Overdesign: An Ontological Point of View

Prof.Dr. Serkan GÜNEŞ
serkangunes@gazi.edu.tr

Çiğdem GÜNEŞ
cigdem.gunes@tai.com.tr

Overdesign threatens businesses as an inevitable reality. One of the biggest causes of this *pathology* is the lack of information about the market and the process. In this paper, first, we aimed to discuss design knowledge in terms of New Ontology approach by focusing on inevitable and limited ontological assumptions in the design process and incompleteness in representation in design knowledge. In the second part of the work, the resonance quality between the designer, product, and the user is open to discussion through embedded message. The study results in several practical suggestions for overcoming the overdesign.

Keywords: design; ontologies; overdesign; new ontology; ontological assumptions; representation; resonance.

INTRODUCTION

Design is a complex knowledge-based process that combines theory and practice. On the other hand, whether *inferior*, *effective*, or *overspec* (Coman and Ronen, 2010), all of the products are the result of a design process. The role of the designer in this process is to transform existing ideas into products or services within his/her expertise and knowledge as a team member (Friedman, 2000). The design field needs a continually expanding, non-stationary, large pool of talent, knowledge, and awareness. For this reason, the design process is a field of expertise that is continuously expanding in terms of knowledge and that a designer generally cannot overcome alone. It cannot have expected that the designer has all the knowledge about his/her area of responsibility, yet this is not ontologically possible.

The designer creates *an object of knowledge* that we may call as design product, with limited knowledge and s/he tries to transmit all kinds of messages to the user through this knowledge object. The nature of the message that is attempted to be transmitted is the main point of this study. Because it should be analyzed in detail how much the message is understood by the user, to what level it reaches the user, from which level the message exceeds the user's expectation and emerges as a pathology. To be able to do this, the product knowledge should be seen as an intense gnoseological object and should be analyzed by separating into layers ontologically. Such an analysis will be a useful tool in determining the conditions under which overdesign will occur by showing from which layer the product has exceeded consumer requirements. In this work, we will use the ontological method of analysis previously used by Ingarden and Hartmann usually for artworks. Thus, we will address the underlying causes of overdesign in terms of [1] the lack of knowledge based on the representation that the designer has ontologically inevitable, and [2] the quality of the message embedded in the design by the designer. we will try to explain the reasons based on lack of knowledge through the discourses of New Ontology, and the reasons for the nature of the message through again the discourses of New Ontology but this time with the help of Kahneman's Prospect Theory due to it has a spiritual context. At the beginning of the study, we will look briefly at the overdesign literature. Then wewill briefly introduce the New Ontology approach to the reader.

A GENERAL OVERVIEW OF OVERDESIGN

According to Ronen and Pass (2008), overdesign is the result of designing products and services beyond the features and needs demanded by the consumer; so the market. According to Belvedere et al. (2013), overdesign occurs in any situation where a product's specifications exceed consumer's perceptions. The circumstances that caused the overdesign were examined in detail and descriptively in the literature. These conditions are mainly dealt with in two categories: behavioral and organizational problems (Ronen and Pass, 2008; Coman and Ronen, 2010; Belvedere, Grando, and Ronen, 2013). According to Coman and Ronen (2009), overdesign is caused by not focusing on the real value demanded by the consumer and by moving away from them due to the constraints on the project. In a detailed study of Coman and Ronen (2010) overdesign is defined as a *pathology*, overdesign's behavioral and organizational measurement and compensation sources and subsequent solution proposals were stated satisfactorily. In the empirical study conducted by Shmueri, Fink, and Pliskin (2012), it was seen that the software developers' emotional approaches such as the *IKEA effect* caused the over-specification. In the studies of Belvedere et al. (2013) focusing on behavioral problems, it was stated that product designers' cognitive bias was related to overdesign, furthermore experience may be effective in reducing overdesign due to its potential to convert the bias into heuristics.

It is necessary to examine in detail the nature of the creation process of design products and in particular the nature of the knowledge needed and produced in this process, in order to understand the causes leading to overdesign, their influences on the process and results, and consequently their reflections on the market. Many studies (Coman and Ronen, 2009; Coman and Ronen, 2010) suggested that the uncertainty created by the lack of information about the market caused the overdesign. The lack of knowledge, which makes the design process an indefinite process, is ontologically inevitable. Perhaps one of the most remarkable aspects of the valuable study conducted by Belvedere et al. (2013) is that the designer is perceived as a psychological being and is surrounded by fallacies of thinking that sometimes can also give positive results. We will give an example in the future for some designer approaches on this subject. However, at first, we will try to briefly explain the ontological reasons for the concept of lack of knowledge that leads to uncertainty and sometimes mistakes in the design process.

ONTOLOGICAL REPRESENTATION PROBLEM IN DESIGN

The concept of ontology, known as the science of existence, is difficult to deal with and present comprehensively with all the discussions about it. When a general and brief evaluation is made, we can see two counterpart aspects in the interpretation of existence. The first one is *subjective idealism,* which restricts existence to human perception and connects existing everything to mind and its imaginations. According to this view that thinkers such as Descartes, Berkeley, Kant, and Fichte defend, the mind creates its own objects, and what we called as the world is in fact mental. According to the other view, *objective idealism*, there is already existence, but the mind only perceives a part of existence. According to this view defended by thinkers such as Plato, Schelling, Hegel, and Hartmann, existence is broader than the object space perceived, and things that are known are always part of what exists. According to Hartmann (1965), the founder of the new ontology, the object that exists in reality and the object that is in a conscious correlation with the object that exists in reality, *i.e.* being and being perceived are different things. The dealing with existence within the ideal forms never provides the full knowledge of the real existence. It can be just reasoning compared to itself. Because being is much wider than the perceived object space and things that are known are always part of what is there. The thing that exists is *objectified* only by a knowing subject. Hartmann called this process as *objectum*. This leads to the following conclusion: We perceive the part of the real being that makes itself visible for us (*phainesthai*) only within our limits of perception, and we make the part that we perceive into the information. The perceived being is generally only the surface of being; it is

external. The actual being is the inside of this external thing. It is the thing that cannot be turned into data that is not secret. So what we called as information is a partial representation of the real being and not the whole being, and this is not what itself really is. Everything we perceive today is a state of being changed into information; the existing thing already exists without us and without being perceived. This is the first ontological cause of overdesign. Failure to perceive being as a whole, and reaching a part of it cause the design process to begin with lack of knowledge. The lack of any information included in the design process is ontologically inevitable. This partial understanding will ensure that the ontological assumptions to be built on this information are also partial. Ontological assumptions built on partial information will create a lack in the representation of existence. As is known, theories and approaches are based on ontological assumptions and are shaped within the limits of those assumptions. The design process improves through the ontological assumptions on which the designer is based within his/her design knowledge. In that case, design information based on the missing representation causes to progress each design process inadequately. As stated by Coman and Ronen (2010) in the case of lack of information, the marketing department or designer will not be able fully to objectify the market and not be able to change whole into information, which is not ontologically possible, so they will accept the only partially objectifiable state of the market so as to guide the creation process. Such ontological assumptions are, in fact, strategic and pragmatic elements which provide a grasp of the heterogeneous market, and which often define the boundaries of the design process or even its fate. The other assumptions about the design process are built upon them and tested on them. In this respect, although it is the subject of missing representation, the ontological assumptions of the designer should not be underestimated and should not be seen as dysfunctional. The kind of information used in the design process is the result of the objection. For example, the fictional user presuppositions identifying potential consumers such as hypothetical *persona* approaches (Cooper, 2004) are the perception content that partially represents the heterogeneous majority. In this technique, it is aimed to satisfy the needs of all consumers through product thanks to persona. Persona is a partial hypothetical consciousness correlate of what exists and does not represent all consumers, and it already cannot ontologically. Hence, the heterogeneous being itself will be the subject of countless persona inevitably. We know the consumer as much as we can perceive, we objectify it as much as we can perceive and change into design knowledge. This is not because of the inadequacy of the designer, but because of the inability to perceive the entire existence from an ontological point of view. The dealing with existence within the ideal forms such as persona never provides the full knowledge of the real existence of consumers. Failing to comprehend the consumer, and therefore, the consumer demands precisely because of the lack of information leads to the integration of more than the consumer's demands into the product. This representation problem causes overdesign. Kahneman (2011) also pointed to a similar situation. According to him, if there are deficiencies in the actual evidence against a situation, the existing space is filled with estimates. We often ignore the possibility that the evidence, which is of great importance in terms of our decision, is missing. Whatever we see is all the reality, or in terms of Kahneman What You See is All There is (*Wysiati*).

ONTOLOGY OF CREATION

Inadequacy in representation is an ontological constraint. Additionally, the uncertainty of the design process can lead to successive errors as a consequence of distinctive behavioral problems of the designers throughout the process (Beveldere et al., 2013). Because when the psychological meanings of the options encountered when deciding on uncertainty combine with people who attribute these meanings to the options and have limited cognitive systems, the patterns that do not match the truth often emerge (Kahneman and Tversky, 1974). On the other hand, the fact that whether people use their limited cognitive capacities up to the end when they decide is a separate debate. In the studies performed by Kahneman, Slovic, and Tversky (1982), it was found that when

people have to make decisions about any event or behavior, they do not behave like scientists at all, on the contrary, they use a lot of judicial bias and heuristics. Similarly, according to Fiske and Taylor (1991), individuals are a *cognitive miser* in decision-making processes. Gigerenzer (1991, 1996, 2001) did not see the problem in cognitive limitation and being a cognitive miser; he noted that it was important that how these problems were presented to the subjects as much as what the problems were.

The design process is an inherently uncertain decision process involving the intuitive, perceptual, and cognitive structure of the designer and their interactions as well as the information constraints in its contents. Applying to the approaches of New Ontology to understand the mechanism of this creation process will help understand the nature of the decisions involved in the process. Many factors influence the creation process in the new ontology approach.

As a psychological being, a designer can only change something that exists into information, on the contrary, s/he puts her/his living spirit on the information and puts out something which does not exist, namely the product. The designer wants her/his living spirit which s/he objectified in a certain product (which is the whole of the creation process) to influence a subject, another consciousness, that is, the product user. The reason for the failure of many design products arises from the fact that there is no consciousness to communicate with its content, to extract spiritual content from the material structure of that product, to perceive it. On the other hand, creating the spiritual entity needed for communication is under the responsibility of the designer. If such a spiritual being is not presented successfully in the way that the subject can perceive, there is not many things that the subject can do. If there is no resonance between the living spirit put on the real structure by the designer in the objectification and the spirit of the subject who understands and follows the product, harmony will not happen. The designer is eager to communicate with the consciousness that perceives through the product. A personal spirit creates a design product at a time, but there are a large number of subjects that will perceive it. Despite there is only one spirit that creates objectivation, there are many spirits who grasp it. Design work exists both with itself, and with the designer, and with the perceiving subject. Separate thinking of them means that the objectivation has not been fully realized. The design product is a data, a bunch of data, a base, a starting point for perceiving the subject. Because there is a need for conscious followers, that is users who will resonate with its spiritual being in order to understand the design, so that these subjects will form the last ring in the objectification of the design work. The role of subjects in design work and resonance with it and reach the spiritual entity behind the product are significant factors in terms of both designer and design work. If a resonance does not occur at an expected level and if the user can not contact with the full features of the product at the level the designer is expecting, this is overdesign. Therefore, the message that a product wants to give is also directly related to the preferences as well as the designer's way of perceiving, knowing, interpreting the being. If there is something to be perceived, interpreted and preferred, then analyzing the designer's decision-making behavior patterns is important to determine what the conditions that create the overdesign in the design process are.

First of all, we mentioned earlier that the designer was equipped with missing information on the ontological point of view. Although the missing information is a state of uncertainty in itself, even in case of this constraint, the designer must make predictions, choose the "best" one from two or more alternatives, or reason based on limited and / or biased information. Especially after the 1970s, identifying the mistakes made during decision making, psychological based shortcuts and biases gained importance as well as seeing people as intuitive statisticians (Todorov, 1997) in this cognitive quest (Martinez, 1998). Moreover, individuals often do not know how to reach their decisions; they are aware of the outcome but do not have any comments on the mechanism (Johnson-Laird and Shafir, 1993). The fact that the rational decision-making models accept individuals as fully informed and sensitive to differences at unlimited

levels (Edwards, 1954), enabled the thinkers such as Herbert Simon (1997) to express their discourses about rationality criticism. According to Simon, rationality was not a mathematical notion but a psychological one, and the point of view had to be made even more psychologically in order to understand economic behavior. However, seeing cognitive structure as a very wide and error-free force was insufficient to explain human behavior (Gigerenzer and Todd, 1999). *The Prospect Theory* developed by Kahneman and Tversky (1979), for example, is essential in terms of stating the fact that the forms of presentation in decision-making problems, comparison points, loss and gain accents are as necessary as the problems themselves. The most significant innovation of appearance theory was to bring the concept of value to the agenda instead of benefit. While the benefit remained a rational (statistical) concept, the value was defined as a psychological concept, not a rational one.

The design process is a spiritual process involving the uncertainties based on lack of information and the contribution of many company components. The fact that the human being is both a physical, a biological, a psychic, a cultural, a social, and a historical entity (Morin, 1999) allows the design process to return to the process of confusing the human mind constantly, and can put the designer at risk of error and illusion in many decisions to be made in relation to each other constantly. The dominance of any part of the partitioned design information according to disciplines often makes it impossible to link the part with the whole, sometimes accepting information as a ready-made tool without reasoning out undermines decision flexibility in processes. Having to decide between too many alternatives can sometimes lead to the development of defense mechanisms, sometimes to exercise the right on the side of what is desired, sometimes to look for shortcuts, sometimes to avoid decisions, and sometimes even psychological behaviors that may go so far as the devaluation of authority. In the *Availability Heuristic* approach conceptualized by Tversky and Kahneman (1982a), the likelihood of occurring the events that are more easily remembered is perceived as higher than the likelihood of occurring the events that are more difficult to remember. In this pattern of behavior, for example, when a design problem is encountered, it will be important how much similar the first past example coming to the designer's mind to the decision to be made at that moment in terms of the decision to be made. If there are too many similarities, it will be expected to repeat the same what happened before. If more than one example is remembered, then all of the past examples remembered according to similarities will have to be sorted. The designer will accept the past experience as a piece of ready-made information for the resolution of similar problems and will use it as a reference for his/her decision. In fact, the vividness of the example will also make it difficult to question past decisions. Availability Heuristic method can be seen as a significant advantage in shortening of the time of decision-making, but because of the easier recall of vivid examples (1) problems with high frequency can be overlooked and / or (2) events with relatively low frequency can be given more importance than necessary. Moreover, if the decisions made in the past are faulty, it will lead to this fault to continue routinely on subsequent projects without learning from the past. The fact that the personal spirit and objective spirit used in the creation process by the designer is based on static and ready-made knowledge created with past experiences is one of the fundamental factors that lead to overdesign. Looking at recurring consumer acceptances, proposing the past options for the preferences regarding the materials and production procedures, insisting on the same form approach in form preferences, repeating old preferences and procedures in general terms will ensure that faults are replicated chronically in the future if past decisions are not questioned in terms of faults. Therefore, overdesign problems that were not diagnosed and analyzed for the reasons will remain chronic problems running in the background in the context of Availability Heuristics. The solution of this is to update the design information, which is an input for design and based on information, according to the existing information. Again, according to the *Representativeness Heuristic* approach described by Tversky and Kahneman (1982b), people prefer to look at what characteristics are representative in appearance, even if they have statistical data in their decision-making. It was argued that the main reasons for choosing intersection clusters

with smaller and lower probability than the original one instead of preferences with high probability were the fact that people could not use *conjoint probability* information (Tversky and Kahneman,1982b) and that they wanted their preferences to be correct (Teigen, Martinussen and Lund, 1996). Furthermore, it is seen that people are confident in small sample numbers (*law of small numbers*) (Tversky and Kahneman, 1971). The fact that people cannot fully understand the law of large numbers, and an understanding of the basic rate concept, according to Kleiter and et al. (1991) lead to such consequences. There are two types of information in the design process; the first one is the basic ratios (*signal*) that facilitate design decisions and are directly related to the problem, the second one is other information (*noise*) other than the basic ratios but not carrying any causal information. Failure to distinguish signal and noise information, concentrating on noise information by ignoring the importance of signal information is one of the reasons that makes it easier to emerge overdesign in terms of design processes. Engineer / Attorney problem of Kahneman and Tversky (1973) is a good example of this. Gigerenzer, Hell, and Blank (1988) linked the central problem with Representativeness Heuristic not only to the problem itself but also how it was designed and presented. Considering the design decisions, going to the law of small numbers creates two fundamental problems related to each other in terms of overdesign. The first one increases the noise level on information as a result of the preference of intersection clusters with lower probability in determining the consumer typology, and the interest is dispersed. Presence of intersections necessitates the satisfaction of many variables in design decisions. Noisy information pieces included in the number of variables and concentrated in secondary matters can serve as justification and catalyst to take decisions that designers want to be right. Ironically, since laws of large numbers concentrate on the largest cluster, it allows to form the problem definitions containing many consumers' expectations and increase in the scope of the problem increases the need for cognition. It was found that metacognition skills of people with high decision-making skills and especially those who had to make decisions under time pressure were as high as expected (Cohen, Freeman and Wolf, 1996). It was found that in particular, individuals with a high need for cognition (*nCog*) conducted more extensive research during decision making, whereas individuals with a low need for cognition tended to make decisions much faster (Bailey, 1997). On the other hand, the fact that individuals with a high need for cognition have searched for a longer time on the complex design problem does not always mean that they have made the right decision, even the use of excessive time in cases of emergency decision making due to competitors can cause harmful consequences. One of the reasons for emerging overdesign so intensely, especially in the products with a high supply circulation such as consumer electronics may be the urgent decision-making pressure against these intensive researches. Therefore, a matter that needs to be investigated further is the effect of average time needed in decision making by sector/market structure on the decisions as well as wrongness or accuracy of the decisions of the designers. On the other hand, overconfidence may be a major cognitive fault source. Overconfidence meant here is the fact that the designer relies upon the special knowledge s/he has more than enough. It was observed that because of the overconfidence problem, people filtered and distorted new information in a way to preserve their confidence (Daniel, Hirshleifer and Subrahmanyam, 1998). However, people attach more importance to the information they collect and the information they have; they tend to exaggerate the truth of information unknown to everyone. Therefore, overconfidence is a loyalty to the designer's personal and objective spirit in which the designer in a simple sense does not develop new information, and which remains as static with existing information. For this reason, for example, whereas the designers ignore information such as financial statements known to everyone and disclosed to the public, they pay attention to the clues about the companies and consumers circulating on the market.

RESONANCE LEVEL

The stage which overdesign emerges gradually after is related to the level of resonance between the designer and the user. The designer integrates the message layered into the

product; the user tries to solve this messaging layer by layer. Here it would be appropriate to explain the message expression. What we called as a message is everything that makes up the product, it is physical form, the features, total design idea that the product has at the spiritual level. The solution of the product by the user is actually a communication between the user and the designer. In this communication, the product itself is an information object that provides communication.

For this reason, the product itself, which is an information object, is made up of two layers in terms of the way it is. The first one is the real layer which can be perceived by senses; that is, the front structure. The other is the irreal structure we reached by grasping; that is, the rear structure. The real layer is homogenous due to the senses which can be perceived and cannot exhibit a layered structure. It looks the same to everyone. However, the irreal layer is heterogeneous because it is related to the cognitive level, i.e. grasping level. Heterogeneity allows it to separate new layers. Each layer that is articulated to the irreal layer reveals new depths that are integral to one another in the grasp of that product. The presence of the product's irreal layer brings the relationship between the creative subject, the designer, and the product, the perceiving and even the grasping subject to the light. The perceptual heterogeneity of the irreal layer can lead to differences in understanding the message given by different consumers. The perceptual heterogeneity can cause a product to be perceived as inferior, effective, or overspec by different consumers.

If the aim behind the design action is to give a message of spiritual existence through a concrete object, the perception of this message as well as the message that is tried to be given is also important in communication construct. One of the fundamental quality problems is how much the design idea that is tried to be given over the design work is perceived by the user, in other words, the resonance of the user with the spiritual entity. There can be several reasons why this problem occurs. The first of them is the representation problem we mentioned earlier. There may be shortcomings regarding the actual representation of existence in the design knowledge that the creative spirit (designer) uses to produce the product and changes into data. The designer may not have analyzed the actual problem and the user at the initial stage of the project. S/he may have chosen a marginal consumer mass as a target by focusing on the secondary problems. Secondly, the designer may not be able to objectify the design idea in a concrete form. In other words, every piece of design idea may not have been reflected in a particular product or may in conflict. This is related to the design team's design process and management capabilities. The third reason may be the user's lack of objectivization. The user may not have reached the concept of design, which is the spiritual entity of the product. Because whereas the designer makes a creation from the level of spiritual being (design idea) to the level of real being (physical product), the user does a critical reading from the level of real being to the level of spiritual being through his/her knowledge of design and experience. If the message that is tried to be delivered through the product after a point exceeds the user's expectations during this reading, the overdesign starts to emerge.

The message, which is consciously placed by the designer into the content of any product, consists of interrelated layers. The importance of separating the product into layers as an information object in terms of overdesign is the ease in determining the fact that overdesign starts after which layer. If the message given through the product can be divided into layers, which it is possible ontologically, it is possible to determine the user is not able to perceive the message given after which stage.

The perception of a product message by the user depends on the user's effort as well as the quality of the message. Therefore, the responsibility for the occurrence of overdesign belongs to the user as well as the designer. Most average consumers are unaware of the possibilities offered by the product depending on different reasons. They act diligently in order to understand the product and to test its possibilities. While product features increase user utility up to a point, the extra product features after a point are subject to

a diminishing *marginal utility* often cited in the Neo-classical economics since these require extra labor for the average consumer in terms of grasping and handling. As a result, product features that are effectively used by the average consumer provide the expected benefits and attract interest because it does not require much effort and is easily accessible. Whereas the product features within understanding create safe areas for average consumers, the product features that require more effort to understand constitute the risk area. For example, whereas the conventional features of a smart TV are familiar to most users, network features that are likely to disappear in complicated menus often remain idle throughout the product life.

We have already mentioned that all the physical and spiritual features of the product are integrated into the product as messages. Although whether these features are present or not is a separate debate in terms of overdesign, the presentation style of the features is also a separate design problem. Tversky and Kahneman (1981) have clearly demonstrated that the presentation of the problem would change people's behaviors in the context defined as the *Framing Effect*. Therefore, besides the problem, the presentation of the problem affects decision-making behavior. The presentation style (framework) of the event or alternatives that need to be decided influences the perceptions of the decision makers, and thus their behaviors and consequently their choices. In this context, the expression style (formulation) of the message to be given through the product may be more important than the solution. This leads us to; for example, usability studies in the field of design. For this reason, in order for the message to be detected by the user as well as integrating a product feature into the product, the following principles must be observed in order not to encounter overdesign in terms of design decisions.

Users are the masters at making inferences that we cannot guess. Most users will not use the product in the way that myopic designers offer, or not even realize many features, not use these features to avoid risks (i.e., malfunction) even if they are aware of them. The design will only mature when you understand your users better. For this reason, it is vital to ensure that a defined target group verifies the embedded features (messages) with diversity through participative design discourse.
In the design processes involving user participation, if the correct user pattern cannot be created, the results may lead to unexpected designs. The practice is sometimes more valuable than discourse. Therefore, instead of listening to the users, looking at what they are doing will lead to more meaningful results.

Each product has primary and secondary characteristics. Secondary features which are not considered well have high potential to create overdesign. For this reason, the necessity of every feature that is articulated to the product must be checked at every stage in terms of whether it is suitable for the original purpose of the product.

Designers are psychological beings. They are loyal to the ideas they work at. This loyalty can prevent them from being objective in their decision-making process. Since labor creates ownership and ownage, they are under the influence of phenomena known as IKEA Effect, Trophy Effect, or I Designed Myself in the literature. Designers should be free when creating their ideas, and an internal control mechanism should be developed to compare this level of freedom with "market realities."

CONCLUSION
Up to this point, we talked about the ontological limits of knowing existence through the discourses of objective ontology, the message intention that the creative process has and the ontological layers of the message embedded in the product. Although the different causes of overdesign are well studied in the literature, the fact that the designer is a psychological being, certain market and occupational information deficiency related to the activities, heterogeneity of users may create difficulties in embedding the required product features into the product and the user's apprehension of those features.

The design process is essentially a series of decisions taken to identify a problem and to solve it. Every decision taken in human-based processes may not be rational. However, the short-cuts (heuristics) used in decision-making mechanisms may not guarantee the accuracy of the decisions because they are often based on individual past experiences and time savings. The first thing that is decisive in the choices made by a designer from alternative options is knowledge. The abilities and the instantly unchanging personality traits that the designer has been associated with the knowledge and experience that the designer has. In the case of lack of information, the designer's willingness to take heuristic-based action (that is, decision motivation) consists of a combination of momentary anticipation towards his/her goal and the instantaneous value given by the designer for that purpose. Nevertheless, designer-based overdesign should be reduced by decision support mechanisms such as reporting ontologically inevitable lack of information, increasing interaction between departments, interdisciplinary teamwork or design practices involving consumer participation; and instant expectation and value given by the designer in case of lack of information should be subjected to secondary testing continuously.

Users are heterogeneous; they have different levels of knowledge and experience. They come into contact with thousands of products and show interest to each of them on a different level. The product which is sufficient for any use may be overspec for the other one. For this reason, this heterogeneity should be considered in the design phase of the product, and the homogeneous group that creates the large mass in the heterogeneity should be taken as a basis on positioning the product regarding the features. Consumers outside the homogeneous group should be used for homogenous group validation.

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