RASSA
Reference Architecture for
Secure Smart Grids in Austria

Methodical Reference Architecture Development Progress

Marcus Meisel, marcus.meisel@tuwien.ac.at
Stefan Wilker, stefan.wilker@tuwien.ac.at
Joachim Fabini, joachim.fabini@tuwien.ac.at
Robert Annessi, robert.annessi@tuwien.ac.at
Tanja Zseby, tanja.zseby@tuwien.ac.at
Markus Müllner, mmuellner@auto.tuwien.ac.at
Wolfgang Kastner, wolfgang.kastner@tuwien.ac.at
Markus Litzlbauer, markus.litzlbauer@tuwien.ac.at
Wolfgang Gawlik, wolfgang.gawlik@tuwien.ac.at
Christian Neureiter, christian.neureiter@en-trust.at

Introduction

The *Reference Architecture for Secure Smart Grids in Austria* (RASSA) project aims at developing a secure, interoperable reference architecture for Austrian smart grids. Building on the strength of the project's consortium, this architecture is being specified in close coordination with all relevant stakeholders in Austria. By instantiating parts of the reference architecture, secure, and compatible smart grid components can be implemented in a consistent and efficient way. This poster shows the progress of this effort and illustrates methodical consequential benefits, as well as the potential to integrate reactive and active security attributes into the reference architecture.

Methods

Modeling in SGAM-Toolbox
(www.en-trust.at/SGAM-Toolbox)

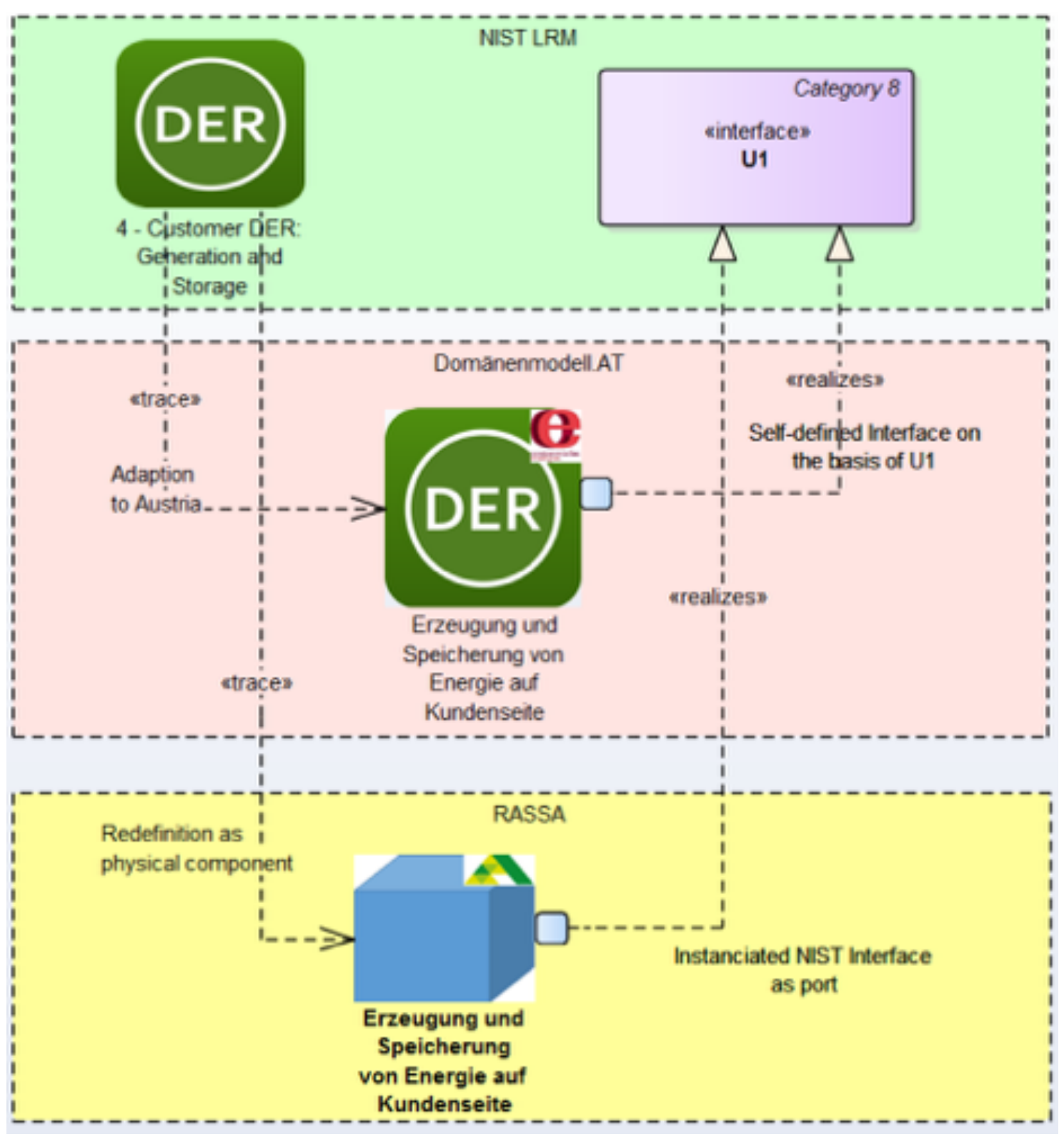
NIST LRM
DER
4 - Customer DER: Generation and Storage
Category 8
«interface»
U1
Domänenmodell.AT
«trace»
Adaption to Austria
DER
Erzeugung und Speicherung von Energie auf Kundenseite
«realizes»
Self-defined Interface on the basis of U1
«realizes»
«trace»
RASSA
Redefinition as physical component
Erzeugung und Speicherung von Energie auf Kundenseite
Instanciated NIST Interface as port

Fig. 1 Traceability of NIST-LRM, Domänenmodell.AT and RASSA in SGAM-Toolbox

Traceable interconnection:

- RASSA
- *Österreichs Energien (OE) Domänenmodell.AT* [1]
- *NIST Logical Reference Model* (LRM) [2]

Prioritization:

- generic basic use cases
- testing toolbox as documentation method
- extensive use cases (e.g., Smart Metering)

Risk Attributes:

- SGAM layer position
- complexity of component
- status of specification (e.g., difficulty, priority, stability)
- constraints (pre- or post-condition)
- risk analysis (e.g., importance)

Reactive Security:

- traffic observation (observation points, filter/sampling strategies)
- signature detection (machine learning, statistics)
- anomaly detection

Active Security:

- sniffing, port scan, replay attacks, fuzz testing
- side-channel attacks (e.g., power analysis)
- probing, fault injection (e.g, voltage glitching)
- analysis of integrated circuits (e.g., decapsulation, delayering/deprocessiong, microscope imaging, reverse engineering)

Results

SGAM-Toolbox can generate UML activity and sequence diagrams, linked to pre-existing RASSA/OE/NIST components in the reference architecture model, by using exact names in a sentence describing a behavior or a necessary action: "`DSO` sends meter data request to `Smart Meter`" and "`Smart Meter` replies sending requested meter data to `DSO`" using `RASSA-Netzbetreiber` instead of `DSO` defines to inherit all interfaces of the differently modeled entity, different from the NIST or OE one, but all are interlinked and can inherit/realize/trace security requirements and attributes.

Fig. 2 is an automatically generated sequence diagram of the most basic architecture view of any smart grid application. One actor is connected to one final device, disregarding all intermediary connections and steps necessary in between.

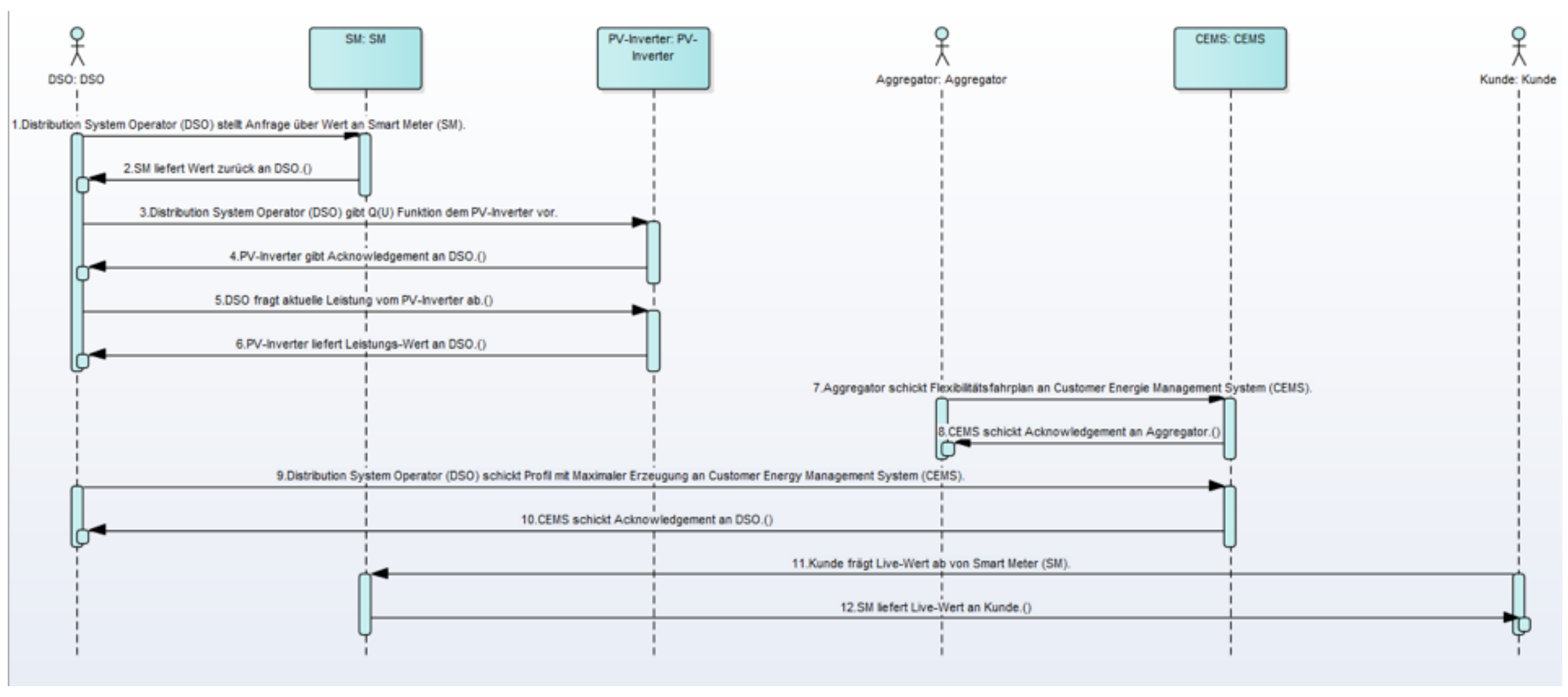
DSO: DSO
SM: SM
PV-Inverter: PV-Inverter
Aggregator: Aggregator
CEMS: CEMS
Kunde: Kunde
1.Distribution System Operator (DSO) stellt Anfrage über Wert an Smart Meter (SM).
2.SM liefert Wert zurück an DSO.()
3.Distribution System Operator (DSO) gibt Q(U) Funktion dem PV-Inverter vor.
4.PV-Inverter gibt Acknowledgement an DSO.()
5.DSO fragt aktuelle Leistung vom PV-Inverter ab.()
6.PV-Inverter liefert Leistungs-Wert an DSO.()
7.Aggregator schickt Flexibilitätsfahrplan an Customer Energie Management System (CEMS).
8.CEMS schickt Acknowledgement an Aggregator.()
9.Distribution System Operator (DSO) schickt Profil mit Maximaler Erzeugung an Customer Energy Management System (CEMS).
10.CEMS schickt Acknowledgement an DSO.()
11.Kunde frägt Live-Wert ab von Smart Meter (SM).
12.SM liefert Live-Wert an Kunde.()

Fig. 2 First five basic system architecture representing use cases modeled in SGAM-Toolbox

Conclusion

Modeling of the RASSA system architecture ist a work in progress. Taking into account potential security attributes for reactive and active security investigations is the next step. Following steps are:

- including interconnection of ENTSO-E market role model
- adding active and reactive security attributes
- evaluating and setting attributes with stakeholders

[1] E-Control, Oesterreichs Energie, Austrian Power Grid, Bundeskanzleramt, Bundesministerien (BMWFW, BMI, BMLVS), Kuratorium Sicheres Österreich, REPUCO Unternehmensberatung GMBH „RISIKOANALYSE FÜR DIE INFORMATIONSSYSTEME DER ELEKTRIZITÄTSWIRTSCHAFT unter besonderer Berücksichtigung von Smart-Metern und des Datenschutzes.“ *e-control.at.* 27.02.2014 (accessed: 9.09.2016) http://www.e-control.at/documents/20903/-/-/3f89d470-7d5e-433c-b307-a6443692d8f7.

[2] NIST - National Institute of Standards and Technology. 2010. Guidelines for Smart Grid Cyber Security: Vol. 1-3, Smart Grid Cyber Security Strategy, Architecture, and High-Level Requirements, Release 3.0. Technical Report, Gaithersburg, MD: NIST, 668.

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