

**Design methodology for elderly  
Impact of aging and culture**

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# Chapter 68

## Design Methodology for Elderly: Impact of Aging and Culture



Lau Langeveld

**Abstract** Design methodology for the elderly is researched on the basis of a literature review. The following main themes are discussed: design methodology, the elderly, needs and culture. The intersection of two domains: design and aging/elderly indicate the impact of aging and elderly on design. The influence reflects the necessity for the holistic approach of the needs based on the proper cognitive functioning of elderly at their capacity level. The intersection of the two domains: design and culture indicate the impact of culture on design. The influence of cultural aspects on design demands a design vision that leads to visionary products. The intersection of the three domains: design methodology, culture and aging/elderly indicate the impact of culture and aging/elderly on the design methodology. The intersection has complex inner relationships and is introduced as the Tao of Designing, where paths, directions are indicated.

### 68.1 Introduction

Elderly are becoming an increasingly more significant part of society, who have difficulty accepting changes in their lifestyles. However, they are happy to learn new technologies to be able to participate in a dynamic society. The impact of aging and elderly on designs is being investigated for the new technologies that come to us. For the intersection between the domains: aging/elderly and design, design characteristics are examined that require innovation and take into account the cognitive functions of the seniors.

The impact of culture on the design is explicitly checked for elderly. For the intersection between the domains culture and design, the different cultural characteristics are researched. This research leads to a dynamic culture, where the design

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culture requires a vision for visionary product development. In the discussion the Tao of Designing is introduced, but the conclusions indicate that the human relationships cannot be fully described.

The scope of this research has been extended to facilitate guidance of Product Design for the elderly where the needs for a new design methodology were demonstrated [1]. In the literature review of this research, the following design features are discussed: design methodology, the elderly, needs and culture. The sources are inexhaustible, but the essential characteristics are under scrutiny. The subhead look at human needs from different perspectives.

The various factors that arise due to the aging of a person, thereby turning into an elderly and impact of these factors on designing products for this target group have been covered. Culture of the elderly target group also has impact on Design specific for elderly, and this has been discussed.

In the concluding discussion section, the concept of the Tao of Designing is introduced which is one way of facilitating design for elderly, but the conclusions indicate that the human relationships cannot be adequately described. Thus design for elderly has to be contextual rather than universal taking into account age of the elderly, culture of the target group, their needs and subconscious desires/wishes and a holistic design methodology which not only considers all these aspects but tries to integrate spirituality into design.

## **68.2 Literature Review**

Design Methodology for elderly requires the insights about Design Methodology, Elderly, their Needs and Culture. There is a significant amount of literature available on the four domains mentioned above and are considered in some paragraphs in this paper. Extra insights are added, e.g. the life triangle in some paragraphs.

### **68.2.1 *Design Methodology***

According to different dictionaries, design methodology can be defined as a collection of methods, habits, procedures and rules to be followed to realise a product design.

Eekels and Roozenburg [2] define design methodology as the valuation, explanation, and description of the methods by researching and experiencing design, in our case product design for elderly. Product design is an integral part of the process of developing new or innovative products. The reasoning used in Design Methodology is from the formal logic that is also passed through blockades. Other rules are used to find a good solution. However, a methodology is the amount of knowledge that is built up from methods, tools, rules, principles, habits, practices and processes. The difference between a methodology and method is not different

from a recipe and the ingredients [3]. The design process is one of the components of the design methodology, but requires a framework for high performance. The framework consists of three phases: (1) Discovery, (2) Design, (3) Development support. All this is necessary for an effective product design process.

In the discovery phase, extra research will be carried out on product design for the elderly regarding the hidden needs, desires and wishes of the elderly. In the design phase, Product design methods have been studied regarding the participation of elderly (in the literature review of the paper ‘Product design for elderly: the need for new design methodology’ [1]). It was found that none of the methods considered the hidden needs, desires and wishes of the target group, i.e. elderly.

A design vision should be evolved with the influencing parameters for the product to be developed in the following domains: marketing, technology and finance [4]. The design vision is to guide through the design process. Eger and Mulhof defined elderly from 65 years and older, the age for attaining pension in the country they referred. Three effects were considered in their design method to know: the cohort effect, the present (the effect of the present period) and the age effect [5]. This method can help designing and styling products that fit better with the requirements of elderly. Product design by storytelling is to identify the story of one person that may be valid for all. IDEO Design Teams [6] follow four steps: (1) Understand, (2) Observe, (3) Visualise and (4) Evaluate. In the visualisation step, the needs of elderly people can be found with storytelling and built-up scenarios for visualising the design task. Storytelling is no more and no less than the expression of the actions taken by people, animals in their environment and their reactions affect their environment.

In the development support phase, the designer must remain focused on the needs, wishes and desires of the elderly. A user test certainly needs to be built into the design process to ascertain whether the needs, wishes and desires of the elderly have been met. This requires much empathy from the designer, because the experience of the elderly may be utterly different from that of the designer.

### **68.2.2 Elderly**

Elderly at present situations is confronted with aging, changes in their living environment, growth in life expectancy and the possibilities of information technology. One crucial aspect in elderly is vitality. Vitality is classified into three types: physical vitality, mental vitality, emotional vitality [7]. Physical vitality embraces energy to do things, able to do things with intensity just because one has proper nutrients and oxygen. Mental vitality involves mental energy to think clearly and the speed of thinking that can be optimised. Emotional vitality means feeling happy, living in peace, being enthusiastic and cheerful. A positive attitude over a long period will increase endurance.

Human experience can be gained during a lifetime between birth and death that develops cumulatively but depends on everyone’s life. A special issue

'Human Experience' of the MISC magazine [8] contains articles about a palette of human experiences that go from public to private and from self to the other. Life may be distinguished into three main segments: educational, working life and retired life.

Perception about elderly [9] must change from the limits experienced by the society they live in and is necessary for the transition. A sudden intuitive enlightenment may appear, and a solution can reveal itself. A method that may provide a solution for enhancing the limits of the perception about elderly is essential.

Six basic physical activities of daily living (ADL) are defined by Katz (1970) [10] for improving Vitality and for a good life the psychological and social daily living activities should be undertaken, which are based on experiences: how to communicate, how to learn, how to socialises, how to create.

In their daily lives elderly must do their own exercise programme that is adjusted to the level of their physical and psychological condition. The exercise programme may help to maintain their physical stamina level [11]. The exercises can also be physical efforts, such as gardening, doing it yourself, doing things, being creative. One should be aware of the complex relationship between psychological and physical limitations such as: stress, exercises, activities and the aging process.

'Being Connected' [12] has a positive influence on the perception among the elderly in society. The world of the elderly will create opportunities for society as a whole. However 'Being connected' is nowadays taken over by social media, but does not solve the problem of the inner human relationships. The meaning of being connected is sharing one's knowledge and experiences with family, friends and acquaintances. Face-to-face communication has the benefits of whole sensory perception such as: image, smell, tension, feeling and charisma [13]. A technological connection such as the Internet is not a connection where we share our inner connections.

Life expectancy has increased throughout the world, which has been achieved through proper nutrition and hygiene and healthcare. The dynamic charts of the WHO [14] mention a life expectancy of 81.9 years for the Netherlands with which they are fourth in the list of life expectancy table. Japan is number one on this list with 83.4 years. Life expectancy in China is 76.1 years and in India 68.3 years. It shows there are undoubtedly significant differences, which often depend on average income, nutrition and healthcare, etc.

Elderly associations can be found all over the world, each with their own mission and goals. In the Netherlands, the Association of Catholic Organizations of Seniors (Union KBO) [15] promotes the slogan: 'Seniors can fully participate in society through contact with other people'.

### 68.2.3 Needs

The needs of people include all the material and spiritual aspects of life that one needs for a meaningful and respectful place in society. These needs meet the hierarchical levels of human needs according to Maslow's hierarchy of needs [16]. However, there are also desires, which are often subconscious or latent. A wish is nothing more or less than the desire that one expects something happens. There are Desires, but these can be fulfilled if the necessary conditions are present.

Needs, desires and wishes are put in a life triangle, but the conditions are distinguished by the priority of fulfilment (Fig. 68.1). The needs are necessary conditions that must be achieved in order to live. Desires are not necessary conditions for survival at the circumstances of life. Wishes or wants are conditions that are fulfilled when circumstances arise.

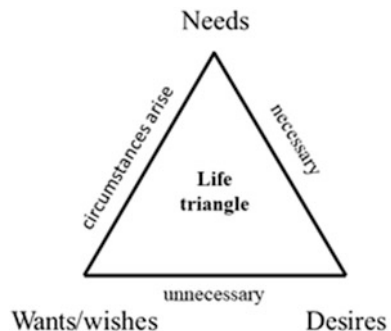
Anthony Robbins classified personal and spiritual needs into six core Needs [17]. Being aware of our behaviour and decisions in our daily lives gives excellent satisfaction and insight into what we are doing. These core needs are therefore used to analyse the behaviour of individuals.

Max Neef has distinguished nine fundamental human needs: Subsistence, Protection, Affection, Understanding, Participation, Leisure, Creation, Identity and Freedom [17]. He also distinguishes between the needs in our existential existence, which is expressed in the terms 'being', 'having', 'doing' and 'interaction'. This leads to a matrix of  $9 \times 4$  with human needs. This human need matrix by Max Neef gives us a great model to carry out analyses that are profound for many widespread problems of an economic nature.

### 68.2.4 Culture

Culture is a collective characteristic of a group or category of people who differ from each other. The culture of a particular profession can, therefore, be described with the distinctive features of that profession. For example, the Industrial Design

**Fig. 68.1** Life triangle with the conditions needs, desires and wishes or wants with the fulfillments



profession can be described as the distinctive feature of an industrial designer, his creative ability. Change of aggregation level means changes in the concept of culture. For example, children receive a cultural anchor from home that differs from the professional culture taught at school or the workplace [18]. Culture is the most complicated concepts, [19]. It is a complex word with its many meanings [20]. But everyone within a group forms a community that lives, works and celebrates within the theoretical concept of culture. Culture as a concept encompasses a large number of knowledge areas in our digital age: education, learning, social, economic, industrial production, organisation, politics, religion, art, lifestyle, habits, etc. Here only the knowledge that is more closely related to the design directly or indirectly is considered.

The design culture must also be researched in more detail. None other than Manzini [21] can be taken as a start with Design Culture and Dialogic Design. For him, design culture has significantly changed from 'objects' to 'thinking and doing'. The design has become a means to approach very complex design problems from a human standpoint and to solve often persistent social, ecological and even political problems. The design culture changes through our thinking, acting and doing the development methods, but also the production processes. Perhaps another step must be taken to integrate the spiritual life into production processes.

### **68.3 Impact of Aging and Elderly on Design**

The difference between elderly and aging is significant, with elderly referring to a group of people and aging indicates a process. According to World Health Organization (WHO), the elderly are subdivided as young old 65–74 years, old 75–84 years and oldest old 85 years plus. The process of aging and age has a different impact on design, but age has the lowest impact. The impact must be viewed from the individual or the group of seniors that can consist of subgroups of elderly. Groups can also include cultural aspects.

Society has difficulty with a useful contribution by the elderly population group to it although elderly also belongs to the society. They participate in the social life as a whole, but they encounter the paradigm of 'enjoying life'. They still have needs, desires and desires that are hidden in their inner life. A holistic approach to understanding them can reveal the inner life. This also implies that a holistic design approach to the needs of the elderly strongly influences the design process, as spiritual and spiritual wisdom needs to be taken into account in the design.

The impact is further explored by what is possible with new technologies, cognitive functions, elderly, and designs for elderly and the intersection between design and aging/elderly. Two factors that exert the most important influences of aging on technological applications: aging of the population and the implementation of innovations [22]. The elderly must learn to communicate with the latest technologies to maintain themselves in their social environment and to develop personally. The latest technologies are picked up much faster by young people [23]

than the elderly because the thinking process is often rational in young people. Far away from side paths and intuitive thinking what the elderly do. However, older people have a natural aptitude to master new technologies but have to overcome much inner resistance to change. Both groups use devices, but the intensity of use differs considerably. This requires a particular design methodology for the elderly. The motor skills in the elderly are deteriorating which also affects the operation of devices. By incorporating larger buttons, correct distance of the buttons, good contrast of images on the screen, these can be made easily adaptable by seniors.

The speed of thinking, doing and feeling, the cognitive ability, reduces gradually for the elderly. These changes vary significantly in the capacities of the elderly for every individual, but these have not been referred to as normal aging with a handicap. According to Peter Sloterdijk [24], change must be made, and stagnancy means a decline in physical and mental ability. Nobody escapes the aging process even if he/she always gives into the change. Aging affects everyone, and one can experience it to his cognitive qualities.

The cognitive function is age-related [25] and consists of three clearly distinguishable functions

1. Basic cognitive functions,
2. Perception.
3. High cognitive functions.

The basic cognitive functions, attention and memory decrease as the age progresses. Attention consists of some areas, but one can be maintained, and the others wane off. This has consequences for the design of products for elderly. *Testing specific functions should merely be avoided; the elderly lose their attention if it does not work correctly immediately.*

The memory is a very complex that is divided over various domains: long-term memory, short-term memory, procedural memory and working memory. The working memory has to deal with the delay of the information processing, which is caused by decreasing cognitive basis functions. *When playing games, reaction speed is an essential design detail, which must certainly be taken into account in the design.*

Perception decreases greatly depending on the sensory capacities of the elderly. The senses give the observation qualities of life, but aging lower the observation quality of seeing and hearing. *Thus while designing for elderly, the designer should avoid creating complex images and design should be clear, simple with good contrast.*

The high cognitive functions such as speaking and language, taking decisions, problem-solving is more or less not subject to aging under normal circumstances. However, the experience of the elderly in their life does extend the decision process by examining all possibilities. *The problem-solving capacity manifests itself with more thoughtful and in-depth solutions, through broader knowledge and experience. This may increase the design time significantly and the costs will rise, but the design value will decrease.*



The intersection of the design and the elderly and aging indicates the influence of elderly and aging on the design. Mathematically this can be written as follows: Design  $\cap$  Elderly/Aging. The influence on the design is reflected in a holistic approach to needs, deterioration of physical and mental abilities and age-related cognitive functions.

## 68.4 Impact of Culture on Design Specific for Elderly

Design culture consists of many design attribute and features: knowledge, value and vision. These end up in a good quality design. This requires many talks and discussions within the framework of the design problem. However, according to Morozov [25], the social context should not be forgotten when designing for elderly. Design knowledge can be acquired or gathered at the design institutions or even in conferences can facilitate the acquisition of new design insights. These insights are based on experience and knowledge. Design values are determined by the quality work of the designer and the prevailing cultural environment during the development process. A design vision is a necessary evil in which the culture is locked up.

In design institutions, design studios, design departments, etc. the design culture plays a vital role in the design process. The internal and external design aspects are essential here. In designs for the elderly external aspects are more important than the internal ones associated with culture and organisation. Internal factors such as: design, validation, production preparation, process communication often lead to a beautiful product. However, the external factors are often not involved, which often leads to failure of a design.

Holistic insights are a necessity at complex design processes. Namely, in addition to the material feature of the design, the social and spiritual feature must also be dealt with the whole. The design team must consist of members who can use their holistic design insights, but still have the necessary empathy to design for the elderly.

Culture refers to 'the whole is complex' [26], which includes knowledge, faith, art, morality, law, custom, etc. that humanity itself has created as members of a society. Every culture has a range of learned human behavioural patterns. These behavioural patterns consist of three different levels: tradition, identity and universals. These behavioural patterns can be expressed in our socially complex life as the pursuit of happiness, well-being and viability.

Organisation culture is a shared responsibility to come from inside a contribution to social production [27]. The internal culture has a direction to form within the set strategic goals, a lively organism with room for personal development, integration of habits, how things are done, the attitude of individuals inside the organisation. Naturally, subcultures originate from large organisations.

The intersection of design and culture indicates the influence of culture, design culture and organisation culture on the design. Mathematically this can be written as

follows: Design  $\cap$  culture. The influence on design is expressed in a dynamic culture, where a design culture leads to visionary products. However, organisation culture is necessary to make these products a success.

## 68.5 Discussion

The impact of culture and aging/elderly is great on design methodology, but the mutual influences are very complex and not fully scientifically described. But it is possible to indicate a direction, path of our daily design behaviour. The three domains involved: Design Methodology, Culture and Aging/Elderly have an intersection. This intersection can be mathematically represented as  $DM \cap C \cap A/E$  and is introduced as the Tao of Designing. Tao is a Chinese word or concept that 'path', 'way', 'route', 'choice', 'key' means the direction of daily life. A less formal formulation means 'doctrine', 'principle' or 'holistic'. Tao is in the context of traditional Chinese philosophy and religion the intuitive knowledge of 'life', and not always explainable, but experienced in daily life. Tao of designing for the elderly requires intuitive thinking to come up with creative and innovative solutions to the design problems that are specifically aimed at elderly.

One way of designing can be successful with three critical domains that are needed to include all aspects of human life. The domains for design specifically for and with the elderly are

- Design Methodology: The awareness of the usefulness of methods, rules, physical laws, procedures, etc.
- Culture: The awareness of knowledge, behaviour and cognition as being the dynamic aspects of designing. But also the realisation of art, designs, laws and norms as being the static aspects of design that are time-dependent.
- Aging/Elderly: The awareness of the aging process of peoples both physically and mentally. Also with the realisation that old people can organise their lives meaningfully, depending upon their personal capacities.

## 68.6 Conclusion

A conclusion that can be drawn is as follows: the impact of aging/elderly and culture cannot be worked out in detail because of the interrelated relationships between design methodology, culture, aging/elderly. The mystical part of intersection  $DM \cap C \cap A/E$  is well absorbed by the introduction of the Tao of Designing. There is also room for the holistic approach to the needs, desires and wishes of the elderly.

Culture manifests itself in daily design behaviour in various forms that depend on the dimensions of time, place and money. One can conclude: culture manifests itself in design identity, design culture and organisational culture of designing.

Elderly and aging are two different concepts that have a particular relationship in cognitive functioning. The following conclusion can be drawn: aging is a time-dependent phenomenon, but aging can be influenced by attempting action. These actions, such as: exercise, knowledge enriching, daily activities, etc. can be undertaken for body and mind with the most significant possible effort, depending on the individual capacities. While designing for elderly, the designer should consider the impacts of these integrate these to create a successful design. Design for elderly has to be contextual rather than universal taking into account physical and mental condition based on the age of the elderly, culture of the elderly target group, their needs and subconscious desires/wishes and a holistic design methodology which not only considers all these aspects but tries to integrate spirituality into design.

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