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Abstract

The ageing population of Europe is a concern for political decision makers as the ageing population by 2020 will represent very large groups of people (18-23% of the population in most EU countries). The issues raised concern elderly people, the age group 75-90 years, as their need for health and social care is expected to grow beyond what national economies can afford. Not much thought is given the "young elderly"- the age group 60-75 years – as the serious age-related problems are yet not visible among them and, hence, they are not on the political radar. Nevertheless, interventions to form and sustain wellness routines among the "young elderly" as part of preventive action programs could significantly reduce the problems society faces when people become elderly. We propose that digital wellness services on smartphones can serve as interventions to form and sustain wellness routines.

***Keywords**: digital wellness services, wellness, "young elderly", ageing population.* Introduction

1 Background and Introduction

The "ageing population of EU" is a broad and ill-defined segment of the population. The issues appear to be deteriorating health conditions of the 75+ aged citizens and questions of how a modern society should cope with them. The approach of a modern society is that the issues should be dealt with through tax-funded programs. As the proportion of ageing citizens is growing in most EU countries – relatively seen fastest in Germany, Finland and Italy – there is growing political pressure to find trade-offs between the costs of the care programs and the substance (read: quality) of the programs as it appears that the tax-paying part of the population simply cannot afford the programs from the year 2030 onwards (cf. [1]).

Thus we need to find another way. We should focus on pro-active prevention, i.e. to find measures that will reduce the growth of 75+ citizens that will need the health and social care support of the society; there is an age group we now call the young elderly – the age group 60-75 years – for which we should develop programs that now will keep them healthy, active and independent and also when they reach the 75+ age group; to be more precise, we should find ways to reduce or eliminate functional impairment with increasing age. The young elderly represent 18-23 % of the population in most EU countries (cf. [1]); this is a large segment of the population that according to recent statistical estimates will be about 97 million EU citizens by 2020. Thus the challenge is huge and will have even much larger consequences for national economies if we do not start to take care of the young elderly.

Functional impairment covers cognitive, physical, social and emotional impairment. Our work with young elderly groups (cf. [2]) has shown that functional impairments are (i) multi-dimensional, (ii) compensatory and (iii) non-static, i.e. (i) they can be described with multiple attributes, (ii) increasing impairment in one function can be compensated with improvement in some other function, and (iii) impairments change over time. In order to reduce functional impairment among the elderly we need to aim at a moving target.

We use wellness as the target concept for developing programs to tackle functional impairment as wellness will tackle all four aspects of functional impairment. 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 (cf. [3]). There has been lively debate over the years about the dimensions of wellness, one of the most complete lists includes: (i) emotional, (ii) financial, (iii) occupational, (iv) environmental, (v) intellectual, (vi) physical, (vii) social and (viii) spiritual wellness (cf. [4]). Els and de la Rey (cf. [4]) show the need for holistic wellness models and have tested this approach with a large empirical study. The choice of wellness instead of health has the benefit that we are not dependent on access to health data that is strictly regulated in most EU countries with confidentiality and privacy limitations.

Pro-active prevention is done through interventions in daily routines of the young elderly that will introduce subsets of wellness routines. We propose that the interventions could be digital wellness services that are implemented with applications for mobile smartphones with effective back-end support from cloud services, that allow (i) simultaneous support of hundreds of thousands of users, (ii) analysis of wellness data produced by smartphones, sensor systems and digital add-on devices, and (iii) data and information fusion combined with knowledge mobilisation to offer the users statistics on their individual wellness programs, summaries on their progress relative to individual goals, suggestions for alternative activities, proposed development of the program and reports that can be transferred to health care and social care systems.

The interventions could work out in the following way: (i) the young elderly develop individual daily wellness routines supported by wellness services on an omnivore platform over mobile

smartphones; (ii) the wellness routines are tailored by/for the users from selections of smartphone applications; (iii) cloud services support the wellness routines and collect and analyse user data for further and continuous development of wellness services.

There will be some positive, practical and immediate effects of the intervention program that can be monitored and measured, and some more long-term, assessable impacts. In common sense terms it is clear that if hundreds of thousands of young elderly citizens will have better health for 10 years or more, then the effects on the health and social care costs will produce savings on the scale of billions of euro annually (in Finland the estimate is around 1.0-1.2 B€ annually, cf. [2]).

There are of course challenges; the first challenge is that common wisdom has it that young elderly do not have smartphones. Statistics now show that smartphones are becoming general purpose instruments and will be even more so by the year 2020 (the mobile connection subscriptions are more than 100% of the population in most EU countries; the proportion of smart phones is closing on 70% in several EU countries). Among the young elderly the proportion was close to 70 % in Finland (in 2015) and it is reasonable to assume that this proportion will grow as most mobile phones sold in 2015 were smartphones.

A second challenge is the doubt that digital wellness services will be at all attractive to the young elderly; this follows on a belief we have found in the market for mobile value services (cf. [5], [6]) that (i) elderly people will not learn how to use services on mobile phones, (ii) there is no real use for mobile services in their daily routines, (iii) advanced technology should be developed for young people – and (iv) if elderly people use the services it will create the wrong brand image for the service developers. We have now been running a research and development program for digital wellness services 2014-15 over an omnivore platform on mobile smartphones with a back-end cloud service; the program has support from two associations for elderly with more than 100 000 members; our findings show that the mobile service market beliefs are misconceptions.

A third challenge is to work out research methodologies that will allow us to get (i) empirically verifiable results on the intervention with digital wellness services, (ii) valid, theory-based results on how the design of digital wellness services will match the multiple wellness criteria, and (iii) empirical verification on how digital wellness services will help reduce functional impairment.

Modern positivism was developed by Auguste Comte in the early 19th century; his key point was that all authentic knowledge allows verification and that all authentic knowledge assumes that the only valid knowledge is scientific. Verification should be carried out through empirical evidence. This is in line with our third challenge. Contemporary social science has largely abandoned positivism (cf. [7]) because of problems with observer bias, structural limitations of studies of important problems and the representativeness of data collected for verification.

Action research has been one of the key directions of service design for a couple of decades and would in our present case tackle problems with the development and implementation of digital artefacts. The development work is often described as co-creative – "to find solutions that work and to not care too much about scientific precision" – but the validation and verification remain subjective, i.e. we cannot be sure that the resulting constructs will work in other contexts and for other purposes.

Design science is another possibility; this is fundamentally a problem solving paradigm with roots in engineering and science and is working out designs in order to find ways to tackle real-world problems. Design science research is described as a paradigm in which a designer answers questions relevant to human problems via the creation of innovation artefacts that will contribute new knowledge (cf. [8]). The designs build on an understanding of what is needed to deal with the problems; the design is both a process (a set of activities) and a product (called an artefact) and both can be validated and verified to be logically consistent and technically free of errors. In our present context design science has a strong appeal. Digital services are software constructs (artefacts) that we can design and work through jointly with the coming users in co-creative processes; the usability of the artefacts can be tested and the functionality of the services can be worked out in the context and with the users. Most of the designs can be generalised in a positiv-istic sense and the insight can be reused for other contexts and the development and implementation of other artefacts.

Action design research (ADR) (cf. [9) found that design science is too technologically oriented and is not paying enough attention to the organisational or user context of the artefacts. The ADR works with digital artefacts that are ensembles shaped by the user context both when designed and developed and when used. The ADR deals with the dynamics and the complexity of the context – in our case the interventions to create wellness routines - that are problems for engineering-inspired methods. It appears that ADR is a promising methodological framework for the design and implementation of digital wellness services (and we are using this approach in our research program); this framework is now being developed as a performative research method-ology for information systems research.

The digital transition of business has created a number of surprises for the business world. Helmut Krcmar in his keynote to the 24th ISD Conference in Harbin (August 2015) noted the following features of the digital transition: (i) inevitable, (ii) irreversible, (iii) tremendously fast, and (iv) uncertain in execution. Digital wellness services for the young elderly – for which we aim to get 100 000 users in the first phase – is digital business. The fourth challenge is the realisation that we cannot just create digital services and everything will then take care of itself. This shows that we need to support the building of an infrastructure (of typically small and medium size companies) for design, development, implementation, commercialisation and maintenance; the approach that we have applied is to build an ecosystem of service and infrastructure developers and providers and to support them with theory and methodology for agile business Scrum processes (cf. [6]).

2 Young Elderly on Mobile Apps and Wellness

We will start by addressing the first two challenges ("young elderly do not have smartphones" and "the doubt that digital wellness services will be at all attractive to the young elderly"). We cooperated with the association for elderly in Mariehamn (in the Åland Islands, that with 28 000 inhabitants is a representative snapshot of the Finnish society) and asked them to invite their young elderly to participate in a survey in the fall 2015. A letter was mailed (the association did not have emails registered for its members) to 380 members with an invitation to answer a questionnaire through a link to Webropol; we collected 101 usable answers (a 26.6 % answering rate) in September-December 2015 that offer some insight into the group; the survey is followed up this spring by in-depth, semi-structured interviews with 25 young elderly in order to get a better insight in their daily routines and to get better knowledge of what wellness routines would be useful for them.

Data analysis was performed by using the SPSS 23 software and a for small samples developed R program in order to calculate confidence intervals when necessary. The characteristics of the Åland sample were reported using descriptive statistics to illustrate frequencies, central tendencies and dispersion of the given variables. Table 1 summarises the computed mode values for seven categorical variables together with a calculated median value for a continuous variable.

	Age	Gender	Highest level of education	Marital status	Current work status	Annual income before tax	Level of experience using mobile apps
N	99	100	99	100	100	100	74
Median	69						
Mode		2 = Female	7 = University	2 = Married	6 = Retired	3 = 20001–30000	2 = Advanced
SD	4.65						

Table 1: Median and mode values for variables of *young elderly* characteristics

The proportion male/female is 44.6/54.5%; 83.1% of the respondents belong to the young elderly, and a further 14.9% are a bit older; 65.3% are married and 14.9% are widowed; 77.2% have a university or technical/commercial degree (university education is rather rare for this age group, which is why we later combined it with second level degrees), 20.8% have a basic education.

In the sample 75.2% are retired and 23.8% are working full- or part-time or are carrying out voluntary work; the most typical annual incomes before tax is < 30 k€ (51.5%), 30-40 k€ (19.9%), 40-50 k€ (9.9%) and >50 k€ (17.8%).

These profiles are typical for the Åland Islands and are representative for the group of young elderly. As we plan to run the digital wellness services over smart mobile phones we wanted to find out how frequent they are in the sample; the summary shows that Nokia/Lumia/Microsoft is the most used phone (46.5%), followed by iPhone (23.3%), Samsung (14.0%) and Other (12.8%); we collected data on the actual types of phones in use and found out that a majority (about 73%, but not all) use smart mobile phones; this was confirmed with the result that 72.9% use mobile apps for navigation, weather forecasting, Internet search, etc.

The respondents answered questions about how useful, easy to use and valuable mobile apps are for them following the UTAUT2 structure of questions (cf. [10]); for the about 70 respondents that use mobile apps we found the adoption of mobile apps scored high on a 5-grade Likert scale on several items:

- mobile apps are useful in my daily life [4.32];
- I will continue to use mobile apps [4.19];
- mobile apps help me to carry out my tasks faster [4.08];
- using mobile apps helps me to carry out important tasks [3.94];
- I can use mobile apps without assistance [3.91];
- I have the necessary knowledge to use mobile apps [3.87];
- Iit is easy for me to learn to use mobile apps [3.79];
- I can use the mobile apps I need with the phone I have [3.75].

The results need to be tested with a larger sample (a study of a sample of 1800 participants is planned as the next step) but the indications are: (i) the young elderly use of smart mobile phones is sufficient to launch digital wellness services; (ii) the young elderly are confident users of mobile apps, which is a prerequisite for getting the wellness services adopted. On the other hand, the proposal

- I am addicted to the use of mobile apps [2.72].

shows that the young elderly are critical of how they spend their time with mobile apps. This meets the first challenge (“young elderly do not have smartphones”) and as mobile apps are digital services we can also claim that the second challenge has been met (for the sample in the Åland Islands, which at least to some degree is representative for corresponding communities in mainland Finland). The results will be verified with a larger sample but so far we can stick to the vision that digital wellness services could be developed and offered on smartphones as they will be adopted by the young elderly.

All the 101 respondents answered questions relating to intellectual and physical wellness on a 6-grade forced scale and a number of proposals scored high:

- intellectual challenges are important for my wellbeing [4.91];
- I get sufficient intellectual stimulation from my everyday life [4.61];
- my physical health has been good compared to people around me [4.38];
- my resistance to illness is good [4.24];
- the amount of information I have to process in my daily life is suitable for me (not too much, not too little) [4.20];

- I expect my physical health to remain good [4.14];
- I expect my physical health to deteriorate with increasing age [3.94].

We wanted to find out if there are any relations in our sample between the characteristics of young elderly, their attitudes toward the use of mobile applications and their perceptions about their wellness. This should give us some idea about what potential users to look for when introducing digital wellness services. This turned out to require some work with statistical tools.

First we constructed eight sum variables to link the characteristics of young elderly, their attitudes toward the use of mobile applications and their perceptions about their wellness. Six of these instruments were obtained by running a factor analysis (Principal Component Analysis (PCA), Varimax rotation) first with 19 statements on mobile applications and then with 11 statements on wellness. The results gave an indication for possible sum variables, which were then constructed by combining a set of high-score statements and dividing the computed sum by the number of these used items. The acquired sum variables were:

- *Mobile_apps_positive,*
- *Mobile_apps_experienced,*
- *Mobile_apps_social,*
- *Mobile_apps_value,*
- *Physical_wellness_positive and*
- *Intellectual_wellness_positive.*

Furthermore, two additional sum variables were created by using seven, selected statements on mobile applications

- *Resulting Mobile_app_users*

and correspondingly, six wellness-related statements,

- *Wellness_positive.*

The constructed sum variables had the same scale as the individual items, thus the range of the sum variables was identical to the original statements.

By calculating the Cronbach's alpha coefficients the reliability of the created sum variables could be established. As shown in tables 2 and 3, all the obtained coefficients were over 0.7. Additionally, the corrected item-total correlation scores were - with one exception (I expect my physical health to deteriorate with increasing age [Wellness], 0.202) - above 0.3. We tested if we can get more cohesive sum variables, and thus a higher Cronbach's alpha, if we remove some statements; in this way a total of five statements were removed (tables 2 and 3) prior to constructing sum variables. Therefore, we can state that all (selected) items within the composed sum variable were measuring the same chosen value consistently.

Although the eight sum variables were found to be reliable ($\alpha > 0.7$), a test for normality showed that all instruments are negatively skewed. As the sample size was relatively small (N = 101), the recommended transformations for negatively skewed data did not produce desired

outcomes and as there were several missing values for the statements on mobile applications (N = 67–75) the use of non-parametric tests were considered to be justified.

In the next stage all categorical variables reflecting young elderly characteristics were first recoded to comprise only two categories and then studied against the created eight instruments. The distributions for these dichotomous variables were not all similar in shape. For the purpose of analysis the variable age was made a two-category variable. A non-parametric Mann-Whitney U-test was run in order to explore possible differences between gender, age (–69 years; 70–), highest level of education (–higher vocational school; technical/commercial degreee + university), marital status (single; in a relationship), current work status (working (full, to some extent, volunteer); retired), annual income (–30000 €; 30001–) and the level of experience of using mobile applications (routine; advanced).

The Mann-Whitney U-test indicated that there were differences in the sum variable the mobile_ apps_ positive scores between age groups –69 years and 70+. The distributions of the mobile_ apps_ positive for –69 years and 70+ were not similar, as assessed by visual inspection. The mobile_ apps_ positive scores for 69-year olds and younger (mean rank = 39.27) and 70+ (mean rank = 23.22) were significantly different statistically (U = 249.0, z = -3.416, p = 0.001).

In the same way all the sum variables were worked out with the two-category variables; space does not allow that all of them are reported.

Table 2: Reliability analysis for two additional sum variables, obtained Cronbach's alpha (all items included, *-marked item removed; used value underlined) and corrected Item-Total Correlation.

Table 3 summarises the obtained mean ranks and p-values; statistically significant p-values are presented in bolder typeface.

Table 4: Reliability analysis for six sum variables, obtained Cronbach's alpha (all items included; *-marked item removed; used value underlined) and corrected Item-total Correlation

There are some insight that can be built from the results in tables 2, 3 and 4. If we want the interventions with digital wellness services on smartphones to collect some first groups of supportive users we should start with young elderly who are,

- Active in full time/part time/volunteer work & advanced users of mobile apps & < 70 years
- Advanced users of mobile apps & more educated
- Males with good physical health & income > 30 k€ per year
- More educated & find mobile apps good value for the price

Table 2.

A set of using mobile application statements	Corrected Item-Total Correlation [>0.3 recomm.]
I think that mobile applications are useful in my everyday life [Q9_1]	0.803
I will continue to use mobile applications in the future [Q9_20]	0.694
Mobile applications will help me to accomplish tasks more quickly [Q9_5]	0.663
The use of mobile applications increases my ability to take care of things that are important to me [Q9_3]	0.794
I'm using mobile applications without the help of others [Q9_17]	0.725
I have the knowledge needed for using mobile applications [Q9_6]	0.691
It is easy for me to learn to use mobile applications [Q9_8]	0.773
I can use mobile applications that I want with my current phone [Q9_9] NOT included*	0.584
SUM variable VII: Mobile_app_users Cronbach's alpha	**0.832** | **0.858** when *item deleted
A set of well-being statements	**Corrected Item-Total Correlation [>0.3 recomm.]**
Intellectual challenges are important for my well-being [Q10_10]	0.504
I get sufficient amounts of intellectual challenges in my everyday life [Q10_3]	0.656
Compared to people around me my physical health has been good [Q10_2]	0.690
My resistance to physical illness is good [Q10_4]	0.700
The amount of information that I have to process during a normal day suits me very well (not too much, not too little) [Q10_7]	0.611
I can get help if I have any problems when using mobile applications [Q9_11]	0.531
I expect my physical health to deteriorate with increasing age [Q10_6] NOT included*	0.202
SUM variable VIII: Wellness_positive Cronbach's alpha	**0.832** | **0.858** when *item deleted

Table 3.

Mann-Whitney U-test, □ = 0.05

SUM VARIABLES	Age		Gender		Highest level of education		Marital status		Current work status		Annual income before tax €		Level of experience using mobile apps	
	-69 yrs	70- yrs	male	female	- institute	higher vocational school -	single	in a relation-ship	in working life a/o volunteer	retired	-30000	30001-	routine	advanced
Mobile_apps_positive Mean rank	39.27	23.22	31.43	33.72	27.38	36.00	32.60	32.45	43.97	28.01	31.15	32.77	23.00	34.21
Asymp. Sig (2-tailed)	0.001		0.622		0.068		0.977		0.002		0.725		0.036	
Mobile_apps_experienced Mean rank	35.10	32.37	34.71	33.31	27.87	38.14	34.57	33.74	38.13	31.22	29.20	37.80	20.75	36.42
Asymp. Sig (2-tailed)	0.572		0.767		0.034		0.871		0.128		0.067		0.003	
Mobile_apps_social Mean rank	34.69	31.67	30.79	36.38	31.35	34.90	35.36	32.57	32.58	33.17	35.00	32.00	27.84	33.41
Asymp. Sig (2-tailed)	0.531		0.236		0.461		0.575		0.908		0.524		0.292	
Mobile_apps_value Mean rank	36.59	28.75	36.87	29.69	26.83	37.84	30.81	34.76	36.71	30.98	29.12	37.26	27.16	33.65
Asymp. Sig (2-tailed)	0.096		0.120		0.019		0.425		0.137		0.075		0.208	
Physical_wellness_positive Mean rank	48.88	45.79	57.27	40.00	44.48	50.16	48.41	47.78	54.16	45.47	40.84	54.45	40.13	33.45
Asymp. Sig (2-tailed)	0.580		0.002		0.309		0.915		0.186		0.015		0.237	
Intellectual_wellness_positive Mean rank	49.62	42.45	46.79	47.16	41.28	51.08	52.92	43.74	61.11	42.63	42.84	51.64	37.75	34.72
Asymp. Sig (2-tailed)	0.200		0.947		0.078		0.115		0.005		0.115		0.584	
Mobile_app_users Mean rank	36.01	26.29	32.25	31.74	26.38	35.46	31.63	32.17	38.69	28.56	29.58	33.30	16.50	34.93
Asymp. Sig (2-tailed)	0.037		0.912		0.055		0.912		0.044		0.416		0.001	
Wellness_positive Mean rank	48.23	42.09	50.09	42.65	42.30	48.30	46.66	45.64	51.93	43.54	41.22	50.17	39.84	32.86
Asymp. Sig (2-tailed)	0.266		0.180		0.275		0.861		0.197		0.104		0.215	
	N = 63 - 95		N = 63 - 95		N = 63 - 95		N = 63 - 95		N = 63 - 95		N = 63 - 95		N = 63 - 95	

Table 4.

Using mobile applications - statements	Corrected Item-Total Correlation [>0.3 recomm.]
I have the knowledge needed for using mobile applications [Q9_6]	0.727
It is easy for me to learn to use mobile applications [Q9_8]	0.819
I can use mobile applications that I want with my current phone [Q9_9] NOT included*	0.560
I think that mobile applications are user-friendly [Q9_10]	0.809
It is easy for me to become skilful in using mobile applications [Q9_12]	0.767
I'm using mobile applications without the help of others [Q9_17]	0.760
SUM variable I: Mobile_apps_positive Cronbach's alpha	0.904 | 0.913 when *item deleted
I think that mobile applications are useful in my everyday life [Q9_1]	0.814
People who are important to me think that I should use mobile applications [Q9_2] NOT included*	0.656
The use of mobile applications increases my ability to take care of things that are important to me [Q9_3]	0.836
Mobile applications will help me to accomplish tasks more quickly [Q9_5]	0.773
Using mobile applications increases my productivity [Q9_7]	0.709
Using mobile applications has become a routine for me [Q9_22]	0.829
I will continue to use mobile applications in the future [Q9_20]	0.754
SUM variable II: Mobile_apps_experienced Cronbach's alpha	0.925 | 0.926 when *item deleted
There are people who support me when I am using mobile applications [Q9_4]	0.461
I can get help if I have any problems when using mobile applications [Q9_11]	0.503
People whose opinions I value recommend me to use mobile applications [Q9_13]	0.584
Using mobile applications is very entertaining [Q9_19]	0.535
SUM variable III: Mobile_apps_social Cronbach's alpha	0.729
Mobile applications that cost something are reasonably priced [Q9_18]	0.700
Mobile applications give good value for the price [Q9_21]	0.700
SUM variable IV: Mobile_apps_value Cronbach's alpha	0.820
Compared to people around me my physical health has been good [Q10_2]	0.714
My resistance to physical illness is good [Q10_4]	0.774
I expect my physical health to remain good [Q10_11] NOT included*	0.593
SUM variable V: Physical_wellness_positive Cronbach's alpha	0.832 | 0.858 when *item deleted
I look for challenges that require thinking and reasoning [Q10_1]	0.585
The amount of information that I have to process during a normal day suits me very well (not too much, not too little) [Q10_7]	0.557
I get sufficient amounts of intellectual challenges in my everyday life [Q10_3]	0.619
Intellectual challenges are important for my well-being [Q10_10]	0.651
SUM variable VI: Intellectual_wellness_positive Cronbach's alpha	0.791
I avoid tasks that require that I concentrate on them [Q10_5]	0.333
I expect my physical health to deteriorate with increasing age [Q10_6]	0.341
I have often found that my life lacks in intellectual challenges [Q10_8]	0.503
My physical health puts constraints on my everyday activities [Q10_9]	0.341
SUM variable NOT constructed Cronbach's alpha	0.593

3 Design of Digital Wellness Services

As we now have identified potential user profiles for digital wellness services we will briefly address the third challenge ("to work out research methodologies for the design of digital wellness services"). In [11] Grönroos revisits service logic and works out service as a co-creation process between the service producer and consumer. This approach appears to be useful for the work with young elderly; we want to introduce wellness routines in their daily routines using digital wellness services as interventions. In work with young elderly groups we

have found out (cf. [2]) that we cannot expect 60+ citizens to (i) change their routines without good reason, (ii) spend time on learning to use digital wellness services on smartphones without good reason, or (iii) adopt wellness services for sustained use without good reason. Digital services they have co-created and wellness routines they have formed themselves may lower the threshold for adopting wellness services for sustained use (which is the way to get health effects). Then we need a research methodology to support the study of the processes that we want to design and implement with the young elderly groups.

On a general level, IS research methodology should be developed to give us the instruments we need to study the development, implementation and acceptance of digital services in the 21st century environment, where the research process will be partially imbedded in and create the practices of the socio-technical world that is being studied. This is our understanding of per-formative IS research (cf. [12]).

Action design research (ADR) (cf. [9]) works with IT artefacts that are ensembles shaped by the organisational context both when designed and developed and also when used. The IS research process when guided by ADR allows the users to intervene in and concurrently evaluate the design and building of the artefact. This is, of course, an approach to deal with the dynamics and the complexity of the context that is a problem for engineering-inspired methods. ADR works towards generic solutions by constructing and evaluating artefacts that address classes of problems than can be typified and generalised from the context and the user experiences and feedbacks.

ADR builds on four stages and seven principles (cf. [9]):

1. Problem formulation: (i) practice-inspired research and (ii) theory-ingrained artefact
2. Building, intervention and evaluation: (iii) reciprocal shaping, (iv) mutually influential roles, (v) authentic and concurrent evaluation
3. Reflection and learning: (vi) guided emergence
4. Formalization of learning: (vii) 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. Lessons learned from the design of mobile services and digital wellness services show (cf. [2], [5]) that the ADR may be too slow to capture the dynamics of the market for digital wellness services. Another lesson that we keep getting from the market is that business models should be part of any development of digital services; this has so far not been considered part of IS research methodology as the business models are considered part of the commercialisation on which researchers do not spend much or any time. It may be time to have a different opinion as IS research keeps missing some fundamental part of the process as prototypes are not being turned into actual use.

Agile Scrum should be worked out as part of stages 1-3 of the ADR. Scrum is part of modern agile software development but is being enhanced to guide project management and team work in projects. The Scrum is worked out in four steps (cf. [13]):

1. Visualisation of unique project reasons and core processes
2. Analysis of functionality needed to support core processes and system design
3. Realisation of the functionality; maintain communication between developers and stakeholders
4. Control if implementation fits the goal; evaluate the project process for logical consistency

At the moment we will have to gain experience from integrating the Scrum in ADR before we can start working out the benefits and problems of developing and implementing a performative IS methodology.

4 Summary and Conclusions

The young elderly 60-75 age group was first ignored by the developers of mobile technology and the designers of mobile services as "not interesting"[5] and then by the politicians worrying about the ageing population as they are "too active, and in too good shape" to request any budget-funded support from the society. Thus there are two cases of missed opportunities: (i) there is a potential market for digital (mobile) services that represents 18-23% of the population in most EU countries; the young elderly are estimated to be 97 million by 2020 in the EU countries (a market that should get some business attention); (ii) interventions that create sustainable wellness routines among the young elderly will reduce the probability for serious illness among the elderly (75+); this will reduce the need for budget-funded health and social care among the elderly. As the young elderly now represent the "baby boomer" generation they will represent large numbers when they become elderly which translates to significant costs for health and social care (3.8 billion € in Finland in 2014). We tested some fundamental assumptions on the use of mobile apps and the perceptions young elderly groups have on physical and intellectual wellness in order to find out if interventions to build wellness routines could be designed and implemented as applications on smart mobile phones. We found support for the visions on how this could be done. A research program – BeWell – is being run with groups of young elderly, supported by two large associations for elderly, to find and design proper digital wellness services.

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