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Defining Creativity in Conceptual Design as Negotiation of Crucial Constraints

Aim of this presentation is to provide an activity-based description of conceptual design. A description that can accommodate the role of different design methods, tools and designer competences commonly encountered in conceptual design. The view rests on the idea that conceptual design is largely a process of collaboratively constructing a mental model of a future design.

All participants of the process, whether they are "users" or professional designers, hold their own conceptions of the desired outcome. They have their own mental models which are typically incomplete and mutually incompatible. This emphasizes negotiation, commonly verbal debate during design meetings, as the tool of the harmonizing and shaping mental models. This indicates a clear communicative role for all aids widespread in design process; sketching, prototyping and modeling - these reflect the mental models and help the design team to approach a shared model, a story, combination of propositions.

But what do the mental models consist of? The claim here is that conceptually speaking these models present a combination of constraints. Constraints are something that people can readily understand and communicate. Constraints are not solely problems or their parts, requirement or need statements. Constraints are both exclusive and inclusive regarding the total design. They might best be compared to an ontology which defines the parts and relations of a system. Important part for design is that the complete structure, a mental model of the artifact, is defined by both included and excluded properties. Constraints are thus both negative and positive, describing what a design is and what it is not. For instance, a positive constraint of a back bag is a laptop sleeve, a negative the lack transparency.

In a typical technology design process, be it design of products or eservices, the constraints could be divided into user, technology, business and designer-based constraints. They all need to be negotiated in the design process. A notable part of the constraints is that the negotiations are heavily biased towards novel, positive constraints about technology or users. This is because the design is assumed to be geared towards creation and not mere replication and the product is expected to have some unique meaning. However, it is notable that there is always an assumption of considerable shared knowledge between the designers (designer constraints), which concerns the old. Designers share tacitly massive amounts constraints that are displayed in their style of doing things and what they choose to communicate in the design meetings.

What consequences does this conceptualization have for creativity? In the proposed schema, creativity becomes a matter of inclusion of the constraints that are important for the *novelty* and *meaningfulness* of the designed artifact. Creativity can simply arise from the inclusion of constraints that have not been previously presented together, but this does not guarantee meaningfulness. I argue that important precursor for creativity is the deconstruction of implicit negative constraints, such as "cell phone can not take picture". Generally, increasing the number of constraints, including user requirements, will complicate the situation because the number of constraints to be satisfied increases. This means that user-centered design for instance does not automatically promote creative design unless it can provide constraints *crucial for creativity*.