Abstract: Increasing complexity of products and safety regulations combined with an increasing amount of variants complicates the process of safety analysis within systems engineering. Moreover, it is known that the early avoidance or prevention of failures saves costs and improves the quality. As methods of safety analysis, i.e. fault tree analyses require immense manual efforts and expert knowledge, the efficiency of these analyses has to be improved. Our paper thus presents an approach to generate and evaluate fault trees by the usage of matrix-based models. It is an approach tailored to the early phases of system design and provides a preliminary fault tree analysis. It automatically generates fault trees and evaluates them. Thus, it facilitates the efficient identification of safety critical elements and the assessment and comparison of alternative system architecture concepts. This paper provides a brief introduction to fault tree analysis and presents existing approaches to automate the generation or synthesis of fault trees. The limitations of these approaches during early stages of design are discussed and the need for a tailored approach is
derived. The developed approach consists of four phases and six steps which each are explained in detail. The whole approach is validated within a small industrial case study and its benefits and limitations are discussed. The case study shows, that the approach successfully improves the efficiency of a preliminary fault tree analysis.

**Stichworte:**
FTA; design structure matrix; functional modeling; safety analysis

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