A Canvas for Causal Modeling
Bachelor’s Thesis

**Supervisor:** Prof. Dr. Alexander Pretschner  
**Advisor:** Amjad Ibrahim  
**Email:** {pretschn, ibrahim}@in.tum.de  
**Phone:** +49 (89) 289 - 17836  
**Starting date:** immediately

**Context**

Causality is a concept that is being studied in domains like philosophy [4, 5], law, and lately in computer science. The influential definitions of causes (e.g. [3, 1]) require some notion of a model. The most known among these definitions is the definition of Halpern and Pearl [2, 3] (HP) to infer actual causality. HP provides a formal foundation to answer causal queries in a way that matches the human way of thinking. The first barrier to utilizing HP is the creation of the causal models which are required by HP. In this thesis, we tackle this problem by proposing a causal model canvas (editor). This editor allows users to manage causal models by relating them to security and safety models like attack and fault trees [6].

The new editor is based on our ongoing research in this area. In this thesis, we extend our core causal model extraction algorithm to include an interactive editing capability that allows analysts to model different assumptions with different granularities. For example, the users can filter and export sub-models, or change the list of agents attributed in a model ¹. Essentially, the editor should be a convenient, interactive tool that supports analysts in importing, editing, and exporting causal models.

**Working Plan**

1. Familiarize with the concepts mentioned in this proposal  
2. Design and document the concept, the design decisions, and the architecture of the solution  
3. Build the editor  
4. Test and evaluate the editor with real-world examples  
5. Write a final thesis about all the steps

**Deliverables**

- Source code of the implementation.  
- Technical report with comprehensive documentation of the implementation, i.e. design decision, architecture description, API description and usage instructions.  
- Final thesis report written in conformance with TUM guidelines.

**References**


¹Details can be given upon requests