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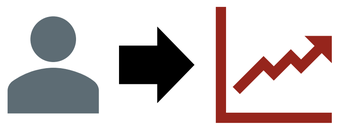
ENGINEERING AND VALIDATION SUPPORT FOR CYBER-PHYSICAL ENERGY SYSTEMS

IRED 2018
International Conference on Integration of Renewable and Distributed Energy Resources

Abstract

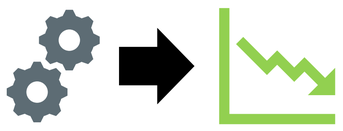
Smart grid systems, microgrids, and local energy communities are prominent examples of future solutions that will have a tremendous impact on distribution system development. To effectively implement these new and complex control solutions, new and advanced engineering methods are needed as well. This work presents an automated and model-based engineering and validation method, which supports the engineer during the implementation of these new applications. The proposed approach is expected to be able to reduce the amount of manual effort and in the end, lower the total engineering cost.

Introduction



- *Increasingly Complex Systems*

  The development of new systems are associated with increasing costs, due to high engineering complexity and mainly manual work.



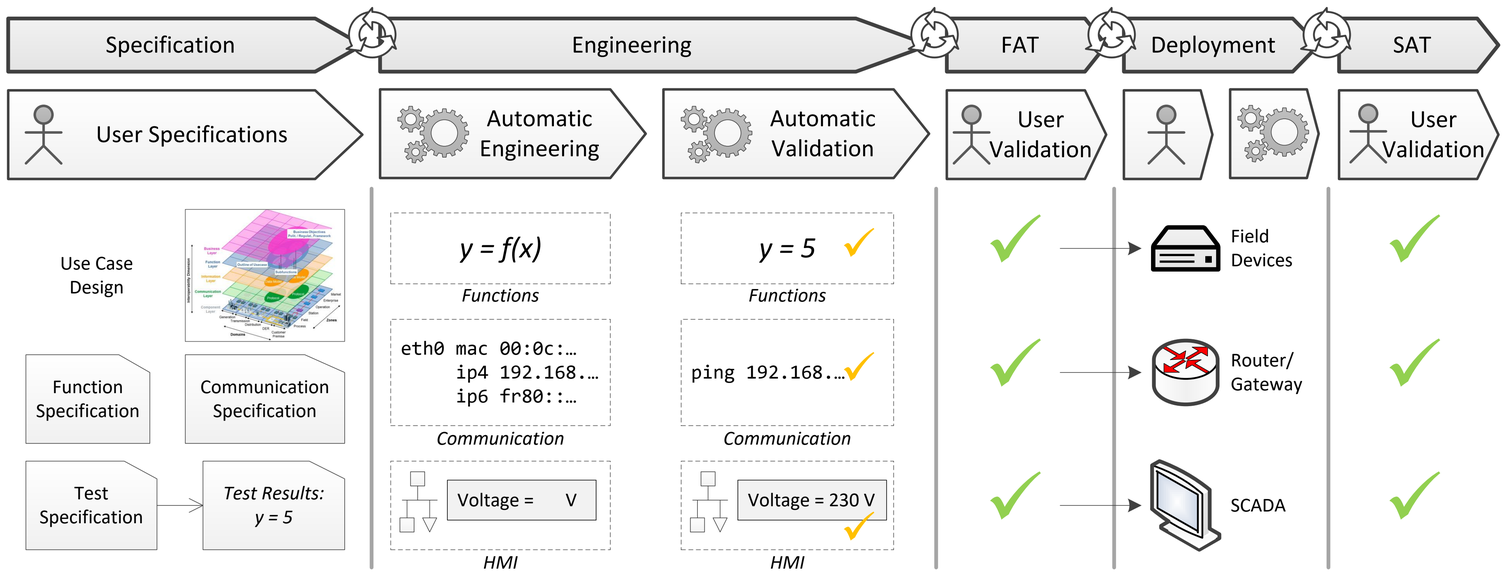
- *Engineering Support as Solution*

  Proper methods and corresponding tools holds huge optimization potential for the engineering process and a reduction of development costs.

Model-Based Support System for Engineering and Validation

The concept for a model-based engineering and validation support system consists of three main parts:

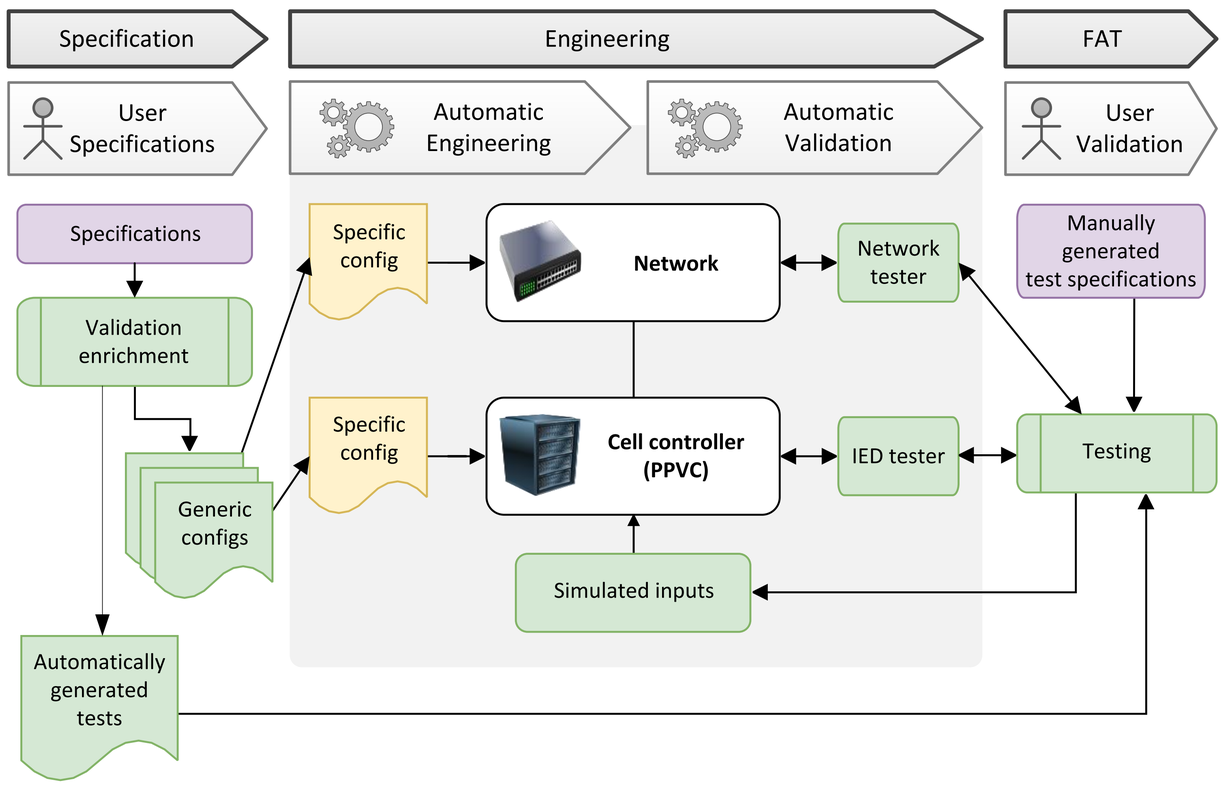
- *Formal specification and use case design:* Based on SGAM, IEC 62559
- *Automated engineering support:* Automatic generation of target configurations and functions
- *Automatic validation and deployment:* Validation support of scenarios with software and hardware



Rapid Engineering of Smart Grid Applications

Example: Development and validation of a secondary voltage control approach

1. Design and specification of voltage control approach by engineer
2. Addition of validation scenarios
3. Creation of platform specific configurations (functional and ICT specifications)
4. Testing as a combination of generated and manual tests, resulting in a Factory Acceptance Test (FAT)



Summary and Conclusions

A model-based engineering can automate many steps that are traditionally carried out manually. Therefore, it is expected that the proposed approach will reduce the manual effort of developing smart grid applications and in the end, reduce engineering complexity and costs.

Acknowledgement

This work is funded by the Austrian Ministry for Transport, Innovation and Technology (bmvit) and the Austrian Research Promotion Agency (FFG) under the ICT of the Future Programme in the MESSE project (FFG No. 861265).