Embedding Non-Quantifiable Product Qualities in Products and Product Development.

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Keywords: Intangible product qualities, socio-technical product development, case studies.

Abstract
This working paper presents research into how companies embed non-quantifiable product qualities into their products. Through 24 interviews within five case companies this exploratory research seeks to understand how non-quantifiable product qualities are treated and developed. The research is being conducted on the basis of grounded theory, following the experiences of companies involved in manufacture of mobile phones, hi-fi's and vehicles. The interim results show different levels of insight and understanding of important product qualities between the case companies, and address key elements in trying to ensure that a systematic and repeatable approach can be pursued. One of the preliminary conclusions is the lack of a developed and shared 'language' (verbal or non-verbal) among product developers, that could provide a richer communication, and thereby better understanding and embedding of the non-quantifiable product qualities.

Introduction
Today many products position themselves in the market on the basis of qualities that are more than just purely technical. These qualities are often difficult to access for the designer due to their non-quantifiable character. This (working) paper will in its final version describe some preliminary findings from research into how companies embed these qualities that are hard to quantify. In this research they are referred to as non-quantifiable product qualities (NQPQ's). The aim of the research undertaken is to map the way industry think and deal with NQPQ's. By gaining an insight into practice in industry, the long-term aim is to add to our understanding and practice in order to ensure a consistent and repeatable embedding of NQPQ's throughout the product development processes.

Increasing importance of NQPQ's
The situation in industry today is that manufacturers often have access to and can incorporate the same technological qualities into their products. Organisations are maturing their technical capability and can rapidly copy Quantifiable Product Qualities (QPQ's). These qualities, being very similar and easy to copy, are therefore not valid product differentiators anymore. New ways of differentiating products are being used, preferably in ways that are difficult to copy. Industry is therefore increasingly concerned with product qualities such as usability, appearance (Macdonald, 1998), identity, semantic qualities (Möno, 1997 and Vihma 1987), pleasure (Jordan, 2000, Flyte & Hauge-Nilsen 2002) surprise and delight (Burns & Evans, 2000), comfort, ergonomics, context of use and environmental issues compared to cost, perceived quality (customer value) and product price. These qualities are often of subjective matter – they are likely to evoke emotional rather than rational response in the user and therefore they may be difficult to pinpoint, and thereby design and access. Another important aspect when understanding these qualities is that that the 'sum is bigger than the values of the individual parts'; NQPQ's are often difficult to identify on their own but have to be assessed as a whole (a gestalt), though they need to be designed individually.

These non-quantifiable product qualities are important to organisations and to design because they are the often product differentiators, and often have a strong effect when

building brand. This research is not concerned with branding as a topic, but how companies organise to embed NQPQ's into the product; it therefore asks questions about design process, about how the designers work and interact, and not asking questions about the product itself.

Research Strategy – empirical data collection
In order to gain an insight into how companies understand, design and embed NQPQ's an exploratory and qualitative approach was pursued, to understand phenomena in their real context (Robson, 1993). This means studying real organisations, with all their complexity, and trying to find data meaningful to the study of NQPQ's. Mature organisations producing high volume products were targeted because it is felt that the NQPQ's will be of higher importance in the design process. Data were collected from five manufacturers; one Hi-Fi, one mobile phone and three vehicle manufacturers in England, Sweden and Denmark. This also allows the researcher to see if there are any industry similarities or differences.

Data was collected through interviews with various actors involved in the product development process. The semi-structured interview method was selected in order to 'get into peoples head's' and get them to describe their world, their perspective on NQPQ's, and their involvement when it comes to decisions, designing and evaluation of NQPQ's. Within each of the five organisations 4-6 people involved in product development where interviewed resulting in 25 interviews lasting 1-1½ hours each. Each of the interviews where taped and later transcribed. The interviewees included product and brand managers, industrial designers, product planners, engineers and area specialists (such as usability experts). It was important to interview people involved in the overall design as well as specific specialists in order to gain an insight into how people with different focus comprehend and disseminate NQPQ's.

Initial data analysis
The research method resulted in a very rich data set that illustrates various points, factors and phenomena that influence the embedding of NQPQ's (social settings, freedom of thought, ideas generation, customer insight etc.). The analysis of the interviews was done through a coding system where any interesting point were highlighted in the transcribed text, these were then printed out individually into many hundreds of pieces of paper. Similar statements were then grouped to begin the construction of themes. The 10 main themes that emerged during this first data analysis are listed below. In cases where individuals made statements that could be placed under more than one theme, they would be put under each theme.

List of identified themes:
1. Awareness of NQPQ's in general
2. The design process of embedding NQPQ's
3. Transformation of NQPQ's into QPQ's
4. Decision making process – who's responsibility are the NQPQ's?
5. Forum for discussing/debating NQPQs within the organisation
6. Embedding NQPQs in the specification
7. Customer insight - understanding who you design NQPQ's for and find out what the NQPQ's are to them
8. Culture/language of designers
9. Influence of pre-perception (previous) experiences
10. Cost - cost cutting and NQPQ cutting

In the final version of this working paper 2-3 themes will be presented, meanwhile one theme; 'Transformation of NQPQ's into QPQ's (theme 3)' can briefly be summarised as an example of initial outcome to date:

Transformation of NQPQ's into QPQ's
There appear to be two distinct notions of the transformation of NQPQ into quantifiable measures. One is the quantification of the ('physical') quality itself - for example breaking 'driveability' or 'sound' down to specific and measurable characteristics. The other is to quantify the response to a product quality - such as using customer or expert ratings to quantify the 'success' of a specific or complex product quality (asking customers to rate the overall feeling of pleasure when using the product).

It is evident in all the cases that companies are transforming qualities that in their nature are non-quantifiable into quantifiable measures. This is often done by breaking a particular quality (like for instance 'usability' or 'driveability') down to several sub-qualities that are targeted and assessed through the use of quantifiables i.e. numbers. The notion of non-quantifiable as being something that can be turned into objective measures does not apply in all cases. In some cases the qualities are transformed from being intangible into being more tangible through less objective methods, where individual perception is a key factor (such as benchmarking). Benchmarking is where competitor products or even non-familiar product are compared in order to position a current product under development or already launched products.

Conclusion - Language and common understanding
Although there seems to be no well defined and tested design process for embedding NQPQ's, it is evident from the data that the embedding of NQPQ's goes through different phases. Firstly of being articulated – NQPQ's are talked about amongst the design team, often by describing their end-result (such as an emotion the qualities should evoke in the end user). By referring to 'feelings' that the product should evoke - 'it should feel like a user-friendly interface', the concept of 'user-friendliness' is simplified to the user emotion. These are then made sensible/visible through their embodiment (for example instant feed-back to the user when interacting with the interface). Very often companies then try to quantify the product qualities – the NQPQ's are turned into QPQ's, which allows a more standardised design and testing procedure to work effectively. The process is illustrated in the 'NQPQ language'-model below.
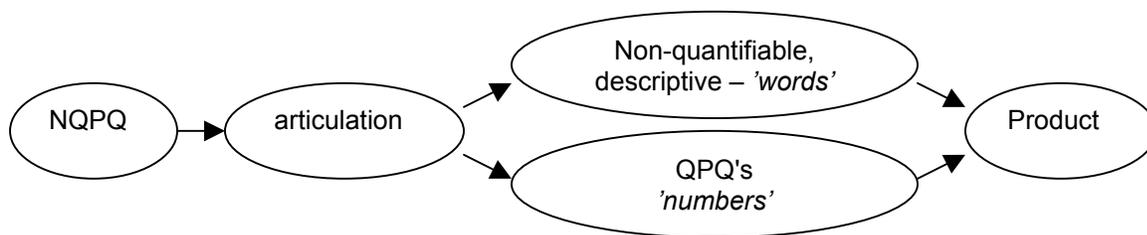

Fig 1. NQPQ's language model.

Although the transformation of NQPQ's into QPQ's is observed to be a strong force in product development, with companies wanting to increase quantification if possible. There also seems to be recognition of the importance of embedding the 'hard to define qualities' and growing acknowledgement that they are in an intangible format. Companies are becoming more comfortable with a design process that spans both the

QPQ lower route **and** the descriptive route that allows for non-quantifiable qualities. One such mechanism is observed in the use of benchmarking as adding to communication and comprehension of NQPQ's as one interviewee puts it:

> *'I mean it is difficult because you can not - you can not see it immediately so you need to hear it, and try it out and discuss it: 'okay, so what is it exactly you mean' so when you have a benchmark and something you can relate to - both of you - it becomes much easier. It is about, as you said, to get a common language and a common understanding of where it is we want to go'.*

This quote illustrates a common solution to making the NQPQ's 'visible' or compre-hendable, so that a group of people will reach a common understanding, through building a language that allows them to share tacit understanding (knowledge) or create a 'common cognitive ground' as described by Nonaka & Takeuchi (1995).

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