

# **Development of an Implementation Proposal in Systems Engineering Using Tennet as a Case Study: An Integrated GAP Analysis of Current Processes**

## **Master Thesis**

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## 7 Conclusion and Outlook

The aim of the thesis was to identify the main challenges and possible solutions for a successful implementation of SE and to derive a practical implementation proposal from this. The central research questions to be answered are what obstacles companies face when introducing SE and how a structured implementation approach for practical application can be designed based on this.

To answer this question, a combination of extensive literature research, expert interviews, a survey and a final focus group discussion was conducted. A practice-oriented process model with 6 phases was developed to support companies in the context-specific implementation of SE and the adaptation of existing structures. The analysis showed that the introduction of SE is not only a technical challenge, but that organizational, procedural and cultural factors also play a decisive role. Key barriers identified included resistance to change, insufficient standardization, a lack of training measures and a lack of support from management. The comparison of the empirical results with the existing literature makes it clear that the implementation of SE requires a profound change in the company.

The developed process model is based on an iterative approach with recurring feedback loops. A completely standardized approach was deliberately avoided in favor of one that allows sufficient flexibility and adaptability to company-specific requirements. The step-by-step approach enables continuous evaluation and, if necessary, adaptation of the implementation, which increases acceptance within the organization and promotes sustainable introduction in the long term. The results of the work are both scientifically and practically relevant. The model developed provides companies that want to introduce SE with a structured orientation that they can adapt individually. The study confirms that successful implementation does not only result from the introduction of new processes and methods, but also from the targeted involvement of employees and a step-by-step change in corporate culture initiated by management. These findings directly answer the research question: The introduction of SE therefore requires not only technical integration, but also specifically initiated changes to structures, processes and corporate culture, which must be actively controlled by management. The developed model offers a practical solution that can be adapted to the specific requirements of the company.

On the basis of this work, new research questions can be derived that can be explored in more depth in future scientific studies and in practice. The present study identifies the scalability of the process model as an aspect of particular relevance. Future studies could address the question of the extent to which the model can be adapted for smaller or larger companies and applied in practice. In this context, the inclusion of different

industries is crucial to create a well-founded knowledge base. Another aspect is the identification of specific monitoring systems, such as existing maturity models, to enable a consistent evaluation of individual processes. Furthermore, an in-depth analysis of additional processes not considered so far would be necessary to ensure a more comprehensive understanding of the implementation and maturity of SE practices. Furthermore, a cross-industry analysis could provide valuable insights, particularly with regard to specific regulatory requirements. Since this work is primarily a snapshot, it is of great scientific and practical interest to see how the implementation of SE based on this process model will develop in the coming years.

To optimize implementation in the long term, continuous monitoring by SE experts should be established. KPIs could be defined to objectively measure the maturity and effectiveness of SE implementation. Furthermore, there is an increasing demand for a stronger scientific engagement with SE in Germany. The funding of interdisciplinary research collaborations between universities and companies would be a further step towards strengthening the scientific foundation of SE and at the same time developing practical solutions for the economy. Furthermore, it can be assumed that with increasing digitalization, new requirements for SE methods will arise that have not yet been considered in this work. A promising research field in this context is the integration of SE with data-driven technologies, especially with artificial intelligence, to automate decision-making processes and enable efficiency gains.

In summary, this work provides a well-founded analysis of the challenges and success factors of SE implementation and provides a practice-oriented model. In addition, promising research perspectives are highlighted that can help to further optimize the implementation of SE and adapt it to future requirements.