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Habilitation: Zusammenfassung

Titel:	"Cognitive Effectiveness in Conceptual Modeling"
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Not even the most brilliant conceptual model would be of any use if no one could understand it. A basic precondition for a model's usefulness in practice is that it be comprehensible. With my research for this habilitation thesis, I contribute novel theoretical insights to the vibrant stream of cognitive research on conceptual modeling and provide empirical evidence on how to develop useful and understandable (visual) conceptual models.

Conceptual models are instrumental in defining such requirements, as they support the analysis, design, development, and documentation of information systems. Although conceptual models are used to promote human understanding of a domain, practice shows that the ability to understand complex models soon reaches cognitive limits. In my habilitation, I studied a variety of open research questions and identified influence factors for cognitive effectiveness in conceptual modeling. Better understandability of conceptual models has direct significance for information systems development and will improve the requirements engineering process by facilitating a common understanding between users and system engineers.

Based on theoretical analyses, experiments and questionnaire-based studies, this habilitation thesis makes significant theoretical and empirical contributions to six areas of human interaction with conceptual models:

- cognitive load theory and comprehension of conceptual models
- deductive reasoning and computational thinking with conceptual models (e.g., comprehension of control flow structures like sequence, loops, concurrency, and exclusiveness in process models; comprehension of OR/XOR relationships, constraints and optional/mandatory elements in software feature models)
- individual cognitive aspects of conceptual modeling (novice-expert differences, cognitive style, creative competence)
- the influence of the design of primary (e.g., semiotic clarity, perceptual discriminability, semantic transparency) and secondary (e.g., visualization, modeling style, layout strategies) modeling notation on model comprehension, user acceptance, user preference, and modeling errors
- evaluation, quality assurance and choice of modeling notations
- the effect of conceptual models on creativity in (business process) redesign tasks

While many of my research insights address universal principles that can be generalized to the parent class of conceptual models, I focused on exploring research gaps in four modeling domains: business process modeling, business decision modeling, software feature modeling and instructional design modeling.