initial analysis started, through listening to it and writing researcher's notes. This was done so that the following interviews could be modified to more closely examine ideas or themes that began to emerge, as suggested by Bogden and Biklen [2]. Analysis of the data was conducted as described by Strauss and Corbin [18]. At the early stage of the analysis open coding was used to question the data. Key remarks and concepts were noted, incidents compared and grouped, and some initial themes developed. As the interviews progressed the themes became better developed. At a later stage, axial coding was used to reanalyze the data with these themes in mind; questions were asked about the conditions, actions/interactions, and consequences of the themes, and the data organized by making connections between the main themes and subthemes. The themes were interpreted in terms of the contexts relating to each participant.

3 Results

3.1 Health Problems and Need for Support at Information Behavior

Although the health status of the elderly participants varied all of them had developed some disabilities that affected their abilities to seek and process information. Some had problems with their eye sight. One of the women said for example: "I see very little because on this eye I don't have a good sight and in the other I have a cataract." Others had started to lose their hearing which hindered them in receiving verbal information: "It's of course the problems with my hearing. It automatically affects me because I miss so much out." And for some, forgetfulness had become a hindrance as one of the elderly women explained: "I forget words and it's becoming worse, I can feel it. ...Even if I'm talking about something that I know and with people who I know I may forget a certain word that I was going to use... It's just the old age." Particularly, when going to doctor's appointments this could be problematic, one of the elderly men said that because of this he needed to make some precautions: "But now I have to write down if I go to doctors appointments and need to ask questions. I do it just to be on the safe side and also to be sure to ask about the things that I want to know about."

Thus, the elderly need for support at information behavior was seen as a consequence of the ageing process and related changes in their health, with the result that they did not feel up to dealing with tasks that they were used to before: "Somehow my courage has diminished", said one of them. Their relatives were aware of their problems, also when the elderly tried to minimize their difficulties: "Her eyesight is very poor but she would never admit this herself", said for example one of them about her mother.

The elderly received informal support with information from their children and children-in-law. In one case a grandchild and another elderly spouse, who received help from her children herself, participated in the support. The need for support varied, some of the elderly needed support with information about certain issues while others had to rely more on their relatives.

3.2 Preferences for Forms of Information

Verbal Information. Verbal information was important to the elderly. This is mainly because of the possibilities of an interactive communication which allows them to ask questions about issues that are unclear to them and get them explained during a conversation. One of them said: "There may be some things that you would like to know more about when you read and in those cases I feel it's better to be able to ask the relevant person, just so that I have no doubts." Thus, verbal information may provide for a better understanding of the health related issues that the elderly are dealing with than information offered in other forms.

The elderly appear to get verbal health information mostly at doctor's appointments and in general they seemed to be content with the information that they received: "It was very good to talk with him. He gave me good information about everything, both what could go wrong and how the process would be", is an example of this. Be-

ing able to get comprehensive health information was clearly important to them and it seems that they felt that it is easier to get thorough information from their doctors today than before, as one of them explained: "They have improved a lot. I think that doctors are much more outspoken when they talk with people now than they used to be."

Another way of getting verbal information is by attending meetings where health education is provided. One of the elderly said for example: "The hearth centre has meetings with lectures for us in the spring and in the autumn. It started recently and I have been there ones or twice, because the same lectures are repeated. It's about diet and other matters." Although this is not quite the same as having a private conversation people nevertheless get the opportunity to ask questions at the meetings. Furthermore, they can discuss the information received at the meetings with their doctors or other health professionals afterwards if they need more explanations.

The relatives who supported the elderly also talked about receiving verbal information, for example by discussing the elderly health problems with their doctors: "There was a gerontologist at [name of the place]...she gave us very good information", said one of the relatives, or by attending meetings: "We went to meetings held by the Alzheimer association...it was mostly information about the disease and the patients", said another relative, who felt that the information that he received was useful.

Printed Information. Printed information was also preferred by elderly. Printed health information and information about formal support were e.g. found in the newspapers: by reading the newspapers and follow the news. Pamphlets were also mentioned by some as a good way to get reliable information: "I just pick up pamphlets. They are at the National Insurance office and hospitals or the health center. You can get them in several places", said one of them. Another one spoke about getting health information by reading books and said: "It has been so that if I notice a book were this or that is being discussed, then I just go to the library to get it." Descriptions about food products were also mentioned as a way to get dietary information: "There's so much information about diet, e.g. the labels on the products."

There was, however, also an incident of one of the relatives complaining about not being able to get enough written information about the formal support that the elderly are entitled to: "The information is so misleading. In the beginning one person is saying this and another one that. There is nothing in writing and it costs endless phone calls. And somehow no one is responsible for the procedure", she complained.

Receiving information could though be problematic for the elderly as one of them explained: "I think it's best to get it from a person, verbally. That is if there is someone with me who can help me to remember it. But then of course it's written information. It's very good to have. You just have to take good care of the papers and not lose them, keep everything in order." Thus, whether the information was provided verbally or in print, it could call for support from the elderly relatives.

Digital Information. The participants in the study were asked about their use of computers to seek information. This was common among the relatives but for most of the elderly seeking digital information was not an option, one of the elderly men said

for example: "I have for example not used a computer or anything like that." There were, on the other hand, examples of the elderly referring to their relatives seeking health information for them: "But my older daughter seeks information on doctor.is and she often gives me information", said one of them.

Only three of the elderly sought health related digital information by themselves. In addition to this, two of the elderly received help from their relatives at using Skype or e-mail to stay in contact with other relatives but did not use information technology to seek information.

Both of the elderly who sought digital health information mentioned the website doctor.is. One of them said: "I usually go to doctor.is for information about diseases and medication. I have also used the Icelandic Heart Association website and other websites to get information." The other one told that she also used Google: "I just type something into Google." Her problem, however, was that most of the information that she found in Google is in English, while the information in doctor.is is all in Icelandic, and she continues: "My English is not so good, that's the problem...I used to read Danish and Norwegian magazines and that has helped me, and English a bit, but I can't really understand the articles."

Language problems are not the only barriers that the elderly are confronted with. Technology develops fast and with growing age people's ability to keep up with new things may diminish. One of the elderly told that she had learned to use a computer before the advent of the internet and the world wide web and that she had not used it to seek information: "I bought a computer before I stopped working...and I used it for typing...But somehow my courage, or I don't know what it is, perhaps being lazy...There's always some new development, you can't follow it."

3.3 Barriers Related to Information About Formal Support and Financial Aid

As described above, the elderly dealt with various problems related to the ageing process and changes in their health, which gave rise to the need for support at information behavior. In general the elderly participants and their relatives were content with the health information that they received. They did, however, talk about various kinds of barriers in connection to information from formal agencies, such as The Social Insurance Administration, other state agencies or their municipality. Among the problems that were mentioned was that information about formal support that the elderly can apply for and the financial information related to the support, or their health treatments, was not sufficiently presented. "The system doesn't point this out to you" is an expression of this viewpoint. As a result the elderly sometimes lacked information to be able to take advantage of what they were entitled to. One of the elderly women said: "There are some things that people have a right to and which they don't receive any information about." When one of the elderly men was asked about a specific incident where he should have been entitled to get a refund on travel cost in relation to a health treatment he answered: "No, I didn't know it at that time." He only learned about it later when someone whom he knew was in a similar position. Another of the elderly men said: "You are not being told so much about it...It's probably rather hidden, for many." Not receiving enough information from the agencies which

are responsible for providing it was clearly seen as a disadvantage: "There could be more flow of information to us", said one of the elderly women.

Furthermore, lacking an overview of the various agencies or persons that they needed to contact in order to get the necessary information was considered a problem. Both the elderly and the relatives complained about information from public agencies being scattered and that they had to seek it in many different places. One of the elderly women said: "It's often like that. You often hear people say that if they need something from the state they need to go to various agencies." This was considered to be both time consuming and demanding. One of the elderly men said: "I had no idea about the time that it takes. To go from one place to another and to wait there for answers." Some of the elderly, furthermore, mentioned cases where they had decided to either not to try, or had given up on trying, to seek information. The following is an example of this: "I have not done anything to find out if I'm entitled to a financial support...because I have had so many problems before." There seems to be a general belief among the elderly participants that this experience is quite common among them: "I'm sure that a lot of people are not doing it because they just don't feel up to it", said one of the women.

Although the relatives of the elderly did not find it quite as difficult to seek information about formal support and financial aid they nevertheless complained about it being unnecessarily complicated and there was an example of a relative who described it in the following way: "But it's a jungle, it's a complete jungle."

Thus, the need for a more transparent and less demanding access to information about the formal support and the financial aid that the elderly can apply for, was stressed by both the elderly and their relatives: "Of course I feel that there is perhaps a need for someone, a particular agency who can answer all my questions, rather than having to run between them...I think it would be very useful not just for me but for so many others", is an example of this viewpoint.

4 Discussion

The paper described findings from an exploratory study of the informal information support that elderly Icelanders, still living in their own homes, receive from their close relatives. The focus was on the means and forms of information that the participants preferred their use of information technology to seek information and the main problems at information seeking faced by them. The description was further limited to findings about three topics of information, which is health information, information about formal support and information about financial aid that the elderly can apply for from the state or their municipality. These topics relate to findings by Hepworth [5] who has identified them as the primary tasks of informal carers.

The society has without doubt an obligation to ensure all its citizens access to information in a way that is appropriate for them. The findings of the study indicate that information about the formal support and financial aid that elderly people can apply for is not adequate presented. The problems were not confined to the elderly as there were also examples of their relatives complaining about this. Previous findings from

the study also show that information about these topics tend to be discovered opportunistically by the elderly and their relatives [11]. Without improvements in the way that the information is promoted it is difficult to see how the policy of Icelandic authorities, that elderly people can, with appropriate assistance, continue living in their own homes as long as possible, can be achieved [9].

Verbal information, which was mainly received at doctor's appointments or health educational meetings, was preferred, particularly by the elderly who appreciated the opportunity to ask questions and get clarifications. This is in line with previous studies who indicate that interactive communication may provide for a better understanding of information [8], [20]. Printed information was also preferred by the participants and it was also customary for the relatives of the elderly to seek digital information. This was, however, uncommon among the elderly as only two of them sought information digitally. Seeking digital information is in general more usual among those who are younger, with a recent findings showing that 43% Icelandic men and 50% women at the age 55 to 74 years had sought health information on the web, against 63% men and 78% women at the age 16-24 years [17]. The results of the survey do not include those who are 75 years or older, as the majority of the elderly in the present study is, but it may be assumed that as people grow older their use of the web to seek information diminishes. This may though change with the coming elderly generations, who may become more used to seeking information digitally.

The use of social networking sites such as Twitter and Facebook to communicate with others and gain information has been growing among older people in the past few years [15-17]. Social media exceeds other more established forms of digital communication, e.g. e-mail, in that it allows for both interactive communication and the delivery of information in various forms, such as graphs, pictures, sounds, text etc. Thus, the attributes of the social media are more in line with the characteristics of verbal communication and at the same time information can be presented in the form that may be best suited for the person involved. The social media may therefore be better suited to the needs of the elderly than other means offered by the internet and the web, such as websites or search engines. Nevertheless, information technology and the ways of delivering information develop fast. So the question remains whether the elderly will be able to adapt and learn how to use new technology, particularly when their physical and/or cognitive abilities start to decline. In the present study, the driving force behind the elderly need for support at information behavior was the ageing process and a consequential failing of their health. As a result they had to rely on help at seeking and interpreting information from their relatives. It might therefore be beneficial for those who plan and design information promotion for the elderly population, whether the information is delivered by digital means or in other forms, to consider also the role of their relatives as informal information supporters of the elderly.

It needs to be kept in mind that the findings presented here are from a small scale qualitative study, and cannot be generated to the wider population of elderly people and their relatives. The knowledge about the issue is scarce and there is a need to investigate it further to shed new light on it.

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mStick and hStick – Simple Technology, Full of Life

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Abstract. This study focuses on the memory and reminiscence stick (mStick) and health stick (hStick) concepts developed in Lahti Region, Finland. The mStick is a biographical memory store where personal documents, like family photographs, texts, audio and video clips, are stored. The hStick is for storing health-related data, needed in the case of emergency or in self-care. Eighteen pilots were launched in 2010-12 to examine user experiences. The pilots have been investigated throughout their implementation to assess the roles and functions of the sticks. Qualitative data were collected in 2010-2011 by means of interviews, learning diaries, photographs, memos, and participatory observation diaries. Qualitative content analysis was conducted. Seven main themes concerning the functions of the sticks were found: coherence of life, empowerment, health promotion, meaningful entertainment, medium of communication, inter-generational relationships and care work support.

Keywords: gerontechnology, reminiscence, health promotion, user-driven approach

1 Introduction

Technological solutions designed for the elderly too often replace human work and human contacts. The systemic nature of technology; technology as part of its context – its relationships with users and the service system – is often forgotten in elderly care [1, 2].

This study focuses on two innovative gerontechnological concepts; the ‘hStick’ and ‘mStick’. These are being developed in a Finnish R&D project for enhancing well-being of senior citizens and promoting their inclusion in the information society in a personally-touching and meaningful way: utilizing older persons’ resources, increasing human interaction, and enriching the quality of care work [3-5].

The *mStick* is a memory and reminiscence stick - a concept supporting memory and testing it. It is a biographical memory store; personal documents, like family photographs, texts, audio and video clips, as well as materials linked to the owner’s hob-

bies and interests, are stored on a USB stick. The stick can also be based on ‘generalized memories’ that are related to a certain period of time, or a certain generation.

The mStick provides meaningful entertainment to independent elderly people and also those living in residential care or long-term care and suffering from memory and communication problems. The contents of the sticks can be produced, shared and used either privately or in reminiscence sessions or alike.

The *hStick* (health stick) is a modernised version of the so-called SOS Passport, on which various health-related data may be saved: personal information, blood group, illnesses, vaccinations, medication, living will, etc. It functions as a safety device in the case of acute illnesses or injuries. First and foremost, however, the hStick functions as a means for self-care as well as promotion of one’s own health, because a comprehensive selection of information on health and health behavior are saved on the stick: results of various measurements with reference values; i.e., blood pressure, diaries on exercise, etc.

The focus of this study is to examine the experiences gained in the piloting phase of the mStick and hStick. The aim was to investigate the impacts of the sticks by defining the different roles the stick plays in customers’ and elderly care personnel’s experiences.

2 Theoretical Background

2.1 Gerontechnology: An Approach between the Human Being and Technological Environment

The visions of technology in elderly care and gerontechnology are strongly based on the threat of shortage of labor in elderly care. Nowadays, it is generally agreed that technology also has social aspects connected with, for instance, usability and acceptability of the products. First and foremost, the stick concepts focus on reminiscence and monitoring of health; their essence is not in technology. The USB sticks as simple technology represent the concrete tool, the “home port” where the memories and health information can be stored and easily retrieved.

The term ‘gerontechnology’ is a composite of two words, gerontology (the scientific study of ageing and research) and technology (the development and design of new and improved techniques, products and services). The field of gerontechnology emphasises that the environment where older people live includes the social and living environment, but also, essentially, the technological environment. In gerontechnology, a system approach has been applied between a human being and her/his technological environment, and the user interface in between. Both the system and the user are dynamic: they are in constant change [6].

Despite this slowly growing theoretical understanding, in practice, technology is still often poorly implemented – as a separate ‘island’ [7]. A central question is: what is achieved with technology and what are its impacts [1], [8]. Technology in elderly care services has an impact on the customers as well as care workers [1], and this is the area of interest in this study, too.

Gerontechnology offers five key approaches – known as Gerontechnology’s Five Ways – to assist elderly people in continuing to lead healthy, active lives: prevention,

enhancement, compensation, care support and research [9-11]. Through these five ways, technology can be used to prevent problems, enhance experiences, compensate for declining capabilities, assist caregivers and conduct research to improve the lives of elders. The mStick and hStick function in all these five roles [5].

2.2 Reminiscence and the Biographical Approach

The idea behind the mStick is based on the theories of life review and reminiscence research [12], [13] and on narrative gerontology [14], [15]. Human beings are biographical creatures, and age is seen as cumulative rather than cross-sectional.

The narrative reminiscence research highlights that human beings have a fundamental need to piece together and communicate about their lives through narratives [15], [16]. Alasdair MacIntyre puts it the following way: "I can only answer the question, 'What am I to do?' if I can answer the prior question, 'Of what story or stories do I find myself a part?'" [17]. According to a heuristic model of reminiscence, people have a capacity, perhaps even a need to retrieve, articulate and disseminate self-narratives [15], [16.] Memories can be seen as building blocks of these narratives [18]. Throughout history and in most cultures there have been storytellers who have passed their experiences to others by recalling the past [13].

Memories and personal life stories are seen as important resources in later life: they help to achieve ego-integrity and a sense of coherence, a sense that one's own life has a meaning and significance which, in turn, helps with acceptance of finitude [19-21]. Triggers like photographs, sounds or smells are sometimes needed to initiate the reminiscence process. Reminiscence has been used with different goals, including the stimulation of cognitive functioning in older people with dementia and improving life satisfaction, quality of life and meaning of life among elderly [22]. Activities encouraging meaningful linkage of the past with the present are essential in order to provide a sense of continuity to an older person's life course [23].

Studies have shown that sharing past and present lives through talk is a central aspect of building relationships between residents and care staff in residential care. Reminiscence is important for care receivers but also for caregivers. It can lead to greater satisfaction with work, including more positive attitudes towards the clients. [24]. In addition, it may offer intergenerational benefits. Through transmitting family narratives to children and grandchildren, an older person can again demonstrate the significance of past events and memories [23].

2.3 A Customer-Oriented Approach in Health Care

The philosophy behind the hStick, in particular, is that a human being is interested in her/his own health and wellbeing. Although health is highly valued on the level of meta-preferences [25], it guides actual behavioral choices much less [26], and the hStick may contribute to filling up the gap. It may stimulate people to monitor and promote their own health more systematically than more limited concepts or tools. Therefore, it may postpone and reduce the need for institutional living and put into practice the aim of people being able to live at home even in their old age, either independently or with assistance.

In recent years, a more customer-oriented approach has been applied to practice in health services. Health policies across OECD countries have sought to promote op-

portunities for users to be included in novel ways in health care, from treatment decision-making to service evaluation and development – called, for instance, patient-centered care or patient and public involvement (PPI) [27]. Customers are encouraged to self-care and to take more responsibility for their health [28].

However, a problem in promoting fluent customer-centered service processes is that patient information is usually not transferred between service providers [27]. This leads to a situation where no-one has a holistic perception of a person’s health condition – not even the patient her/himself [30], [31].

3 Research Design and Method

The data for the study were collected by means of action research within the research and development project where the hStick and the mStick are being developed with a user-centered approach in multi-actor innovation processes and networks.

Eighteen small scale pilots related to the sticks were launched in Lahti Region, Finland in 2010–2012. The pilots became selected at a start-up event, and some of them came along in the second stage after the first experiences had been collected.

The hStick has been developed in six communities/organizations: Seniors’ Living Lab group, Padasjoki Home Care (belongs in Oiva, The Center for Primary Social and Health Services), Lahti Health Kiosk, the exercise counseling of City of Lahti, a bank, and a travel agency. In all the communities, the customers are involved in the development work.

In Table 1, again, there is a list and brief descriptions of the mStick pilots.

Table 1. mStick pilots

Pilot organization	Participants	Output
Community College Wellamo	A group of highly educated immigrants and their group leader	A personal mStick for immigrants: digital life stories (form: WMF), translated diplomas, basic health information, an information package and essential web links about Finland
Lahden Lähimmäispalvelu (a non-profit association)	Three independently living older women, their group leader and assistant	A personal mStick for independently living ageing people including photographs and written stories in a digital form
Harjula Settlement Association	Four older persons, a service consultant, three students of social and healthcare and their teacher	A personal mStick for customers of senior homes, including photographs and oral stories
A local Parkinson Society	Parkinson patients, their near relatives	A personal mStick for Parkinson patients (specific contents to be confirmed)
A local Alzheimer Society	A group of men with early stag-	Collectively compiled struc-

	es of dementia and two group leaders	ture (visualized in the form of an interface) for a personal mStick for people with early stages of dementia
The Onni Well-being Center	Older people participating in a handicraft group for seniors	A collective mStick about the history and activities of the handicraft group: photographs, video clips, audio clips
Activity center for seniors, Sysmä (Aava, The Center for Primary Social and Health Services)	Four older persons and two group leaders	A personal mStick for four customers of the activity center, including written life stories, photographs, audio clips, other personal documents
Lahti Deacony Foundation	Four older persons (some of them with dementia), their near relatives, a service manager, care personnel, three students of healthcare and their teacher	A personal mStick for customers of senior residential services: digital life stories (WMF), photographs, oral and written stories, a semi-structured form about personal biographical information A collective activity stick: thematic movies, song lyrics, proverbs, rules of games
Activity Centre for seniors, Iitti (Aava, The Center for Primary Social and Health Services)	Customers of a senior activity centre and their three group leaders	A collective activity mStick about the theme "from sheep to wool, from wool to sweater": photographs and oral stories in a digital form
Activity Centre for seniors, Orimattila (Aava)	Customers of a senior activity centre and their three group leaders	A collective activity mStick about the theme "holidays": photographs, oral stories in a digital form
Avainsäätiö (A non-profit association)	Persons with communication problems (aphasia) and their relatives, and the care workers	A personal mStick for people with communication problems, done with the help of "a communication carpet", including information about the person's interests and means of communication
The Mäntsälä adult education Centre	Participants of the mStick course, the teacher and the head teacher	An mStick course (to give skills to build a personal mStick) for older people with basic IT skills (starting)

The pilots have been examined with an explorative approach: the question is about a process of co-creation of the innovative concepts, and collective knowledge creation from different perspectives. The pilots have been investigated throughout their implementation to assess the roles and functions of the sticks. Qualitative data were collected from 2010 until early 2012 by means of group interviews and other meetings (47 end-users, 42 workers¹/students/teachers), learning diaries, photographs, memos, and participatory observation diaries. As a novel concept was explored, there were no readily available theoretical categories as such, but the data were analyzed according to the principles of inductive content analysis with open coding, creating categories and abstraction. In Table 2, there is an example of the phases of analysis.

Table 2. An example of the analysis

Utterance	“I have noticed that the fear towards technology has already turned into curiosity.”
Contents	Taking part in an mStick pilot has relieved the fear for technology
Sub-theme	Participating in the information society
Theme	Empowerment

4 Results

Seven main themes/categories were found concerning the roles and functions in the process of producing structure and contents for the sticks. Most of the roles are related to the impacts at the individual level, but also wider impacts were referred to, for instance, impacts on near relatives and on practices in health care and elderly care organizations. In the following, the categories are presented.

4.1 Feeling of Coherence of Life

Reminiscence is felt to function as part of a person’s identity work, helping to build a feeling of coherence in life:

“Writing the life story helps you find something that maybe indicates that the chosen direction has been a good choice and you can accept the decisions you have made.” (a customer, an mStick pilot)

Memories are an important resource for an older person. ‘Living in the past’ should not be regarded as regression, but as a crucial part of human essence as a biographical creature and as a way to build one’s identity. Memories are often nostalgic, but nostalgia can be a reflexive, not necessarily regressive sentiment [32]. Elderly people can perform meaningful ‘identity work’ or accomplish ‘mature imagination’[33] by reflecting their biographies. Identity work is an everlasting task for a human being, according to modern identity theories [34], [35].

Also storing health-related materials to the hStick – having it all in one package – has been felt to build coherence from the perspective of health; in spite of the suspicions in the health centres concerning the information security related to USB sticks.

¹ Both from management and employee positions.

“Nine years ago I got seriously ill, and I have been having controls and blood tests since then. A couple of weeks ago, when I went to the health centre, I asked them to save the results on the stick, but they refused. I got the results on paper, and I compared the results to the old results. It would be nice if these results were on the stick, maybe to have some graphs of them. It is important to me that I’m aware of my health history.” (a customer, an hStick pilot)

4.2 Empowerment

An important factor related to the individual and society is the role of the stick in making a person visible and appreciated in her/his social environment.

“It is so wonderful that the life and work history of mine have been noticed in this way and I feel that they are appreciated. This is like an award for my life work!” (a customer, an mStick pilot)

The mStick may highlight the user’s uniqueness and the aim of avoiding facelessness in an institutional setting. People living in institutions can acquire the status of a recognized individual, not only that of a patient, in the eyes of care personnel and other patients, if excerpts of their biographies are presented in joint recreation sessions or alike.

“This illness (dementia) makes you somehow more blank, and if at this stage the customer is ‘faceless’, there are many things that the nurse doesn’t understand. But if the customer has a face and a past, he or she is a person and can be regarded in the right way.” (The responsible nurse of a dementia unit)

The hStick, too, has essentially to do with empowerment in health-related issues: what people could do themselves for their health and how they could prevent problems. Health and social care personnel benefit by acquiring more reliable anamnesis information and a real picture of what a customer has done for her/his health. The idea of the hStick was actually invented by a retiree who is actively participating in a Living Lab group where it has been developed. The motivation for him and other co-developers has been that an elderly person her/himself would take more responsibility for her/his own health, and to gather personal health-related information in one concrete place, the stick, because the different official health care information systems do not communicate with each other. His experiences about presenting the stick in a health centre has been that doctors are not willing to insert the stick in their computers because of fear of viruses, but the idea of having all the essential documents carried on by the patient was warmly welcomed by the doctors, in order to have a holistic picture of the person’s health.

One separate stream of empowerment has been that the sticks have increased the interest towards new technology. They have proved to be a meaningful way of using technology, and facilitated inclusion into e-services and the information society.

“I have noticed that the fear towards technology has already turned to curiosity.” (a service consultant in senior residential services)

When developing the mStick, the starting point has been reminiscence, not the technology, but the participants have been curious and also astonished about the possibilities of this “little piece of technology” to store and present the life story in many formats – sounds, still and motion pictures.

“I hadn’t seen such a stick before. Well, that was... that was a miracle.” (a customer, an mStick pilot)

The mStick offers opportunities for lifelong learning. Preserving the life story and other biographical documents in a digital form and utilizing opportunities offered by information technology (IT) have evoked a new kind of interest to learn computer skills among the older people. Third sector educational organizations have taken an interest in the matter, too. One of the pilot organizations, an adult education centre, is about to start a ‘Stick course’ for seniors. In this course, the aim will be to build illustrated digital life stories and simultaneously to learn IT skills in a personally meaningful way.

The sticks implement the aim of providing an “information society for all”, because also the age cohorts who are not used to using IT may participate. Technology is invisible, and for users, IT skills are not necessarily required. As an example of this, in the pilots, there are easy-to-use solutions for presenting the materials, such as digital photo frames and televisions with USB ports.

4.3 Health Promotion

The main motivation factor among the elderly people to participate in the development work of the mStick was the willingness to live actively also in the later life, and to take care of one’s health.

“Cars have a service manual, so why don’t human beings?” (a customer, an hStick pilot)

When producing contents for the mStick, one of its functions is the memory exercise function. The simple process of selecting photographs with an elderly person to be stored on the stick may serve as a memory exercise in itself:

“Yes, it became a true memory exercise, when we went through these photos and what happened and when.” (a customer, an mStick pilot)

In the process of developing the mStick, the cumulative nature of reminiscence was used. One piece of memory provokes several other memories. For instance, when the contents of the personal mStick were shown to a person with a memory disease, she told more and more and fulfilled the gaps in the life story, as she remembered new things all the time because of the photographs. [36]

4.4 Meaningful Entertainment

For the ageing people who participated in the study, the work method was meaningful entertainment and a precious life experience as such. Reminiscence and storing of the memories as well as social participation during the work method have been activating in other ways, too.

“It has been fun to share memories with outsiders, as there have been some unusual incidents in my life.” (a customer, an mStick pilot)

“Also my children have noticed that now this grandpa has got some new power.” (a customer, an mStick pilot)

According to the data, looking back to childhood memories has brought joy to life after widowhood and relieved feeling of loneliness. Older people have experienced both the reminiscence and the preserving of memories as meaningful entertainment which has brought novel contents to life.

4.5 Medium of Communication

The mStick may function as an instrument for telling about one's background. It offers an instrument to immigrants, who may have problems in getting heard in the society, for telling about their background and storing the official documents needed in the complex process of integration.

The mStick may function as an instrument to express oneself and tell about one's life and wishes, even if a person is not able to speak. Tools for this are being planned in one pilot organization. The mStick also helps the communication of those who have memory problems, functioning as a memory support. A group of men suffering from early stages of dementia, together with their group leader, planned the contents of their mStick, with the aim of telling what things are important to them and what they wish when the disease progresses.

The hStick contains the basic health information needed in case of an emergency, when the person may not be able to express her/himself. It may facilitate the flows of information at the interfaces of organizations:

"In the worst case, if a private doctor has prescribed medicine X, and the older person with dementia doesn't remember that. The information should be on the stick. If another doctor prescribes medicine Y which does not suit together with the medicine X, it may cause a dangerous situation." (a home care instructor)

The hStick has also proven to be useful when travelling abroad, for instance, in cases of language problems between the patient and doctor.

4.6 Intergenerational Relationships

An important factor is that the stick does not replace but rather promotes and enriches human contacts and mutual communication. The mStick may build a bridge between generations by enhancing intra- and inter-generational interaction and communication.

"I have told my own daughter quite a lot about my childhood, but my daughter's son is only a year and a half, so I am wondering how long I will be here to tell him and I remember who I am. From this viewpoint, the stick seems important." (a customer, an mStick pilot)

One of the participants in the mStick pilot mentioned that the main reason for why she participated in the pilot was that she wanted to give the stick to the future generations.

"That was the reason why I got so enthusiastic, as it will be left for the grandchildren." (a customer, an mStick pilot)

The ageing people felt that the stick would help them to "stay alive" in the consciousness and memories of the future generations. Over 80 year old lady wanted to record her greetings to her great-grand children:

"So now this whole life of mine is there on one tape, and then at the end, I gave my regards to that fourth generation – of them, tomorrow, the fifth of the fourth generation turns one year old. So this is left for them, the bigger ones remember me all right, but these little ones will not remember me anymore, so they will see from photos what the grand-grandmother was like and she even gave her regards to them – so that's a nice thought." (a customer, an mStick pilot)

With the mStick, it is possible to create ‘generational intelligence’, an ability to put oneself in the position of age-others. It offers a possibility to collect generational memories. The society is changing rapidly, and, for example, stories concerning the everyday rural life a few decades ago are regarded as very important.

“The children of that time, compared to the children of today, they didn’t play but they got the responsibility for the tasks that they were given to, because they knew that there was no option. That was how I felt.” (a customer, an mStick pilot)

4.7 Care Work Support

The role of the mStick is not replacement of human workforce in the care work, but rather enrichment of the work. The benefits are especially great if a person has communication problems which easily lead to misunderstanding.

“This is great – here you can really see that this person likes that the hair rollers are put into her hair after the sauna or shower. When you concretely see it, you’ll remember it better.” (a nurse who was shown the mStick of an elderly woman)

The mStick enables care workers to see the patient as a holistic creature with a biography and a past. It facilitates communication between patients and the care personnel - if names of the relatives are saved on the photographs, for instance.

“If you think that this resident does not remember the names of relatives or mother or sisters, for example, so if the names have been recorded here, the care worker can utilize them – see, here is this ‘Elma’.” (a student)

Televisions with USB ports are used as mStick platforms, if computers are not available or if they are felt to be aversive. A simple platform is a digital photo frame, which is rather cheap.

Even though ‘holistic care’ is desirable, the way in which healthcare professionals often talk reveals that the ‘basic work’ consists only of the medical and practical treatments. Good experiences have been gained of having social and health care students as ‘stick tailors’ in the pilots; they have found the work very inspiring and useful. The students of healthcare and their teachers in the pilots emphasized that stick tailoring and the related biographical approach as part of studies and curricula would be an important step towards a change in job descriptions and the care culture. Tailoring of sticks is a job that requires - not only IT and information-related skills but also - a humanistic approach, gerontological knowledge and social skills. The use of the mStick is a step towards holistic care, where a person is seen as an entity, not just a patient with certain illnesses.

“In this way we get to know something very essential about the resident. The life history is very important. It is related to the autonomy of the person, which is an essential part of the care work.” (a service manager)

There seems to be potential for a cultural change in care practices, highlighting the need for a biographical approach in care work, where getting to know the customer more deeply is not felt as extra work but as an internal part of basic care. The mSticks are concrete tools for applying this kind of a holistic approach. A biographical approach may also raise social appreciation of elderly-care work.

The stick can also act as a new kind of tool and service product for care workers organizing reminiscence sessions and other joint programmes. The sticks that are produced within one reminiscence group can be shared and used also in some other group, if appropriate. For instance, a group of seniors from an activity centre visited a

sheep farm, and then participated in the whole process of producing a sweater in the traditional way from wool with several phases (dyeing, spinning, knitting...). In many of the participants, having experiences of living in an agricultural society, memories evoked from the past decades. Visits and conversations were videotaped. The material will be used in several senior activity centres as part of activity programmes and reminiscence sessions. This is an example of recreational activities which could be done without an mStick, but, at the same time, it is an example of why it is useful to store these activities on the stick. By storing the materials, these generational memories can easily be shared, and they also reach those people who are not capable to go to the sheep farm and spin and knit themselves.

5 Conclusion and Discussion

The experiences gained in the pilots during the development process of the mStick have been encouraging. Many of the elderly people were first a little suspicious about new technology and this kind of a working method, but in the end, most of them got the feeling that it was more than worthwhile to 'jump into the unknown', and they expressed their thankfulness in many ways. Also the care workers regarded the mStick as a useful tool in their work and were willing to develop it further in order to implement and adapt it as a permanent practice in their organizations, which would be the desirable end-result of the project.

Some suspicions and barriers have naturally come along, too. Concerning the hStick, fears of viruses and worries about information security have emerged. The results show that the hStick can be accepted easily and adopted, when it functions as a means for monitoring one's own health, learning self-care and giving feedback. As to the mStick, it takes time to collect and store the materials on the stick, especially with people suffering from memory diseases. Some active seniors may be able to do it themselves, either independently or in courses and groups, but in most cases, some extra help is needed. The role of near relatives may be crucial here.

The questions of when and how to produce an mStick also have to be pondered upon individually in different situations. For instance, for some persons, it may be inconvenient to do the reminiscence work when she or he is moving from home to a dementia unit, for instance, because the current life situation may be stressing and confusing. In this case, an option could be to use generalized reminiscence materials instead of personal materials. For some other persons, however, looking into the past may build integrative bridges in the phase of change.

Also technology-related problems have been met. Even though the mStick is rather simple – sometimes regarded as too simple – as technology, its idea may be difficult to understand for persons not familiar with computers, and it may be confused with the internet, for example. Some of the care workers who assisted in producing materials for the sticks also mentioned that – because of their inadequate IT skills – the work has been quite time-consuming. The mStick, however, is easier to understand as compared to the alternative that the personal information were stored in the "cloud". Computers are not necessarily needed in using an mStick, if there is a digital photo frame or a television with a USB port available. However, the concept does not imply

that the USB sticks are the only possible type of technology; future technological platforms may well be different.

So far, the experiences mainly concern the development phase of the sticks: thinking about the structure, choosing the materials, producing and storing them on the stick. The concept itself is still under development, and results concerning, for instance, the long-term use of the sticks are forthcoming.

The user-driven approach and piloting have shown that, actually, more than two sticks have emerged. The mStick preserving personal memories has been broadened to store also collective memories and different kind of activities as well as wishes concerning every-day life and preferences concerning care activities and alike. Areas of application are numerous. Gathering and storing personal, collective and health-related information – with the older person as an active participant, co-creator in this process – the sticks are technology that is “full of life”, which has made the idea relatively easily accepted and implemented.

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The Design of Information Technology as Design of the Information Society

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Abstract. The design of a technical product is often focused on the development of that particular artefact. However, when we introduce new technology we don't simply replace old technology with new, but change many things within the whole context of use. With the help of familiar examples from our everyday life we illustrate how far-reaching the consequences of seemingly tiny-looking technological changes may be. Finally, we propose a design model which combines the traditional user-centred design cycle with a broader view. The premise of the proposed model is that when designing information technology we fundamentally design the information society.

1 Introduction

The construction of the information society and the design of information and communication technology (ICT) have a complex relationship. In this paper, we analyse the relationship focusing on the kind of technology that best represents the stereotypes of how the information society manifests itself in our everyday life. That is, we aim to conceptualise the design of ICT consumer products in terms of the construction of the information society.

An idealistic approach to the construction of a healthy information society would mean having a detailed vision which would form the basis for the development of the practical issues like technology. In other words, the role of technology would be to purely serve the realisation of a societal vision.

However, most creative efforts in the development of technology are rarely based on any commonly agreed societal value or vision. More likely the motivation is purely commercial, even if the façade looks innocent; for example, environmentally friendly technology only became popular after the commercial opportunities became evident. Another more or less hedonic striving force in the development of technology is surely the pure playfulness of human nature, combined with creative problem solving in everyday life [1]. In addition, the emerging new technical opportunities appear to trigger creative ideas about practical applications.

In all of these motivations the common feature is that they are highly technologically driven. Technology is created primarily for individuals, and the success of the development is assessed in such terms e.g. sales (consumer-view), usability or user-experience (user-centred approach). Whether we refer to consumers or users, we are talking about individuals, not the society. The societal success of technology has received little attention let alone the concept of designing technology primarily to achieve societal benefits.

The societal issues can be seen from a number of different perspectives. It has been argued [2, 3] that individuals are becoming disembedded from their immediate social and spatio-temporal context and increasingly participating in a global social context. This change can be attributed to a large extent to information and communication technologies [2]. On the other hand, it has been argued that users shape use cultures rather than the other way around [4]. From a social network perspective, for example in the case of the telephone, technology reinforces rather than disrupts existing social ties. Whilst, users may initially shape the uses of technology, once it becomes an established part of social life, the consumption of technologies in turn becomes a determinant of everyday living. Therefore it should be asked, how will technology distinctively shape culture, and how this cultural phenomenon relates to social change. Thus, individually and socially, the culture of consumption emerges in a stream of new goods. What industrialised countries therefore have in common is that they are “consumer cultures”, meaning a culture that has both achieved a stable form, and is at the same time continually changing due to the combination of new technologies and high economic growth. It can be argued that the consumption of technology has ritualised referring to the relation between technology and culture [5]. Further, it can be said that the consumption of particular technological devices such as the telephone becomes routinized after a period of novelty [6] thus becoming a constituent of our culture and society. In other words, personal technologies change the behaviour of the individuals, and once ritualised, the new behavioural patterns change the society. Figure 1 illustrates these relationships; technology is provided for an individual, who is in constant interaction with the society and related culture.

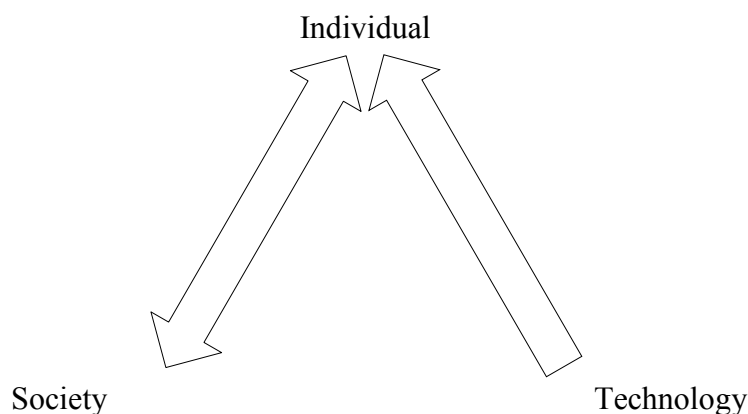


Fig. 1. Relationships among individual, society and technology

Technology here becomes culture insofar as it is translated into everyday life. How technology relates to culture or society is the core of this article; a question of how the everyday phenomenon brought about by technology add up to larger, cultural and social phenomena and how these can be taken into account in the design of ICT products and services.

While novel ICT products and services have improved both technically and in terms of quality of service, they can create new problems as individuals try to adapt to new ways of use and use cultures. Therefore, it is not enough to focus solely on how people use specific devices there is a need to understand how people live in their realities. In other words, instead of understanding just the use of artefacts, their presence in peoples' everyday lives, and the relevant societal and cultural aspects should be understood as well [7].

Technology has a profound impact on our everyday reality, and will continue to play a major role in shaping the future, both globally and locally. There are already clear indications that the cost of the prevailing IT-driven cultural phenomena will be high in terms of well-being [8]. Technological revolutions are, however, among the most consequential things that happen to humanity, and technological change is largely responsible for the evolution of basic parameters of the human condition. Because of the profound consequences of technological implementations, it seems inevitable that more effort than is currently put into policy making, placing objectives, and directing research and development of technology needs to take place

This article outlines a proactive approach to the development of technology. The proposed approach places social and cultural issues relating to the design of technological products and services firmly centre stage.

1.1 From change of technology to change of culture: two cases from the past

The relationship between technology and culture is common sense. However, new technology is often introduced as if it were just an individual, innocent organisation of any given functionality. Therefore, in the next section we remind readers, with the help of familiar examples, the wide-ranging impact even one single innovation can have on our culture. The examples illustrate the dynamics of a typical process from initial technical concept to a product which finally becomes a constituent of a society.

- Example 1: Remote control device (RCD)

The development of the remote control of television started from simple, well-defined practical problem: how to change channels and adjust the volume of a television without leaving the viewing location. The first solution was to bring the control panel via wires to the viewing place ("Lazy Bone" from 1950's). Later the device was developed to work wirelessly¹. In many respects, the basic concept has remained the same over the last sixty years, which indicates that it served well the original need. The interesting issue then becomes the different ways in which the remote control has influenced our media culture. Firstly, before the advent of RCDs commercials were

¹ The first product of this kind, Zenith "Flash-Matic" from 1955 worked with visible light

placed between the programs before we had RCD. Unfortunately for advertisers the RCD made changing the channel after a program so effortless and quick that the visibility of commercials drastically reduced. Therefore, the commercials had to be placed during a break in the program itself – so called ‘commercial breaks’ in order to increase the probability that they were seen. This, in turn, changed the structure of programs. Secondly, it was noted that the users of RCDs tended to switch channel before the final credits of a program, so in response a split-screen technique was created: the credits role in half of the screen during the last scene. Thirdly, it is fairly obvious that the huge growth in the number of channels available would hardly have happened without the RCD; the culture of zapping through the channels was enabled by the RCD. The zapping culture, in turn, highly rules the production of all televised material: In whichever moment you switch to a given channel, there have to be elements that entice you to stop zapping and stay on that particular channel. [9, 10]

The RCD has thus become the enabler of zapping culture, which in turn has revolutionised much of our media consumption and production. This particular piece of technology has then become the bottleneck in the creation of televised material. In other words, RCD helped to control the television, but as a side effect, dramatically reduced the opportunities to create high quality television programs. It can be argued that the fragmented world of media and the increasing restlessness of our technology saturated everyday life is in part caused by the trend that the remote control of television launched.

- Example 2: Mobile phone

The shift from landline telephones to mobile phones has caused salient changes in our culture. Although the time perspective for making objective comparisons between life before and after the penetration of mobile telephony and other communication is probably too short, conclusions from everyday observations are self-explanatory.

The vision of the creators of the mobile phone was probably very simple: Wouldn't it be fantastic if all people could carry their personal telephone in their pocket? As in the previous example, the early visionaries barely thought beyond the individual's perspective. The introduction of mobile phone has resulted in the rundown of many of the opportunities and social patterns which relate to the stationary telephone. Along with the internet, mobile devices have been the fore most catalysts of our fragmented, hectic lifestyle, not least among the younger generation. At the same time, families have lost their communication “nerve centre”, the landline telephone, in which family members became familiar with each other's contacts. Thus the device which was – according to slogans – supposed to connect people has caused unravelling of social order [11]. We argue that if the landline phone with its social benefits and superb sound quality – resulting in an ultimate feeling of presence – were to be introduced now, that it would be praised as a brilliant innovation, providing that someone managed to create profitable business around it.

2 Re-orientation: Design of Technology->Design of Society

As a concluding statement, we will propose a model of technology design, which would articulate the design of information technology as the design of information society. This does not refer to technical orientation to information society, but to the fact that the introduction of new ICT-products and services inevitably shape our society. Therefore, the designers should be well aware of the consequences of their work. The proposed model is a framework which would enable the designer of an individual product or service to conceptualise his or her work as a contribution to the construction of the information society. Figure 2 illustrates the proposed method. The method combines a typical iterative user-centred design model and the so called Rich Use Scenario (RUS) method. The lower cycle in the figure illustrates the user-centred approach and the upper one illustrates RUS, respectively.

The typical iterative, user centred design cycle is based on the idea of frequently reflecting upon the user's perspective of the proposed design ideas: Once something has been designed, it is exposed to evaluation, which often takes the form of some

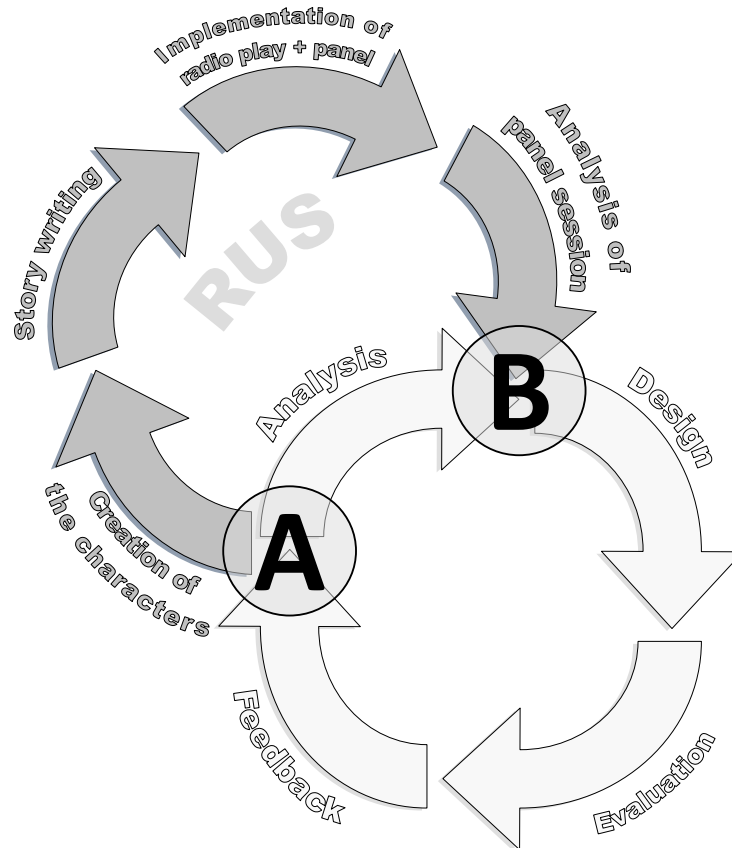


Fig. 2. Composite of UCD and RUS cycles

kind of user study. The feedback from the evaluation is then analysed and utilised in the next design iteration.

As such, the above described cycle clearly does represent the user's point-of-view. However, there are at least two weaknesses with this strategy. First, the thing to be evaluated is something that has taken form already, an embodiment of a concept. It does not say anything about the origins of the initial idea or concept. Second, in being user-centred, it is very individualistic by nature. The evaluation criteria are more likely to be hedonistic than social. In other words, it stresses the individual's wants and experienced needs rather than any common good.

Because of these weaknesses we propose the development of an iterative design of ICT applications and services by adding an analysis of wider impacts in each iteration. As the method for such an analysis we propose Rich Use Scenario (RUS), which was originally created for the practical needs of user-interface design.

2.1 RUS in a nutshell

Use scenarios have a long and well established history within application development. At the general level, use scenarios can be defined as descriptions about a user using an application [12]. The main reason for using use-scenarios is that purely technical descriptions are inadequate in revealing user-related issues of design.

Typical guidelines for the preparation of use-scenarios [13] encourage the creation of many scenarios in order to cover as many use cases as possible. However, the problem with this strategy is that the scenarios tend to be mechanical and the relating user characters flat in nature. The objective of Rich Use Scenario is, to inspire creativity in the design team rather than enforcing highly credible or likely scenarios as is the case in typical use scenarios [14-16]. The underlying idea is that RUS would form a common basis for discussions within an interdisciplinary design team: When engineers, designers and usability specialists gather together, there is an apparent communication problem. Engineers talk about technical opportunities, while usability specialists talk about the user. RUS is found to be an effective method of avoiding communication gaps among different perspectives.

Due to its nature, in RUS one single use scenario is created. The preparation of the scenario starts with the creation of an inspiring character (or characters), the persona [17]. Then the whole story is written in the form of a radio play manuscript. The essential thing in the preparation of the manuscript is that the story is vivid and provides the listener with an opportunity to identify herself or himself with the character. The technology to be designed has a role in the story, but the story should not primarily be about the application but rather about life itself.

The manuscript is then used as a basis for a radio play. Radio plays have been found to be an appropriate stimulus for group discussions. Compared to video, radio play leaves more space for imagination thus supporting creative thinking. In turn, compared to a written story, a radio play's strength is in that it provides a shared temporal focus: each member of the group focuses on the same point of the story at any one time, while when reading a written story group members don't have this shared experience [16].

Having listened to the radio play, the participants of the design panel are supposed to discuss the story. The organisation of the group discussions may differ greatly depending on the actual design task. The discussions are usually recorded and analysed.

Even if RUS has more generally been used to reveal the individual user's point-of-view, a radio play may also deal with societal, environmental or health issues, to name but a few. Therefore the application areas of RUS are endless.

2.2 RUS as an element of the proposed design method

As described above, the RUS-method can be used in a wide variety of contexts. The essence of the method is to evoke creative ideas and enhance communication within a design group. As such, it serves the pursuit of expanding the typical user-centred design cycle to cover a broader range of issues.

In Figure 2, point 'A' refers to the phase where usability related issues will be analysed in the user-centred circle, and wider issues are handled in RUS-iteration. In phase 'B' an individual user's point-of-view and the wider, e.g. societal perspective are converging. This is the crucial point since it provides the input for the next design iteration. I.e. in point B, the output of analysis of the RUS cycle and the usability cycle provide input to the design phase.

3 Discussion

The aim of this paper is not to diminish the potential of technological innovations in the construction of a healthy information society. It is neither realistic nor appropriate to demand that in all technological creations the sole motivation should be the realisation of ideal society. It is up to the political system to set limits on research and development. On the other hand, in order to fully exploit human creative potential, setting limits is obviously not enough; governments should also promote the construction of innovation-friendly circumstances. In other words, the political system is responsible for both enabling creative activities and reflecting them in terms of ethical values. In the creation of well-being in the information society, it is essential to acknowledge that the information society is fundamentally a product of human creativity and political decisions. The way to well-being in any future society is thus to support creative design and to expose the outcome to ethical reflection.

This paper proposes an approach to combining the development of novel technologies with the construction of a healthy information society. Ideally, these should not be separate issues but the construction of technology should be fundamentally seen as the construction of society. In Figure 1, there is no feedback from society to technology. The proposed approach would imply the adding of a two-headed arrow between the words 'society' and 'technology': so that firstly, the requirements of the healthy society would work as a criteria for design, and secondly, a healthy society would more likely feed constructive technical ideas which ultimately contribute to well-being.

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Socio-Psychological Barriers in Assistive Technology Adoption for Totally Blind People

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Abstract. In recent years, assistive technology for people with disabilities has been enhanced to offer better quality of life. The Comprehensive Assistive Technology (CAT) Model explains assistive technology adoption for people with disabilities, including blindness and visual impairment. However, the 'optimistic' outlook of assistive technology adoption models fails to highlight the socio-psychological barriers in technology adoption in the case of totally blind people. Using perspectives drawn from the CAT Model and relevant research highlighting attributes associated specifically with blindness, this paper examines socio-psychological barriers in assistive technology adoption for totally blind people.

Examination of relevant literature pertaining to assistive technology adoption models and socio-psychological attributes applicable to totally blind people ascertains that negative social conditioning, need for control over surroundings, frustration, anxiousness, and social embarrassment are barriers in assistive technology adoption. These results highlight the need for further practical research to analyze attributes that restrict assistive technology adoption, as well as the need for broader research into barriers of assistive technology adoption. The results provide practical opportunities to remove the barriers that inhibit assistive technology adoption for totally blind people.

Keywords: Assistive Technology Adoption, Totally Blind People, Socio-Psychological Attributes

1 INTRODUCTION

Numerous studies have highlighted the importance of technology in order to improve overall quality of life, whether that is through the use of virtual [1] or mobile technology [2]. The improvement offerings apply especially in the case of health care, as in the case of patients with severe medical conditions [3], or electronic health records [4] as well as mobile health care [5].

However, there is little differentiation between technology and assistive technology, except in their applicability. Riemer-Reiss and Wacker [6] have stated that "assistive

technology is geared towards individuals with disability, enabling them to participate in society as contributing members”. Advancement in assistive technology has provided better enablement of improved quality of life for people with disability [7], [8].

Within the last ten years, various assistive technology adoption models have highlighted attributes that have an impact on assistive technology adoption for people with disability. The Human Activity Assistive Technology (HAAT) [9] model targets the needs and desires for assistive technology adoption, whereas other models including Needs, Analysis and Requirements (NARA) [10], and USERfit Method [11] rely solely on design and usability for assistive technology adoption. Matching Person to Technology (MPT) Model [12] provides personalized view on assistive technology adoption, while the Comprehensive Assistive Technology (CAT) model [13] provides a comprehensive extension to the approach taken in the HAAT model.

While Hersh’s model [13] (and other models) focuses on assistive technology adoption; the models give little consideration to the negative socio-psychological attributes associated with the target population in the adoption of assistive technology. In this paper, the target population is totally blind people. A totally blind person is defined as:

A person with complete lack of form and visual light perception, recorded clinically as No Light Perception (NLP) [45].

A totally blind person often relies on assistive technology for better orientation, mobility [14], information gathering and social inclusion [13], and eventually, enhancing the quality of life [8].

The socio-psychological implications of blindness have been carefully studied by various researches [15-17]. However, not too many studies have focused on socio-psychological attributes pertaining to technology usage for totally blind people. This paper cross-examines behavioral attributes that are specific to the subject group (totally blind people) while also focusing on the idiosyncrasies and personal aspects that are unique to each member within this group. The multi-disciplinary approach of this conceptual paper provides a deeper understanding of behavioral characteristics of totally blind people, specifically those characteristics that are barriers to assistive technology adoption.

This paper starts with establishing the proper definition and benefits of assistive technologies, citing relevant examples in the case of totally blind people. This is followed by comparison between relevant assistive technology adoption models. Then, the socio-psychological attributes of the target population are detailed. These behavior characteristics are then combined with the proposed theoretical model to create a targeted model that provides clearer understanding of negative (or perceived negative) socio-psychological factors that limit technology adoption for totally blind people.

The final section of this paper ends in conclusion and discussion, citing theoretical and practical contributions, as well as ideas for further research.

2 BACKGROUND

2.1 What is Assistive Technology?

Emiliani [18] has said that there is little difference between technology and assistive technology. However, historically, assistive technology has been referred to as technology that is primarily used by people with disability, enabling them to participate in society as contributing members [19]. Hersh [13] has defined the role of assistive technology in terms of social model as “overcoming the gap between what disabled people want to do and what the existing social infrastructure allows them to do”. Within this paper, special emphasis has been laid on assistive technology, focusing on the essential components of technological advances that can enable totally blind people to improve their quality of life.

Assistive technology provides numerous benefits for people with disability. According to Hersh [13], assistive technology can be used to overcome the social, infrastructure and other barriers experienced by disabled people that prevent their full and equal participation in all aspects of society. Similarly, Carr, Gibson and Robinson [20] have pointed out that assistive technology allows people to continue in their normal roles and meet their expectations of life despite their physical impairment and disability. However, in the case of visually impaired and blind people, while assistive technology is very useful, its implementation and accessibility has been often questioned [21].

Some of the more common assistive technologies that are used by totally blind people include Screen readers [22], Braille printers [23], Personal Digital Assistants (both Braille and Speech operated) as well as Audible Tactile Signs and Warning Surfaces.

3 FRAMEWORK AND BASE-MODELS

3.1 Assistive Technology Adoption Models

For the purpose of this research, the following relevant assistive technology adoption models were considered:

- Human Activity Assistive Technology (HAAT) [9]
- Matching Person to Technology (MPT) [12]
- Comprehensive Assistive Technology (CAT) [13]

These models are based on the idea of clearly defining all necessary attributes that affect the adoption of assistive technology by people with disability (hence applicable to totally blind people). A careful comparison and contrast provided a clearer under-

standing of the base attributes that govern assistive technology adoption within these models. Table 1 highlights various attributes that form the cornerstone of relevant assistive technology adoption models.

Based on the analysis in Table 1, Matching Person to Technology (MPT) model does not offer a deep insight into the socio-psychological attributes of technology adoption. Moreover, while the Human Activity Assistive Technology (HAAT) gives a clearer insight into the core attributes of assistive technology adoption, it is outdated, and succeeded by Comprehensive Assistive Technology (CAT) Model, which provides an in-depth and extensive attribute analysis for an assistive technology adoption model.

Furthermore, the following factors add to CAT Model's relevance for this research paper:

- The model (Figure 1) is easy to understand and visualize, represented in a tree-like structure
- The model is one of the recent frameworks available for assistive technology adoption.
- The model considers the socio-psychological attributes (Person and Context) in extensive detail.

There is however one drawback: CAT Model lacks feedback mechanism, which makes it limited in applicability, especially in case of individuals – thus reducing opportunities of personalization. Considering all these factors, CAT Model provides the best fit for capturing, analyzing and assessing the foundations of socio-psychological barriers that totally blind people face in adopting assistive technology.

Table 1. Comparison of assistive technology adoption models

Attributes	Matching Person to Technology (MPT) [12]	Human Activity Assistive Technology (HAAT) [9]	Comprehensive Assistive Technology (CAT) [13]
Context	Psychosocial characteristics	Social framework	Cultural and Social
	-	Physical Environment	National Setting
	-	Applicable to personal and assistive technology	Local Setting
Person	Needs and Preferences	Mechanistic role	Characteristics
	Expected technology benefits	-	Social Aspects
	-	-	Attitudes
Activity	Related to versatile activities	Procedure, operation or task	Mobility, Recreational Activities
	-	-	Daily Living, Education and Employment
	-	-	Communication, Cognitive activities
Assistive Technology	Separate measures depending on context	External Enabler	Activity Specification and End User Issues
	-	Overcome contextual barriers or obstacles	Design Issues
	-	-	System Technology Issues

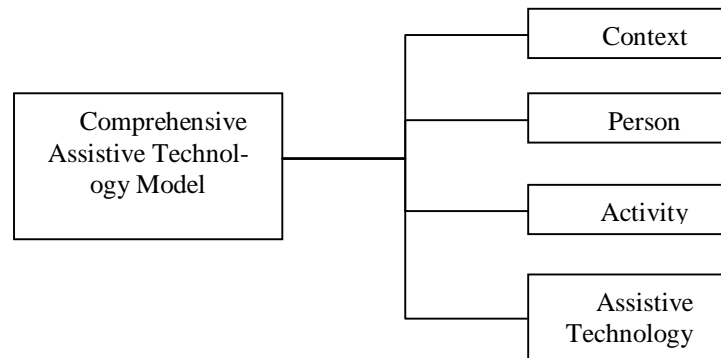


Fig. 1. Comprehensive Assistive Technology (CAT) Model [13]

3.2 Socio-Psychological Attributes associated with Blindness

While past research in this area has been criticized due to lack of understanding of heterogeneous nature of the population [24], many recent researches have delved deeper into the personal as well as societal nature of behavioral characteristics associated with blind people [16], [25-26]. However, very few studies have clearly conceptualized the socio-psychological attributes that inhibit or restrict assistive technology adoption for totally blind people.

Researching for this paper involved analyzing various articles that highlight socio-psychological attributes associated with blindness. Preference was given to those articles that looked at socio-psychological factors in context of assistive technology usage. It must be clarified that while some characteristics are common to the general target group, there are various other factors that are unique to individuals and cannot be generalized.

Due to its detailed and targeted nature, the socio-psychological analysis in [26] was considered to be foundations for most appropriate socio-psychological model for this conceptual paper. This paper highlights the key socio-psychological elements that are central to the target population, yet at the same time applicable to individuals. For the sake of easier cross-comparison to the CAT Model [13], contributions from Shinohara and Tenenberg [26] were analyzed and categorized in Table 2.

In Table 2, the third column represents the perceived effect of the socio-psychological (and activity and assistive technology-based) attributes. The negative and positive scale has been extracted and analyzed from the study conducted by Shinohara and Tenenberg [26], according to whom it is imperative to consider socio-psychological aspects of assistive technology adoption since simply changing the nature of assistive technology does not determine its adoption trend – personal attributes are relevant and important for good user experience.

The perceived negative effect of various socio-psychological attributes generally impedes technology adoption. These effects can be counteracted by other more positive effects, which have higher weight age in such a scenario [27-28]. However, for this paper, only the perceived negative (or otherwise negative) socio-psychological attributes have been considered.

Within the 'contextual' context, the reaction of community, local and national setting can have an overbearing effect on assistive technology adoption in case of totally blind people. Lack of external motivation, positive discrimination as well as indifference can often be perceived as a negative force, thus reducing the overall commitment for totally blind people to adopt assistive technology. As a matter of fact, various researches have commented on the importance of society in promoting assistive technology adoption [29-31].

An individual's personal characteristics and personality type affect assistive technology adoption [13]. In the case of totally blind people, some character traits (whether enforced by environment, by condition, or by context) can impede technology adoption, as highlighted in the table above. The need for control over surroundings can cause grievances against assistive technology, as it can often be perceived as a hindrance rather than a facilitator [8], [32-33]. Expectations also form an important personal attribute, controlling or affecting the outcome of assistive technology adoption. High expectations followed by bad experience with assistive technology could increase social embarrassment and affect self-esteem amongst people with disability, and in this case, totally blind people, resulting in higher than normal technology abandonment [34], or seeking outside help.

Table 2. Analysis of study by Shinohara and Tenenberg [26]

Attributes	A blind person’s interactions with technology Shinohara, and Tenenberg [26]	Perceived Effect on Assistive Technology Adoption
Social	Social Conditioning	Negative
	Desire to socialize with normal sighted people (friends & family)	Positive
Psychological	Control over surroundings and expectations	Negative
	Need for Independence (control but not be controlled)	Positive
	Social Embarrassment (Avoiding unnecessary attention) and Self Conscious	Negative
	Greater need for Comfort	Positive
	Frustrated and anxious (when technology fails)	Negative
	Determination	Positive
Activity	Flexibility in usage	Positive
	Personal preference motivation	Positive
Assistive Technology	Need for Efficiency	Positive
	Significance	Positive

Social embarrassment and the resulting self-consciousness are two major threats to assistive technology adoption. As highlighted by Shinohara and Tenenberg [26], Social embarrassment can be a deterrent to assistive technology usage, as the users might perceive it to be bothersome for other able-sighted people in a social environment. This kind of perception limits the usage of assistive technologies [35-37], and hence can be a huge barrier in assistive technology adoption.

4 PROPOSED MODEL

Based on the two multi-disciplinary models that have been selected through careful analysis, this paper highlights the negative socio-psychological attributes that can be potential barriers to assistive technology adoption in the case of totally blind people. According to the Comprehensive Assistive Technology (CAT) Model suggested by

Hersh [13], the contextual and personal attributes are further elaborated, as represented in Fig. 2.

Figure 2 highlights the socio-psychological sub-attributes from cross-section of the CAT Model and the (negative) attributes extracted and analyzed from study conducted by Shinohara and Tenenberg [26]. These attributes highlight the socio-psychological characteristics that could potentially impede assistive technology adoption. The cross-examination of the attributes across the assistive technology adoption model and socio-psychological model is necessary as it provides common ground to compare and relate attributes.

Based on Figure 2, four factors can be summarized as causes of potential negatively impact on assistive technology adoption in the case of totally blind people.

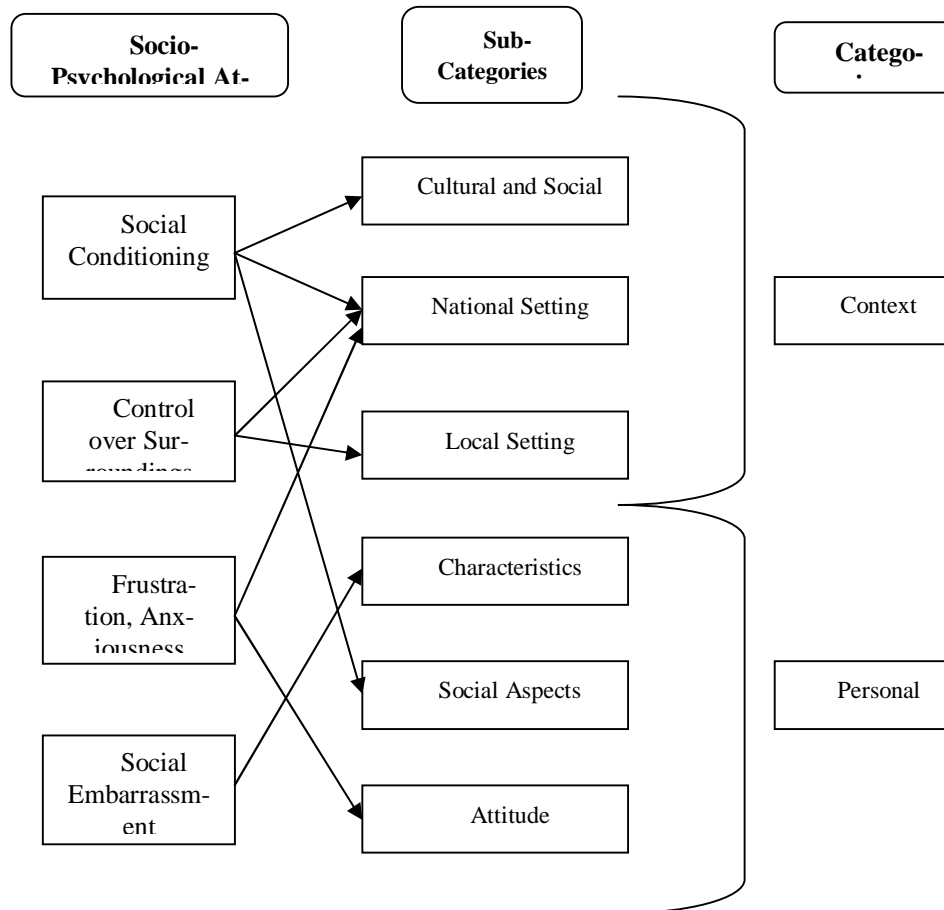


Fig 2. Proposed model for socio-psychological barriers for assistive technology adoption for totally blind people

Societal

- **Social Conditioning** is defined as the sociological process of training individuals in a society to respond in a manner generally approved by the society in general [46]. According to Young [38], personality and social conditioning have strong correlation, and hence negative social conditioning can affect personality negatively. Due to the social paradigms surrounding blindness (as a disability), the unintentional social conditioning promotes a sense of positive discrimination, pity and sympathy for blind people. These factors can make (blind) people self-conscious. In many cultures, blind people are expected to completely depend on other people, and not assistive technology – which is a strong impediment in assistive technology adoption.

Psychological

- **Control over surroundings & Expectations:** Blind people wish to be independent and manage their daily tasks without continuous assistance [39-40] as highlighted in the study by Shinohara and Tenenbergs [26], while blind people wish to have control over their surroundings, these wishes don't always translate into reality, leading to frustration and anxiousness in assistive technology usage [26], [41-42]. Similarly, high expectations from assistive technology usage, followed by frustration or even failure could result in loss of trust towards technology, thus affecting assistive technology adoption.
- **Frustration and Anxiousness:** Quite often, one of the major reasons for lack of assistive technology is frustration from lack of understanding or ease of use. In the case of totally blind people, and as has been highlighted in the analysis above, frustration and anxiousness in relation to assistive technology impedes its adoption. While personal characteristics (motivation to learn and use) can alter the level of frustration and anxiousness associated with assistive technology usage, people with no vision face certain difficulties with technologies that people without vision take for granted. These two factors are major deterrents to assistive technology adoption.
- **Social Embarrassment:** As highlighted in the study conducted by Shinohara and Tenenbergs [26], (totally) blind people prefer to be aware of their surroundings in the way of knowing the time, location and other useful information. However, curiosity and unwanted attention from others, as well as lack of empathy, can lead to heightened self-attention [43], thus impeding use of assistive technology. Social embarrassment is also a major deterrent to assistive technology adoption for totally blind people.

5 DISCUSSION AND RESEARCH IMPLICATIONS

Assistive technology provides multitude of benefits to people with disability. While three different assistive technology adoption models that were examined; based on requirements of this research, the Comprehensive Assistive Technology (CAT) Model was found to be most suitable. By combining the assistive technology adoption model with the socio-psychological attributes highlighted by Shinohara and Tenenberg [26], it can be reasoned that certain socio-psychological attributes (social conditioning, need for control over surroundings, frustration and anxiousness, social embarrassment) that are common to totally blind people can impede assistive technology adoption. While these results cannot be generalized to the entire totally blind population [26], [44], they represent an interesting theoretical model that should be tested with further research to ascertain the level of impact these impeding attributes have. Moreover, these attributes are in no way exclusive to the target population (totally blind) in question.

While this research is not an exhaustive representation for all totally blind population, it brings up some interesting insights and results that could promote deeper understanding of socio-psychological factors that affect assistive technology adoption for totally blind people, and other disabled groups. This research managed to go beyond the archives socio-psychological implications of blindness, and delved deeper into to socio-psychological attributes pertaining to technology usage for totally blind people. The cross-examination of the multi-disciplinary fields allowed focusing on behavioral attributes specific to the subject group, while focusing on the personal attributes that might affect assistive technology adoption.

This research could further benefit from real-life case studies that offer deeper insights into the lives of totally blind people, especially those that have not yet adopted assistive technology, which could otherwise provide an opportunity to improve their quality of life. During the research, it was also realized that assistive technology adoption models do not explicitly cover the negative attributes that are barriers to adoption. It is recommended that future studies should also concentrate on analyzing characteristics and attributes that restrict assistive technology adoption. From a practical perspective, this research offers opportunities to work with totally blind people to remove completely, or at the very least reduce, the impact of negative socio-psychological attributes that deter assistive technology adoption. Reducing the impact of these attributes would provide much needed support for assistive technology adoption for totally blind people.

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Professional Skill Improvement of Specialists in Medical and Social Rehabilitation of Persons with Dependence Problems

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Abstract: Alcoholism and other chemical dependency - an important medical and social problem in the European North of Russia. The quality of medical and rehabilitative care for people with problems of dependence is based not only on medical but social components. Training of medical and social rehabilitation of persons with problems of dependence requires the development of a regional program that includes several key areas - health, social, psychological, pharmacological, organizational and methodical.

Key-words: dependency problems, medical and social rehabilitation, improvement of professional skill

Rehabilitation - the complex medical, psychological, social and occupational activities aiming at the complete restoration of health, impaired functions, psychological status and health of people who have lost this ability due to illness, injury, defects, mental and physical development and other causes.

Rehabilitation is based on the ideology of unity paradigm of biological, social and spiritual essence of man, changing as a result of the disease and is able to recover for the implementation of an integrated health and social care technology and rehabilitation programs.

Substance abuse rehabilitation contingent based on the maximum possible restoration of physical, mental and spiritual condition of the patients and the correction or the formation of normative personal and social qualities, the ability to fully function in society without the use of psychoactive substances that cause addiction.

Rehabilitation in Addiction is:

- The system of scientific knowledge about health-social rehabilitation of patients with substance abuse, based on current understanding of pathogenesis and clinical features of disease and optimal additive treatment options;
- A set of educational, psychological, educational, medical, social, legal, employment measures for the rejection of the use of psychoactive substances with the formation of a stable orientation of the individual anti-drug, its re-socialization and reintegration into society.

The primary goal of rehabilitation - Failure of a patient from the use of surfactants that caused addiction.

The ultimate goal - the restoration of personal, social and marital status of the patient, based on changes in psychological attitude of the individual and ideas about themselves, develop self-control and self-discipline, the acquisition of new productive experience of coping with problematic situations, disclosure, and the realization of its spiritual, moral, creative, emotional and intellectual capacities.

Rehabilitation can only be successful if its implementation based on a number of fundamental propositions:

- Voluntary participation of patients in rehabilitation activities;
- Attitude of the patient to discontinuation of psychoactive substances;
- Accessibility and openness of the rehabilitation agency;
- Trust, partnership and responsibility in medical rehabilitation process;
- Systematic, diversity and individualization of rehabilitation approaches;
- Phasing of rehabilitation measures;
- Unity of the biomedical, socio-psychological and pedagogical methods target effects;
- The reorganization of the living environment and the formation of rehabilitative environment;
- Inclusion in the rehabilitation of important persons from the microsocial environment;
- The active role of ex-patients in medical rehabilitation process.

Rehabilitation - a specialty of the XXI century, it must:

- To be generalists,
- Constantly introducing new rehabilitation technologies that create the conditions and prerequisites that make the patient recovers from his physical, mental and spiritual resources
- Be able to work in Multiprofessional team at all stages of treatment and rehabilitation process.

The program is based on the above provisions, aimed at a comprehensive approach that includes technology and techniques of psychotherapy, psychological, social, and pharmacotherapeutic recovery of persons with diseases of dependence.

In this connection of the mentioned on the basis of the Northern State Medical University the new scientific-and-methodical direction is implemented, the aim of which is improving the skills of specialists in medical and social rehabilitation of different age groups of persons with dependence problems. It includes theoretical (cycles of improvement of qualification, psychological trainings) and practical work in hospitals and rehabilitation centers.

The main components of the work are:

Medico-social - linkages between psychiatric hospitals, dispensaries and regional social services;

Psychological - prevention of burnout syndrome of professionals providing care of patients with problems of dependence;

Pharmacological - justification of the use of new pharmacological opportunities, preventing the appointment of a "heavy" psychotropic drugs (with the replacement of the maintenance treatment and "secondary correction" of the psychological status of patients taking into account the working-age and elderly, and members of their families);

Organizational and methodical - training of specialists responsible for all phases of medical and rehabilitative care and quality of life of patients; preparing them to working in a multi-disciplinary team - both through the provision of effective health and social care in the modern information society.

Expected results of the program:

- Implementation of the results for the training of specialists:

- At regional level:

-) inclusion in the scientific and educational programs at the Faculty of Postgraduate Education SSMU for the training of specialists of the Arkhangelsk region

- At the international level:

-) inclusion in the project partners from the Nordic countries - the scientific and the practical and academic centers;

-) introduction of the results in the joint international master's programs with educational centers and the practical organization of the North-West of Russia and the Barents Euro-Arctic region for the training of medical and social rehabilitation of people with social diseases, taking into account international experience in the Nordic countries.

- Development of recommendations for professionals on the complex medical and social, psychological and pharmacological assistance for the rehabilitation of patients with substance abuse at postgraduate level.

The practical significance - improving the efficiency of training to implement the program of rehabilitation of persons with problems of dependence with the following components:

- Medical and social: to strengthen trade links between substance abuse hospitals, psycho-neurological clinics, social services and the specialized departments of Saratov State Medical University;

- Psychological: prevention of professional burnout syndrome professionals providing medical and social and psychological treatment and rehabilitation assistance to addicted patients;

- Pharmacological: Pharmacological rationale for the use of new features, excluding the appointment of "heavy" with the replacement of psychotropic drugs in the maintenance treatment and the "secondary adjustment" of the psychological status of patients and microsocial environment;

- Organizational and methodical: Preparing to work in a multi-disciplinary team of professionals responsible for the stages of treatment and rehabilitative care to patients with substance abuse;

- International: an organization based on the SSMU International Centre for Preventive Drug Abuse.

The impact of ICT (Information and Communication Technology) for Inclusive Education - status quo and outcome for the teacher training

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Abstract. The focus of this paper is on ICT (Information and Communication Technology) as a key tool for the further development and fortification of an inclusive education system which in turn requires a specific need of media literacy for all protagonists in the educational process. Drawing on the example of pupils with low vision and their specific learning situation, the benefit of ICT to enhance the participation of pupils with SEN (Special Educational Needs) in mainstream schools will be demonstrated. This particular link between ICT and inclusive school settings which is affirmed by international documents poses new challenges to all professionals. By naming relevant factors influencing the ICT usage in the educational field, the current situation will be described (with particular view on Germany). Finally, this literature review points out the next crucial steps to increase the use of ICT with the main target of pushing and improving towards a more inclusive education system.

Keywords: ICT, media literacy, inclusive education system, teacher training

1 Introduction

In the 21st century, known as the media age, the practice of ICT (Information and Communication Technology) gains in importance including all areas in the society. Also in the area of education, ICTs are indispensable elements [1, 2]. Nowadays, media literacy is equally important as writing, reading or calculating.

Especially in the view of the current educational debates, the key role of ICT must be highlighted [3]. In 2007 more than 100 states all over the world signed the “Convention on the Rights of Persons with Disabilities”. In Article 24 all signatories declare that: “*Persons with disabilities can access an inclusive, quality and free primary education and secondary education on an equal basis with others in the communities in which they live*” [4]. This article defines the global goal that all children - with or without a handicap - have the opportunity to learn together. It is, however, undisputed that this enormous demand - the development of an inclusive education system - needs a crucial change in the culture of learning and teaching. Changes in the culture of learning and teaching can be significantly supported by using ICT. This statement is confirmed by a lot of government documents and papers [3, 5, 6].

While a large variety of benefits of ICT usage have been proclaimed, this paper picks up the classification of the UNESCO. In Accordance with the UNESCO, three benefits of the use of ICT have an enormous effect on the high quality education for all pupils and must be spotlighted. *“The advantages (...) are based on the possibilities it offers for alternative means of communication, providing access to educational resources in a more convenient way and to enhancing learning motivation”* [3]. In contrast to the further discussion, this comment refers to the whole group of children and youths with disabilities. At the same time, the UNESCO points out the particular share of professionals in the process of educational change [3]. In order to make use of the innovation potential of ICT, qualified teachers are absolutely necessary [1, 7].

2 Main questions

According to the UNESCO, ICT can be defined as follows; ICT is a *“diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information”* [8]. Following this definition, ICT is an extended term which encompasses tools such as hard- and software, computers, E-Learning, internet, etc. Based on this broad definition, the benefit of selected ICT-tools for enhancing a high quality education for all will be presented more detailed. Therefore, this paper focuses on the special learning conditions and possibilities of children and youths with low vision. Some practical examples will demonstrate the expected benefit for this target group. Furthermore, the paper illustrates how the teachers were prepared for these new teaching skills. Particularly, the consequences for the professionals and their training will be discussed.

2.1 The impact of ICTs for pupils with low vision

Nowadays, mainstream schooling without ICT is not imaginable for children and youths with low vision. With regard to the specific benefit for this target group, some essential functions of ICTs in the inclusive setting will be demonstrated.

In this regard, it must be kept in mind that all types of visual impairment and blindness have different effects. The absolute manifestation of this impairment and also the resulting consequences for the participation process in the daily life are highly individual. Thus, learners who have the same visual condition may use their vision in different ways. To assess the real effect of the visual impairment, the classification of visual impairment from HYVÄRINEN is recommendable [9]. HYVÄRINEN proposes to categorize the vision in the following four main functional areas: communication, orientation and mobility, activities in daily life and sustained near vision tasks. The further purpose of this classification is to verify if the pupil uses, for example in daily life, blind techniques, low vision techniques or sighted techniques. In the following example of HYVÄRINEN, the classification will be demonstrated. *“A child with central scotoma and low visual acuity may need very high magnification, even CCTV to read, or prefers Braille and talking books when longer texts need to be read. These children may have no problems in orientation and moving in known places where they thus use*

techniques typical to normally sighted but may have problems in unknown places” [9].

By using this classification, the expert is able to give detailed information about the visual impairment which is the basis for harmonizing the ICT-equipment with the individual skills of every youth and child with low vision. This also shows that general recommendations are impossible, so that the following examples can only name some possibilities for applications. The UNESCO ITE (Institute for Information Technologies in Education) and the European Agency for Development in Special Needs Education differentiate between four possible types of application of ICT usage: 1. Supporting personal access to information and knowledge, 2. Supporting learning and teaching situations, 3. Supporting personal communication and interaction and 4. Supporting access to educational administrative procedures [3]. This model includes not only the profit for the pupils, but also for the professionals. Basically all types of the education system - from early intervention to higher education - are affected by the use of ICT.

1. *Supporting personal access to information and knowledge:* First of all, assistive technologies play an important role in improving the equitable participation in the educational field. Using assistive technologies like speech output, braille display or screen-reading software allows visually impaired or blind pupils to access the same curriculum as their peers. With the aid of assistive technologies, it is possible to address the individual learning requirements [10]. Secondly, ICTs open up possibilities for an independent and autonomous life. Thus, they allow low vision pupils to develop media literacy which is absolutely necessary for the higher education and professional training.
2. *Supporting learning and teaching situations:* Exact knowledge about the visual capability (visual range, visual acuity etc.) of every learner with low vision is one of the most important conditions to support the individual learning process. Only the accurate vision diagnostic allows making learning materials which are tailored for the best possible learner support. As a part of this diagnostic process, ICTs, like iPads, can be used. In addition, the documentation of the learning progress of every pupil can be managed as an online resource by implementing E-Learning tools [11]. In this way every involved person has access to this information which considerably simplifies the interdisciplinary exchange. That, in turn, has positive effects for the planning of learning and teaching situations because they can be organized more oriented on the behalf of children and youths with low vision.
3. *Supporting personal communication and interaction:* Furthermore, making use of the internet and social media can support pupils with low vision to communicate with their peers and hence facilitates their social inclusion. Very common tools, like iPhone or iPad, which are also possible to handle for persons with blindness or visual impairment, remove any barrier. In addition, a lot of studies demonstrate that the mere use of ICT motivates pupils to access information and cultivate a positive learning attitude [12]. Moreover, ICTs are an integral part of our society.

Therefore, all pupils with or without handicap need the access to ICTs (E-Inclusion).

4. *Supporting access to educational administrative procedures*: Supported by online tools, both professionals can profit from a network that allows communication and interaction, even time and local independent. A research of BECTA (British Educational Communications and Technology Agency) shows that ICT “*supports reflection on professional practice via online communication*” [5]. This reflection must also include the didactic and methodic consequences of the use of ICT for the further development in the educational field. It demonstrably reduces the professional workload, because the modification of individual learning materials is faster and easier organized by taking recourse of the electronic system [12]. In addition, it is possible to create an offer of information for interested colleagues which indicates the specific needs of pupils with low vision and provides practical advice how to interact with them (for example Inclusive Services and Rehabilitation) [13]. This offer can be extended in any order, for example for networking between parents and teachers.

Of course, some examples belong to more than one category. In no case, it is necessary to classify in a strict way because this model is only used to show the variety of functions of ICT for pupils with low vision (in accordance to the UNESCO ITE). All in all, these examples signalize the essential potential of modern media for organizing a school for sighted and low vision children and youths. Implementing an inclusive education system is not imaginable without new technologies. ICT supports the equal access to education for every pupil - with or without a handicap.

2.2 The significance of ICTs in the education policy regulations for the teacher training

ICTs offer not only an excellent advantage for pupils with low vision, but also are a challenge for the professionals. Regarding the significant link between ICT and inclusion, it must be asked how the competences and qualification needs are embedded in the national recommendations. In this context, these competences are often summarized as media literacy. Widely used is the definition of ASPEN, who specifies media literacy as “*the ability to access, analyze, evaluate and communicate messages in a wide variety of forms*” [14]. According to THOMAN and JOLLS media literacy can be defined as follows: “*Media Literacy is a 21st century approach to education. It provides a framework to access, analyze, evaluate and create messages in a variety of forms - from print to video to the Internet. Media literacy builds an understanding of the role of media in society as well as essential skills of inquiry and self-expression necessary for citizens of a democracy*” [14]. Additional, the following definition of HOBBS highlights the special opportunities for teachers: “*Media literacy makes it possible for teachers to change how and why they teach. The basic premises of media literacy serve to alter existing power relationships between student and teacher, and*

between reader and text. Media literacy opens to question the unchallenged 'content delivery' approaches that have dominated education of the nineteenth and twentieth centuries"[15]. The definitions describe the comprehension of media literacy and corresponding competences. The common papers are based on these definitions. Especially, the statements of THOMAN/JOLLS and HOBBS accentuate the potential of ICT for learning and teaching situations. These more expanded versions also mention the resulting options for actions which open up by using ICTs - for example self-expression. It can be observed that the German policy papers refer more to the perspective of ASPEN which allows first conclusions about the content orientation.

In the following the main impacts for the most involved parties will be discussed based on the fact that the inclusive school setting is initiated by a cooperation team of mainstream school teachers and special education teachers. In order to benefit from the high potential of ICTs in the educational field, both professional groups must be qualified. Due to this high potential, which is confirmed by a lot of international and national papers, one may ask how this statement is fixed in the curricular standards for the teacher training (with special focus to the teacher training in Germany) [3, 5, 6]. This is important because all further details for the teacher training are based on this paper. The official documents that define the content of the teacher training for mainstream school teachers only mention the general relevance of media literacy [16, 17]. The statements only require that all teachers must be able to handle media in the consideration of conceptual terms, didactic approaches and practical applications [17]. However, in this statement the connection between media and the potential of their use is not named so that the impact of ICTs for the individual learning opportunities of each pupil - also for pupils without SEN - is not highlighted.

In contrary, the curriculum for special education teachers contains the inclusive orientation [18]. This document specifies that the special education teacher must ensure the best possible school participation including the selection of adequate ICTs for these pupils. To fulfill this task, the special education teacher needs expert knowledge to train and support the pupils with low vision. Therefore, diagnostic competence is also requested, especially to choose the best suitable assistive technology.

Also, the UNESCO votes in favor of qualifying all teachers *"to use ICTs to support learners with special needs in their initial training"* [6]. The UNESCO abstains from concretizing the qualification needs for the different types of educational staff. However, it is important that not the same technical know-how is needed for both professionals [3]. The best participation of every pupil has to be ensured by a close cooperation between a special education teacher with specific ICT-knowledge in the field of SEN and a mainstream school teacher with technical know-how in the field of inclusive education.

2.3 Factors influencing the use of ICTs

From a systemic perspective, the education policy papers for the teacher training are only one factor which can promote the ICT usage in the further development of an inclusive education system. Additional factors are attitude, motivation and expe-

periences of the professionals towards ICT. Available specific concepts and technical infrastructure also influence the innovative use of ICT [19-21].

In general, a positive basic attitude is one of the most important prerequisites for the use of ICT in the classroom. Recently, investigators have examined that all involved professionals - educators, teachers and headmasters - must have a positive attitude towards the use of ICTs [19]. Furthermore, the advantages of ICTs in the educational process must be realized by all professionals [20]. Nevertheless, these advantages like enhancing weak pupils or ensuring equal opportunities for all pupils were not identified by the interviewed professionals. Accordingly, these specific opportunities for the inclusive school setting must be highlighted. Also, the connection between attitudes and personal experiences with ICT is pointed out by scientific studies [21]. Some professionals consequently avoid ICTs which has an enormous impact on the inclusive education. ICTs are often used in only one way - as an additional tool - what will not affect the innovation potential of ICTs. A couple of studies show that there is no lack of technical access or equipment (at least in the most European countries), but a deficit of qualified educational staff [1, 7]. In Germany as well as in other European countries the IT-infrastructure is well developed [19]. However, more complex inclusive and media settings need a special technical support which is not available in the most European countries. For this reason, the current situation of technical support must be expanded.

Frequently, ICTs were presented as a universal problem-solving tool for difficulties in education and teaching. According to NILSSON (cited in BRODIN and LINDSTRAND) social and educational skills are as important as media literacy [20]. To receive this real potential, the ICT usage needs to be coordinated with educational and social basic skills of the professionals.

3 Considerations for further improvements

After analyzing research studies and practical examples it is obvious that the understanding of the close linking between creating equal opportunities for all pupils and using ICT must be advantaged. For this reason, it is necessary to expose how this process will be supported. Regarding the above notification, it is possible to identify four main objectives for the future development derived from the framework of the UNESCO: 1. Promoting the role of ICT for inclusive settings, 2. Fortification of the teacher training, 3. Strengthening of scientific research, 4. Improving the framework conditions [3]. Focused on the demand of the educational staff, these main objectives will be described in an exemplary manner. More detailed information on this is available in the paper of the UNESCO, which is based on the "Convention on the Rights of Persons with Disabilities".

1. *Promoting the role of ICT for inclusive settings:* In the future, the educational staff has to develop a greater awareness and understanding of the importance of ICTs for the inclusive education system. ICTs are not only additional tools, but it offers relevant solutions to provide equal learning opportunities [3]. This potential must be realized from the whole system. In this context, the importance that all prota-

gonists - educators, teachers and headmaster - are equally involved in this process is crucial [20]. For example, the headmaster as leadership and manager of the school plays a verifiable, significant role in this process because he is in the position to extensively stimulate the educational debate (multiplier effect). The only way to activate sustainable processes of change is to include all protagonists in this process. Simultaneously, it must be fixed in the policy framework to clarify the educational policy objectives [3].

2. *Fortification of the teacher training:* There is no doubt that all professionals must be well prepared for their new tasks - ICT usage and inclusive education [4]. Especially, teacher training can give an excellent impact on teacher's improvement by applying new teaching forms, methods and contents [3]. In general, it is necessary that all three periods of teacher training are focused. During the first two periods, it is important to extend the curriculum of student teachers by absorbing media-related educational activities. Particularly helpful could be the link between the professorships of SEN and of media literacy by offering joint classes. In extending the needed knowledge, the third period of teacher training plays an important role. Lifelong learning gains in importance, because the dynamics increase in all areas of our society. By implementing online tools the teacher training will be organized more efficient e.g. by offering time and local independent working. Furthermore, online tools are excellent tools for the further education training, because they open up the special opportunity to combine specific knowledge and the ICT usage (for example specialized training course of the UNESCO) [6]. Focusing on the increasing individual special problems of pupils using ICTs, new types of further teacher trainings are imaginable [19]. Hence, there is a need for detailed and specific professional knowledge what requires a more individual teacher training (for example exchange via Learning-Management-System). Altogether, the offer has to become more flexible.
3. *Strengthening of scientific research:* Up to now, there are only few studies about the use of ICT for pupils with SEN what in turn limits the conceptual knowledge about handling ICT in inclusive learning situations [20]. There exist more facts about the use of ICT for pupils without handicap. Therefore, it requires more studies to identify the various conditions that allow the use of ICT in the inclusive education system (and also the creation of new tools, methodic and didactic approaches etc.). In accordance with scientific research, efforts are necessary to change the preferences of teachers. The majority of the educational staff ignores ICTs. For this reason, all professionals must experience helpful advantages like reduced workload. This process can be supported by evaluation studies and programs on ICT usage. The traditional way of using ICT (as an additional tool) dominates, but innovative ways of using ICT are not used. In order to promote this practice, professionals, regulations and research cooperation are required. The exchange of

experts makes it possible that new theoretical and practical concepts will be improved continuously.

4. *Improving the framework conditions*: The majority of research studies attests that the basic infrastructure is satisfactory. It must, however, be critically stated that the support in more complex learning and teaching situations must be improved [7].

4 Conclusion

Altogether, the global demand to create a school for everyone has a significant bearing on the future education system. Independent of the national and regional occurrence of the inclusive education system, this paper identifies a need for all teachers to integrate ICT into their learning and teaching practices.

In conclusion, it cannot be denied that the use of ICT is linked to the success of inclusive school settings. In line with this statement, all teachers have to cultivate an awareness of the possibilities of ICTs for children and youths with or without a handicap. In this context, it is very important to promote a concept of lifelong learning what is absolutely necessary in a rapidly changing area like ICTs. In no case, the formulation in the educational policy papers is satisfactory. In contrast to national government documents, most of the international papers affirm the significant connection between ICTs and inclusive education. It is necessary to reformulate the national curricular standards for supporting the successful implementation of new policies in the teacher training, and also in the school and classrooms. In line with the results of the UNESCO, it is important to strengthen the scientific research to enhance the contact between theory (universities) and practice (schools).

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