

DESCRIBING DESIGN METHODS ACCORDING TO THE SPECIFIC NEEDS OF USERS

T. Sauer, B. Berger, H. Birkhofer

Darmstadt University of Technology
Department of Product Development and Machine Elements
e-mail: sauer@pmd.tu-darmstadt.de

Keywords: Design Methods, Method Model

Abstract: *Methods are applied by several kinds of users, e.g., designers in practice who wish to solve a problem or a teacher at the university who wants to impart knowledge about methods. Every user has specific requirements which coincide with the description of methods. Thus, optimizing the description of design methods and the access to them is a precondition for the effective use of methods. This paper presents a Process oriented Method Model (PoMM) which offers a standardized description of design methods and the individual access to them. The PoMM is suitable as a checklist for describing design methods and as a guideline for teaching and applying them.*

1 INTRODUCTION

The description of design methods often varies concerning the kind and volume, and is very often insufficient for applying methods in design projects. The same circumstances or facts are described in various terms and in different sequences. Thus, the search for methods for both the learner, e.g. student at university, and the user, e.g. developer in industry, is complicated.

Concerning the structure, descriptions of design methods are often insufficiently divided into processes, methods and product-models. Design methods are mostly described to impart knowledge, not competence. Didactical elements such as application-oriented explanations, hints, aids and assessments are seldom pointed out separately. The main target group is the scientific community; the needs of designers at work are seldom considered. Thus, it is aimed to optimize the description of design methods using a standardized, extensive and thorough framework.

Step-by-step actions, the logical order and defined results and levels characterize the procedure of methodical developing in product development. Product development can be conceived as a process with many sub-processes. A process is defined as the changing of state using a procedure which transforms a defined starting state into a desired ending state.

In general the process of product development seldom runs in a defined and straight order, but in many different ways, depending on the actual application [4]. The designer has to plan and control the whole process by arranging the sub-process in a flexible way. To work effectively he often uses design methods. There are many different methods and tools to support single sub-processes. The designer uses an individual mix of methods. He selects the most suitable design methods depending on several factors, e.g., user skills, infrastructure and working aids.

Therefore the designer needs an individual, highly flexible and detailed access to design methods or even parts of them.

2 THE PROCESS-ORIENTED METHOD MODEL (POMM)

The context of several design methods and the chronological order are as important for successful problem solving as the individual description adapted to the specific problem. Thus, a model for description of design methods has been designed, named the Process-oriented Method Model (PoMM). The Process-oriented Method Model (Fig. 1: *The Process oriented Method Model (PoMM)*) supports processes in product development and describes design methods in a standardized and structured way, but also enables an individual and flexible access to individual method parts.

Analogous to a product development process, the application of a design method can also be conceived as a process, namely the planned procedure transforming a given input (starting state) into a defined output (ending state).

The modules of description of the Method Model are organized in two sections - the process modules and the access modules.

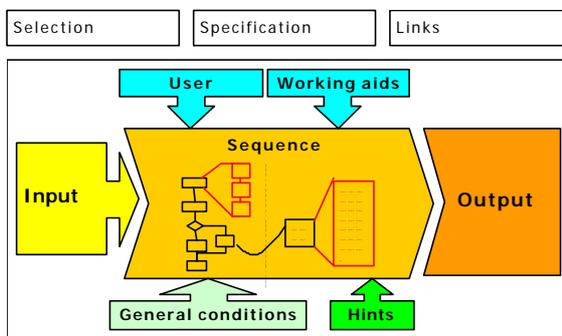


Fig 1: *The Process oriented Method Model (PoMM)*

The process modules are designed in a process-oriented way and the contents have a direct influence to application of the design method. Process modules are the input, the output, the procedure, influences by the user, general conditions, hints and aids.

The access modules are designed for a flexible and detailed search and for linking to other design methods within the same context. Access modules are the classification of the method, relationship to

other methods, specifications and links, e.g. literature or examples.

The description of design methods with the Process-oriented Method Model combines optimized support for product development processes with flexible and individual access to design methods. Furthermore, contents are described using modules on different levels to choose the most suitable content and presentation. Design methods can be described in the following ways: application-oriented, wide-range, holistic, standardized and structured. An extensive completeness of design methods and contents is ensured by both the integration of several authors and standardized structured modules, which can be used as a frame for their work. The defined modules of description are appropriate for computer-aided working: they can be retained within a database, thus making detailed searches, flexible access and easy navigation practicable.

3 References

- [1] H. Birkhofer, U. Lindemann, M. Meier, *Product Development as a Structured and Interactive Network of Knowledge – A Revolutionary Approach*, WDK 28, Proceedings ICED 01, Glasgow, 2001, p457-464
- [2] H. Birkhofer, H. Kloberdanz, B. Berger, T. Sauer, *Cleaning up Design Methods – Describing Methods Completely and Standardized*, Proceedings of the 7th International Design Conferenc, Dubrovnik, 2002
- [3] H. Birkhofer, B. Berger, S. Walter, *Modularisation of knowledge – a new approach in the field of product innovation*, Proceedings of the 7th International Design Conferenc, Dubrovnik, 2002
- [4] G. Fricke, *Konstruieren als flexibler Problemlösungsprozess – Empirische Untersuchung über erfolgreiche Strategien und methodische Vorgehensweisen beim Konstruieren*, VDI Schriftenreihe Konstruktionstechnik, Düsseldorf, 1993
- [5] MAP-Tool, Vom Markt zum Markt, Forschungs-Verbundprojekt des Landes Baden Württemberg, www.uni.karlsruhe.de/~map
- [6] G. Pahl, W. Beitz, *Engineering Design*, Springer, London, 1996