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Digital Wellness for Young Elderly: *Research Methodology and Technology Adaptation*

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Abstract
The age group 60-74 is labelled the "young elderly" and refers to people in transition from working life to retirement. Studies of mobile services have shown that young elderly customers are regarded as "not trainable" and "not interesting". Digital wellness services for the "young elderly" with mobile technology represent a new approach to wellness. We compared wellness services on mobile smartphones and did a detailed study of one of them. We found out that standard methodology for developing digital services does not work out too well for the "young elderly" and implemented action design research.
Keywords: Wellness, Mobile value services, Young elderly group

1 Introduction

Mobile technology has quickly become a global phenomenon on an unprecedented scale; we now have estimates of 6.9 billion mobile phone connections in use this year (ITU Statistics 2014). This gives rise to a couple of proposals on the context and use of mobile technology. The high level of penetration means that mobile technology by necessity has an impact on the daily routines of a majority of the population and that the increasing presence of smartphones can be expected to leave footprints of more advanced use in their daily routines.

The standard approach is that mobile service innovations are built and quickly launched after which it is found out if they make/made sense to the potential users by tracing the demand. In the early years it was possible to identify distinct user groups and to work out what kind of mobile services would be useful for them (Carlsson and Walden 2012) and then it was possible to build some acceptance and demand models. Since 2010-12 this has become much more demanding as the general population is now the users of smartphones and mobile services and they appear to do whatever they like with the services, wherever they decide to use them and for whatever purpose they decide to focus on. When we could identify distinct user groups it made sense

to work out explanatory models for the use of mobile services (Carlsson, Walden et al 2002, 2004, 2005, 2006, 2012; many of the original results were first presented at the eBled conferences) with the help of the Technology Acceptance Model (Davis 1989) and the Unified Theory of Acceptance and Use of Technology (Venkatesh et al, 2003, 2012). This does not appear to be the case anymore as mobile technology and digital services change how we build and carry out our daily routines; the routines may not offer good explanations for how we select mobile services.

In this paper we will study how daily wellness routines of a specific consumer group – the "young elderly" – may be formed by mobile technology and digital services. We have called the age group 60-74 the "young elderly" and distinguish it from the age group 75-84, "senior citizens", as we found out that the issues and needs for the two age groups are different. The "young elderly" is a sizeable customer group in the Nordic countries (about 4-5 million people) for building the same or similar mobile services as the countries have similar cultures, similar social care legislation and similar political value systems. The "young elderly" will be about 97 million in the EU by 2020 and the age group represents 18-23 % of the population in most EU countries (cf. UN statistics 2014); the age group is expected to be 1 billion globally by 2020. This "not attractive, not interesting" market could potentially be the basis for a global digital service industry (Turban et al 2009). This context is the one we are addressing.

The age group 60-74 will have some age-related functional impairment and we propose that digital services on mobile platforms could be designed and implemented to counter the impairments. This will keep the "young elderly" active, autonomous and self-reliant, which will improve individual quality of life. It will also have a significant impact on society as improved health for the "young elderly" will reduce the cost for tax-funded health and social care; the impact is significant as we deal with a very large group of people. On a global scale the impact will be somewhat dramatic.

We will sketch a few more proposals. Digital services for the "young elderly" will be delivered over mobile platforms but will be produced and supported through cloud architectures. This allows the core of the services to be designed and built according to a common standard – as the EU initiated and sponsored the GSM standard for mobile networks – but will require nationally, regionally and culturally tailored services. This will initiate and drive new business models for an agile development of digital services and ecosystems. The ecosystems will be growth environment for hundreds of SMEs that develop digital services in each country; the ecosystems will form a global industry over the next decade. The final proposal is a change of attitude – the technology for "young elderly" needs to be advanced, this age group will drive the next generation of technology development; why ? –1 billion users will have an impact on technology developers.

In this paper we can work out only parts of this context and test only a few of the proposals; in section 2 we will introduce digital wellness services and explain experiments we carried out with groups testing the services; in section 3 we have worked out the adaptation of IS research methodology for the "young elderly" context; section 4 summarizes the results.

2 Wellness Services

2.1 Wellness Dimensions

It is taken as common wisdom that people get more concerned about their health and well-being with increasing age as impairments of various kinds start to appear. Countering the effects of impairments will be the challenge for a quickly growing wellness technology. Wellness services could be digital services developed for and used over mobile smartphones.

Adams (2003) identified four main principles of wellness: (i) wellness is multidimensional; (ii) wellness research and practice should be oriented towards identifying causes of wellness rather than illness; (iii) wellness is about balance, and (iv) wellness is relative, subjective or perceptual. Saracci (1997) - health and happiness are encompassed in the term "wellness". Myers, Sweeney and Witmer (2005) – "wellness is a way of life … optimal health and well-being … body, mind and spirit are integrated by the individual to live more fully within the human and natural community". The WHO defines wellness as "the complete mental, physical as well as social well-being of a person or groups of persons in achieving the best satisfying or fulfilling life and not merely the absence of disease or any form of infirmity (WHO 2014). There has been quite some debate over the years about the dimensions of wellness, one of the most complete lists includes: emotional, financial, occupational, environmental, intellectual, physical, social and spiritual wellness (UC Davis 2015).

After a series of interactive, semi-structured workshops with groups of "young elderly" in the fall 2014 and spring 2015 we built wellness with four dimensions: (i) intellectual wellness, (ii) physical wellness, (iii) social wellness, and (iv) emotional wellness; one reason is that wellness now mirrors the functional impairment dimensions. Figure 1 shows that physical wellness will influence emotional, intellectual and social wellness; an improvement of physical wellness may have a positive (or sometimes negative) impact on the other wellness dimensions; a decline of physical wellness may have either positive or negative impact on the other wellness dimensions.

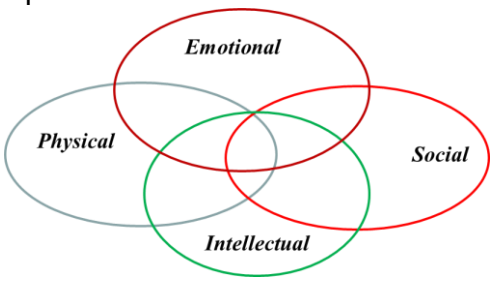

Figure 1: Wellness dimensions

We found out during the workshops that the effects are individual and personal – the "young elderly" are set in their routines – and that we should avoid being too detailed in the way we work out the wellness effects. Systematic studies of larger groups of "young elderly" should produce wellness profiles, which then would support wellness services (fig.2).

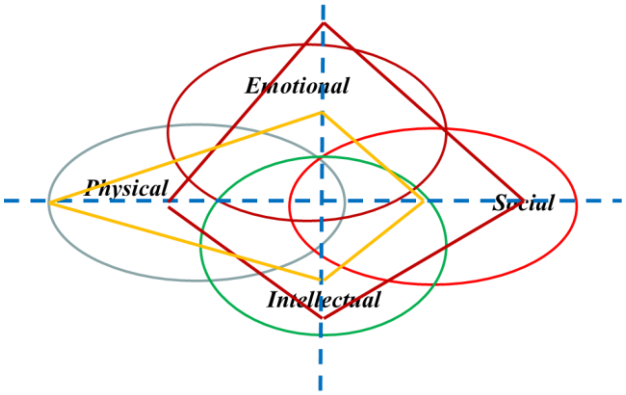

Figure 2: Wellness profiles

A further study of the wellness dimensions indicated that we can identify "grades of wellness" with some min and max levels that would be relevant for a majority of the "young elderly" (but there will always be individuals that do not fit any pattern); this is indicated with the dotted lines in figure 2. Then we worked out the red profile for people active on social and emotional wellness, but not so active on intellectual and physical wellness (our easy-going friends). As a contrast we worked out the yellow profile for people active on physical wellness but not that active on emotional, intellectual and social dimensions (our marathon and triathlon active friends). The profiles will find support in analytics (with data from different countries, cultures, socio-economic groups, etc.) and form a strong basis for wellness services.

In 2014 90% of the Finnish population aged 55-64 had used the Internet in the past 3 months; 56% used the Internet several times per day; 83% has used Internet banking in the past 3 months and 31% had followed some social network service; the share of Finns using smart phones in 2014 was 60% - the 55-64 age group showed 28% in 2012 but was around 50% in 2014 (the estimated increase per year was 10% points) (cf. Statistics Finland 2014); the use of digital services is becoming common among the "young elderly".

In Carlsson and Walden (2012) is described the results of a series of annual studies 2003-2011 of the adoption and use of mobile services among Finnish consumers; the studies were based on random samples of 1000-1300 consumers; the samples were representative for Finnish consumers. After the 2008 generation shift in mobile phones there was no significant change in the use of mobile services; most users continued with the same, basic services (voice, SMS, ringtones and icons, search functions) with more functionality on the new generation phones (Sell et al 2012). A new generation shift in 2011 came with the smart mobile phones. Smart phones drove the development of mobile applications, users with a smart phone downloaded applications and started using more and/or more advanced mobile services (Sell et al 2012). Application downloads from Apple's App Store are counted in billions; in Europe 7.2% of the subscribers will use downloaded applications by 2015; worldwide this is estimated at 5.9%, but in North America at 26.9% (Portio 2011). The 2011 survey of Finnish consumers found that besides a small 'power user' group (15 %) and 'interested but inactive users' (47 %), 38 % of smart phone users do not have advanced services (Sell et al 2012). Similar results were found by the network operator DNA (AddValue 2012) where 29% of the respondents were 'passive smart phone users' with only voice and

short message services. The market studies are reality checks to remind us that the general population is not that keen on getting new and advanced mobile services. We should bear this in mind when we get enthusiastic about digital wellness services – it is not a given that the intended users will actually be excited about using them.

2.2 Wellness Service Applications

In the spring of 2014 we explored the market for wellness services over smartphones with a group of 26 graduate students. We restricted the state-of-the-art to the three most important operating systems – Android, iOS and Windows Phone – and collected the applications that were most often mentioned on the Internet in surveys of wellness services (our study is not claimed to be an exhaustive search; the market is also most dynamic and fragmented, the borderline between health care and wellness services is not well-defined). There are already quite a few applications (fig.3); they are innovative, overlapping and competing; some of them are already showing millions of downloads, others are just finding their first customers.

Android, iOS and Windows Phone

- **Sports Tracker:** Shows running distance, maps; tracks movement by walking, cycling or running.
- **MyFitnessPal:** Set target weight and get meal suggestions; shows daily routine for calories and exercise.
- **Endomondo:** GPS integration for running, cycling; Pep –Talk; integration with social networks.
- **Wellmo:** Tracking weight, steps, sleep, exercise, alcohol, mood; personal targets, resolutions; integrates with external devices, databases;
- **Runtastic:** Tracking fitness routines; keeps track of routines done with applications.

Android and iOS

- **Lift:** A virtual coach for reaching set goals with different pre-installed objectives.
- **Weight Watchers Mobile:** Tracks food consumption, activity level, weight; healthy habits, exercise advice.
- **Noom Weight Loss Coach:** Tracks calories, activity; coaching the user to achieve weight loss goals.
- **Fig:** Holistic goals for 300 activities; wellness guide; sharing common goals with friends.
- **Fitbit:** Tracking daily goals, progress; steps taken, distance travelled, calories burned, sleep; food plan.
- **Nike + Running:** Only running; speed time, distance with GPS, smartphone accelerometer; routes, maps.
- **Moves:** Activity monitoring; step, calorie counters; walking, running, bicycling; routes on map.
- **TactioHealth:** Monitoring everyday life; steps taken, weight, exercise, body fat, heart rate, blood pressure, cholesterol and BMI; integrates with external devices.
- **Fitocracy:** Role playing game on workouts; achievements, points, rewards, levels and competitions.
- **'8700':** The ideal average daily consumption in kilojoules (kJ); healthy personalised eating plan.

Android

- **S Health:** Pedometer, exercise tracking, weight tracking, heart rate monitoring and food intake tracking.
- **Lose It:** Weight loss goal set; trackers for weight, sleep, steps and exercise; meal and exercise planning.
- **My Tracks:** Tracks movement for walk, run or bike; measures speed, distance and elevation.
- **DBSA Wellness Tracker:** Tracking emotional, mental, physical health; at-a-glance summary of health trend.

iOS

- **Datalove:** Wellness values as input by the user; analysis and graphics; metrics through GPS.
- **Cardiio:** Follows heart rate on smartphone camera; gives a fitness level rating, potential life expectancy.
- **WellnessFX:** Health goals with data analysis, visualization and trends; integrates with laboratory tests.
- **Teemo:** Fitness as a game (climbing, running, sports), communication in social media.

Figure 3: Wellness applications for Android, iOS and Windows Phone

The students searched for mention of "five winning wellness products for smart phones" on a large number of websites and registered the wellness products that were nominated as "winners" by various experts; the MyFitnessPal got the most frequent nominations followed by Fooducate, Fitocracy and Runkeeper (of which only Fitocracy made the students' list of promising applications).

Many applications appear to have a narrow focus on a few wellness activities but there are exceptions (Endomondo, Fig, Fitbit, S Health, Sports Tracker, Wellmo); it appears that the ideal solution for the "young elderly" should integrate the functionality of many of the applications.

Next the students were given access to the Wellmo application (actually a platform for scores of applications and close to the "ideal" solution) and asked to install it on their smartphones (free access by Wellmo Inc. which is a Nokia spin-off). Their tasks: (i) learn how to use Wellmo; (ii) build a profile of personal targets and resolutions; (iii) define weekly targets and find out how well you meet them over 4 weeks; (iv) find out how well personal targets fit your wellness objectives; (v) find out if there are features missing that should be included.

The students completed diaries (in the form detailed by Brandt et al 2007) over their activities and wrote reports on their findings to give us a first summary of the digital wellness services; in total we collected 26 diaries. The students were rather critical of the Wellmo – in typical student fashion – but the reasons varied quite a bit. Some of the students were active users of wellness apps (typically Sports Tracker, Nike+ Running, etc.) and found Wellmo not as advanced as these; some users found weight watching ridiculous as they were body builders and wanted to build body mass; several users missed GPS-based tracking and maps to support training activities, other users wanted integration with social media to challenge friends. There were specifics: technical excellence is expected for interfaces (typical for many competing apps); wireless connection and integration with smart watches, sensor armlets, sleep monitors, diet support, digital scales for weight watching, etc. mostly because there are apps on the market featuring one or several of these functions. Overall the judgment was that Wellmo is a "pretty good" but yet "not just right" app that has the potential to become a useful wellness tool.

Discussions over the integration possibilities brought the idea that an omnivore solution would be beneficial [omnivore, Latin omnes, omnia for "all, everything" and vorare for "devour", cf. Wikipedia] – the user should be able to build a wellness package by allowing series of apps to interconnect and offer her/him the synergistic functionality of many specialised apps. This should be a worthwhile challenge for the smartphone developers and for Wellmo. Wellmo is, in fact, rather a good prototype of an omnivore platform and as the Wellmo developers have continued developing it with more omni-

vore features (it is now having interfaces to 100+ digital devices and services, cf. fig. 4).

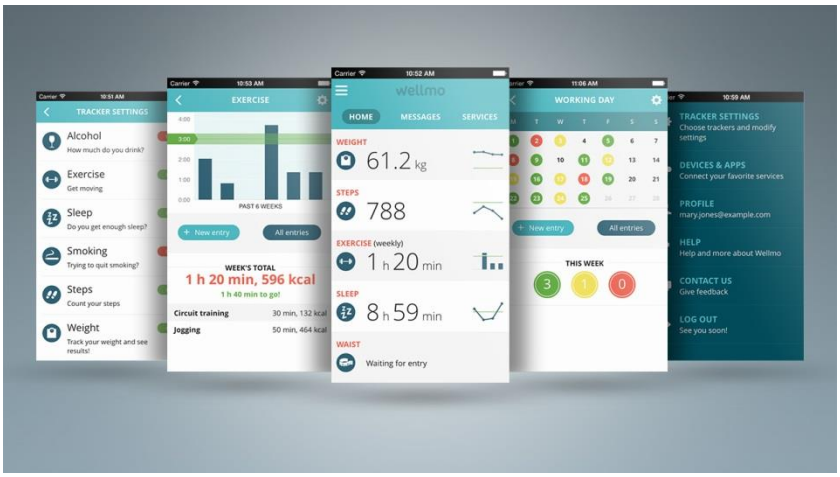

Figure 4: Wellmo as an omnivore platform

A final observation was that Wellmo and most of the competing apps are planned and designed with some wellness features in mind; the software was built (using advanced, well-tried modules and agile methods) and composed as prototypes; the prototypes went through extensive testing and validation; then the process of persuading potential users to become adopters started. It appears that this approach is not very good and many of the "not just right" features are the results of the development method. Thus the group of graduate students was given an additional task: to demonstrate Wellmo to "young elderly" in their family and among their friends and to find answers to several questions: (i) what wellness features and criteria are important for the young elderly? (ii) if Wellmo is to be adapted to the young elderly market, what features are still relevant, what features should be changed, what features need to be added? The students carried out interviews with 52 people from 9 countries.

It quickly became clear that the substance of "wellness" becomes different with advancing age; the focus of the requirements for improvements to Wellmo differed from what the students were looking for. There was not so much active use of athletic apps as wish lists including (i) BMI calculators and weight monitoring; (ii) diet advice and calorie counters; (iii) trackers of sleep patterns; (iv) activity trackers, "personal trainers", pedometers; (v) reminder, appointment booker & tracker; (vi) medication monitor, reminder; (vii) blood pressure monitoring; (viii) health care adapted monitors, symptom checkers; and, (ix) smoking, drinking monitors. The people interviewed represent, no doubt, a convenience sample that is not very representative. Nevertheless, it is possible to capture the notion that the "reminder-tracking-monitoring" functionality will probably be valuable as part of their everyday routines.

3 IS Methodology Adaptations

In terms of IS research methodology we used a case-study approach to work out the digital wellness services that could fit the "young elderly". This helped us to realize that we are on the wrong track. The "young elderly" group does not understand "wellness" in the same way as the students do – and not in the same way as the Wellmo designers do (the same seems to apply to most of the wellness apps). The students happily spent time to figure out how to install, activate and use the Wellmo app and several of

the competing apps that they found on Internet. The "young elderly" group did not have any patience with spending time to learn how to use an app; the Wellmo that was demonstrated to them and which they tried to use was found non-intuitive and too complicated; their reaction was that the app should have a clear and demonstrated value before they start investing time with it.

We find ourselves in an interesting situation i.e. to find and/or work out a research methodology that will support the development of digital wellness services for "young elderly", when these services do not yet exist and when we do not know if the intended user group actually would like to have them. The methodology should also guide the development of business models and ecosystems.

Design science is bringing out practical relevance in theory constructs and – if necessary - compromising on science precision to get constructs that are useful for planning, problem solving and decision making. The designs build on an understanding of what is needed to deal with real world problems. The design is both a process (a set of activities) and a product (an artefact) and both can be validated and verified to be logically consistent and technically free of errors. Design science has strong appeal as a conceptual framework for digital wellness services; they will be software constructs (artefacts) that we can (i) design jointly with potential or coming users; (ii) the artefacts can be validated for design and construct errors, the usability of the artefacts can be tested and (iii) the functionality of the services can be worked out in the context and with the users for which they were designed. Most of the results of (i)-(iii) can be generalised in the positivistic sense; the insight can be reused for other contexts and for the development and implementation of other artefacts.

Action design research (ADR) (Sein et al 2011) found that design science is too technologically oriented and is not paying enough attention to the organisational context of the artefacts. In our case the forming of ecosystems for wellness services is the organisational context that we should allow to influence the artefact design. This is, of course, to deal with the dynamics and the complexity of the ecosystem that will be a problem for engineering-inspired methods. ADR intervenes in problem situations and works out IS artefacts that help solve the problems, even if the setting is dynamic and complex.

Gronroos (2008) proposed that service design should be a co-creative process between the service producer and the customer; if a firm adopts a service logic it will be possible to get involved with their customers' value-generating processes. As we found out that "young elderly" will not be keen on getting educated on digital wellness services we have proposed another approach: to work out the services in co-creation processes with groups of young elderly. We realize that we will have to find similarities in knowledge and skill backgrounds, in functional abilities, in social skills and needs, in wellness status, in the structure of daily routines, in wellness objectives, etc. and use that in order to develop design principles. We also realize that we will be having interactive development processes with these groups of people that are somehow similar, and that we will be doing this first with tens of groups in a country, then with hundreds of groups in several countries, moving to thousands of groups in tens of countries. This will require effective IS support in order to be manageable.

Proposal for a methodology. The foundation should be in ADR which builds on four stages and seven principles (Sein et al 2011):

1. Problem formulation: (i) identify situations for which an ME is needed [practice-inspired research]; (ii) work out an overview of state-of-the-art technology for ME [theory-ingrained artefact]

2. Building, intervention and evaluation: (iii) design and animate ME functionality [reciprocal shaping], (iv) interactive, iterative design of functions with input from team [mutually influential roles], (v) interactive and iterative validation and verification of emerging ME artefact(s) [authentic and concurrent evaluation]

3. Reflection and learning: (vi) team evaluation and context adaptation of ME artefact (guided emergence)

4. Formalization of learning: (vii) specifications of ME application for software builders (generalized outcomes)

ADR offers the flexibility and innovation processes of design science combined with the possibility to verify and validate the technical and logical correctness of artefacts through strict testing methods.

The ADR methodology was tested by a (new) group of 30 graduate students during the spring 2015. Their assignment was to take Wellmo as their initial platform and then to work out wellness services (based on the results of the previous student group) that would fit the daily routines of the "young elderly" and support them in developing routines for wellness to be included among the daily routines. The students got 18 volunteers from one of the associations for elderly in the city of Turku to work with them as experts and sparring partners on the daily routines of "young elderly", on their perceptions of wellness and on the type of wellness services that would benefit them. This turned out to be a rewarding process: the students did not have any deeper insight of the context and the world of the "young elderly" – their ideas of what digital wellness services may be useful and value-producing were rather far off the mark. The volunteering experts had a great time with the students, they learned about the new technology and about possibilities that this could offer them, they had ideas about what wellness services should be and how they should be used – ideas the students could identify from their work with the Wellmo – ideas they could work out to service and software designs in the ADR process.

The ADR process required a number of iterations that were collected in design reports (we collected 15 design reports, the students worked pairwise) that were presented to the Wellmo service and software designers in a seminar. A new version of Wellmo with the wellness service designs worked out by the students is due in spring 2015. Our plans are now to run this set of wellness services in new ADR processes with several groups of 20-25 "young elderly" volunteers; these groups are set up to run during summer and fall of 2015.

In our work with the associations for elderly we realized that the work with digital wellness for "young elderly" may serve as pro-active prevention, i.e. by getting the age group 60-74 years to adopt wellness services, and to build and sustain wellness routines, we can contribute to keeping the 75+ age group healthy, active and independent. Besides other positive effects this will have a significant impact on tax-funded health and social care costs for the society.

Advancing age carries with it risk for suffering functional impairment. This risk is understood through common sense, spreads through common wisdom and is verified through statistics and studies carried out by the UN (2014). It is possible to influence the risks with a systematic use of wellness routines, including changes and adaptations

of these routines. The wellness routines are now understood in the four-dimensional sense we have introduced.
Functional impairment can be loosely classified as cognitive, physical, social and emotional impairment (cf. Saracci 1997) – there are a number of classifications, but we should keep the classification simple and useful for our context. In our definition of wellness – emotional, intellectual, physical and social – we matched the impairment classification in order to get a basis for the development of wellness services and wellness routines. Functional impairment is non-static, it is a dynamic process that changes in multiple dimensions; thus the wellness services should match the dynamics and the multi-dimensionality.
A final lesson learned from the semi-structured, interactive workshops with the "young elderly" volunteers was that the "digital wellness" processes will produce results over extended periods of time. First, the adoption of wellness services on mobile platforms is its own process; second, the forming of wellness routines, and then maintaining and sustaining them, is also a process that will work out over time; third, the development of the digital platforms and services runs in parallel with the first two processes – and is actually much faster than these; fourth, there needs to be an ecosystem (or several eco-systems in several countries) of digital service developers and providers, platform developers and providers, back-end support (most probably cloud service-based) developers and providers, personal trainers and consultants, public service integrators, etc. – all the actors needed to make a modern society provide support to hundreds of thousands, probably millions of citizens.

4 Summary and Conclusion

We identified the "young elderly" age group as a growing and now very large group of people for which systematic development of mobile services has not been foreseen nor planned. We noted that the key argument is proactive prevention, i.e. if the "young elderly" are healthy, active and independent then possibly/probably also the next, "senior", age group will show better health, activity and independence. There is a growing concern that EU member countries will not be able to provide the health and social care they should give their ageing population because of the unfavourable age structure of their societies – the number of citizens in the productive population will not be enough to carry the cost for health and social care of the ageing population.
We have worked out the idea of digital wellness services for the "young elderly". First we carried out a state-of-the-art, and then we had a group of students to thoroughly test one promising wellness application (actually a platform) and compare its strengths and weaknesses with five competing applications. The tested platform – Wellmo – was then evaluated with a group of "young elderly" and we found out that their needs for wellness services differed from the perceptions and design assumptions of the Wellmo designers. This was then the starting point for another group of students to carry out an ADR-based design process of wellness services for the "young elderly". Their results and design protocols were adopted by the Wellmo service and software designers and are now being implemented.
In parallel with technical work with digital wellness services and the development of a platform for them – which we defined as an omnivore platform – we also carried out

work on the key elements of wellness and the relationships between adoption of wellness routines and the risk for functional impairment. It was formulated as common sense by our "young elderly" volunteers when they were working with the students – if wellness routines keep you from suffering functional impairment it is a small investment, because "it is much more fun to become older if you are in good shape".

References

Adams, T. B. (2003), The Power of Perceptions: Measuring Wellness in a Globally Acceptable, Philosophically Consistent Way, Wellness Management

AddValue (2012), Report for DNA on Smart Phones, Helsinki 2012, 32 p

Brandt, J. Noah, W. and Scott R. Klemmer. (2007), Lowering the burden for diary studies under mobile conditions. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, pp. 2303-2308, ACM

Carlsson, C. and Walden, P. (2012), From MCOM Visions to Mobile Value Services; Roger Clarke, An-dreja Puchar and Joze Gricar (eds.), The First 25 Years of the Bled eConference, University of Maribor, Bled, pp 69-91

Carlsson, C., Carlsson, J., Puhakainen, J. and Walden, P. (2006), Nice Mobile Services do not Fly. Observations of Mobile Services and the Finnish Consumers, in Pirkko Walden, M. Lynne Markus, Joze Gricar, Andreja Pucihar and Gregor Lenart (eds.), Proceedings of the 19th Bled eCommerce Conference, eValues, Bled, Slovenia

Carlsson, C., Carlsson, J., Denk, M. and Walden, P. (2005), Mobile Commerce: Insights from Expert Surveys in Austria and Finland, in Douglas R. Vogel, Pirkko Walden, Joze Gricar and Gregor Lenart (eds.), Proceedings of the 18th Bled eCommerce Conference, eIntegration in Action, Bled, Slovenia

Carlsson, C., Hyvonen, K., Repo, P. and Walden, P. (2004), It's all about my phone! Use of Mobile Services in Two Finnish Consumer Samples, in Yao-Hua Tan, Douglas R. Vogel, Joze Gricar and Gregor Lenart (eds.), Proceedings of the 17th Bled eCommerce Conference, eGlobal, Bled, Slovenia

Carlsson, C. and Walden, P. (2002), Mobile Commerce: A Summary of Quests for Value-Added Products & Services, 15th Bled Conference Proceedings, Bled, pp 463-476

Carlsson, C. and Walden, P. (2002), Further Quests for Value-Added Products & Services in Mobile Commerce, ECIS 2002 Proceedings, Gdansk, pp 715-724

Davis, F. D. (1989), Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology, MIS Quarterly, 13(3), pp 319-340

Gronroos, C., (2008), Service logic revisited: who creates value? And who co-creates? European Business Review, Vol. 20 Iss: 4, pp.298 - 314

ITU Statistics (http://www.itu.int/ict/statistics)

Myers, J. E., Sweeney, T. J. and M. Witmer (2005), A Holistic Model of Wellness. http://www.mind-garden.com-/products/wells.htm

Portio (2011), Disruptive Mobile Applications and Services 2011-2015, Portio Research Limited

Saracci, R. (1997), The World Health Organization Needs to Reconsider its Definition of Health. http://bmj.bmjjournals.com

Sein, M.K., Henfridsson, O., Sandeep, P., Rossi, M. and R. Lindgren (2011), Action Design Research, MIS Quarterly,, Vol.35, No.1, 37-56

Sell, A., Walden, P. and Carlsson, C. (2012), I am a Smart Phone User – Key Insights from the Finnish Market; Harry Bouwman, Virpi Tuunainen (eds.), Proceedings of the ICMB 2012, TU Delft, pp 265-276

Statistics Finland 2014, http://www.stat.fi

Student Health and Counselling Services, UC Davis (2015), https:// shcs.ucdavis.edu/wellness/, retrieved March 28, 2015

Turban, E., King, D. and Lang, J. (2009), Introduction to Electronic Commerce, Pearson, Harlow, UK

United Nations Department of Economic and Social Affairs (2014), Population ageing and sustainable development, No. 2014/4; available at: http://www.un.org./en/development/desa/population/publications/pdf/pop-facts/Popfacts_2014-4.Pdf; accessed on March 21, 2015.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D.(2003), User Acceptance of Information Technology: Toward a Unified View, MIS Quarterly,Vol. 27, No. 3, pp. 425-478

Venkatesh, V., Thong, J. Y. L., and Xu, X. (2012), Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology, MIS Quarterly, Vol. 36, No.1, pp 157-178

World Health Organization (2014), Preamble to the Constitution, www.who.int, retrieved March 28, 2015