Theoretical issues in evaluation and assessment of product use and appreciation during product design and development

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Introduction

Systematic engineering and industrial design processes are based on lists of specifications and decomposition of solutions for the execution of design processes. In addition, a well-known design axiom is that early identification of potentially problematic issues are cost-saving and reduces lead-time.

Today, the key success criteria of more and more artefacts are dependant on the acquisition, the use and the appreciation of the product. Systematic considerations of these product aspects lack the theoretical grounding and design exemplars that traditional engineering research has produced. This means that considerations in these areas are difficult to include in the design processes.

If considerations of acquisition, product use and appreciation are to be included early in design processes, they must be theoretically grounded so that they are usable when ranking product properties and provides the designer with tools for analysis and prediction.

Acquiring new methods and tools in design activity is dangerous because it opens up the possibility of bureaucratization and formalism in design and at the same time it poses new challenges to designers: Should they acquire new professional tools in their work, or should they facilitate product design and development to be a trans-disciplinary activity?

Core design activities

Design theory, as it is known from engineering design and industrial design, has some basic normative features:

1. The problem and sub-problems to be solved must be listed in a design draft or a set of requirements. As a minimum they must be formulated.
2. The problems and functional statements must be decomposed to a level where solutions can be found efficiently.

In order to arrive at a feasible description of the solution, the design team must perform at least four different types of activities:

- Design activities concerned with the elaboration of solutions and alternative solutions.
- Evaluation activities concerned with the evaluation of solutions and alternative solutions.
- Cognitive synchronisation and problem clarification.
- Activities pertaining to conflict and negotiation.

Synchronisation and conflict may seem unnecessary parts of design activity. But as technical artefacts can be described and used in a large number of ways, the issue of common notations, models and a shared worldview is of no small importance in design.

Key success criteria are often understood implicitly in design projects. A much quoted axiom of design in technological contexts is that problematic, or potentially problematic, issues should be identified early in the process. This will reduce the cost of changes and improve the lead-time of the product. A common background among the project participants is therefore facilitating the communication among team members, but at the same time it is highly important that team members have the adequate methodological tools and knowledge to solve the problems.

What are the success criteria of a particular product?

Historically, the critical aspects of engineered products have been those concerned with safety, reliability, production quality and cost. But as markets and production facilities become more globally integrated and the patterns of consumption in the industrialized world changes towards more specialized products, the key success criteria of those products also change. Today, the acquisition, use and appreciation of products may be the key success criteria of products that earlier were purely mechanical challenges to realise. This represents different challenges than earlier when a designer could employ probabilistic models derived from natural sciences such as metallurgy, physics and mathematics.

The research question of this paper is therefore: How can one establish a usable, purpose-oriented theoretically grounded framework for the identification and application of valid metrics to the acquisition, the use and the appreciation of products by the end-user?

The underlying motivation of this question is that a product may be understood and used by the end-user in many different ways. By engineering standards, this is normally referred to as the function of the product. But functions are an inadequate description, unless you are willing to denote any social or psychological process as a function. Functions always hold a purpose, whereas understanding the purpose in human activity may be beyond the scope of any design project.
A large number of models have been put forth in order to describe the many aspects or domains products may take part in. A product can be a symbol of something else, it may contain visual myths which cannot be formulated, and a product can facilitate human interaction in unanticipated ways.

Two important points can be drawn from this

- Unlike the physical product, the product perception is not a sum of its parts. The perception of products stem from social mechanisms of which the designer holds little knowledge.
- Off-hand judgements are the only tools available to the designer when evaluating the social impacts and effects of proposed solutions or alternative solutions. This means that design methodology as we know it today may fall short of aiding the design activity.

The problems in evaluating use and appreciation of products may be minimal. The designer may overcome them with a good common sense, a good knowledge of the market, strong moral imperatives and so on. But when the context of production or the market changes the lack of valid heuristics and metrics can be devastating.

New success criteria for products – What can the designer do?

Three current issues may highlight the problems designers encounter when working in unknown territory:

- Branding is about the perception and social symbolism of the product. Shoe producer Nike is the classic example of how the individual product must adhere to a set of rules that are grounded in social phenomena and advertising. Evaluating an individual product's adherence to the brand and identity issues is a challenge with traditional design methodology.
- Eco-design is by large a matter of communicating the production process to the consumer. To make sound sustainable judgements in design is an important challenge. But to communicate sustainability through products have proved to be elusive.
- Providing functions in stead of products have come to focus through digital products. An example is the CD. The consumer no longer buys CDs. Legally, he is renting a right to listen to music. But the consumer still regards the CD as his property. The mental change required for consumers to accept right to functions rather than ownership of objects is years ahead.

Conclusion

The lack of grounded heuristics for behavioural considerations in product design and development is a problem because designers and engineers may lack the professional tools required for emerging technologies and new products. As the key success criteria of products are changing, so should design methodologies.

For designers and engineers, the present toolbox may seem limited. New production methods and consumption patterns represent new challenges in design. Therefore, it is an open question whether designers and engineers should acquire new professional skills, or whether the design processes should be opened up to a larger degree of trans-disciplinary work than is done today.

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