

The contents of ‘worth’ in ageing citizens’ wishes for technology and design

Jaana Leikas¹ and Pertti Saariluoma²

¹ VTT Technical Research Centre of Finland, ² Cognitive science, University of Jyväskylä

Abstract— The paper presents a study which aim was to understand what kinds of quality attributes are valued by the aging citizens in the usage of technical devices and services. Thus the study focused on *worth* in the motivation of individuals to purchase or use a specific product or service. Instead of questioning what specific technologies could offer for aging people, we wanted to examine different sections of everyday life of ageing persons and review them in the light of technology and user needs and wants. A user study inquiry was carried out where around 400 older citizens expressed their subjective opinions about significant areas of their life. The basic question in this investigation was in which areas of life older people prefer and expect new products and services to be developed. Logically, these areas of life define on their part the contents of *worth*.

I. INTRODUCTION

The information contents of mental representations or the mental contents of users have become an important alternative basis for technology driven design practices. Nevertheless, this new approach does not rise without serious conceptual analysis. This means searching for efficient conceptual perspective to everyday life and how it is represented in users’ minds. One of the new promising attempts to conceptualize essential aspects of life for designers is to bring *values and worth* into consideration and express them in the designs, architectures and specifications of products and services.

In this paper, we empirically investigate the possible contents of worth as elderly people experience them. The structure of the paper is the following: First we introduce the concepts of value and worth from the point of view of interaction design. Then, we describe the user study carried out with elderly citizens. After that, we present and interpret the findings. Finally, we show conclusions and challenges for further research.

II. HUMAN VALUES AS MENTAL CONTENTS

Action is the essence of human technology interaction. People use technologies to achieve their personal goals, and for this reason action forms a logical conceptual postulate, i.e., intuitive basic concept in analyzing interaction processes [19] for conceptual postulates). The main aim of scientific human- technology interaction analysis is to find explanations for interaction phenomena. This means that we have to be able to explain human action [22]. One natural ground for

explaining actions is mental contents.

Mental contents refer to the information contents in human mental representations. Evidently, all human actions must be controlled by mental representations. There is no action that would not be represented in human nervous system, because our movements, perceptions, and thoughts have their neural responses. However, our neural states differ from each other with respect to the information contents, and our deeds differ respectively with respect to their contents. This means that through understanding mental contents associated to an action we can understand the respective action, its quality and other properties compared to other actions [20]. For these kinds of reasons, mental contents are a very general platform for analysing interaction processes and related actions.

The key point in content-based thinking is using contents in explaining human behaviour and respectively as the ground for design solutions [21]. Mental content is a very general property of human mentality and therefore it can effectively be used in solving many different types of design problems. A designer interested in content-based design thinking must firstly define a design problem, investigate what involved mental contents are and base the actual design decision on the knowledge of the mental contents.

Human beings have numerous different types and classes of mental contents. All our actions have their mental representations with respective mental contents. This means that there are practically no limits to what mental contents can be, nor to the aspects, which they may have. However, traditional philosophical analysis of human mental representations or “Vorstellungen” has lead to many important insights about the types of mental contents people have. Intentions or goals of human action represent one kind of mental contents, which has an important role in investigating human action [1]. When we know human goals, we can explain selection processes during action. We know why something is relevant while something else is irrelevant. Mark selects a mobile camera phone to send pictures of his newborn to his mother.

One of the most important types of mental contents are human values. Human values are resultants of societal demands and psychological needs, learned and determined by culture, society, and personal experience [17], [18]. They are as much a reflection of individual needs as of societal goals and demands, and appear in

various admixtures with knowledge and beliefs. Consequently, values can direct our behaviour and explain our past conduct.

III. DIFFERENT APPROACHES TO 'VALUES' AND 'WORTH' IN THE DESIGN

Considering how central part values are for human mentality, relatively little has been carried out so far to investigate them and develop respective design processes in interaction design. Fortunately, the field is not absolutely empty and some paradigms can be found. *Value-centred Design* (VCD) [2], [4]. is an approach to product design with the primary concern on the impact of interaction outcomes. It is developed within the context of research on usability evaluation and contextual fit. In this approach, the product development goals and design decisions are based on the intended or desirable value for the user, whether "commercial for consumers, governmental for citizens, or 'freeware' for cashless communities of interest" [4]. There is a distinction between VCD and commercial product design. In the latter product value captures both the commercial sense of value (i.e., value for the supplier), with the economic sense of value (i.e., value for the buyer).

Unlike Value-centred Design, *Value-sensitive Design* (VSD) [6], [7] brings human values and norms, our ethics, in the design. It is primarily concerned with values with moral import, e.g., those that centre on human well-being, dignity, justice, welfare, and human rights. The approach also addresses values of usability, conventions and personal taste. It covers the assumption that human values can be imparted to the artefacts and things that we develop and use. Value Sensitive Design methodology involves e.g., social-scientific research on the understandings, contexts and experiences of the people affected by the technological designs. According to van den Hoven [11], Value-sensitive Design approach greatly matters since information technology has become a constitutive technology, i.e. it partly constitutes the things to which it is applied. It shapes our practices, institutions, and discourses in different ways. What e.g., health services, transport and communication will look like in the future will in many ways be determined by the ICT applications people decide to use in these domains.

Cockton [2], [4] argues that Value-centred Design is too much concentrated on the vision of the future. He also stresses the need to differentiate value-centred approaches from narrower approaches such as VSD and commercial product design. Instead of visioning the future, the focus should be on concrete proposals and cover key design requirements such as 'needs', 'quality', 'values' and 'wants'. Following this, Cockton introduced *Worth-centred Design* (WCD) as a development framework which focuses on the *worthwhile*. In the WCD the focus is on things that will be valued, as manifested in people's motivation, individually or collectively, to invest one or more of time, money, energy and commitment [4]. According to Cockton, worth is a motivator: Designing

worth means designing things that will motivate people to buy, learn, use or recommend an interactive product.

These paradigms illustrate that there are different interests in the area of interaction design with respect to values. At least three different perspectives to values can be found. Firstly, one can take business values, which refer to corporate profit making and policies, secondly, we have designers' conceptions of users' values and finally we have users' true values. As can be seen in above referred analyses, these three perspectives often contradict each other. Too often this is negative to the development of interaction industry and its social meaning. If designers misconceive users' values, it can easily be counter productive to their design and business interests. Respectively, the misconceptions may lead, from the users' point of view, to biased technologies considering the users' values.

In this paper, we focus on the notion of Worth, which Cockton [4] has presented in his paper. Our main interest is to empirically analyze the contents of this theoretical notion among elderly people. A way to do this is to investigate the latent factors underlying under visible preferences. When we discuss values it is important to separate cognitive contents of values from their emotional and volitional dimensions, which are important in assessing the power or strength of the commitment to the cognitive contents. This is why investigating latent value "clusters" makes sense when we are interested in the users' real value systems.

IV. METHOD OF THE STUDY

Our study focuses on *worth* as the motivation of elderly citizens to purchase or use a product or service with specific characteristics. Instead of questioning what specific technologies could offer for aging people, we wanted to examine different areas of everyday life of ageing persons and review them in the light of technology and user needs and wants.

A user study inquiry was carried out where older citizens expressed their subjective opinions about significant areas of their life.



Fig. 1. More than 400 Finnish citizens participated in the study.

The study was carried out in 2006-2007. Around 400 Finnish retired citizens (155 male, 261 female), with the age of 50-89 and with different backgrounds, participated in the study. The study was conducted in six different cities around Finland, and organized in 12 different workshop sessions. Approximately 40 participants participated in each session.

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. In the session, a five minute hands on introduction to the questionnaire was given, so that all participants would become familiar with the questions in the form.

The inquiry focused on significant areas of life of older people. Four main groups for the walks of life were first outlined in order to describe different life areas more specifically. These main groups were formulated based on the scope and academic discussions of different R&D projects around the subject of ageing and technology [5], [8], [10], [12], [24]. These were: (i) Activities of Daily Living, (ii) Learning and Communities, (iii) Culture and Entertainment, and (iv) Mobility.

Table 1. The selected life areas and their characterizations.

<i>Life area</i>	<i>Characterization</i>
<i>Public transport</i>	moving from one place to another by train, car, bus or plane
<i>Travelling</i>	tourist information services
<i>Summer house activities</i>	services for summer house dwellers
<i>Wellbeing and health</i>	health services and health care
<i>Fitness and sports</i>	participating sports groups or exercising by oneself
<i>Culture and entertainment</i>	participating arts and sports events
TV	watching TV, participating TV games, TV shopping
<i>Household management</i>	cleaning, gardening, dwelling security
<i>Friends and relatives</i>	communication with friends and relatives, enhancing social intercourse
<i>Activities of daily living</i>	eating, washing, dressing-up, etc.
<i>Running errands</i>	acting as client in different offices
<i>Shopping</i>	shopping and ordering services
<i>Hobbies and free time</i>	participating different free time activities
<i>Religion</i>	participating church services and activities
<i>Learning</i>	studying new things
<i>Civil activities</i>	acting as an active citizen in the society

These main groups were then divided into 16 different

life areas. The selected life areas were characterized to the participants by the following contents (Table 1).

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

V. RESULTS AND DISCUSSION

The basic question in this investigation was in which areas of life a respondent prefers and expects new products and services to be developed. Logically, these areas of life define on their part the contents of *worth*. When people see that in some area it is important to get new devices and services, these devices and services are for them worth developing and using.

Table 2. Rotated Factor Matrix(a) of different life areas.

	Factor			
	1	2	3	4
LA8 Household management	,639			
LA10 Activities of daily living	,615			
LA12 Shopping	,583			
LA11 Running errands	,555	,422		
LA4 Wellbeing & health	,482			
LA5 Fitness and sports	,372			
LA16 Civil activities		,606		
LA15 Learning		,555		
LA9 Friends & relatives		,391		
LA14 Religion		,361		
LA2 Travelling			,661	
LA3 Summer house activities			,330	
LA1 Public transport				
LA7 TV				,505
LA13 Hobbies		,452		,489
LA6 Culture & entertainment		,414		,476

Extraction Method: Principal Axis Factoring.
 Rotation Method: Varimax with Kaiser Normalization.
 Rotation converged in 7 iterations. Cut point .3.
 Cronbach's Alpha = .79

Our scale gives an overall view of the important areas, but the picture is somewhat disparate. This is why we wanted to reduce the areas and consequently search for the possible underlying factors. Therefore, a principal axis factor analysis with varimax rotation was conducted.

We found four basic factors. They are everyday life, social participation, travelling and cultural and entertainment activities. Everyday life refers to the practical activities of senior citizens when they take care of their daily routines. The outcome means that they feel

it difficult for them to execute these routines and consequently hope that new technologies and services could aid them in carrying out these necessary duties of life. The second factor refers to the out of house type activities. This means taking care of friends and relatives but also errands of some type. The third factor refers to travelling and summer house activities. The latter are a very important type of leisure activity in Finland. Perhaps, its loading is rather low than high, which might refer to the fact that senior people are not necessarily interested in getting more technology to their summer cottages. Finally, the fourth factor entails typical senior citizens' cultural activities.

Thinking of senior citizens, factor analysis has extracted four major areas of worth. These areas belong in a natural manner to the senior citizens' form of life in Finland and undoubtedly, in many other parts of western world. This means that worth-conscious designers should think them carefully. The presented "worths" are part of the mental contents of the senior users and they should be involved in design processes. Finally, the harmonization of the user values as a part of users' mental contents decides the value of the emerging design paradigms.

Well-designed products and services must have a clear practical value for the users. Value sensitive design concentrates on "useworthy" artefacts and services [3]. However, this type of design presupposes understanding the mental contents of the target users. This means understanding their needs, values, intentions and practical activities. We should not understand the mental contents of the users solely from cognitive point of view, but they contain also actions, emotions and values [14], [22], [23].

In worth-oriented design the awareness of the worth-related mental contents is only the first presupposition for design thinking. People's needs are not yet design, but what the actual products are services will be depends on designers' thinking. Applying knowledge about user's mental contents is crucial from the point of view of the computational ethics in design [16]. From a value sensitive point of view it is not sufficient that we design for human immediate goals, but the designer must take a moral stand and think what is good for the future users of technology.

Mere observing the needs and values of the future users does not yet mean that the design process itself would be worth-conscious. There are several reasons why observations do not automatically open values required in the design process. Firstly, all our observations are themselves "theory laden". This means that what the observers perceive depends on their preconceptions of life and the observed behaviours [9]. Secondly, 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 taken unreflectively and uncritically in worth-conscious design processes.

Design is value sensitive only, if it follows basic moral

standards such as Kant's [13] "categorical imperative", which entails the idea that we should not do (or design) anything which we would not like to become a general practice in society. In concrete, designers should think what they themselves as senior citizens would expect from technology. They should think what they themselves as senior citizens would expect from designers.

Values are essential in all human social behaviour. However, in modern ICT-world the value issues get a new form. In face-to-face economic behaviour, the standards are controlled in many ways and people are aware of those ways. However, in ICT-world the moral problems get new forms and new scales. The only way to reach the level of normal social ethics is to incorporate ethical principles in design thinking. This may require schooling, new tools, and design standards, or expressed in a simple manner, a new design culture.

ICT creates new forms of life. However, these forms of life cannot be independent from ordinary life. Consequently, in the long run it is essential that everyday ethics in ICT-world gets the same shape as in the everyday life. One aspect of the new design culture is that designers are sensitive to the problems and interests of the old people. They need to get acquainted with the principles of ethics and find ways to incorporate this knowledge in ordinary design practices. Eventually, question is here about the mental contents involved in design thinking [21].

The results of our study illustrate the user needs, wants and values of aging citizens concerning different sections of everyday life. They provide valuable data for ICT designers since these experienced *worths* of aging citizens can constitute a potential business value for the product developers and service providers. The focus in our study was on Finnish aging citizens and the results thus reflect the aspects of the Finnish information society and the welfare state. There is a clear demand to expand the study into other countries as well, in order to find out cultural similarities and differences in this area. Our study emphasized how important it is to investigate the information contents of users' mental representations, i.e., their mental contents, in order to create rational grounds for designing services and devices [22].

Values represent on important type of mental contents involved in design processes. There cannot be a design process without explicit or implicit value decisions. When considering technologies for senior citizens, the primary value solution is how we should take into account the special needs and hopes those people during the design processes.

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