Dynamic Network Reconfigurations for a Robust Smart Power Grid

The RobuSmart Project

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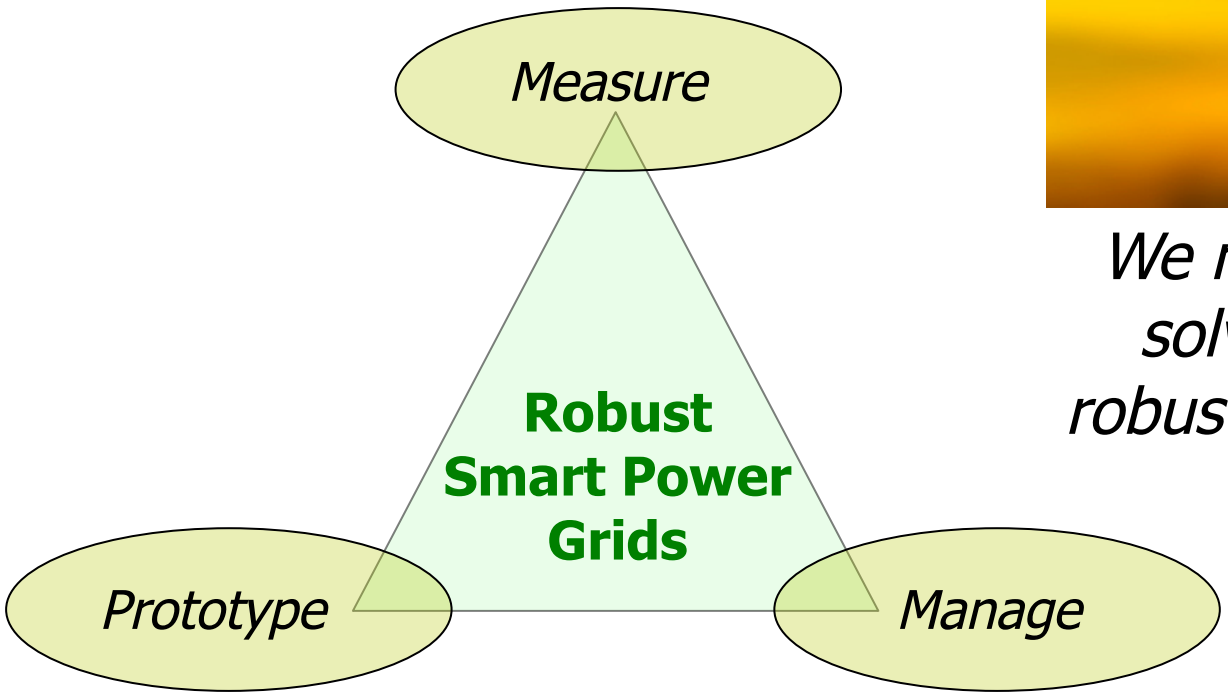
Network Architectures and Services group

Project Scope

We need all pieces to solve the puzzle of robustness in the Smart Power Grid



Complex network

Large-scale distributed system

1. Measure

Measure power grid robustness under **cascading failures**.

We consider **network topology** and **power flow dynamics**

Power grid **optimization**, other factors:

User, energy markets, infrastructure aging

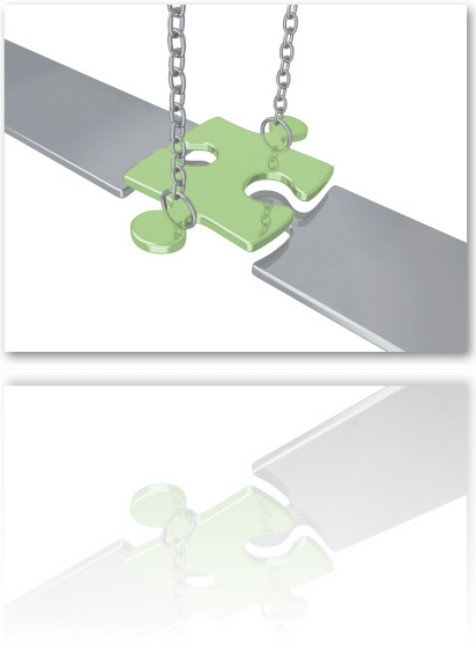
Y. Koç, M. Warnier, R.E. Kooij, F.M.T. Brazier, *A robustness metric for cascading failures by targeted attacks in power networks*, IEEE International Conference on Networking, Sensing and Control, 2013 (to appear)

Y. Koç, M. Warnier, R.E. Kooij, F.M.T. Brazier, *Quantifying Cascading Failures in Power Grid with an Entropy-based Robustness Metric*, 2013b (submitted)

2. Prototype

Simulation, emulation and deployment of distributed systems

Power system calculations in **numerical computing environments**



Little work on **integrated tools**

Online distributed optimization of power systems

M. Oey, S. Splunter, E. Ogston, M. Warnier, F.M.T. Brazier, A Framework for Developing Distributed Agent-Based Applications, In Proceedings of the 2012 IEEE/WIC/ACM International Conference on Intelligent Agent Technology, 2010

3. Manage

Decentralized **demand and supply side** energy management

Coordination of physical power assets to meet global power objectives

Validation using realistic operational power grids

Capturing **business and policy** constraints

E. Pournaras, M. Warnier, and F.M.T. Brazier, *Peer-to-peer Aggregation for Dynamic Adjustments in Power Demand*, 2013b. (submitted)

E.Pournaras, M. Yao, R. Ambrosio, M. Warnier, *Organizational Control Reconfigurations for a Robust Smart Power Grid*, book chapter in Internet of Things and Inter-cooperative Computational Technologies for Collective Intelligence, in the Springer Book Series "Studies in Computational Intelligence", 2013 (to appear)

E. Pournaras, M. Warnier, and F.M.T. Brazier, *Local Agent-based Self-stabilisation in Global Resource Utilisation*. International Journal of Autonomic Computing, 1(4):350 – 373, Dec. 2010.

Questions?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TNO innovation for life


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SMART GRID
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