DESIGN FLAWS: FLAWS BY DESIGN?

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In this paper, we discuss the influence of design flaws on design and the influence of design on design flaws. By defining design flaws as a design-related product property that leads to reduced product quality, it can be argued that a design flaw is always the result of a design failure – the failure to create product quality. By exemplarily applying a problem solving model to design that is the result of research into human failure in complex, dynamic and intransparent situations (while, of course, acknowledging that there is a lot more of research into human behaviour in design), we identify possible causes of design failure.

STATUS OF HUMAN BEHAVIOUR IN DESIGN RESEARCH: A REVIEW OF ICED AND DESIGN CONFERENCE PROCEEDINGS

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The paper reviews the empirical research on human behaviour in design presented at past ICED and Design conferences. While a quarter of all conference papers dealt with aspects of human behaviour, only 40% of these papers referred to the relevant psychological literature on research methods, cognition, team processes and organizational aspects of product development. The paper discusses if there is a paradigm change towards more empirical research on designing and how design science could benefit from drawing more on existing research on human behaviour to then explain the specifics of designing.

MERGING PROCESS ROLE PROFILES WITH PERSONNEL (QUALIFICATION) PROFILES

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The development of a product is not a routine activity but a unique activity, which is therefore undertaken in a project. The generation of these and respectively the selection of staff members for appropriate tasks took place so far predominantly not systematically but due to experiences of the respective responsible persons. PDM systems offer themselves now to cause a linkage of already deposited abstract personal requirements with concrete abilities of staff members and thus to support setting of the qualitative beside quantitative personnel planning. By a systematic procedure section represented in the following, the entire product development can be affected both in financial and qualitative as well as temporal view positively.

KANSEI INFORMATION APPROACH FOR AN INTERDISCIPLINARY DESIGN METHOD PROPOSAL BASED ON INTUITION

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Interdisciplinary approach is seen as solution for more comprehensive designs. However, interdisciplinary knowledge sharing encounters many issues, due to disciplinary ontology and human subjective understanding. This paper introduces a Kansei Information viewpoint on these issues and suggests a design method based on intuition. This method proposes to add to the SECI Model, an Evoked Metaphor, defined as a set of intuitively transferable and validated information and operating laws. The Evoked Metaphor permits tacit and explicit knowledge sharing thanks to the mental process of intuition This sharing knowledge structure is inserted into the design process to support interdisciplinary communication between members during the entire project.

REFLECTING COMMUNICATION: A KEY FACTOR FOR SUCCESSFUL COLLABORATION BETWEEN EMBODIMENT DESIGN AND SIMULATION

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A core issue in integrating CAD and CAE environments is the coexistence of different perspectives: a topological one in embodiment design and a functional one in simulation. This places increasing demands on human communication. The paper claims that reflecting communication - triggering active thinking about communication as well as mirroring perceptions of designers collaborating at interfaces - is a key factor for successful collaboration. For this purpose, a maturity grid-inspired approach to diagnose the current and desired state of communication between design and simulation engineers in the car body development is presented. Results include lack of overview of the sequence of tasks in the design process, reflection and understanding of information needs.

A FRAMEWORK FOR MEASURING TEAM MENTAL MODELS IN DESIGN

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The paper discusses the value of researching team mental models in design to overcome potential difficulties in collaboration. The authors present an overview of the existing literature on team mental models and suggest a model by which the underlying cognitive processes that are inherent to designers can be studied. This model covers four main types of mental models: task, process, team, and competence. Based on previous research in other domains, a framework for measuring mental models of team members in design collaboration is presented. Finally, the basic outline of a categorization scheme assessing the underlying cognitive structures relevant to the model is discussed and the benefits of this behavioural analysis are elaborated.

IMPROVING THE PRODUCT INNOVATION PROCESS IN TEAMS BY SUPPORTING REFLECTION

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The process of innovative product development is characterized by high demands on the cognitive capacity of designers. We define the product innovation process as a complex task under conditions of task novelty, pressure and uncertainty. The experimental study presented in this paper investigates the contribution of reflection support to the successful development of an innovative product. We used an adapted version of Kelly's Repertory Grid method to foster reflection about a group task. Results show a positive influence of the method on the quality of product innovation. We describe the method, illustrate its implementation in a specific design task and discuss the industrial application of the method.

EXPERIENCING ENGINEERING DESIGN

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The paper offers an anthropological view on engineering praxis, multidisciplinary research and science reasoning. The paper is based upon experiences from both student activities and the research in a classroom laboratory at NTNU. The aim of the paper is to show how a potent action research methodology, with experience oriented ontology as a foundation, developed in the meetings of disciplines and persons. The paper argue that engineering praxis is interesting to understand, not only by results, but as a praxis and a process in itself, and suggest that abduktive inference is an important and often neglected aspect of engineering praxis.