

'Worth' and mental contents in designing for ageing citizens' form of life

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J. Leikas, P. Saariluoma. 'Worth' and mental contents in designing for ageing citizens' form of life. Gerontechnology 2008; 7(3):305-318. In designing technologies for older people, it is essential to understand their form of life, how they mentally represent it and its relations to technology. We can use content-based psychological research to investigate mental contents of people, who employ this knowledge to solve important psychological issues such as problems of human-technology interaction. In this particular study, we have focused on the contents of the concept of worth, as this notion opens up an important perspective to the motives of the users of technology. A user study where around 400 older citizens expressed their subjective opinions about significant areas of life was carried out. These areas of life constitute their individual form of life. There were two basic questions in our investigation. Firstly, we wanted to find those areas of life for which older people prefer and expect new products and services to be developed. Secondly, we investigated ageing persons' subjective opinions of the most important product qualities for these products. In conclusion, the paper presents the relevant 'worths' that ageing citizens perceive in technology. Understanding the contents of product worth related to users' form of life opens up new perspectives on the road to more focused design of successful and desired products and services for the ageing population.

Keywords: older people, worth, values, mental contents, form of life

The information contents of mental representations or the mental contents of users form an important alternative conceptual basis for technology-driven design practices. The basic ideas of content-based psychological research are intuitively clear, although the practice itself may look complex in the beginning. At least, the foundations are quite clear. Firstly, human mental representations have their information contents¹⁻². Secondly, any psychological research which uses the phenomena of mental contents in explaining human behaviour and action can be classified as the psychology of mental contents²⁻³. Following these two basic principles, it is possi-

ble to investigate a vast number of important psychological issues.

Content-based psychological thinking also has its role in user psychological research⁴. By user psychology, we mean psychological investigation of users' mental processes, cognitions, emotions and motives during interaction⁵⁻⁸. An observant reader may ask what the difference between the presented goal and the traditional research of user needs is⁹⁻¹³. The answer is that content-based analysis of users' mental representations allows replacing a rather general and unelaborated concept of 'user needs' with philosophically, sociologically

and psychologically more sophisticated, expressive and analytical notions such as user values, attitudes and motives¹⁴.

As numerous sociopsychological approaches have demonstrated, expectations, values, goals as well as cultural factors have an important role for people in forming their motives¹⁴. We should thus investigate how the goals that people have are embedded in their life and how this knowledge can be exploited in technology design.

However, user psychology cannot be established by straightforward application of traditional psychological concepts. As the basic psychological concepts are not specifically directed at interaction problems, the designers must find problem-specific ways of conceptualizing these interaction problems. In our current case, it is also necessary to search for interaction concepts which could be applied for investigating the motivation of the users. In the case of older people, it is essential to find notions that could express the properties specific to this type of user interaction motives. Here, we are specifically interested in two notions. They are the notions of 'worth' and 'form of life'¹⁵⁻²⁰.

WORTH AND FORMS OF LIFE

Gilbert Cockton¹⁷ has called attention to the notion of 'worth', by which he refers to things that are 'worthwhile', i.e., things that are of worth to their users. Technical objects, products, devices or services are motivating for people by the added value related to their lives. Thus the notion of worth neatly binds together objects and their motivating dimensions, and thus provides a rational basis for the design of technology. Consequently, Cockton speaks for 'Value-centred Design (VCD) (also Worth-centred Design - WCD)^{15,17}, which is an approach to product design with the primary concern on the impact of interaction outcomes. In this approach, the product development goals and de-

sign decisions are based on the intended or desirable practical value for the user. Here, it is important to notice that 'worth' does not refer to a moral value, but to the additional value a technology gives to human life.

Cockton's¹⁵⁻¹⁷ point opens up further questions: Firstly, we may consider the contents of the notion of worth itself. If people consider some device or service worthwhile, they must have some mental representation of worth itself. That representation is associated to a number of attributes, which define what people's personal criteria for something to be of some worth are. This question may partly be analytical, but in practice it is an empirical problem.

Secondly, we must ask the question: how do we cope with life in the context of worth? Generally, what is valuable for a certain group of people, even in terms of acceptance of technology, is not necessarily important or valuable for all people²¹. Our values reflect societal demands and psychological needs. Values are learned and determined by culture, society and personal experience as well as the situation in life, and are determinants of attitudes, judgements, choices, attributions, and actions²². This means that the life of an individual itself sets restrictions to the 'worth'. A suitable differentiating notion in this context would be the 'form of life'. This concept inspired by Wittgenstein covers the system of different lifestyles and subcultures that individuals participate in, the meanings and objective conditions they share, the way of experiencing life and the mode of doing things^{18-20,23-24}.

There are a number of notions close to form of life. Typical examples are 'lifestyle', the 'way of life' and 'life area'. Allardt²⁵, for example, points out that the choices we make in our everyday life concerning, for instance, consumer products can be explained from three different viewpoints.

Our choices can be (i) connected to our way of life, (ii) based on discretion, or (iii) reflections of fashion. Allardt's viewpoints thus stress the influence of floating factors of life in selecting products or services²⁵⁻²⁶. However, 'life area' refers to more stable aspects of life such as working and spending free time. It thus defines the kinds of things you use your time for, whereas 'lifestyle' defines how you use your time. 'Form of life' can be seen as a holistic notion, the conceptual attributes of which are lifestyle, the way of life and life area. Thus it entails both floating and stable dimensions of life.

Forms of life do not depend on individuals. People are "thrown" to the pre-existent forms of life and have little possibilities to change them, as forms of life are formed by the actions, habits, language games, and physical conditions not only of the person in question but of so many other people, also. One can choose one's way of life or one's lifestyle, but one cannot choose what one's form of life eventually will be. One becomes old and has to adopt the form of life of an old person even though the way of life or lifestyle may greatly vary. Ageing people will leave work life, experience decline in their functional capacities, gradually lose their old friends and mates and get new types of social contacts such as new friends or grandchildren. This is why we associate 'worths' to the notion of 'form of life' rather than to other less holistic and floating notions.

The attributes of form of life, lifestyle, the way of life or life areas can be used to investigate what a particular form of life is like. Here, we shall mainly use the notion of life area as the basis in analyzing the connection between old people's 'worths' and 'form of life'. Both 'worth' and 'form of life' refer also to experienced mental contents. People represent their life and the technology they use. Therefore, their conceptions need not be identical with the reality. Thus, we can apply the basic ideas

of content-based psychology to investigate them and their interrelations^{1-3,27-28}.

'Worth' and 'form of life' appear as notions that seem to be in an intimate connection to each other, but we do not know whether this is also empirically true. To know what is of worth to someone or some group of people, we have to analyse the contents of their mental representations, individual or shared. Similarly, to understand a form of life, we have to be able to empirically analyse how people represent that particular form of life. In our case, we have to be able to explicate what kind of properties of technology are of worth in the form of older people's life.

Technologies are seldom designed with some special form of life or some set of worths in mind. Designers seem often more interested in making their products as general as possible, even though user groups are different and people have different forms of life. If form of life and worth are interconnected in users' thinking, it makes sense to argue that designers should take into account the properties of larger forms of life and the systems of worth associated to those forms of life.

In our study, we wanted to investigate whether the two aspects of interaction are linked to each other. Consequently, we designed a two-part questionnaire with a number of questions measuring both product qualities, i.e., the worth of a product and the properties typical to the form of older people's life. We wanted to get information about older people's technical preferences and the possible connections of these mental contents to their forms of life. This type of information is valuable for user psychological design of technologies.

METHODOLOGY

Study design and procedure

The study was carried out in 2006-2007 in different workshops around Finland. About 400 retired Finnish citizens (155 male, 261

female), aged between 50 and 89 and with different backgrounds, participated in the study. The data were collected using a questionnaire with rating scale questions. Prior to the session the participants were informed about the objective of the study. To make sure that the participants understood the questions before answering them, a hands-on introduction to the questionnaire was given in each workshop.

The inquiry

Two sets of questions were defined. The first set was intended to investigate the characteristics of the older people's forms of life. Of the questions presented to the respondents 16 related to the areas of life that might be potential targets of improvement by means of ICT-technologies. Four main groups of life areas were outlined, based on the academic discussions and

different R&D projects around the subject of ageing and technology^{26,29-34}. The groups were: (i) Activities of Daily Living, (ii) Learning and Communities, (iii) Culture and Entertainment, and (iv) Mobility. These groups were then divided into 16 different life area attributes (*Table 1*).

The respondents were first asked to state their subjective opinions concerning significant areas of life with respect to product and service development, using a five point scale. The scale's descriptors on a 5-point Likert scale were: very important = 5, quite important = 4, no opinion = 3, not very important = 2, and not at all important = 1. The participants prioritized, in order of importance, the five most important life areas for them, considering the design and usage of products and services.

Table 1. The selected life area attributes and their characterizations

Life area attributes	Characterizations
Public transport	Moving from one place to another by train, car, bus or plane
Travelling	Tourist information services
Summer house activities	Services for summer house dwellers
Well-being and health	Health services and health care
Fitness and sports	Participating in sports groups or exercising by oneself
Culture and entertainment	Participating in arts and sports events
TV	Watching TV, participation in TV games, TV shopping
Household management	Cleaning, gardening, dwelling security
Friends and relatives	Communication with friends and relatives, enhancement of social intercourse
Activities of daily living	Eating, washing, dressing-up, etc.
Running errands	Acting as a client in different offices
Shopping	Shopping and ordering services
Hobbies and free time	Participating in different free time activities
Religion	Participating in church services and activities
Learning	Studying new things
Civil activities	Acting as an active citizen in society

The second part of the questionnaire was devoted to the product qualities regarded as important. A set of 15 questions with different quality attributes was introduced to the respondents. The selected set of attributes was suggestive rather than comprehensive and was based on older people's psychological concepts: values, habits and experiences. Except for efficiency, the attributes did not conform to any ISO-standards. ISO usability attributes³⁵⁻³⁶ focus on office usability rather than on usability in everyday contexts. Here a number of alternative attributes were presented to the subjects. In the end, the definite choice and prioritization of different attributes for product development depends on the pri-

mary goals and sub-goals of the users. The respondents stated their subjective opinions about the role that the set of different quality attributes of products and services played in their everyday life.

A five-point Likert scale was used to assess each quality attribute for older people's current views about technical products and services (Table 2). The scale's descriptors were: very important = 5, quite important = 4, no opinion = 3, not very important = 2, and not at all important = 1. Quantitative analyses were conducted on the collected data. In the data analysis we ignored the "no opinion" response and used the values of the remaining four-

Table 2. The set of quality attributes of everyday products/services of the survey

Product quality attributes	Characterizations
Availability	It is easy to purchase the product/service
Aesthetics and image	The product/service is beautiful or looks nice
Affordability	The product/service is cheap
Ease of learning	The usage instructions are clear and understandable
Ease of use	The usage of the product/service is easy and effortless
Efficiency	With the help of the product/service I can complete a certain task more easily and with less effort
Entertainment	Using the product/service is fun/enjoyable and brings me joy
Financial benefit	It is financially beneficial for me to use the product/service
Guidance and training	I can easily get guidance on how to use the product/service
Power to decide	I control the product/service and decide about its function (I can, for instance,, turn it off whenever I want)
Privacy	The product/service will keep my confidential personal data private (for instance, account numbers and date of birth)
Reliability	The product/service operates reliably and is always ready for use
Safety	The product or service increases or maintains my personal safety
Social esteem	People have a higher regard for me because I use the product/service
Social networks	With the help of the product/service it will be easier for me to socialize with people

point scale instead. Furthermore, as the 3 and 4 responses were relatively few in numbers, we used only two categories in testing: 1 and 2 or more.

RESULTS

Significant areas of life

To get an idea about how important the different aspects of the areas of life and product qualities are to the individuals, the analysis was started with the descriptive means and standard deviations of the individual questions (*Table 3*).

As can be seen from the table, well-being and health as well as activities of daily living are the most valued life areas of the senior citizens. The next most valued areas are friends and relatives and everyday

Table 3. The importance of the different areas of life

Life areas	n	Mean (SD)
Well-being and health	425	1.2 (0.4)
Activities of daily living	405	1.5 (0.8)
Friends and relatives	420	1.5 (0.8)
Household management	408	1.6 (0.8)
Public transport	411	1.7 (0.9)
Fitness and sports	398	1.8 (0.9)
Running errands	402	2.1 (1.0)
Hobbies and free time	399	2.1 (1.0)
Shopping	403	2.2 (1.1)
Travelling	385	2.5 (1.2)
Culture and entertainment	391	2.6 (1.1)
Learning	397	2.6 (1.1)
Religion	410	2.6 (1.2)
Civil activities	392	2.8 (1.2)
TV	395	2.8 (1.2)
Summer house activities	381	3.0 (1.4)

issues. Hobbies and cultural themes are much less valued. TV and, somewhat surprisingly, summer house activities (in Finland summer houses are really common) are the least important ones. This means that new technologies are appreciated mainly for the purposes of taking care of activities of everyday living and well-being. Other issues of everyday life are also important. When considering hobbies and free time, technologies are of much less value.

The most important individual qualities of the products are reliability, ease-of-learning, ease-of-use, privacy, and safety (*Table 4*). Typical emotional characteristics such as aesthetics and social esteem are of much less worth to the older citizens. An interesting detail here is that learning to use the devices is seen as more important than ease-of-use. This suggests that older citizens appreciate the purpose of use, i.e., the fact that they can really benefit from the technology. Their attitude could be

Table 4. The importance of different product qualities

Product qualities	n	Mean (SD)
Reliability	398	1.3 (0.5)
Ease of learning	400	1.3 (0.5)
Ease of use	409	1.4 (0.8)
Privacy	396	1.4 (0.7)
Safety	398	1.4 (0.6)
Affordability	401	1.6 (0.8)
Power to decide	392	1.7 (0.9)
Availability	388	1.7 (0.7)
Guidance and training	392	1.8 (0.9)
Efficiency	383	1.8 (0.8)
Entertainment	394	2.0 (1.1)
Social networks	387	2.2 (0.9)
Financial benefit	394	2.2 (1.1)
Aesthetics and image	387	2.6 (1.2)
Social esteem	389	2.9 (1.2)

described as pragmatic. Of course, the technology developers who are seriously interested in this segment of population should pay more attention to teaching and training their customers to use the devices.

The descriptors do not yet give much information about the possible interconnections and associations between the two

Table 5. The results of factor analysis of the questions concerning the areas of life. (Rotated Factor Matrix(a)); Extraction method: Maximum likelihood; Rotation method: Varimax with Kaiser normalization; Rotation converged in 7 iterations; Cut point =0.35; Cronbach's $\alpha=0.79$

Life areas	Factor			
	1	2	3	4
Household management	0.63			
Activities of daily living	0.62			
Shopping	0.60			
Running errands	0.56	0.43		
Well-being and health	0.47			
Fitness and sports	0.36			
Civil activities		0.61		
Learning		0.55		
Friends and relatives		0.39		
Religion				
Travelling			0.68	
Summer house activities				
Public transport				
Hobbies and free time		0.42		0.51
Culture and entertainment		0.40		0.50
TV				0.48

types of variables, which is the main focus for us. Nevertheless, it would be important to investigate possible connections between forms of life and product qualities when looking for support for a claim that the form of life is an important factor in people's worth conceptions. To get a more holistic picture of the preferences of older people, we therefore investigate, in two separate factor analyses, what the possible latent variables behind the areas of life and the worths are. The maximum likelihood analysis with Varimax rotation was chosen.

Four main factors corresponding to significant areas of life were found (Table 5). These are everyday activities, social life, private hobbies, and travelling. The factor analysis provides us with the main characteristics of the older people's significant areas of life and thus depicts us the content of the 'form of life' of senior citizens (Table 6). Older people take care of their everyday activities, such as running errands, mobility and wellness. Thus, the first factor, 'Everyday activities', defines the most important areas of older people's everyday life. It may appear surprising that fitness and sports are included into everyday activities, but we must remember that habitual everyday exercise, such as moving from one place to another by foot, has always been a part of the everyday life of the current generation of older people and never regarded as a special hobby by them.

The second factor, 'Social life', expresses the activities and hobbies with social contacts, such as participation, study, and friends. The third factor, 'Private hobbies', again concerns hobbies, but, for instance, the importance of TV indicates that these are more personal, non-social hobbies. Finally, the fourth factor is 'Travelling', which is characteristic for a large part of this generation's retired people. Of these factors, everyday activities are in the fore, followed by social life, while private hob-

Table 6. Descriptive statistics of the significant areas of life

Significant life areas	n	Minimum	Maximum	Mean (SD)
Everyday activities	352	1,00	4.20	1.66 (0.53)
Social life	343	1,00	4.83	2.27 (0.63)
Private hobbies	370	1,00	5.00	2.43 (0.90)
Travelling	360	1,00	5.00	2.77 (1.03)

bies and travelling seem much less important as a whole.

The factor analysis gives us a relatively clear picture about the significant areas of life and thus the form of life that the retired people live in Finland currently.

Table 7. Factor analysis of different product qualities (Rotated Factor Matrix(b)); Extraction method: Maximum likelihood; Rotation method: Varimax with Kaiser normalization; Rotation converged in 5 iterations; Cut point =0.35; Cronbach's α =0.78

Product qualities	Factor			
	1	2	3	4
Social esteem	0.75			
Aesthetics and image	0.67			
Entertainment	0.51			
Financial benefit	0.50			
Efficiency		0.61		
Guidance and training		0.53		
Ease of learning				
Availability				
Ease of use				
Power to decide			0.66	
Reliability			0.40	
Social networks			0.38	
Safety				
Privacy				
Affordability				0.97

They are people who have time and desire for different types of hobbies and social activities.

They wish to take care of their own well-being, everyday activities and household management, and would appreciate the help from technology in these activities, especially if the solutions enhanced their personal safety. They call for easy-to-learn and easy-to-use user interfaces and clear instructions, and expect the solutions not to violate their privacy.

Product qualities

The second part of our questionnaire concentrated on those product qualities which can convey the worth of a product to the respondents. These are the qualities that the respondents saw as important in the emerging technologies that would support their life. Again, we made a factor analysis to compress the material for further analysis and searched for the latent variables underlying different worths. In this way we hoped to get a more general understanding about the worths from the viewpoint of the older citizens (Table 7).

Four main factors were found (Table 8). These can be conceptualized as 'Social worth', 'Efficacy worth', 'Operational worth' and 'Purchasable worth', and are comprised of different product qualities experienced by the respondents. The first three factors provide us with some essential attributes of product worth. The 'Social worth' factor expresses four typically prestige characteristics and indicates how people wish to portray themselves socially in relation to technical products and devices. The 'Efficacy worth' factor gives two dimensions of the efficiency of use

Table 8. Descriptive statistics of the product worths

Product Worths	n	Minimum	Maximum	Mean (SD)
Purchasable worth	401	1.00	5.00	1.59 (0.82)
Operational worth	370	1.00	3.67	1.70 (0.56)
Efficacy worth	372	1.00	4.50	1.82 (0.68)
Social worth	363	1.00	4.75	2.45 (0.82)

Table 9. The correlations between product worths and form of life latent variables; *=0.05>p≥0.01; **=p<0.01

Form of life variables	Product worths							
	Social		Efficacy		Operational		Purchasable	
	r	n	r	n	r	n	r	n
Everyday activities	0.41 **	321	0.25 **	323	0.26 **	323	0.18 **	339
Social life	0.34 **	317	0.33 **	320	0.28 **	317	0.13 *	331
Travelling	0.16 **	326	0.20 **	329	0.04	329	0.05	343
Private hobbies	0.21 **	337	0.21 **	340	0.12 *	340	0.03	356

and self-efficacy, i.e., learning to do something and being able to reach the goals effectively. The 'Operational worth' factor expresses control of the technical system and power to decide about its function. Finally, the fourth factor, 'Purchasable worth', is obviously relevant, though its relation to 'worth' ('worth for money'/ value / price) is more ambiguous than that of the first three factors.

Table 8 shows purchasable worth as the most important one. Thereafter comes operational worth, efficacy worth, and, finally, social worth. These latent variables provide us with high level and global worths. They provide us with criteria which the new technologies should fill. Interestingly, social esteem or status values are not very important to senior citizens. The main worth is seen in being able to purchase new devices and being able to fully use them. It is interesting that older people's concepts of worth are very purpose oriented. The most important thing seems to be that they can obtain the technology, that it functions well and that they can make it work. A smoothly functioning

final operation of the device or technology is the main point in their thinking.

Product worths and the form of life

After screening the results by factor analyses we began to investigate the connections between the types of factors and the connections between the significant life areas and the significant product qualities. Consequently, each factor was converted to a mean sum variable. This enabled us to investigate the associations between the product worths and the form of life factors, which provided us with more information about the underlying associations between the two aspects of interaction. The correlations between the product worths and the form of life variables can be seen in Table 9.

Here, we can see that social worth is correlated with all areas of life typical of the older people's main areas of life. Efficacy is also correlated with all areas of life. However, the two other worths do not have strong correlations with these areas of life. The results are logical. The social worth of technology is associated with all the as-

pects of product worth. It is true with efficacy also. However, there is no real link from hobbies and travelling to operational or purchasable life. Very probably these areas are not so important regarding the product, as they are available in any case. As a whole, the results illustrate that there is a clear association between the form of life and worths. Thus this is an important topic for any future study.

Some of the original variables were seen as very important by the respondents. Therefore we decided to correlate those variables separately with the "form of life" and product quality latent variables to get more information about the nature of the possible connections between the form of life and the worth of technology. The screening showed some higher than 0.3 level correlations, which is important for the interpretation of the results. Social worth correlated with purchase value ($r=0.71$, $p<0.000$), availability ($r=0.37$, $p<0.000$), and, finally, efficacy worth correlated with ease-of-learning ($r=0.311$, $p<0.000$). No product quality item correlated over 0.3 level with any of the latent form of life variables.

These individual observations also suggest that the form of life and the worth are linked to each other. The last of the correlations seems to imply that efficacy depends on the ease of learning, i.e., technology can be efficient only if respondents are able to learn how to use it. The second suggests that only available technology can have social value. Finally, older people seem to think that the more expensive and more multifunctional a technology is the more social value it may have²¹. For example, mobile phones with a camera may add social worth to the product compared to the basic models, but they are also more expensive.

DISCUSSION

We found clear associations between the representations of worth and the form of

life. This means that to understand the product worth it is important to relate it with the properties of the forms of life. The kind of life older people lead or, more precisely, the way they represent their life, often sheds light on how they regard product worths. This is why it is not only important to investigate what is consciously experienced as worthwhile, but it is also important to connect this knowledge with the aspects of the form of life.

The picture of the form of life older people live is very clear. It is characterized by daily routines, health, social activities and everyday private hobbies such as television or travel. The technologies should provide improvements in these key areas for the older people while, at the same time, being purchasable, learnable, and controllable. Otherwise they do not have much meaning to them.

The issues older people see as important in technology are very simple and pragmatic. The technologies must be available in two senses. They must be purchasable and operable. Older people must be able to reach their goals with the technology they have. This means that they must be able to use and control the technology. Intuitiveness is not as important as learnability. The logic is evident: the main thing is that older people can make practical use of the technology. It does not matter how they reach this goal. Gaining proper training is thus more important than ease-of-use of the product.

Melenhorst³⁷ has come to similar conclusions with us in her research of older adults' benefit-driven approach to new communication technology. Regardless of whether older adults' decision about the new technology was positive or negative and irrespective of their experience, older people focused on benefits rather than costs. Czaja et al.³⁸ also point out that the choices older people make about using a particular technology cannot be explained

solely by their age or education but require considerations of other psychological factors. Also Lähteenmäki and Kaikkonen³⁹ note that ageing can create new needs to which marketers can answer with special differentiation strategies. Czaja and Lee⁴⁰ in their general review also argue for the importance of teaching and training in the usage of technology. Thus our pragmatic 'worth' and 'form of life' based study has clear connections with the tradition.

There is one important thing to call attention to. The study gives us information about the mental contents of the older people, about how they represent their world. This does not give us direct knowledge about how things are or how things should be. The study gives information about how things are and how they should be only when the older people are able to represent them correctly. This is a vital piece of knowledge when we think about design.

The study suggests that older people do not regard entertainment or social networking as very important for their life. This may imply that they perhaps cannot appreciate the potential made available in these areas by the new technologies. This might apply to other areas as well: they might use technology to take care of their practical life activities but presumably, due to the relatively modest supply and difficult availability, they do not have any clear idea about the possibilities that the new technologies could open up to them.

The development and usage of ICT technologies generates novel ways of living, contributing to the evolvement of the ordinary life of the users. In order to make advancements, these emerging walks of (ICT) life should support the form of life that the specific users lead. A prerequisite to understanding older people's form of life is that the designers are familiar with the worths of older people, i.e., sensitive and open to the expectations that older

people have towards technology. Easy-to-use products for daily activities and personal safety are some targets of these expectations, to mention but a few.

Many human-centred design approaches^{36,41-42} include observing the daily routines of certain individuals in order to understand the actual needs of the users. However, mere observing the needs and values of the users does not yet mean that the design process itself would be worth-conscious. There are several reasons why observations do not automatically generate the values required in the design process. Firstly, all our observations are themselves 'theory laden'. This is to say that the observer's discoveries depend on his preconceptions of life and on the observed behaviours⁴³⁻⁴⁴. Secondly, the observations are intertwined with the designer's own enthusiasm, beliefs and values. Thirdly, moral principles are not observable kinds but rather non-perceivable based on general concepts. From this point of view, empirical evidence, such as we have presented above, cannot be considered unreflectively and uncritically in worth-conscious design processes.

In the light of the results and previous studies⁴⁵, we can't emphasize enough the wishes of the respondents towards training for adopting new technological solutions. Most people need guidance in the use of new technologies, and this should be given on the spot when purchasing, for instance, a mobile phone. Also, training sessions in the use of devices should be organised, and these should be carried out by people who are familiar with the learning processes and learning environments of older people.

Worths as values cover much broader contents than the moral values of human welfare and justice. However, we want to emphasize that, when considering the contents of worths of older people in the design, it is important to incorporate

the principles of ethics in the discussion. Many elderly people tend to be vulnerable and less powerful than the target groups of most commercial products, and thus consideration of ethical principles is also needed in the design, in order to make acceptable products for that group of people⁴⁶. Friedman et al. have called for 'Value-sensitive Design (VSD)⁴⁷⁻⁴⁸, which brings human values and norms, i.e., our ethics, in the design. VSD is primarily concerned with values with moral import, for instance, those that centre on human well-being, dignity, justice, welfare, and human rights. Emphatic and ethical considerations can indeed be a way of acquiring understanding of the worths that influence and guide the decisions that older people make in terms of their everyday life and technology. Ethical design aims to serve the needs of humans⁴⁹⁻⁵⁰ and emphasizes the moral stand in the design, i.e., creating something that is 'good for man'. Hence, instead of designing only for the immediate needs of older users we should think what is good for the mankind and, accordingly, good for the future users of technology. It is important that everyday ethics in the ICT-world is in line with the moral and ethical principles

of our everyday life. Following the basics of value-sensitive design, we could even argue that the designers should follow the basic moral standards such as Kant's⁵¹ 'categorical imperative', which entails the idea that we should not do (or design) anything which we would not like to become a part of general practice in our society. This means that designers are challenged to consider, in the light of their worths in their form of life, what kind of technical solutions they themselves as senior citizens would accept in their everyday life and what kind of approaches they would expect from the design.

Finally, such concepts as worth of the form of life are important in the content-based user psychological investigation into human-technology interaction. There are categories with information contents which reflect how people represent technologies. By investigating these categories and their interconnections, it is possible to get information about many subconscious dimensions of human-technology interaction. In this way, content-based user psychological analysis may contribute to the field of human-technology interaction design.

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