

## WHAT IS THIS THING CALLED DESIGN RESEARCH?

Lucienne Blessing

The importance of engineering design as an industrial activity and the increasingly complex and dynamic context in which it takes place, has led to the wish to improve engineering design. Although people have designed for centuries – and no doubt attempted to improve the process -, it did not become a research topic until well into the second half of the 20<sup>th</sup> century. Still, despite 30 years of design research, the field is not always considered to be a scientific discipline. A lack of clarity exists about what constitutes design research and how to go about it. The aim of the presentation is to shed some light onto “this thing called design research”, to draw boundaries and encourage discussion.

### 1 Design research

Design is a complex activity, involving artefacts, people, tools, processes, organisations and the micro- and macro-economic environment (market, legislation, society) in which it takes place. Design research aims at increasing our understanding of the phenomena of design in all its complexity and at the development and validation of knowledge, methods and tools to improve the observed situation in design. It is this integration of “generating knowledge about design and for design”, that is “instrumental to the development of engineering design”. [1]

Engineering design research has experienced an exponential growth. The downside is that:

- Many strands of research have emerged, that are neither established nor clearly defined;
- It is no longer possible to obtain an overview of the results;
- Referencing islands are common: groups of researchers refer to each other’s work, only by coincidence becoming aware of the work on other islands.
- No agreed terminology exists: even for basic terms such as ‘function’ and ‘design’;
- Little verification and validation of findings takes place;
- All address something different: few attempts exist to bring results together;
- All do something different: no established research methods and methodology exist.

### 2 Main issues

Three related issues need addressing:

- The lack of overview of past and present research activities,
- The lack of use of results in practice,
- The lack of scientific rigour.

Design research shows a large diversity of research topics and methods. Although “variety has the potential of delivering value [...] there is a risk that research may end up in a set of unconnected streams and in a sort of methodological anarchy where anyone can come along and claim the scientific validity of his work” [2]. This is what happened in design research. To develop comprehensive models and theories, the results have to be brought together.

If the aim of design research is to improve design, and if this research is to be successful, research should have some effect in practice. Important issues are: the development of guidelines, methods and tools on a solid understanding of designing; a proper validation of the developed support; and addressing the implementation of this support.

A lack of scientific rigour can be observed. Design research must be scientific in order for the results to have validity in some generic, practical sense. For this, design research has to develop and validate knowledge systematically. This requires a research methodology.

Design research, as defined here, not only involves the formulation and validation of theories about the phenomenon of design. It also aims at improving the observed phenomenon. That is, design research involves design, namely the creation and evaluation of a desired situation and of the means to realise this, which cannot be derived directly from an understanding of the present situation. These activities should be made explicit in a research methodology [3].

### 3 Conclusions

Design research has passed through three overlapping phases: Experiential, Intellectual, and Experimental [4], but a theoretical framework has been largely missing. Together with a fast growing number of researchers, this has led to increasing concerns about the efficiency and effectiveness of design research. In the near future we have to focus on the improvement of our research: an established methodology is one of the main requirements. A methodology that covers both the study of the phenomenon of design as well as the development of design support. Only then, we might enter the next phase in design research: the theoretical phase.

#### References

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Corresponding author:

Prof. Dr.-Ing. Lucienne Blessing, Engineering Design and Methodology  
Faculty of Mechanical Engineering and Transport Systems, Berlin University of Technology  
10623 Berlin, Germany  
Tel: +49-30-314-23341, Fax: +49-30-314-26481, E-mail: [blessing@ktem.tu-berlin.de](mailto:blessing@ktem.tu-berlin.de)  
<http://www.ktem.tu-berlin.de>