

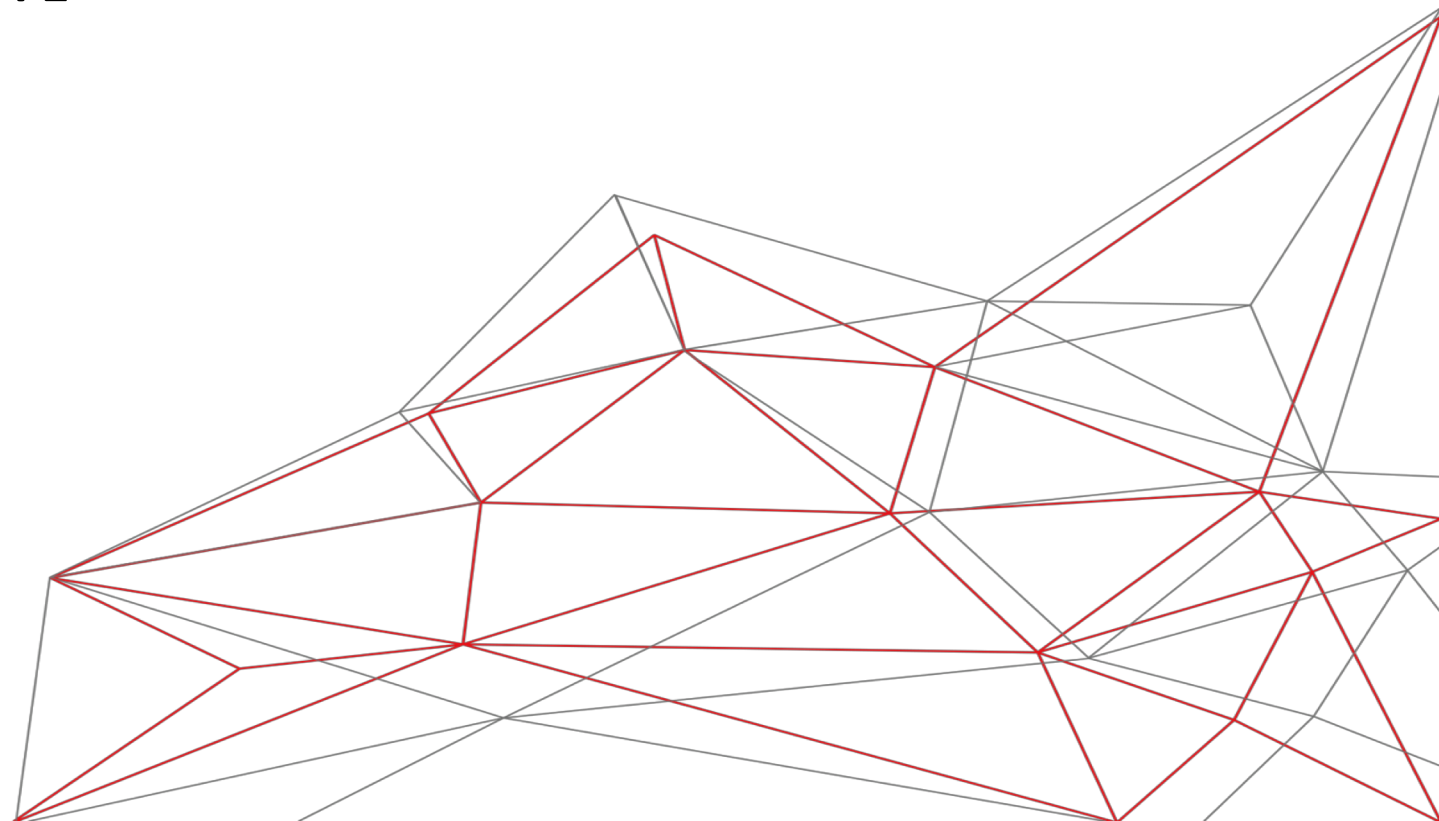
DSO SCADA REQUIREMENTS

AN AUSTRIAN DSO GROUP PERSPECTIVE

SGTech Europe 2019, Amsterdam
26-28 March 2019

Walter Schaffer
Salzburg Netz GmbH

Public (for distribution)



MOTIVATION

... OUR WORLD, OUR ENVIRONMENT IS CHANGING QUITE FAST ...

- › Climate strategies & targets
 - › 2020 and 2030 climate and energy packages
 - › 2050 long-term strategy
 - › Carbone footprint
 - › Decentralization of generation



https://ec.europa.eu/clima/policies/strategies_en

Americas Cup

How to fly a foiling boat?



Source: FAZ

Americas Cup

Control the balance, i.e. balancing
and new technologies



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https://ec.europa.eu/clima/policies/strategies_en

- › Digitalization
 - › IoT (IT OT Convergence)
 - › Automation
 - › **Cybersecurity**

https://ec.europa.eu/info/publications/EC-Digital-Strategy_en

FUNDAMENTALS AND PREMISES

- › Focus on the chances and opportunities to meet our customers expectations
 - › **Security, quality and costs of supply**
- › Our (DSO) fundamentals
 - › Secure network operation
 - › Compliant with regulations and standards
- › Requirements, not solutions
- › Consider the risks and threats in a second phase

Participating partners (DSO)

- › Österreichs Energie
- › Energie Klagenfurt GmbH
- › Energienetze Steiermark GmbH
- › IKB Innsbrucker Kommunalbetriebe AG
- › KNG-Kärnten Netz GmbH
- › Linz Stromnetz GmbH
- › Netz Oberösterreich GmbH
- › Salzburg Netz GmbH
- › TINETZ-Tiroler Netze GmbH
- › Wiener Netze GmbH

FOCUS IS ON DSO NETWORK OPERATION

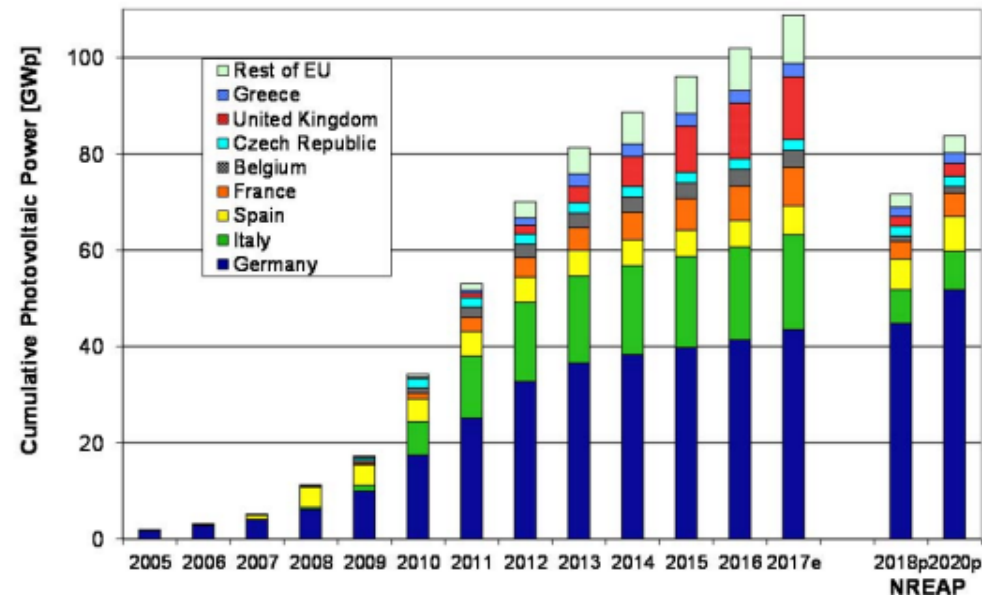
› **System operation**

- › HV-level, TSO - DSO interface

... dramatic diffusion of PV panels on LV and MV networks ...

entso-e report “Dispersed generation impact on CE region security”, 2014 report update

Cumulative installed grid-connected PV in EU + candidate countries (NREAP: goals of the National Renewable Action Plans) ...

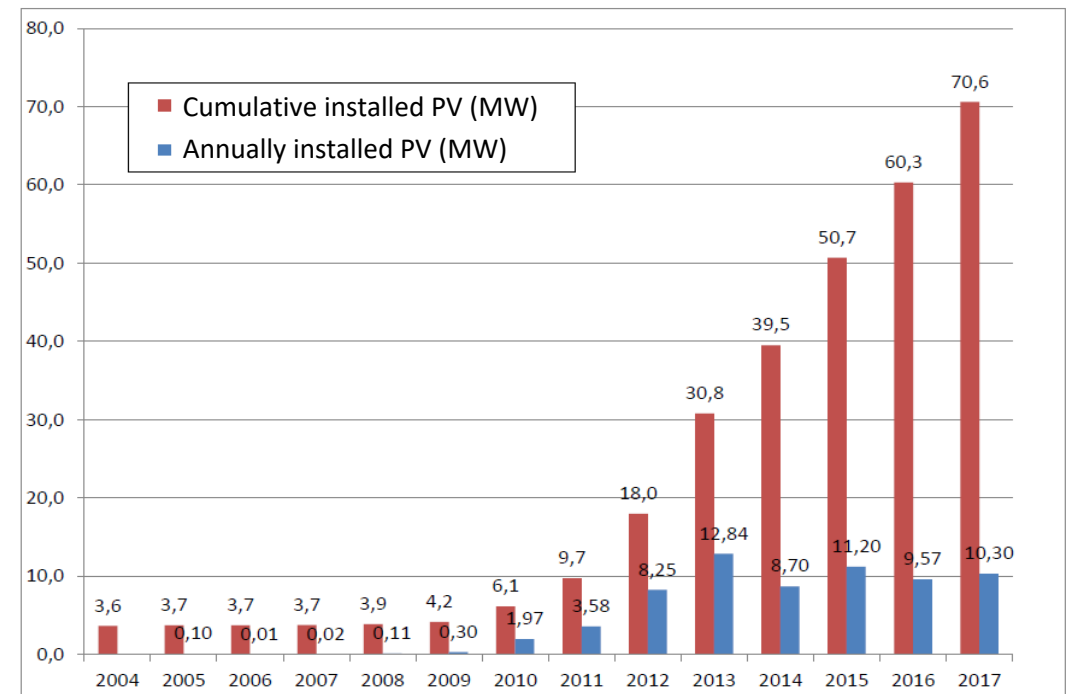


PV Status Report 2017, JRC, European Commission

Jäger-Waldau, A., PV Status Report 2017, EUR 28817 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-74071-8, doi:10.2760/452611, JRC108105

... and in Salzburg

max. demand 860MW, generation share of up to 50% (mainly hydro power)



Renewables are requested by our society, respectively by our customers. Are they therefore a thread or a **challenge**?

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Security, quality and costs of supply are common tasks, especially for TSO and DSO
they should be addressed and solved together

- › **Digitalization in MV network operation**
- › **Digitalization in LV network operation**
- › Workforce Management (WMF)
- › Backup or fallback requirements

SYSTEM OPERATION

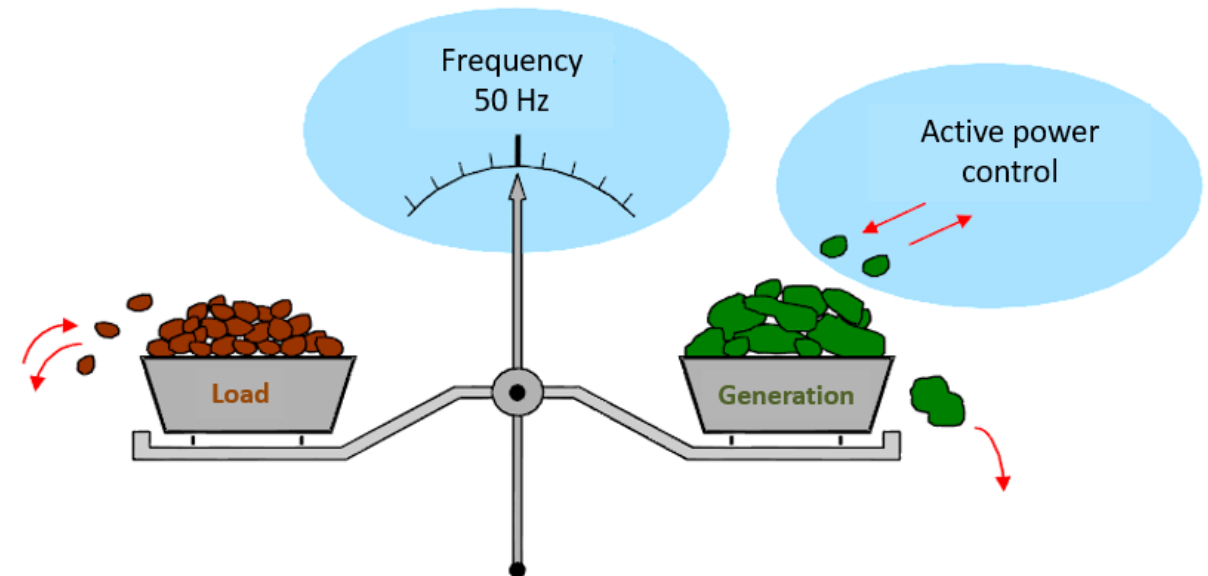
TSO – DSO Interface

- › Increasing generation at DSO level
- › Contribute to system and ancillary services



Network Codes

- › Apply **probabilistic** methods at LV und MV level
not (only) deterministic approaches
- › Exchange information not (only) data in **both ways**
- › Information, Identity, Integrity: '3 I' of information security



“AIRPORT MODEL” OR “AIR TRAFFIC CONTROL” MODEL EUROPEAN AIR TRAFFIC CONTROL

Eurocontrol

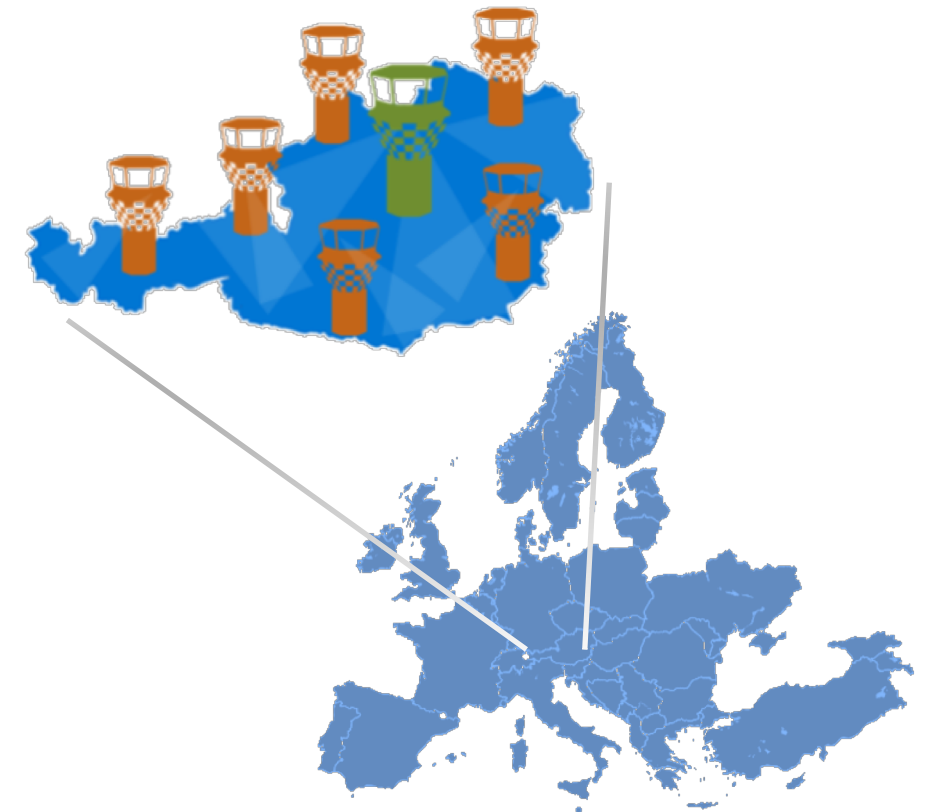
- › European Organization for the Safety of Air Navigation
- › Air traffic management across Europe
- › Coordination and planning of air traffic control

National, regional air traffic control (ATC)

- › Responsible for the dedicated air space
- › Congestion management

Airport Tower (ATC Tower)

- › Coordination and control at the airport starts, landings, ground traffic, security
- › **Point of customer contact**



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structured, **bidirectional**
information exchange



“AIRPORT MODEL” OR “AIR TRAFFIC CONTROL” MODEL EUROPEAN AIR TRAFFIC CONTROL

Regional Control Center(s)

- › European Organization for the Safety of Air Navigation
- › Air traffic management across Europe
- › Coordination and planning of air traffic control

Transmission System Operator / control area

- › Responsible for the dedicated air space
- › Congestion management

Distribution System Operator

- › Coordination and control at the airport starts, landings, ground traffic, security
- › **Point of customer contact**

structured, **bidirectional**
information exchange



DIGITALIZATION IN MV NETWORK OPERATION

Example: Flooding, June 2013

- › Alarms at one SCADA workplace on 2 June 2013 from 06:30 to 19:30
 - › 300 alarm messages, i.e. one alarm every 2½ minutes
 - › 200 telephone calls, i.e. one call every 4 minutes



salzburg24.at



Salzburger Nachrichten

DIGITALIZATION IN MV NETWORK OPERATION

- › Intelligent ALARM and MESSAGE MANAGEMENT
 - › Prioritization and clarity, i.e. clear arrangement
 - › Dynamic, topology dependent alarm management and allocation

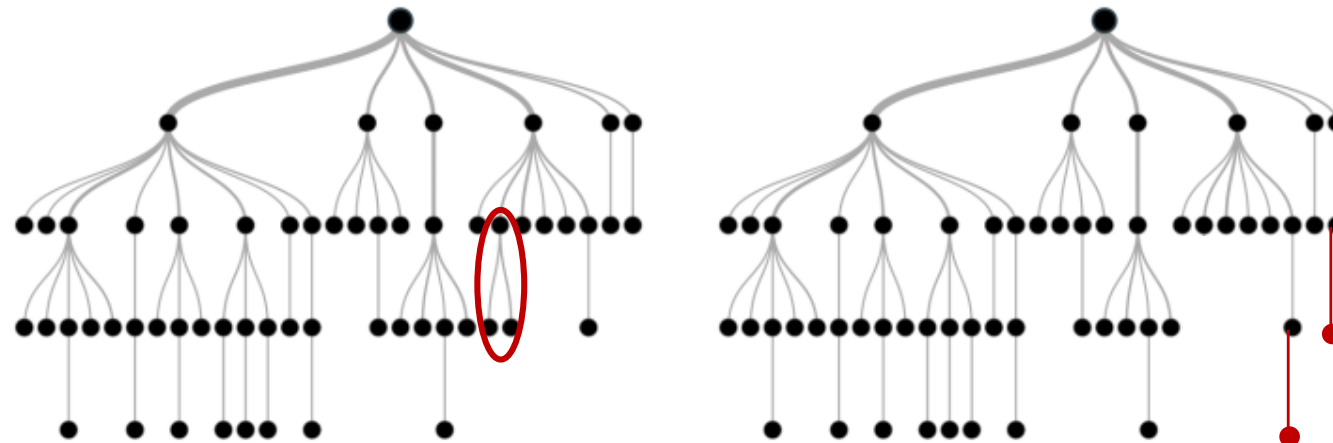
TSO / DSO terminal

HV / MV Substations: HV node

HV / MV Substations: MV branches

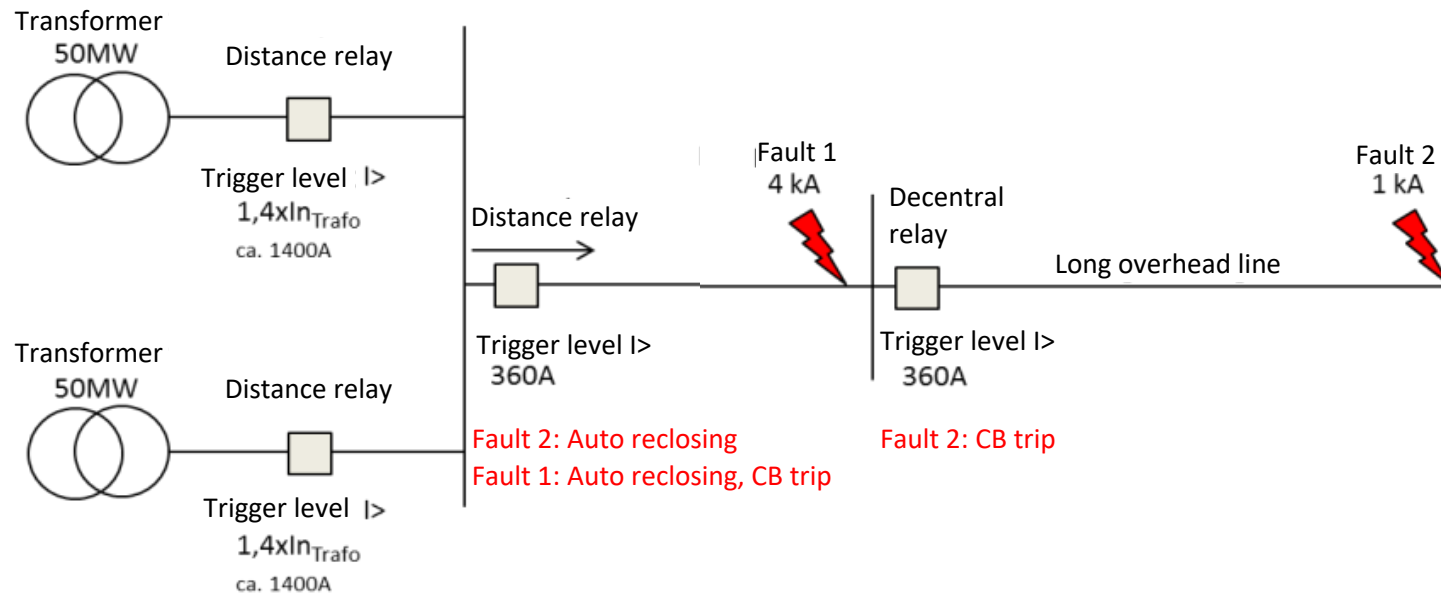
Secondary Substations with protection
1st level

Secondary Substations with protection
2nd level



DIGITALIZATION IN MV NETWORK OPERATION

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 - › Traceability and visualization
 - › Verification of the protection system and functions



es)

DIGITALIZATION IN MV NETWORK OPERATION

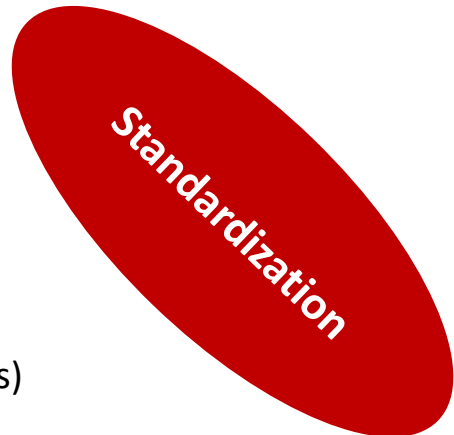
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- › Fault Localization
 - › Distance protection, decentral relays and CBs, fault locators
 - › All types of network topologies, i.e. open and **closed loops, meshed networks**
 - › Consideration of the increasing decentralized generation at distribution level
 - › Use of further information, e.g. Geo-Information, (fault) probability

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- › Sensors
 - › Simple integration in the existing infrastructure, „**plug & play**“
 - › Incorrect, faulted sensors should be detected automatically, by intelligent algorithms
data from these sensors shouldn't be considered in SCADA
 - › Costs for installation, monitoring and replacement have to be taken into account (e.g. batteries)

DIGITALIZATION IN MV NETWORK OPERATION

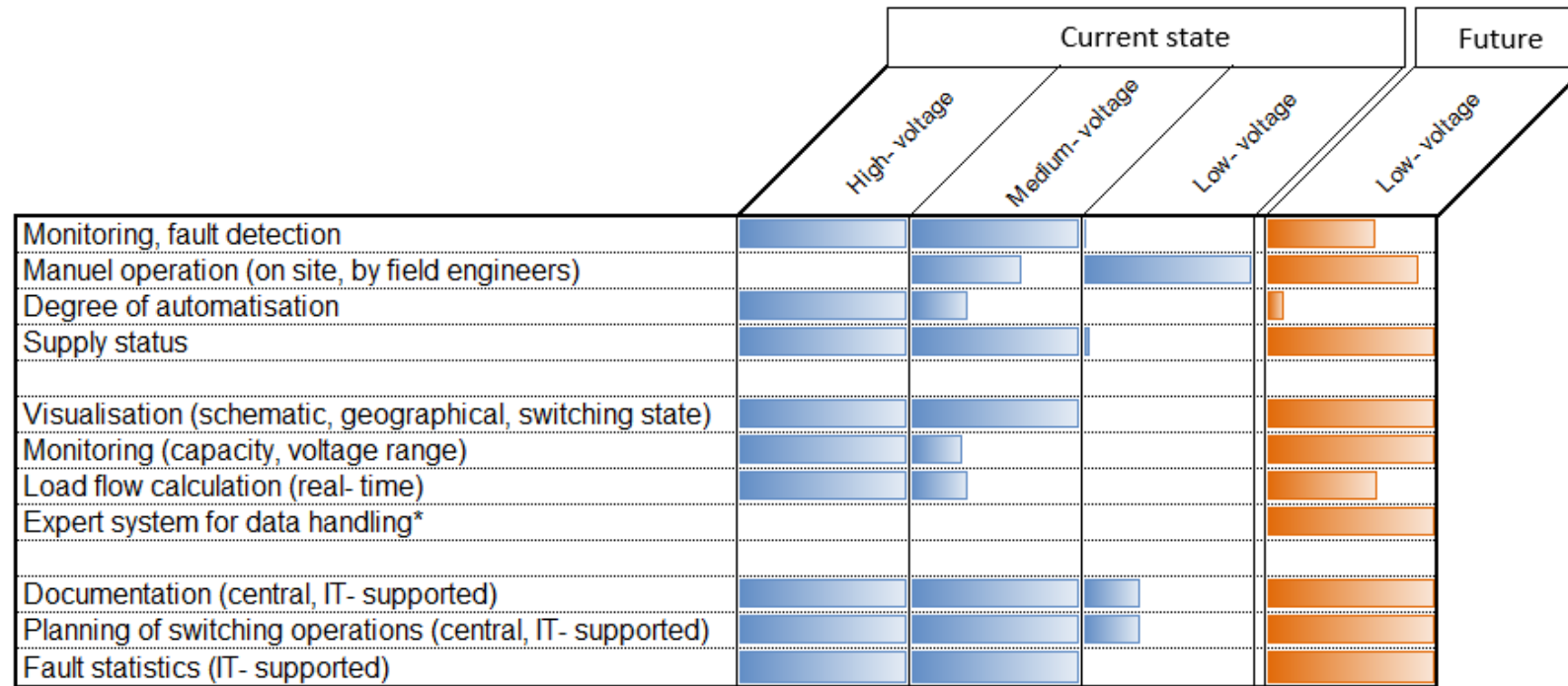
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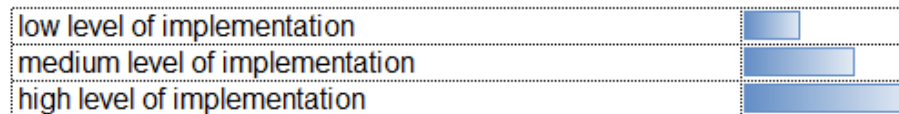
Standardization

NETWORK OPERATION AT DIFFERENT VOLTAGE LEVELS

“DEGREE OF AUTOMATION”



* caused by the big amount of data



DIGITALIZATION IN LV NETWORK OPERATION

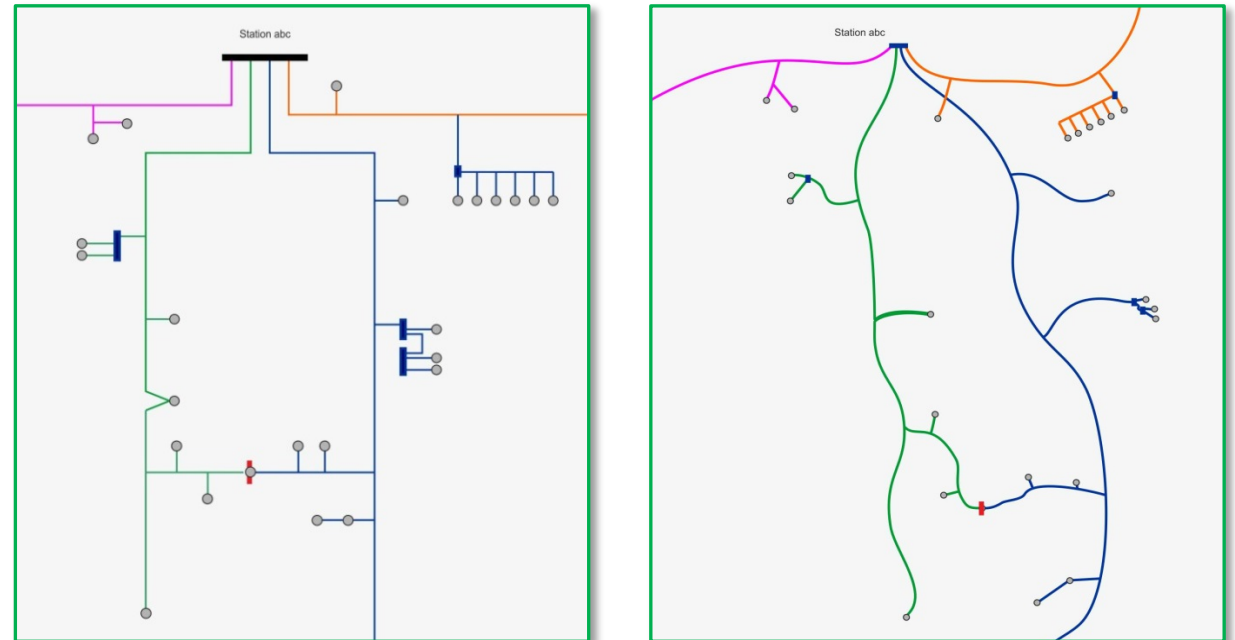
	Online	Quasi-Online	Offline
Connection type	permanent	permanent	none
Data exchange	permanent	on demand	manually
Data availability	“just in time” (real time)	event triggered close to real time when limits are exceeded (alarms)	local storage
Time domain	seconds or less (immediately)	< 10 minutes (single digit)	none

Big Data

- › (semi-) automatic generation and data processing, using already existing information
- › „plug & play” sensors, including parametrization
→ Standardization
- › Remote configuration and parametrization
- › Wide area network
 - › Mobile communication channels and devices
 - › ICT Security

Schematic or Geographic representation?

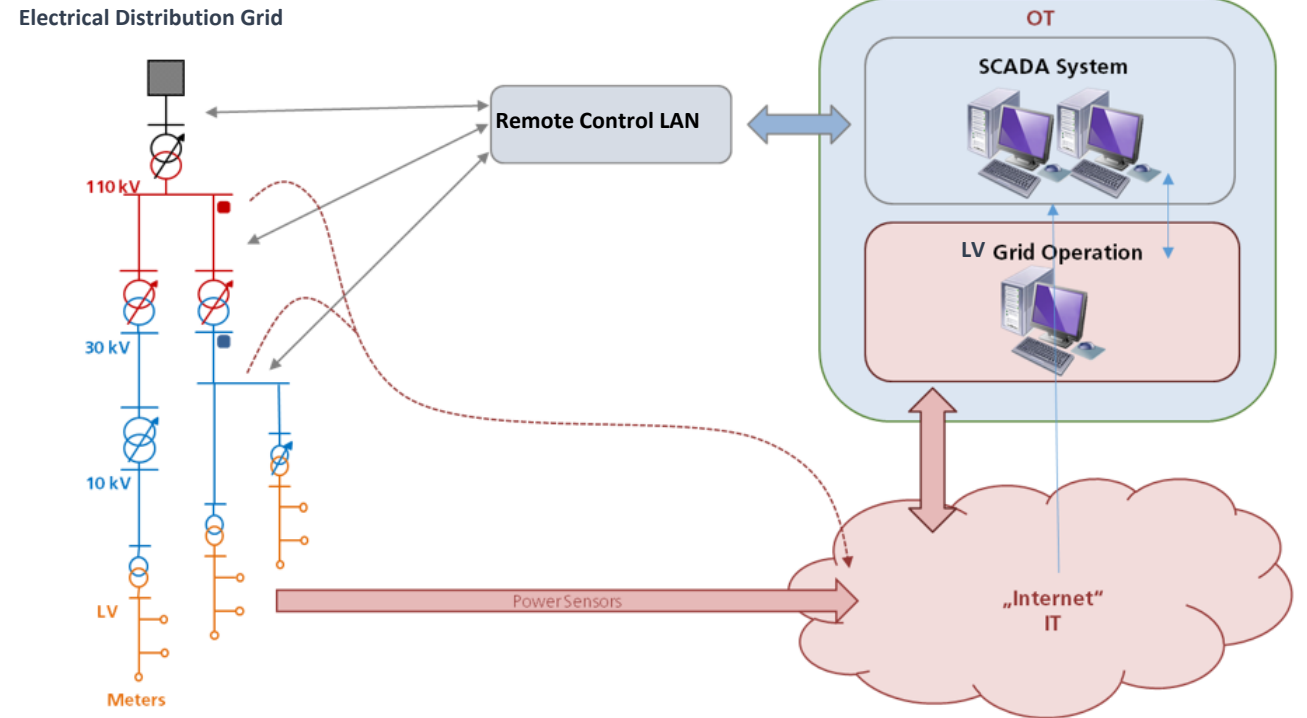
- › different advantages and disadvantages
- › Automatic schema generation based on GIS



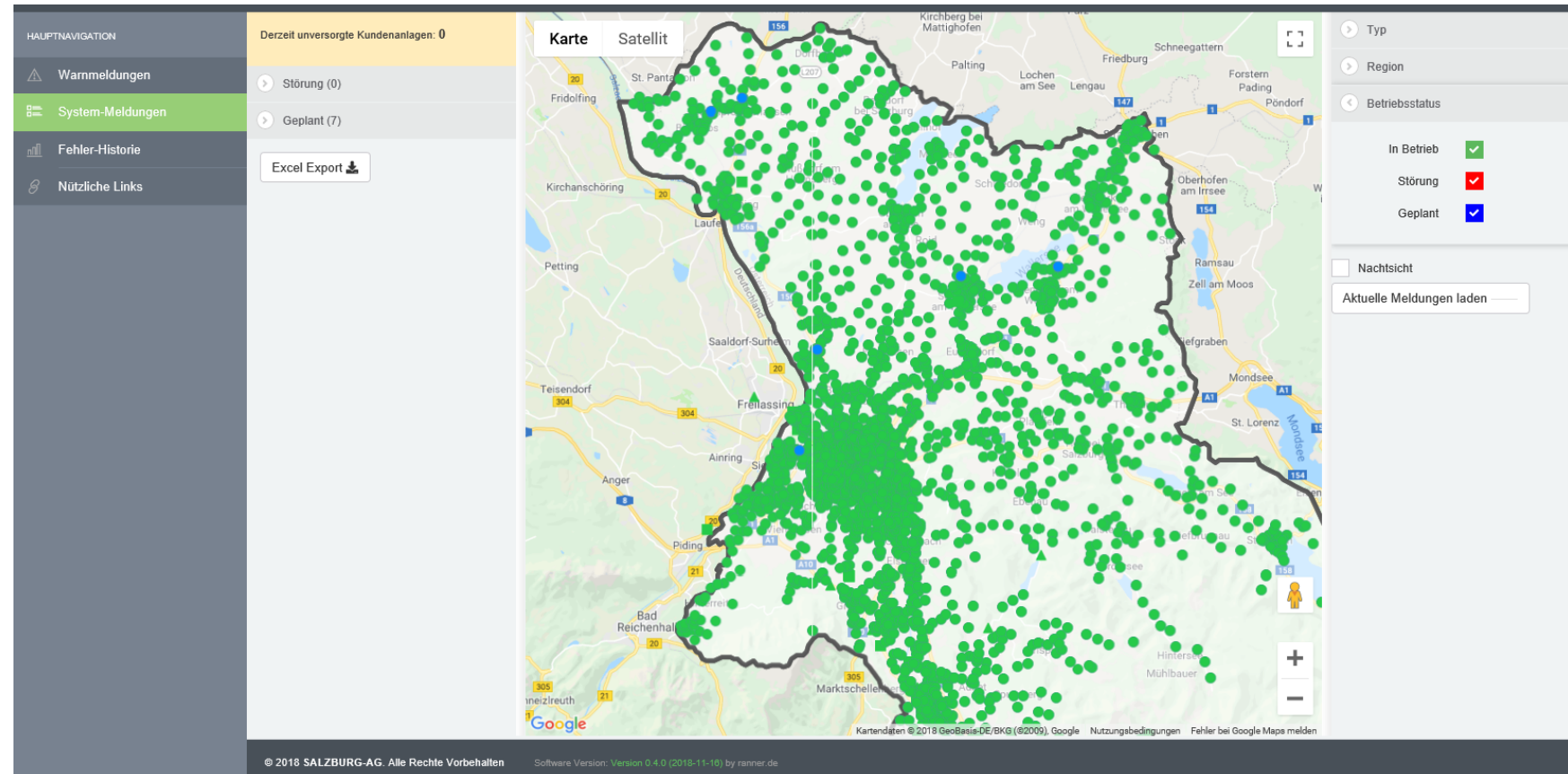
DIGITALIZATION IN LV NETWORK OPERATION EMBEDDING

Embedding

- › Integrated SCADA covering all DSO voltage levels
- › SCADA on its own
- › Another system, e.g. GIS
- › Different security measures depending on the IT-Interfaces
 - › ICT respectively cyber security
- › Flexibility
 - › SCADA: developing new functionalities
 - › LV grid: rate of change, actuality
- › **Security of supply**



CUSTOMER INTERACTION – WEB APPLIKATION



Similar solutions are available at DSOs in Austria and across Europe,
sometimes with restricted public access

SUMMARY

Security, quality and costs of supply are a common task concerning TSO and DSO

Digitalization

- › accelerates to a centralization of decentralized functionalities
 - › requires standardized and interoperable components and systems
 - › calls for appropriate ICT-security mechanisms
- next step: „white paper“ regarding security requirements

<https://oesterreichsenergie.at/die-welt-des-stroms/stromnetze/digitalisierung-der-netzfuehrung-im-verteilernetz.html>