Cyber-risk assessment in grid planning

CINELDI/NORCICS workshop on
cyber security in cyber-physical electricity grids

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Outline

- Motivation, challenges and needs
- Grid planning and cyber-risk assessment
- Self-healing case
- Identifying high-level risks using CJML
- Further work

Motivation, challenges and needs

- Smart electricity distribution grids are cyber-physical systems with mutual dependencies between power and cyber parts
- Lack of cybersecurity may jeopardise security of supply
- Grid planning has several challenges

- The target of analysis is not implemented
- Information about the target of analysis is at an conceptual level (high-level)
- The information about the final grid is therefore uncertain
- Non cyber-experts have to assess cyber risks with very limited knowledge about the grid under development

There is a need for a low-threshold risk assessment method to identify high-level cyber risks in the planning phase

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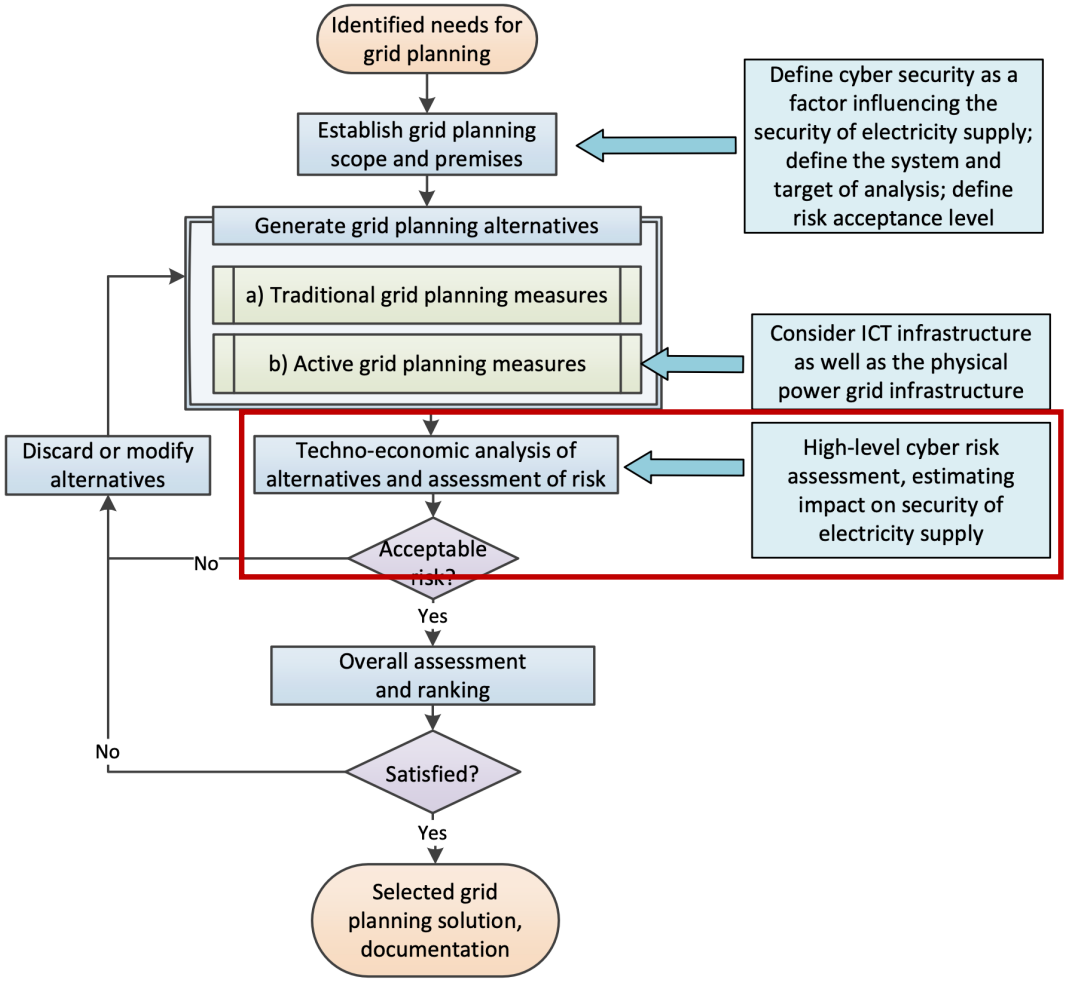

Grid planning and cyber-risk assessment

- Identify needs for grid planning
- Assess grid planning alternatives and associated risks
- Select the most optimal solution
- Cyber-risk assessment fits in many steps of this process
- Our focus: cyber-risk assessment of the potential alternatives including ICT

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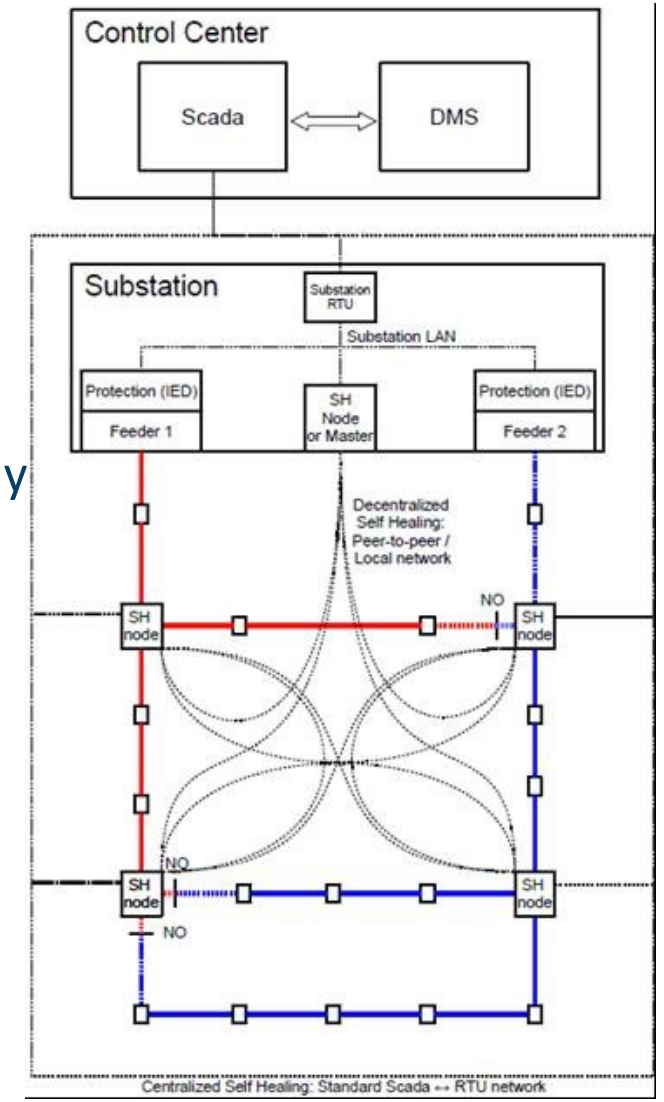
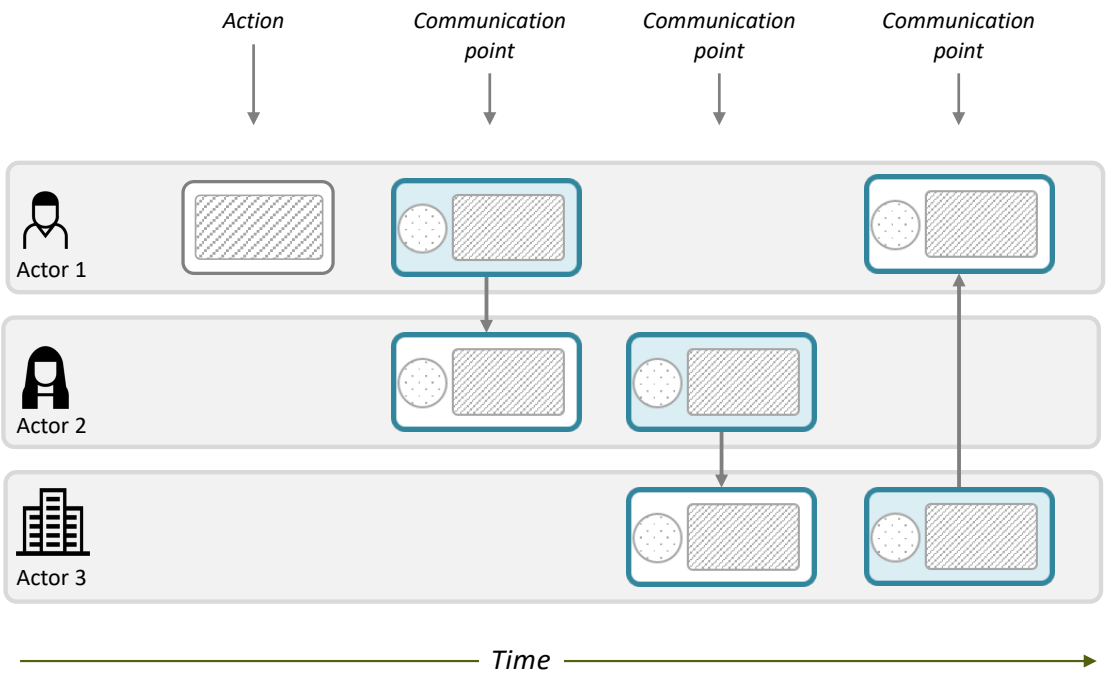
Self-healing case

- A grid company wants to explore the possibilities of implementing self-healing grids as part of grid planning
- In self-healing grids, digital solutions are used to reconfigure the network and to restore the power supply
- Digital solutions, e.g. SCADA, are vulnerable to cyber attacks (Supervisory Control and Data Acquisition)
- One possible attack: a hacker gains unauthorized access to the SCADA system and changes switches in the self-healing grid, which further leads to power outages (attack on security of supply)

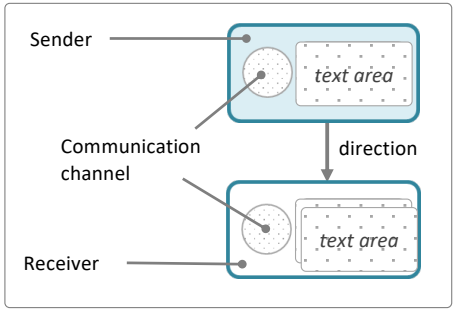


One possible approach to model high-level risk is to use the Customer Journey Modelling Language

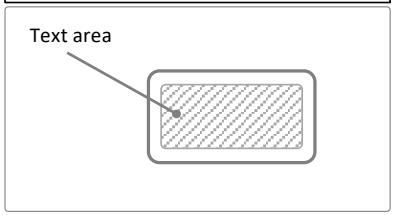
All the actors involved in the journey has a separate swimlane.



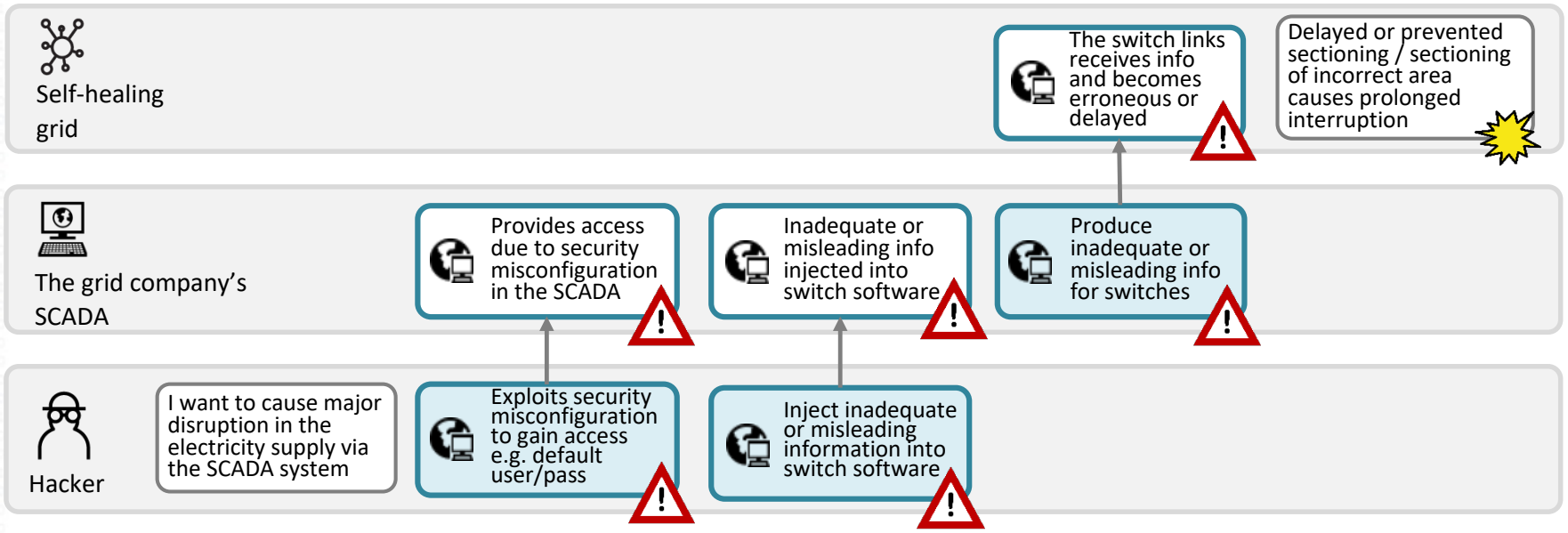
A communication point has a sender and a receiver that must be positioned in the corresponding swimlanes of the actors.



An action element is used for non-communicating events



Hacker attacking switches in the self-healing network leads to disruption of electrical supply



Further work

- Continue to develop and test the risk assessment method in industrial cases
- Adapt the risk assessment method for other steps in the planning phase
- Include guidelines to identify interdependencies between power and ICT systems as part of the risk assessment method
- Identify scenarios that could harm security of supply

References

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- to empower the future Smart Grid

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