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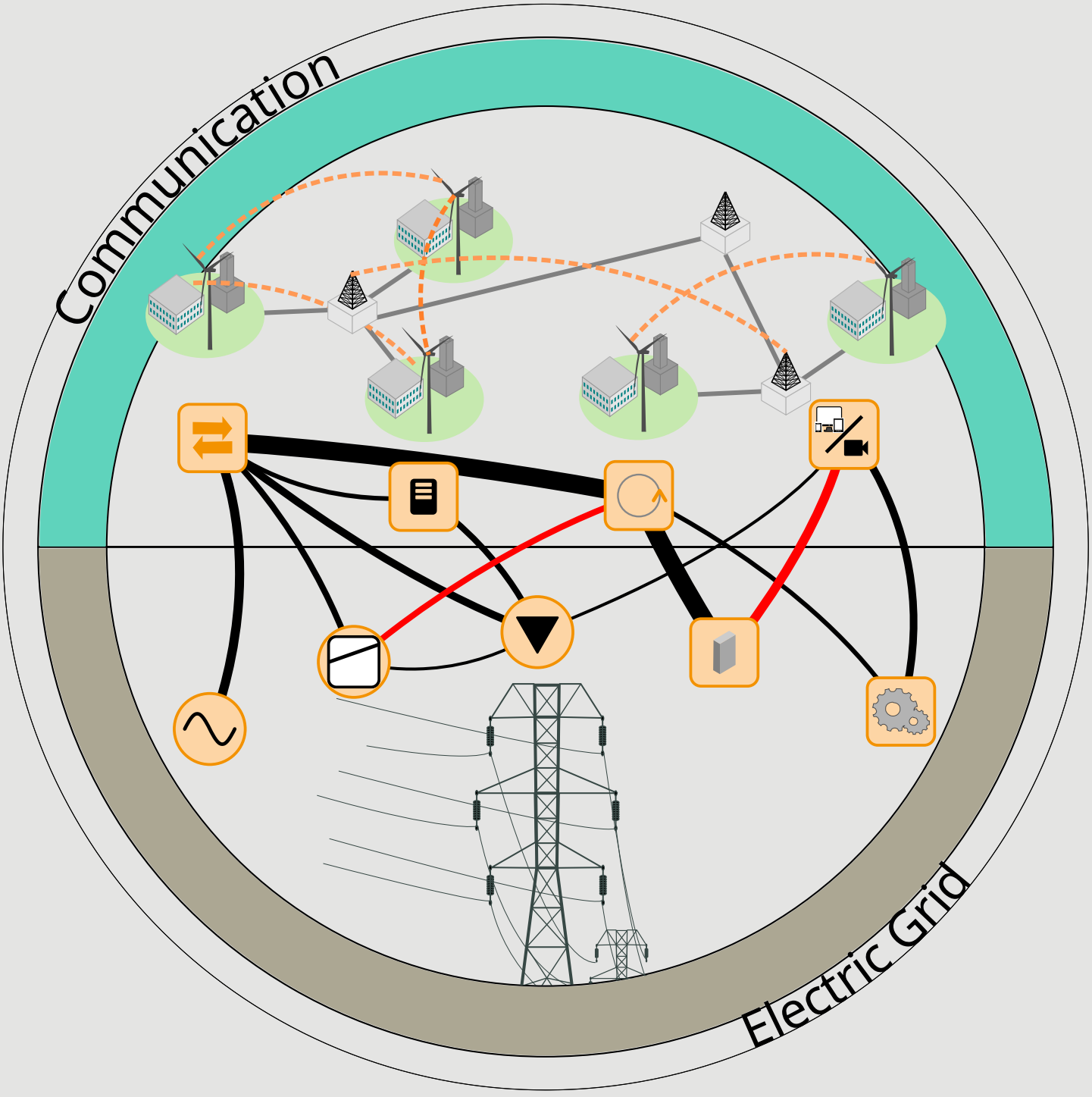

THE KNOWLEDGE OF INTERDEPENDENCIES IS ESSENTIAL TO UNDERSTAND THE OVERALL SYSTEM.

Weitere Infos

Robustness Evaluation and Assessment of Interdependencies in Smart Grids

Abstract

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1 Introduction

Interdependent systems consist of two or more subsystems, which are concerning each other in the manner that each of the subsystems provide essential services to the other subsystem. Often, the interdependent systems are created by interconnecting systems with the goal to provide an added value in form of new services or improved efficiency, reliability, or service quality. An example for this is the smart grid where the electrical distribution network is augmented with ICT equipment such as controllers for sensors and actuators interconnected via communication networks in order to make the grid ready for the fundamentally changing grid usage in future. The interdependencies that occur from the interlinking of the ICT system with the electrical power grid however carry significant risks. The past has already shown that occurring failures can cascade across coupled subsystems making the overall system completely uncontrollable. For many of larger scale black out scenarios of the last decade, the interdependencies played a vital role for the spread of failure states.

2 Aim

The aim of this project is to find a methodology for assessing the robustness of smart grids in particular and interdependent systems in general with respect to how state changes within one subsystem affecting other subsystems along interdependencies. An interdependent system is denoted as robust, if influences between the mutual dependent subsystems have no effect onto the operational state either of the subsystems and the overall system.

3 Method

In a first step an approach is being developed for identifying and qualitatively describing interdependencies for modelling the mutual dependencies in interdependent systems. Second, a methodology for rating the robustness of interdependent systems quantitatively including system dynamics. Model and quantification method can be used within a monitoring and control system as a basis

for providing a decision basis for autonomous optimisation of the overall system robustness.

4 Results

Current results include theoretical work regarding interdependencies in smart grids, an initial interdependency model, and first considerations for quantification and system integration based on the Organic Computing paradigm.

5 Project participants

Dipl.-Inf.(FH) Ferdinand von Tüllenburg, MSc received his first academic degree Dipl.-Inf.(FH) from the Department of Computer Science and Mathematics at the University of Applied Sciences of Regensburg and his MSc degree from the Department of Computer Science and Mathematics at the University of Passau. Since 2013 he works in research. His research interests include distributed and multi-agent systems, communication networks, and smart grids.