

CLASSIFICATION OF USERS

- DUE TO THEIR RELATION TO THE PRODUCT

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Abstract

The purpose of the work behind this paper was to find purposeful ways to classify the users who are interacting with physical products. An investigation of 30 various artefacts was carried out and three different ways to classify the users due to their relations to the product and other users were found. This paper presents two new definitions of groups of individuals, side-users and co-users, who are affected by the product, and a use profile composed by a number of categories. Moreover, a classification of the users depending on their relation to other users is presented. It is also shown that different demands could be made upon the products due to their users' group belongings.

Keywords: Classification, human factors, man-machine interaction, user

1 Introduction

There are numerous different aspects to consider when to develop a product, which has an interaction with the user¹. The product has to be ergonomic, which includes ease of understanding and use. Furthermore, the product needs to be attractive to the user and thus its aesthetic and social attributes are essential. Moreover, it has to suit to the actual use situation. All these aspects assume that the user's capabilities, limitations and needs have to be taken into account. This fact underlines that the designers have to know for whom they design the product.

Users and use situations could be explored in different ways. It is important to have contact with the users and learn about their needs by for example interviews, observations and discussion groups [1], [2]. There are also methods, for investigating the users and the use situations when the design team has no direct contact with the user. To get a better picture of the users and to manage to satisfy their needs, they should be classified in various groups.

The aim of the work behind this paper was to find and discuss purposeful classifications of the users who are interacting with physical products. This paper introduces three different ways of classifying the users depending on their relations to their product and to other users:

- Side-users and co-users

¹ A user is here defined as any individual who, for a certain purpose, interacts with the product or any realised element (system, part, component, module, feature, etc., manifested in software or as concrete objects) of the product, at any phase of the product life cycle [3].

- Use profile
- Relations between users

2 Approach

To find different classes of users an investigation of 30 products was carried out. The investigated products, such as consumer products, vehicles, processing machines and tools, have a close interaction with at least one user. The products' various users were identified and their relations to the product and the other users were acquired. These relations were analysed and diverse patterns for classifications could be discerned.

3 Theoretical basis

3.1 Defining the intended user

When designers design for a use situation they usually put themselves in the role of the user [4]. A designer or an engineer is rarely representative for the user of the product and therefore it is important to consider the type of user who is really going to use the product. It is also necessary to communicate the use situation so that all of the designers' views are ventilated and the design team gets a common picture of the design issue, the intended users and the use situation. It may be easier to communicate these with help of a tool or method. User classification could be a support.

The degree of fulfilment of user needs affects the success of the products according to Cooper and Kleinschmidt [5] and Griffin and Hauser [6]. To be able to realise the proper requirements the right user must have been concerned. It is crucial for the designers to know for whom they design [7], [8], [1] and therefore it is essential to define the intended users. Despite this fact Gould [1] states that the designers are disinclined to define the user and if they do so they do not take the definition seriously. Gould also says that though the user population is going to expand broader than the definition, it is better to define a user group early in the design phase than leave it open, as the absence of user definition does lead to slipperiness and not flexibility as could be expected.

3.2 Classification of the intended users

Theories such as Hedge in [2] and Preece [7], clarifies the user characteristics such as the person's age, gender, body dimensions and training as important variables which influence the use situation and consequently have an impact on the product design. These user characteristics define the users' abilities and limitations. However, the classification made in this research is not focused on the users' individual characteristics but based on the relation between user and product and different users.

It is not only the end users who get affected by the product design. Other users have to be considered and investigated during the design process. Buur & Windum [4] arrange users into two main groups - *primary users* and *secondary users*. The first group embraces those who use the product for its primary purpose, e.g. the driver who drives a truck, whereas the second group comprises those who actively use the product, but not for what it is primarily intended, e.g. maintenance and repair personnel.

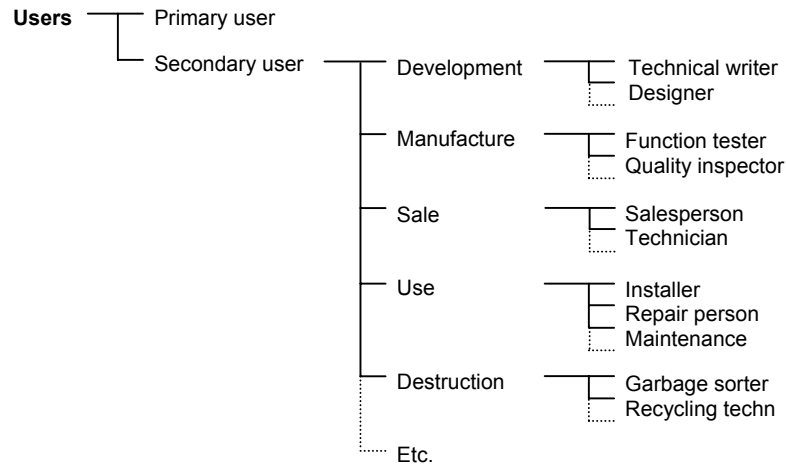


Figure 1. Categorisation of users into primary users and secondary users.

Other authors e.g. Monö [9] have defined these user groups. He uses the terms *filter groups*, to which the secondary users belong, and *target groups*, which correspond to the primary users.

However, there are more individuals than the groups, primary and secondary users, who the designers have to consider during the design of a product. Two new definitions of groups of individuals - *side-users* and *co-users*, who become affected by the product, are presented below.

4 Side-user and co-user

Certain products, such as an underground railway system, have numerous different users. The motorman, the guard and the passenger are all primary users, while the cleaner and the repairman are secondary users [4] of the product. The people living in the vicinity of the railway and who are affected by the noise from the trains and the hazardous environment are not included in the definition of user since they do not have any certain purpose to interact with the railway just by living near it. Nevertheless, it is essential to consider those people who interact with a product without any particular purpose. Therefore, two new groups of people who interact with a product have been introduced - *side-users* and *co-users*.

Side-users: Side-users belong to the group of people who are affected by the product, either negatively or positively, in their daily life but without using the product. People living near the railway become side-users of the trains passing by. They are disturbed by the noise and have to be careful to avoid injuries.

Co-users: A co-user is a person who co-operates with a primary or secondary user in some way without using the same product. Co-users may each have a technical system of their own which they use on the same level. They may often be seen as co-operating primary users vis-à-vis the ordinary primary users but for a higher level of the system, e.g. the driver in a traffic situation is a co-user of another driver's car and the two drivers may also be regarded as primary users of the traffic system.

5 Use profile

The different users could be further investigated under different categories according to their relationship to the product, namely the use experience, influence on and responsibility of the use, emotional relationship to the product and degree of interaction with the product. Literature in Human Computer Interaction, e.g. Faulkner [10] and Preece [7], stresses the importance of identifying the users' level of expertise, i.e. if they are novice, intermittent or expert users. This is also important to do when to design a physical product – an artefact. However, there are numerous other categories in the relation between user and product that ought to be considered. These categories are shown in Table 1.

5.1 Primary and secondary users

Use experience

The user's experience of the product may differ depending on how long and how often the user has used the product.

- *Length of use and education:* According to the length of time the users have used the product, they may be categorised as newcomers, experienced users or specialists. The specialist is a person who is trained in using the product or uses it habitually in, for example, work or leisure. It is relevant to consider whether the user has previously used the same type of product or a similar system in order to form an opinion of the user's experience of the product. If a product is aimed at newcomers, it is of great importance that the product has a user interface which is easy to understand.
- *Frequency of use:* Another way of classifying the users is to determine their frequency of use. The requirements on the product change if a user uses a product seldom, occasionally or often. If a user uses a product often, it is very important that it is well adapted to the physical conditions of the user and that it is possible to adjust it for the user. It is also important that the product does not create stressful situations. Consequently, the product needs to be ergonomic.

Influence on and responsibility of use

The influence on the use situation may appear in different situations, for example the user may have an influence over the choice of product as in a buy situation. Moreover, the user may have control over the use situation when he/she handles the product or may be totally powerless. The responsibility may also vary from different users.

- *Influence on the choice of product:* A user may not have any influence at all on the choice of products he/she uses. The situation appears when the user has no power in the decisions regarding what kinds of product to order. This is typical for a user in a work situation, such as nursing staff who use hospital products that the purchasing department has ordered.

It is of particular importance for a person who cannot affect the choice of the product he/she should use that the product is ergonomic and well suited to the user. This is evident with regard to the prevention of working injuries.

- *Influence on the use situation:* In some cases, users have no influence over the use situation. For example, when a seriously handicapped patient is being pushed in a wheelchair, the user is totally helpless and dependent on the product and the carer. In this situation, it is essential for the product to express safety and reliability.

- *Responsibility in use:* The use of a product may involve a considerable responsibility, for example a pilot flying an airliner or a surgeon handling his instruments. This is extremely important to consider, especially when it comes to users working in hazardous environments. In the design of products with such tasks, the designers have to decide whether to give the responsibility to the user or let the technical system control the tasks.

Emotional relationship to the product

The special feelings a user may have for a product vary between different types of products and also between different users. Sometimes, a user may almost “fall in love” with a product and in other cases the product may mean nothing to him/her.

- *Ownership:* The designer also needs to consider whether the user is going to own the product or possibly rent it. This fact may be closely related to the use frequency. Examples of products that are not owned are office products such as copying machines, overhead projectors and office chairs, and public products such as public toilets and buses. A general product sets higher demands on the user interface because its users have neither the time nor the enthusiasm to learn it and the use situation is seldom appropriate for struggling with a complicated user interface. There may also be variety in the way that users treat the product; for instance, in the care with which they use it. Feelings for the product may also vary between different users depending on whether they own the product or not.
- *Social aspects:* For many users, it is important that the products they use give the right signals to society. For example, some users want a product to create an exclusive impression and others want it to symbolise a particular group affiliation.
- *Mental influence of the product:* The user may be under a high degree of mental influence of the product, such as feelings, impressions and opinions of the product. For example, it may be important that the user thinks the product looks safe. The semantic functions are of importance for the mental influence of the product.

Interaction with the product

The cognitive and physical interactions differ between users depending on the type of product.

- *Cognitive interaction:* Some users have intensive cognitive interaction with the products and it is important that they can interpret the signs from the product (understand what the product is intended to communicate), so that they understand how to handle it. In regard to the mental influences, this sets high demands on the semantics² of the product.
- *Physical interaction:* The frequency of physical contacts with the product affects the demands on the physical ergonomics of the product. The product should be suited for all the expected users or it should be easy to adjust the product to suit them.

Within each of these categories, a user might be studied to determine the conditions to which he/she is subject. The different categories are collected in Table 1. The table also shows various examples of aspects which it is important to consider in designing products for these types of user.

² Semantics - The study of messages of signs [11].

Table 1. Use categories, users' degree of performance of the categories and extent of importance of different aspects of the product due to the categories.

	Categories	Degree of performance	Extent of importance of the product
Use experience	Length of use and education	Newcomer Experienced Specialist	▼ Semantics
	Frequency of use	Seldom Occasional Frequent	▲ Ergonomics ▲ Stress factors
Influence on and responsibility of use	Influence on the choice of product	No influence Some influence Much influence	▼ Physical ergonomics
	Influence on the use situation	No influence Some influence Much influence	▼ Physical ergonomics ▼ Confidence
	Responsibility in use	No responsibility Some responsibility Much responsibility	▲ Reliability
Emotional relationship to the product	Ownership (Use of:)	General product Rented product Owned product	▼ Semantics ▲ Aesthetics/sense
	Social aspects	Of little importance Of some importance Of great importance	▲ Aesthetics/sense
	Mental influence of product	User with no mental influence User with some mental influence User with much mental influence	▲ Semantics
Degree of interactions with the product	Cognitive interaction	No cognitive interaction Some cognitive interaction Much cognitive interaction	▲ Semantics
	Physical interaction	No physical interaction Some physical interaction Much physical interaction	▲ Physical ergonomics

Even if two users have the same profile according to above categories, they are going to be different. This is due to the fact that the users are individuals and they may differ in regard, for example, to wishes and demands, attitudes, motivations, abilities and skills, knowledge, and cultures.

5.2 Side-users and co-users

Classification of different groups of users

All primary users and secondary users could be classified according to the categories above, see table 1. Side-users and co-users may be classified according to most of the categories above; the frequency of use, the mental influence of the product, and the degree of cognitive interactions and physical contact with the product. They may own or rent the product of

which they are side-users or co-users and therefore they also may have influence on the choice of product. However, it is more often the primary user who possesses a product. Side-users or co-users may also have experience of the product, which can affect their attitudes to the product and their behavior in the use situation. The other categories, in Table 1, show mostly the lowest degree of fulfillment, i.e. in the upper alternatives. A side-user or a co-user has hardly any possibility to influence the use situation, the social aspects are mostly of minor importance and they may not be responsible for the use situation.

6 Relation between different users

As shown earlier in the paper a product may have more than one user such as primary users, secondary users and side- and co-users and there must also be different kinds of relations between these users. These dissimilar relations between users and the roles they play in the use situation may be less important than the theories presented earlier in this paper. Still, they are worth to consider as they could give other views to the use situation and the demands on the product are affected by these interactions.

Control

- *User with responsibility and dependent user*

Examples: Carer/doctor – patient and driver – passenger.

This type of relations between a responsible and a dependent user occurs when a user handles or operates a product which also affects another user who has no control over the product. The user who operates the product and is responsible for it also has responsibility towards the other user. Therefore, it is important that both users trust the product. The independent user must also have confidence in the responsible user.

Consequently, when designing such a product, it is important to bear in mind that it should inspire confidence and also express safety.

- *User who affects another person*

Examples: Motorist – pedestrian and a person using a chainsaw – a person who is near the chainsaw.

These two users have also a relation where one part has control over the use situation and affects the other part. However, in this case the user, who is affected, does not use the product for its primary purpose. He/she is often a side-user or a co-user to the product, which means that he/she has not chosen to be in this relation with the product and the other user. The product needs to be designed for making a good relation between these two users. The side-user or the co-user does not want to be disturbed and the primary user does not normally like to be the one who is disturbing.

Collaboration

- *Collaborating users to the same product*

Examples: Sailors on a sailing boat and children playing with a seesaw.

Some products need more than one user in collaboration for being used in a proper way. In some of these cases there may also exist a formal or informal group leader.

The product needs to have an apparent user interface and the allocation of the tasks should be clear.

□ *Compromised users*

Examples: People who share the space around a cash desk and passengers of a plane who are taken their seats.

One type of collaboration may be to compromise. Users who have to agree with each other when they use the product is an example of such a relation. This type of products needs to be designed to facilitate the compromising in these situations.

Performance and demonstration

□ *User with spectators*

Examples: Person showing OH-slides for an audience, a waiter, who serves people with a teapot and a train guard, who uses a loudspeaker to inform the passengers.

Some users have persons who are observing them when they are using the product. That may be frustrating for both parts if the user does not manage the product. Therefore, the product ought to have a clear, simple user interface. It may also be tiring for the spectators, to watch the user spend more time in handling the supporting product than in performing the task he/she is actually intended to perform. Consequently the product needs to be quick and simple to use.

□ *Expert and amateur/novice*

Example: Repair man – customer.

When a person takes a product to a service technician and they start to discuss the problem with the product, the two users have the roles of amateur and expert. It is important that the two parties can conduct a discussion and understand each other. Therefore a product, which could be in focus in such a situation, should have a clear user interface that supports the explaining and understanding of the products functions.

□ *Instructor and learner*

Example: Driving instructor – learner.

Sometimes, a person needs to demonstrate and explain to another user how a product works. This situation is an example of an instructor and learner relation. The design of products, which is often at the centre of this type of situation, should support and facilitate demonstration and learning.

Preventing

□ *User who inhibits another user with the aid of the product*

Examples: Parents prevent children from opening the oven door with a safety catch.

This type of relation occurs when a user prevents another user from doing something with the aid of the product. This is relevant for crime prevention and maintaining law and order. Sometimes, it is also necessary to protect a user in some way by preventing him/her from using the product in a particular way.

Social relationships

□ *Person who wishes to influence other persons*

Example: A person with an exclusive wristwatch and the person he/she wants to impress.

There are numerous social aspects that influence the relation between two persons due to products. These different relations have to be detected and discussed. Does the user have this product in order to impress other people or to show a special group affiliation? The user may want to give those around him/her the impression of being rich or that he/she thinks of the environment or prefers a particular type of music.

7 Conclusion

Two new groups of individuals, side-user and co-users, who are affected by the product, were defined and these individuals are important to consider when designing a product. The different groups of users could also be investigated by a number of categories and a use profile could be set up. Furthermore, it was also identified a number of relations between these different users.

It is concluded that classifications of the users support the identification of important aspects, which has to be considered during the design phase, such as ergonomics, semantics and aesthetics and moreover how to facilitate for the user in the use situation. These aspects are due to the relation between product and user but also between the products various users.

Summarised it was shown that it was possible to classify the users in various purposeful ways and that different demands could be made upon the product due to their users' group belongings.

The intended use of these theories is to include them in a working procedure. It is thought to give the people in the design team a better understanding and a more common view of the users by inviting them to specify the different users and their relation to the other users and the product.

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