

A MULTIDISCIPLINARY FRAMEWORK FOR (TEACHING) HUMAN PRODUCT RELATIONS

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ABSTRACT

In this paper we introduce a framework for dealing with the complexity of human-product relationships. The actual framework is a matrix of design perspectives, with three cooperating disciplines on the one hand and three levels of abstraction on the other hand. Basis of the framework is the notion that a product cannot be seen as stand alone, yet always is influenced by the user(s). Thus, according to philosopher Don Ihde [1], user and product together define the actual product (use). The framework was developed for an integrated course on human product relations with input from the research groups on Usability, Design Aesthetics, and Philosophy of Technology. The interaction (or relation) between the product and the user can be analyzed and influenced with the use of theory from these three disciplines. Therefore we discern “A human as a User”, “A human as an Aesthetic”, and “A human as a Consumer”. From the philosophy of technology perspective (the human as a consumer) for instance, the theory of mediation and the ethics of influence of behaviour are used to analyze existing human product relations and create meaningful new ones. The three levels of abstraction within the framework concern interaction on an individual, a social and a societal level. Finally we discuss the implementation of this framework within education practice.

Keywords: Human product relations, aesthetics, usability, philosophy of technology, research through design education

1 INTRODUCTION

The core difficulty in solving industrial design problems has changed. Merely solving technical functionality problems is no longer enough to create successful products, because the functioning of products is more and more defined in its social context. In the 1980s the Postmodernist movement caused a shift from function being the most important descriptor of products towards meaning [2], but since the turn of the century, the way people *use* products became the major factor [3]. The most important topic for design for now will be the facilitation and influencing of the way that people use products, both for providing pleasure in use as for influencing socially desired behaviour. Successful products then will need a mix of emotional impact, user experience, social acceptance, and a worthy contribution to society. In this paper we propose a framework, based on three different industrial design related disciplines, for coping with this demanding situation. The paper shall describe the framework and underlying theory in detail, and discuss its benefits and limitations.

2 RESEARCH THROUGH DESIGN EDUCATION

The framework was derived from a cooperation that started with the design of a new, integrated course for second year industrial design engineering students. The idea was to bring all the recent research from our University, related to human-product relations together. Three research groups joined the project. One research group is part of the Faculty of Engineering Technology and is doing research in usability issues. Topics that are addressed by this group are the use of scenario based design methods [4], and design for dynamic use situations [5]. The second group is located at the same faculty and researches Design Aesthetics, especially the social and cultural aspects of design from historic perspective [6], and the implementation of meaning in product aesthetics [7-8]. The third research group is part of the Faculty of Behavioural Sciences and addresses the Philosophy of Technology. This group is especially interested in the ethical issues concerning the changing relationship between

humans and technology and the role that artefacts play in shaping these relationships. An example issue is that, due to developments in Nano-technology and artificial intelligence, the boundaries between humans and products themselves are blurring [9]. The input from the three groups made a good start for setting up a course for teaching the whole complex of human product relations at different levels, but a framework that could structure all the aspects was needed in order to prepare a clarifying learning experience. All the people involved in the course were both teachers and researchers (50/50), as is common in our University. By setting up and actually performing the course, with researcher-teachers from the three groups together, the desired framework was designed and elaborated. With this approach, one can speak of “research through design education”.

3 HUMAN PRODUCT RELATIONS

The linking factor in the treatment of human product relations within the three research groups is the notion that a product cannot be seen as stand alone, yet always is influenced by the user or users. A product without use (and therefore a user or users) is like an artwork in the museum. The other way around, the user is also influenced by the characteristics of the product in the way he or she uses the product. Thus, according to philosopher Don Ihde, user and product together define the actual product [1]. Products can stimulate certain forms of use by the way they are designed and on the other hand inhibit other forms. Like binoculars that stimulate to look at far away objects, but prohibit a broad sight, or ready-to-eat meals, that discourage cooking but stimulate eating on your own. The latter is an example where the product, or the associated technology, not only influences the individual relation of the user with a ‘product’, but it also influences the behaviour of the user in its interaction with other people – by not eating together. Thus the implications of the human product interaction are also defined on a social level. The way we look at products and how they influence our lives can even be defined on a Society- or cultural level. The direct interaction with a chainsaw is pure individual for the average forest-worker. But since the device played a major role in the cult movie “The Texas Chainsaw Massacre” in 1974, the associations people have with these objects will never be purely functional anymore. The individual relation will therefore always be influenced, one can even say ‘infected’, by this common cultural connotation (Figure 1).



Figure 1. (left) A product (Chainsaw) without use context is like an artwork in the museum. (top-right) a Human-Chainsaw relation at an individual/physical level, and at a cultural level.

Human product relations are even more complicated when we look at the different roles that individual products can play in different situations. A mobile phone can serve as a social device to communicate with all your friends, or as a game-console when waiting for a delayed flight, or it can be a life-saver when you have had an accident on a remote location. In different contexts, different product characteristics are important. The latter requires an easy interface and reliability, while the others demand a broad functionality and some fun look-and-feel.

3.1 Three levels of abstraction

To clarify all the different forms of interaction we introduced levels of abstraction, for both analyzing and developing human product relations. The three levels of abstraction within the framework are “Individual”, “Social” and “Societal”. The first one handles how an individual user interacts with a product. The second one describes how a product facilitates (or inhibits) the social interaction within a group of users, and the last one concerns the impact of the use of specific products upon society (and vice-versa). As for a typical product like the MP3 player, the individual interaction with the product is dependent on the physical look and feel of the product, the user interface, and other use aspects like battery life and memory capacity. But on a social level the MP3 player can play a role in sharing your music with others, and the use of MP3 format has changed the way we buy music. In particular the way we look at paying for music, which is a result of the use of products at society-level (Figure 2).



Figure 2. Individual, social and societal influences of the use of an MP3 player

3.2 Three perspectives

The interaction (or relation) between the product and the user(s) can be analysed and influenced with the use of theory from the three disciplines. Therefore we discern “A human as a User”, “A human as an Aesthetic”, and “A human as a Consumer”. A human as a user deals with usability aspects. For instance ergonomics and user interface design at the individual level, but it can also play a role at a social level. The way that park benches are designed for instance, can influence the social contact between users (Figure 3). Usability can also play a role on society level. With our example of the park bench, the incorporation of a trash bin could prevent users to throw their waste in the park. This society level also instigates future use scenario questions. For example the use of compact camera’s and camera phones has started many societal discussions on privacy issues, particularly with regard to the extent to which it should be possible to turn off the camera sound. One way to investigate and anticipate this future use issues is the application of scenario planning [6].



Figure 3. Usability issues of a park bench on a social (left-mid) and on a societal level (right)

Aesthetic issues in human product relations deal with taste and related user preferences. This has a strong relation with culture and background of the prospective user or user group. Important tools for influencing the relations are semiotics [11] and the use of cultural archetypes. A hammer, for example, can look like a ‘hammer’ hammer, a stylish hammer, a kids’ hammer or a safety hammer (Figure 4). In all cases the basic functionality stays the same, while the styling determines the actual use and therefore the relationship with the user.



Figure 4. Different aesthetic appearances of a hammer depict different user behaviour

These issues of aesthetics can also be addressed on the different levels. A hammer from a do-it-yourself shop is designed for an individual, physical relationship with the user, when he or she is doing a task. And DIY-shops have recently introduced slightly smaller hammers with flower patterns, targeting at their growing group of female clients. A chairman's hammer, however, facilitates user relations at a social level, and it is intended to give the owner status. That is why often a particular 'design of authority' is applied to such objects. Aesthetics can also play a major role on society level when it is intended to strengthen a certain cultural identity or is a tool for the communication of values. Think of uniforms, religious signs, and the recent revival of designs that are based on cultural heritage, forming a countermovement versus globalization.

From the philosophy of technology perspective (a human as a consumer), the theory of mediation, the concept of scripting, and the ethics of influence of behaviour are used to analyse existing human product relations and create meaningful new ones. The individual relation of a person with his or her hammer can thus be analyzed from philosophical perspective. When someone uses a hammer to drive a nail in a piece of wood, he or she does not pay attention to the hammer, but rather focuses on the nail in the wood. This means that the user and the hammer together form a system that drives the nail in the wood. Heidegger calls this ready-at-hand, and the hammer *mediates* the relation between the user and the nail [9]. Only when the hammer breaks, it receives back the attention of the user. The relation with the safety-hammer from figure 4 is also outside the attention of the user, but in a different way. The object is not physically used, but only serves as an agent to make the user *feel* safe more.

In a similar way, philosophic theory can be used to analyze interactions on a social level. The script concept by Madeleine Akrich [12] and Bruno Latour [13], is a way to describe the manifold roles technological artefacts play in their different use contexts. They argue that artefacts possess a "script" in the sense that they can prescribe the actions of the user. Products are able to evoke certain kinds of behaviour: a plastic coffee cup has the script "throw me away after use," whereas a porcelain cup "asks" to be cleaned and used again. The park bench with the separate seats as mentioned earlier, determines with its designed-in script, that individuals are positioned next to each other at a fixed distance, whereas the sturdy picnic table invites people to sit together and facilitates certain popular 'misuse' (Figure 3). Artefacts thus can influence, constrain or enrich human behaviour in the way that these artefacts *mediate* the relation of the user with the world, and this influence can be understood in terms of scripts [14]. This type of influence of behaviour can be extended to a society level when certain behaviour is rendered as 'good' or 'bad'. Then we enter the realm of morality and ethics. For instance with an artefact like the speed bump, that incorporates the script "drive at a speed that is safe for other traffic".

4 FRAMEWORK

So in the end, the framework is a matrix of design perspectives, with the three respective disciplines on the one hand and three levels of abstraction on the other hand. In every cell certain aspects play a role, which can be addressed with underlying theory. Of course the list of aspects can be endless, but the table indicates the topics that are addressed within the participating research groups (Table 1). The use of the framework in a design project is meant as a structuring device for several phases. The framework should not be seen as a method. That is just restricted to the topics in the respective cells, where several methods are available to address these topics. As an example for 'the user as consumer' on an individual level, mediation analysis can be used to assess how a product influences the relation between the user and his world [14].

Table 1. Framework Overview

	A human as “user”	A human as “aesthetic”	A human as “consumer”
Individual	Ergonomics Interaction design Dynamic use	Aesthetic preferences -	Mediation -
Social	Rich interaction Dynamic use	Identity Status -	Mediation Morality -
Society	Future use scenarios -	Culture History -	Influence of behaviour Ethics

The framework as a structuring device can first be helpful in the analysis of the design problem. What is the context? Which users are involved? Which factors play a role in the human product relation at this moment? What are problems on an individual level, on a social level and on the society level? The framework then helps to structure the desired experience and intended behaviour of the prospect users in the design phase. The idea is to start the design phase with a clear view of the desired relation or relations. This demands an alternative phrasing of the actual design problem. It should not be product-focused, but rather demand-focused. From the users’ demands then, the desired human-product relations can be derived. So the design of a new mobile phone can be “a Mobile phone that saves you when your car broke down on a rainy day”, or “a Mobile phone to keep you company in a waiting room of a dentist”. The complexity of the actual design task lays in the interconnection between the different aspects and of course the balance between different demands and their according relations. Furthermore the framework provides no clue as to which topics are important in a specific design situation. However it is not always necessary to design for all the cells in the matrix. In addition, explicitly addressing all cells during the analysis of the design problem helps to define the correct questions.

5 COURSE

The framework is developed for (and also within) an integrated course for second year students in Industrial Design Engineering. The course is based on a series of workshops where the theory of the framework is taught and practiced. Each workshop handles a combination of “perspective” and “abstraction level”, forcing the students to integrate the different fields of interest. In one workshop for example, the combination of Design Aesthetics and usability on an individual level is addressed by the use of personas [15]. In this way both aesthetic preferences and usability aspects like the level of education, or physical disabilities of prospective user groups can be investigated and visualized. In the design phase, the creativity method of interaction relabeling [16] was used for developing rich interactions from both usability- and aesthetic perspective. We also introduced scenario planning [6] as a means of exploring future use possibilities in combination with ethical issues.

In the end of the course the students have an individual assignment where they have to implement the three different perspectives (User/Aesthetic/Consumer) in one design. Street furniture is chosen as the subject, because all the three levels of abstraction (Individual/Social/Societal) can play an important role in the human-product relation here. To complete the course the students have to reflect on their project in an essay, explaining the relation(s) that they implemented in their design in terms of use, aesthetics, and philosophic theory. This combination of practical work (actually designing and making something) and theoretical reflection proved to be a good descriptor of the extent to which the students grasped the complexity of the subject. In the end just a few students were able to address all cells of the framework, however the majority of the group was able to implement combinations of one perspective and one or two levels of abstraction in a meaningful design.

6 CONCLUSION

Bringing together the research on human product relations from three different research fields in one course required a structure on which the course could be built. This led to the development of the framework of human product relations which considers these relations from three perspectives (human as user, aesthetic and consumer) and three abstraction levels (individual, social and societal). In this way our educational work both rested on and inspired our research. In education the framework proved to be successful in both directing our course work and providing a structure for the students to use in their individual projects.

In research the framework will be used to integrate future projects of the three research groups, in order to make the findings of the individual research projects more appropriate for integrated product design, both in an educational context as well as in design practice. The students' assignment results of the course will be used to develop the framework further, especially focusing on the interconnection between the topics from the different cells, again for stimulating an integrated product design approach.

REFERENCES

- [1] Verbeek, P.-P. & Kockelkoren, P. The things that matter. *Design Issues*, 1998, 14(3), pp.28-42.
- [2] Heskett, J. *Toothpicks and Logos*, 2002 (Oxford University Press, Oxford). p.57
- [3] Green, W.S. & Jordan, P.W. *Pleasure with Products*. 2009 (Taylor & Francis, London)
- [4] Bijl-Brouwer, M.v.d. & Voort, M.v.d. Participatory Scenario Generation. *Design Principles Practices, An International Journal*, 2009, 3(1), pp.269-288.
- [5] Bijl-Brouwer, M.v.d. & Voort, M.v.d. Strategies to design for dynamic usability. in *Proceedings of IASDR2009 Design Rigor & Relevance*. 2009. Seoul, Korea: (Korea Society of Design Science).
- [6] Eggink, W., Reinders, A. and Meulen, B.v.d. A practical approach to product design for future worlds using scenario-development, *11th Engineering and Product Design Education Conference; Creating a better world*, 10-11 September, Brighton. (Institution of Engineering Designers, Wiltshire UK)
- [7] Eggink, W. A practical approach to teaching abstract product design issues. *Journal of Engineering Design – Special Issue on Design and Emotion*, 2009, 20.
- [8] Eggink, W. A Chair to Look to the Moon: What We Can Learn from Irrational Design History for Contemporary Design Practice. *Design Principles and Practices: an International Journal*, 2009, 3(1), pp.103-114.
- [9] Verbeek, P.-P. *Filosofie van mens en techniek*, 2009, October 15th (University of Twente, Enschede).
- [10] Verbeek, P.-P. *De daadkracht der dingen*, 2000 (Boom, Amsterdam).
- [11] Eves, B. & Hewitt, J. Semiotics, Design Character Language. in *10th Engineering and Product Design Education International Conference*,. 2008. Barcelona (Institution of Engineering Designers, Wiltshire UK).
- [12] Akrich, M. (1992). The de-scription of technological objects. In W.E. Bijker and J. Law, Editors (Eds.), *In Shaping technology/building society* (pp. 205-224). (MIT Press, Cambridge, Massachusetts).
- [13] Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artifacts. In W.E. Bijker and J. Law, Editors (Eds.), *In Shaping technology/building society* (pp. 225-258). (MIT Press, Cambridge, Massachusetts).
- [14] Verbeek, P.-P. Materializing Morality: Design Ethics and Technological Mediation. *Science, Technology & Human Values*, 2006, 31(3), pp.361-380.
- [15] Cooper, A. *The inmates are running the asylum: why high-tech products drive us crazy and how to restore the sanity*,. 1999 (Sams, Indianapolis).
- [16] Djajadiningrat, J.P., Gaver, W.W. and Frens, J.W. Interaction relabelling and extreme characters: methods for exploring aesthetic interactions. in *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods, and techniques*. 2000. New York: (ACM).