The role of design properties and demographic factors in soft usability problems

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User-centred design and co-design are nowadays prevalent in product design. However, the number of product returns in consumer electronic industry is continuously increasing. Most complaints are not technical in nature but have to do with non-technical or 'soft' problems. Our study investigates these problems with electronic devices in relation to design properties, characteristics of users and their follow-up (re)actions. The results show that people massively complain about a large variety of products, from computers to e-book readers, and from washing machines to vacuum cleaners. Soft problems are the outcome of the interaction between user characteristics and design properties. Whether users take action upon their complaints also depend on their background. The results have to be translated into a design language.

Keywords: user centred design, usability, product design, soft problems, user behaviour

Since user-centred design was introduced to the electronic industry, they have increasingly adapted the paradigm in their design process to make consumer products successful in the market. Nevertheless, product return of consumer electronic products has been continuously increasing since mid 90s (Den Ouden, 2006; Koca, Karapanos, & Brombacher, 2009). Interestingly, more than half of the reasons for product returns have nothing to do with technical problems, but are related to 'soft' problems that cannot be traced back to a specification violation or failure (Kim, 2014; Kim & Christiaans, 2012): this is the same concept as 'No Fault Found' or 'No Trouble Found' problems in reliability engineering (Brombacher, Sander, Sonnemans, & Rouvroye, 2005; Khan, Phillips, Jennions, & Hockley, 2014). Soft problems have first been recognized explicitly within modern high-end consumer electronics industry and then especially within the mobile industry: in 2006, product returns due to soft problems cost the global mobile industry $4.5 billion (Overton, 2006). More recently consultancy firm Accenture puts the percentage for these soft problems for returned electronic consumer products in the US at 68%. The company estimates the overall cost for product returns for the US market alone to be $13.8 billion (Douthit, Flach,

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& Agarwal, 2011). Product return must be a big threat to the electronic consumer product industry because it would end up with consumer disloyalty and a serious revenue loss. However, the unfamiliarity of industry with the nature and meaning of problems that has no technical cause could be a much bigger threat to them since they can hardly cope with such kind of consumer complaints unless they are aware of the reasons of product return.

The increasing user dissatisfaction with electronic consumer products, on the other hand, has raised questions about the reasons for this increase on the user side. One might postulate that the complexity of electronic devices has increased, leading to 'intrinsic' cognitive load problems (see for a recent publication about cognitive load theory (De Jong, 2010)). Another reason for complaints, as mentioned in literature, is when the product doesn't meet users' expectations (Den Ouden, Yuan, Sonnemans, & Brombacher, 2006). For instance, consumers are likely to be attracted by the number of features when buying a product. Once they have actually worked with a product, however, usability starts to matter to them (Rust, Thompson, & Hamilton, 2006). However, the increase over the years in the number of soft problems does not mean that product quality is going down. More and more consumers nowadays are becoming more aware and react accordingly: they do not take any problem with the product for granted anymore. And when they feel dissatisfied with the device they are more willing to take action.

Hence, interaction effects between manufacturers' strategy, products' characteristics and users' characteristics might cause the soft problems phenomenon. Leaving the companies out of the equation, we mainly focus in this study on the influence of user characteristics, design properties and their interactions. The research questions are:

1. How do 'soft' problems with electronic consumer products interact with user characteristics and design properties?
2. What actions are consumers willing to take after experiencing any dissatisfaction with such a product?

1 Background

1.1 Soft problems

In earlier survey studies regarding soft problems a categorisation of these problems was already proposed (Kim & Christiaans, 2012; Kim, Christiaans, & van Eijk, 2007). First, it turned out that all problems expressed by users were related to their perception of the product's 'instrumental quality', i.e. the extent to which the device contributes to the performance of users or to the promotion of their goals (Hassenzahl, 2004). Three types of soft problems could be derived from the data following the quality dimensions