

MISQ Archivist

Cognitive Diagram Understanding and Task Performance in Systems Analysis and Design

Monika Malinova and Jan Mendling

Abstract

Models play an important role in systems analysis and design (SAD). A diagrammatic model is defined as a mapping from a domain to a visual representation in such a way that relevant information is preserved to meet a specific goal. So far, cognitive research on diagram criteria in relation to task performance has been fragmented. The aim of this paper is to (1) consolidate research on the cognitive processing steps involved during understanding and task performance with diagrams, (2) consolidate corresponding criteria for such diagrams to best support cognitive processing, and (3) demonstrate the support effective diagrams provide for performing SAD tasks. Addressing the first aim, we develop a theoretical cognitive framework of task performance with diagrams called CogniDia. This framework integrates different cognitive theories from research on diagrams in software engineering and information systems. Regarding the second aim, we review the literature to organize criteria for effective cognitive processing of diagrams. We identify research gaps on verbal and task processing. Regarding the third aim, we use the theoretical cognitive framework to investigate how diagrams support the SAD process effectively.

Keywords: Models, diagrams, systems analysis and design, cognitive processing, criteria, guidelines, task analysis, CogniDia