Workshop on Resilience for Cyber-Physical Energy Systems

RESili8 Stakeholder Workshop

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2023-05-10 09:00 – 12:30
Stockholm, Sweden

This project has received funding in the framework of the joint programming initiative ERA-Net Smart Energy Systems' focus initiative Digital Transformation for the Energy Transition, with support from the European Union's Horizon 2020 research and innovation programme under grant agreement No 883973

Agenda

Time	Subject
09:00 – 09:15	Welcome and Introduction *Filip Pröstl Andrén, AIT Austrian Institute of Technology and Digital Futures*
09:15 – 09:45	Key Note: Resilience Challenges for System Operators *Stephan Stålered, Ellevio*
09:45 – 10:15	RESili8 Project Overview *Filip Pröstl Andrén, AIT Austrian Institute of Technology*
10:15 – 10:30	Coffee break
10:30 – 11:00	Technical Input: From Misuse-Case to Analysis Data: How to use a functional toolchain for expert-based AI analysis *Arlena Wellssow, OFFIS*
11:00 – 11:30	Technical Input: Sensor Data Consolidation and Verification *Victor Bagge, DLAB, and Henrik Sandberg, KTH*
11:30 – 12:15	Panel Discussion • *Lars Nordström, KTH* • *Frank Fransen, TNO* • *Stephan Stålered, Ellevio* Chair: *Francesca Soro, AIT Austrian Institute of Technology*
12:15 – 12:30	Recap and concluding remarks *Filip Pröstl Andrén, AIT Austrian Institute of Technology*

Overview of the RESili8 Project

Resilience for Cyber-Physical Energy Systems

Filip Pröstl Andrén, AIT Austrian Institute of Technology

Facts and Figures

- ERA-Net Smart Energy Systems call
  - Joint Call 2020 (MICALL20) on Digital Transformation for Green Energy Transition
- Duration 3 years
  - May 2022 – April 2025
- Budget
  - Around 2 000 000 €
- 8 partners from four countries

AIT Austrian Institute of Technology – Project coordinator

Wiener Netze

Fraunhofer ISE

OFFIS

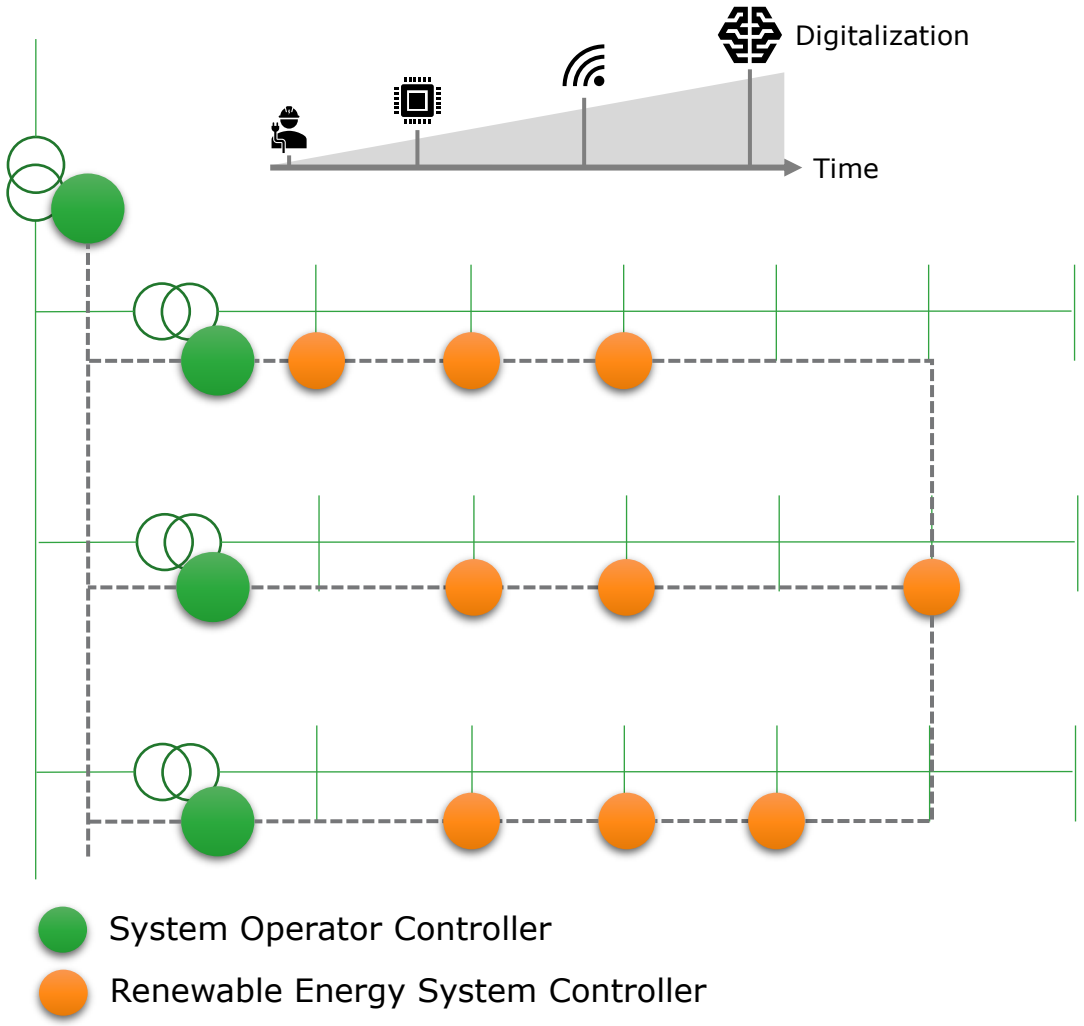
SOLANDEO

TU/e

dLab

KTH Vetenskap och Konst

Motivation



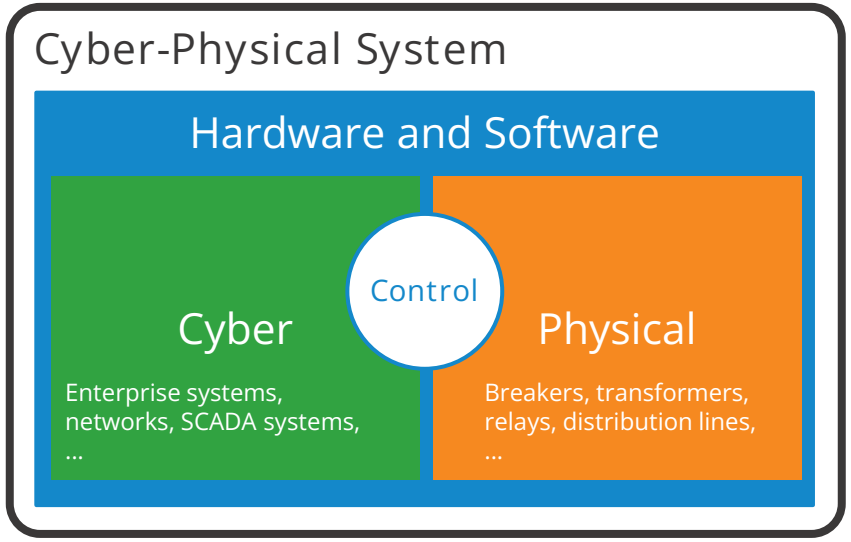
- Digitalization of future energy systems
  - Enabling increased RES penetration
  - Facilitate new energy solutions, e.g., micro-grids, energy communities
- Increased amount of threat vectors
  - Physical
  - Cyber
  - Combinations of both
- How can resilience be ensured?

Resilience for Cyber-Physical Energy Systems

- What is resilience?

  Resilience is the ability of a system to detect and predict disruptive events, respond by securely transitioning to a stable (sub-optimal) operation point, and take appropriate measures for fast recovery to a desired normal operation mode"

- What is a cyber-physical (energy) system?



Resilience for Cyber-Physical Energy Systems

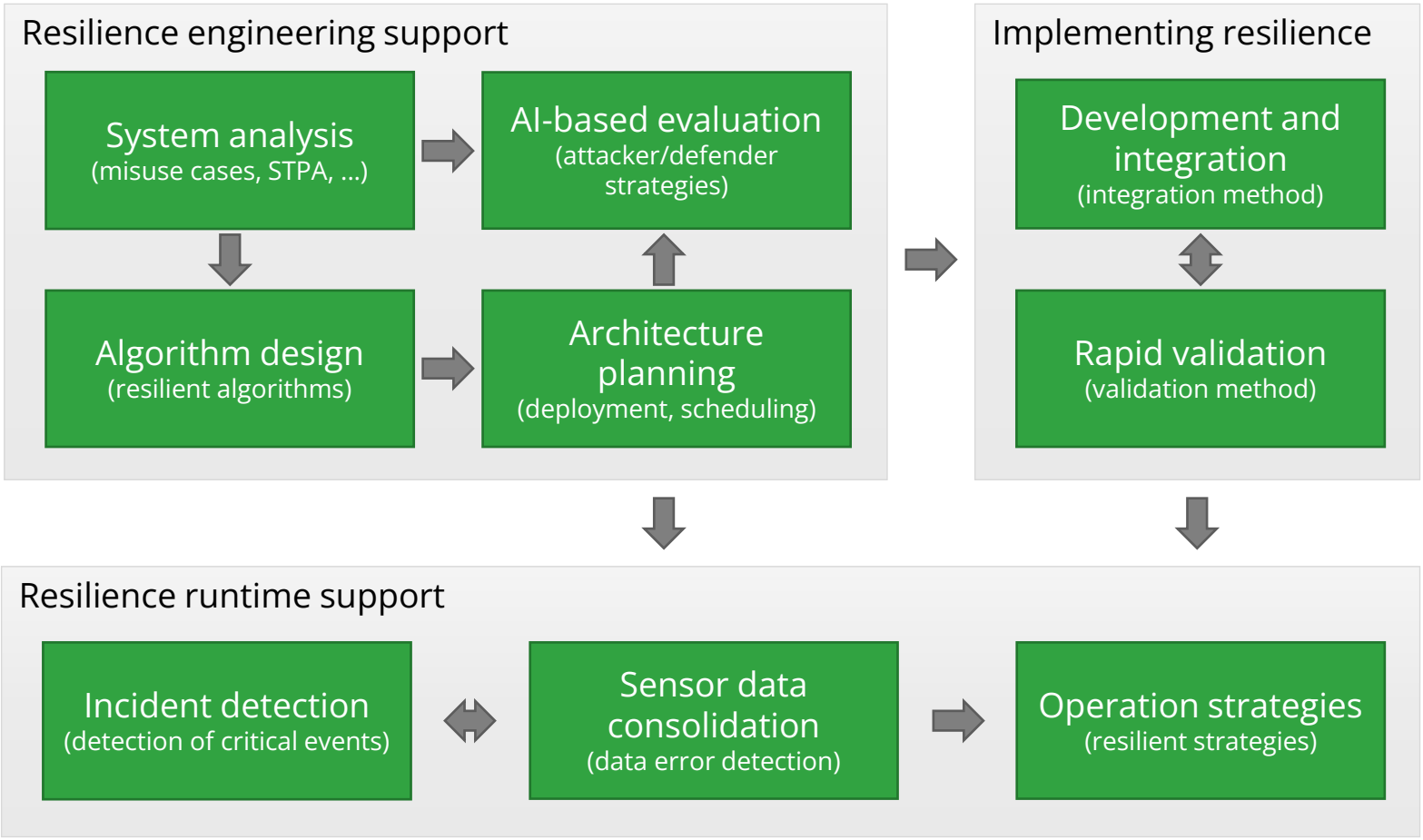
- Resilience of future digitalized energy systems can only be promised if a cyber-physical view is taken

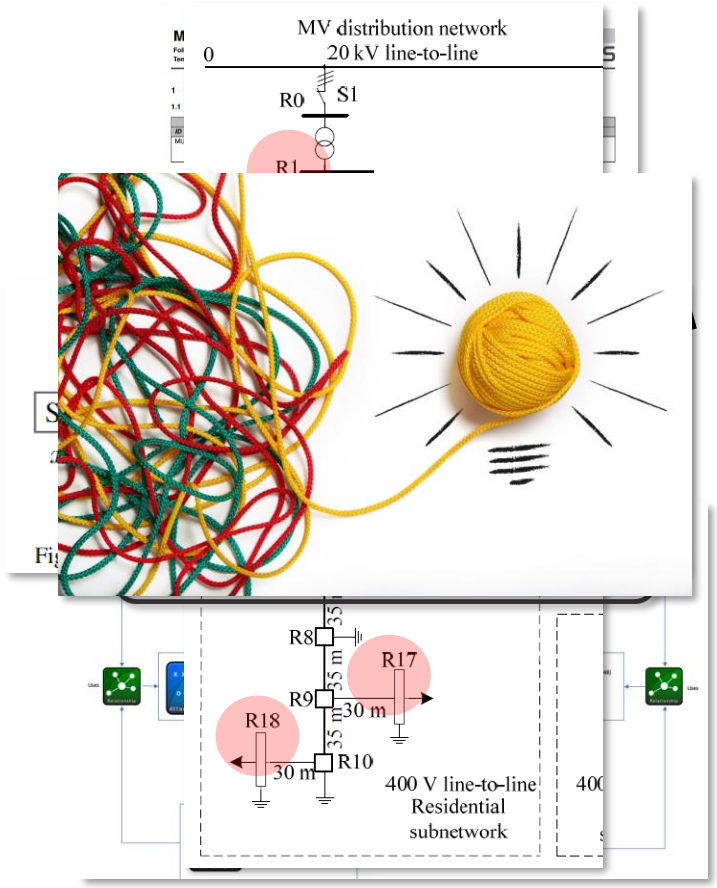
- Challenges
  - What system architectures can promise resilience for future scenarios?
  - How to design and implement resilient applications?
  - Resilient operation of cyber-physical energy systems?

Main Goals

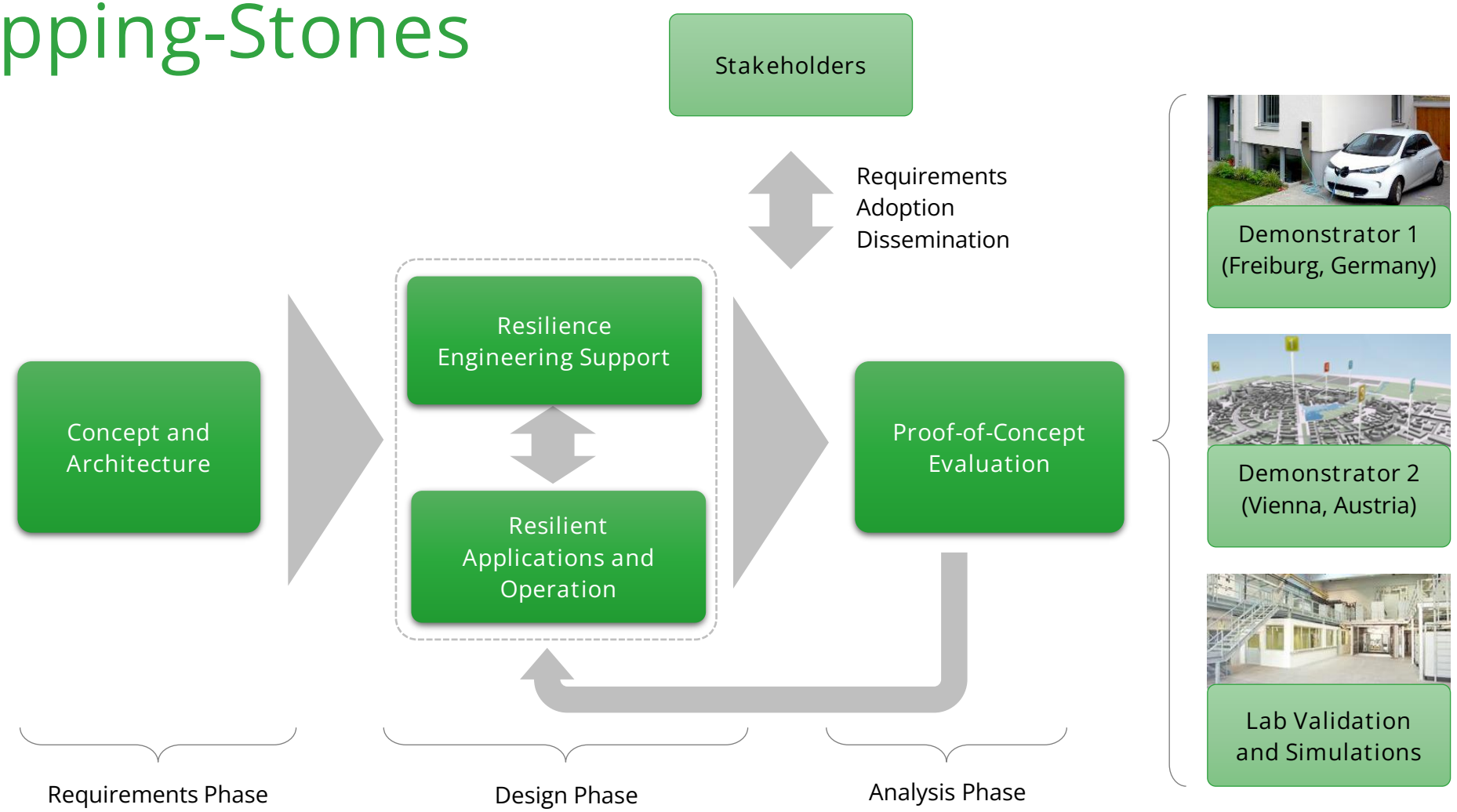
- Resilience engineering support
  - Support system operators to optimally design, plan, and evaluate cyber-physical system architectures
- Implementing resilient applications
  - Rapid implementation and validation solution, which can significantly reduce the time-to-market of new strategies
- Resilience runtime support
  - Proposal of a runtime support system, which will be able to suggest, and execute, actions (physical and cyber actions) that will recover a system back to a normal state

RESili8 Contributions



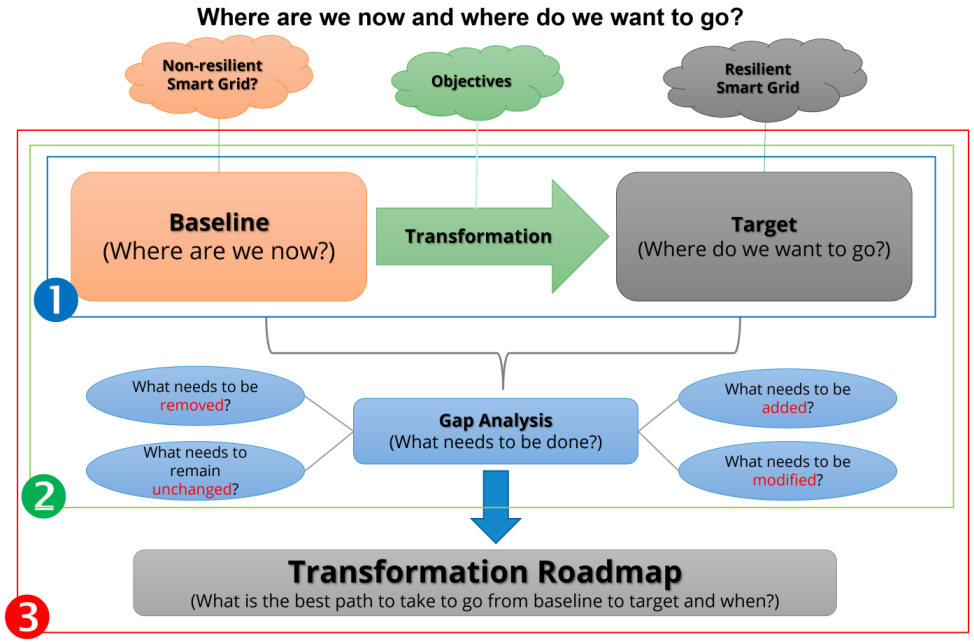


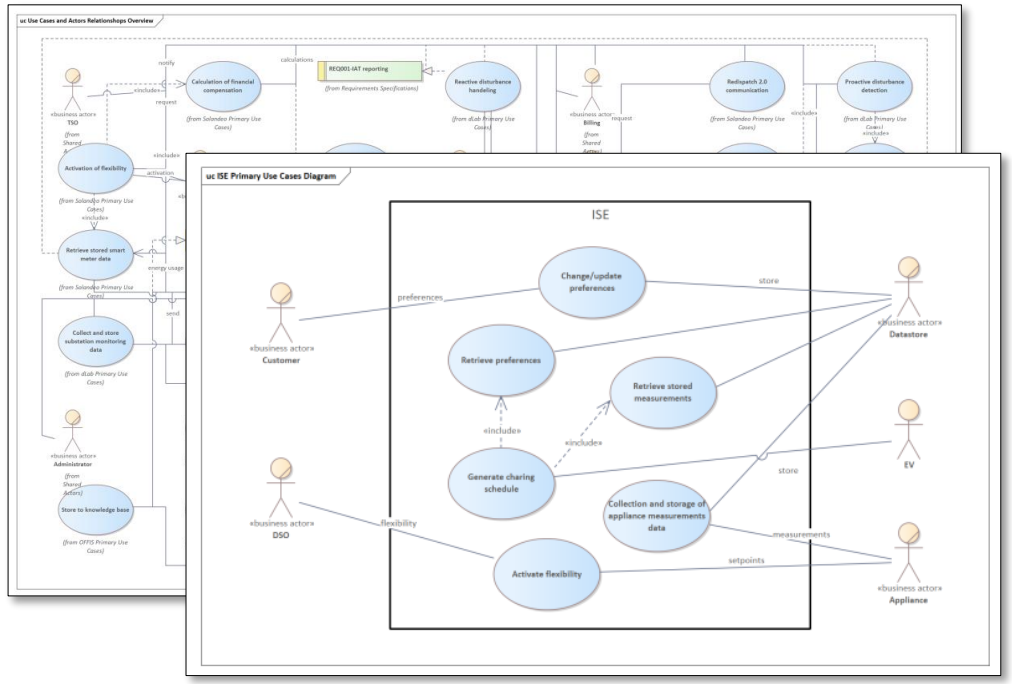
RESili8 Stepping-Stones



Concept and Architecture

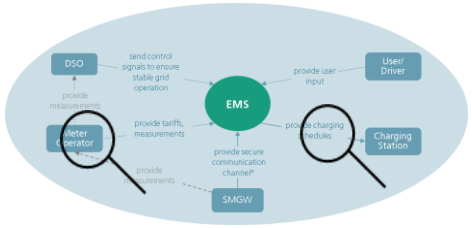
- Results from requirements analysis for resilient architectures and operation



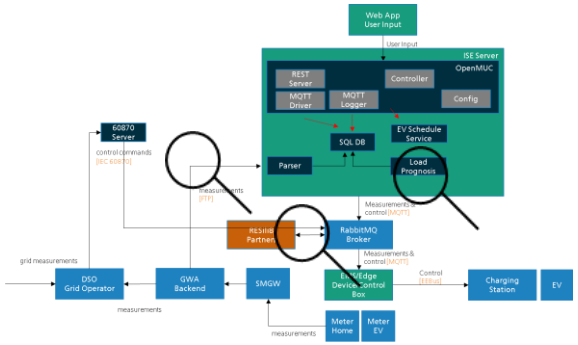


Resilient Applications

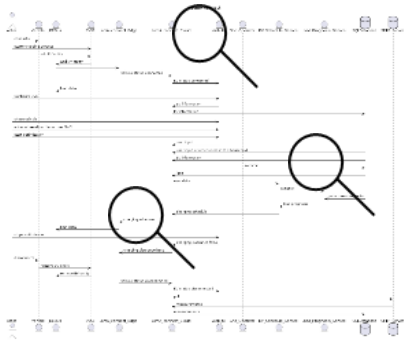
System Testing



Context Diagram



Package Diagram



Sequence Diagram

System Analysis Output

Control Action	Control Signal Hazardous When Applied…				Hazard
	Any time	Too early	Too late	Not	
Spray Valves			(H1)	H1	HC-1
Main Heater	H1	H1	H1		HC-2
Backup Heater	H1	H1	H1		HC-2

Feature / Module	Bounded Queues	Fan Out & quickest reply	Circuit Breaker	Feature …	Feature …
EMS	✓	✓	⚡		
ISE Server	⚡	✓	⚡		
Web APP	⚡	✓	✓		
Module …					
Module …					

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Module …					
Module …					

RESili8 Validation Framework

Implement resilience patterns

Conclusions

Recap and concluding remarks

What‘s next in RESili8?

- All work packages are started
- Installation of measurement equipment in Wiener Netze‘s grid
  - Incident detection
- Evaluation planning started
  - Validation in the lab and in the field

- Upcoming workshop
  - EPESec 2023 Workshop @ ARES 2023

Thanks!

RESILI8

Visit our website!

www.resili8-project.eu

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Smart Energy Systems ERA-Net

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