



Vaasan yliopisto
UNIVERSITY OF VAASA

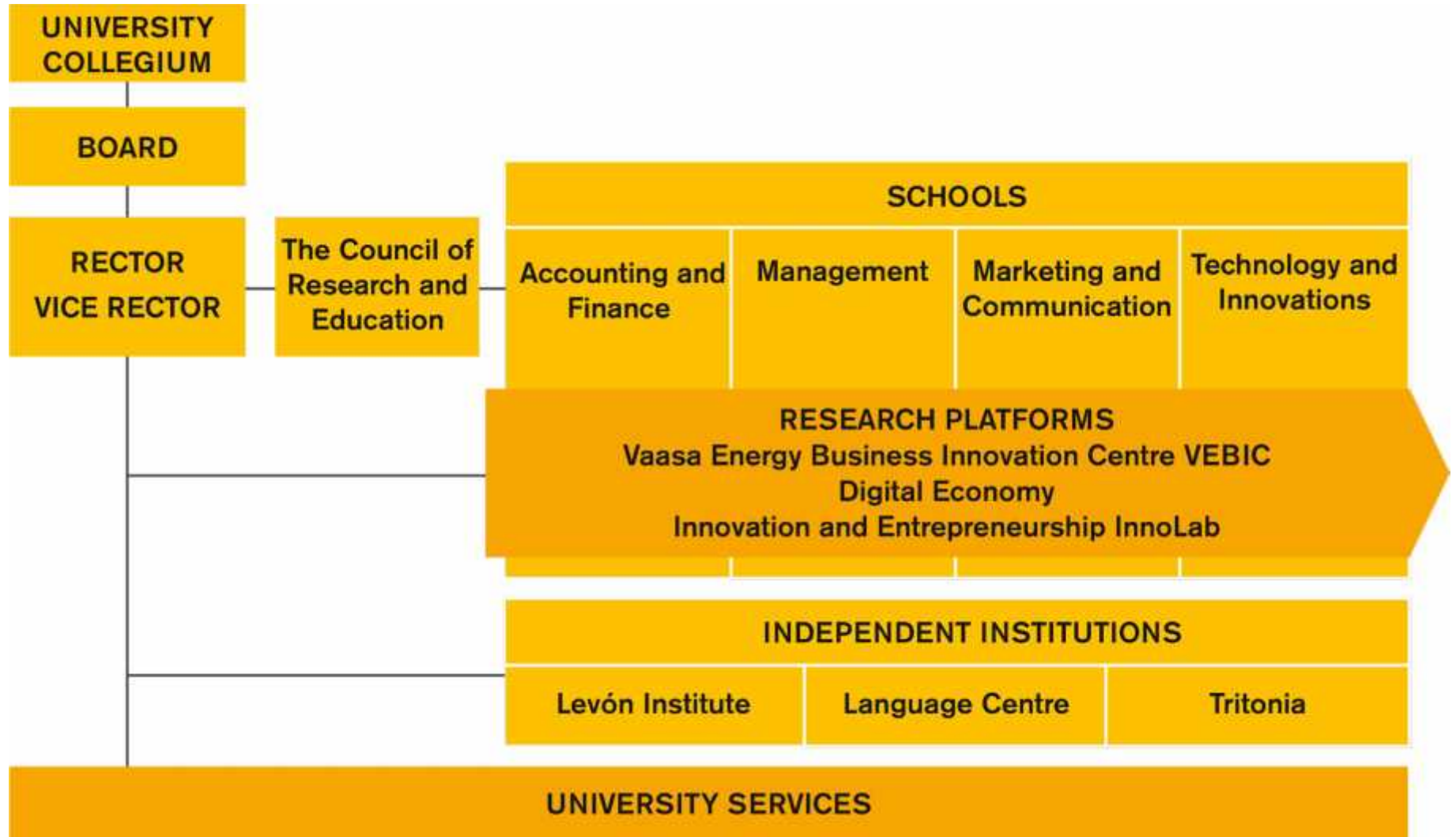
Smart Electric Systems

RESEARCH IN ELECTRICAL ENGINEERING

KIMMO KAUHANIEMI

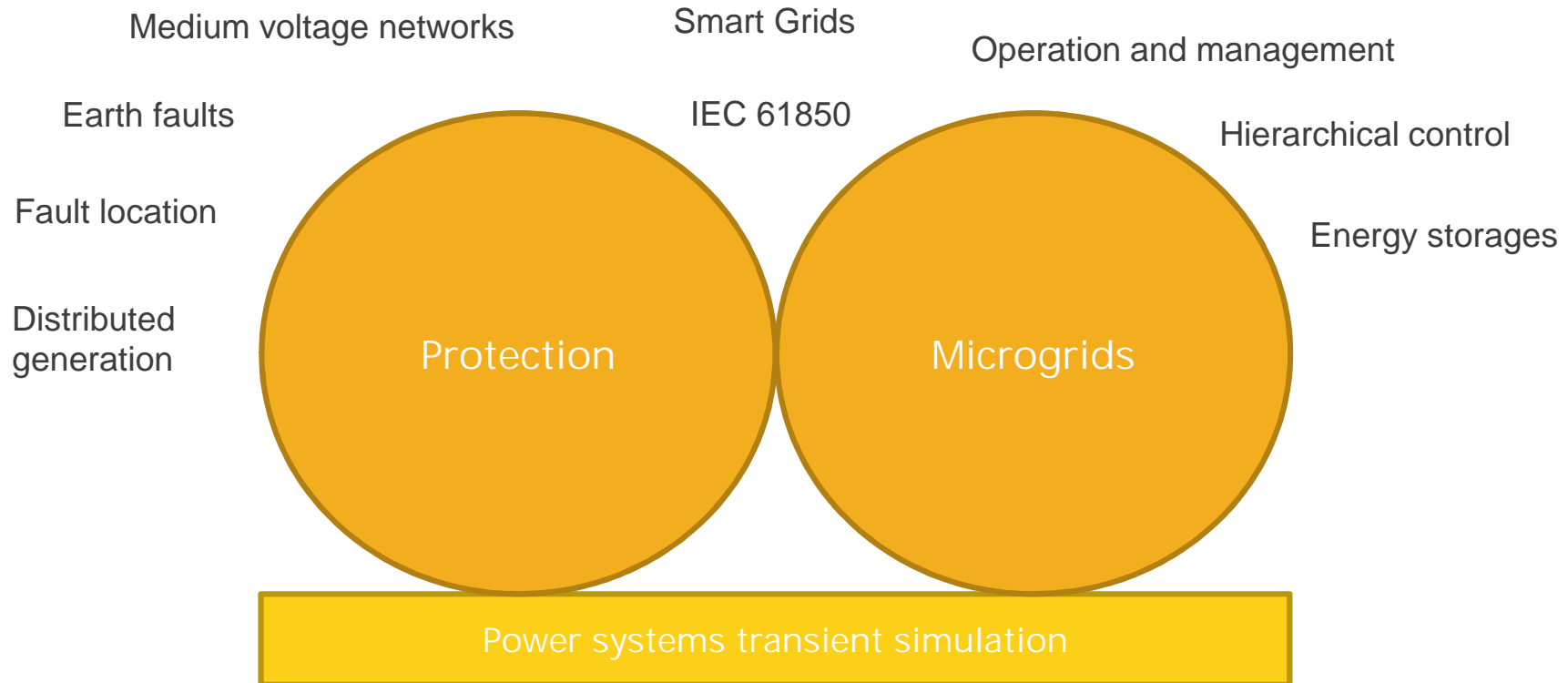


Vaasan yliopisto
UNIVERSITY OF VAASA





Research focus in Electrical Engineering



PAC laboratory

protection
automation
communication

IEC 61850 enables seamless
integration of devices from
different vendors

Projects:

- DEMVE (2011-2014)
- eDEMVE (2015-2016)

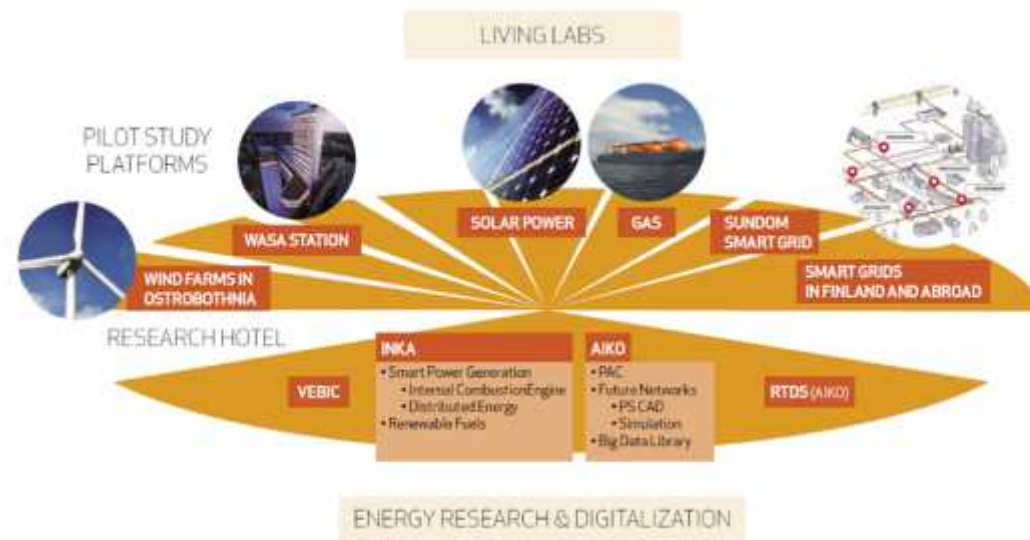




SESP – Smart Energy Systems Research Platform

Project for building the new multidisciplinary research platform
(2017 -2018, part of AIKO program)

- ▶ Smart Grid laboratory
 - ▶ PAC laboratory (Protection, automation and communication)
 - ▶ Relay protection
 - ▶ IEC 61850 communication
 - ▶ Microgrids
 - ▶ Real time digital simulation (OPAL-RT)
- ▶ Big Data
- ▶ Living lab sites
- ▶ New business concepts and models





Vaasan yliopisto
UNIVERSITY OF VAASA

Living lab site: Sundom Smart Grid

- ▶ On-line measurements:
 - One HV/MV substation (all feeders)
 - Three secondary substations (MV/LV)
- ▶ Total 20 measurement points
 - IEC 61850-9-2 stream with current and voltage measurements, 80 samples/cycle
 - Power, RMS voltages and currents etc. measurements with lower sampling rate (GOOSE)





Vaasan yliopisto
UNIVERSITY OF VAASA

”Smart Grid Lab”

- ▶ OPAL-RT OP5600 & eMEGAsim
 - ▶ Digital and Analog I/O cards
- ▶ Omicron CMS356 amplifiers
- ▶ First HIL-tests with protection relays in progress



VINPOWER

Vaasa innovation platform for future power systems (2017-2019)

Cabled medium voltage networks

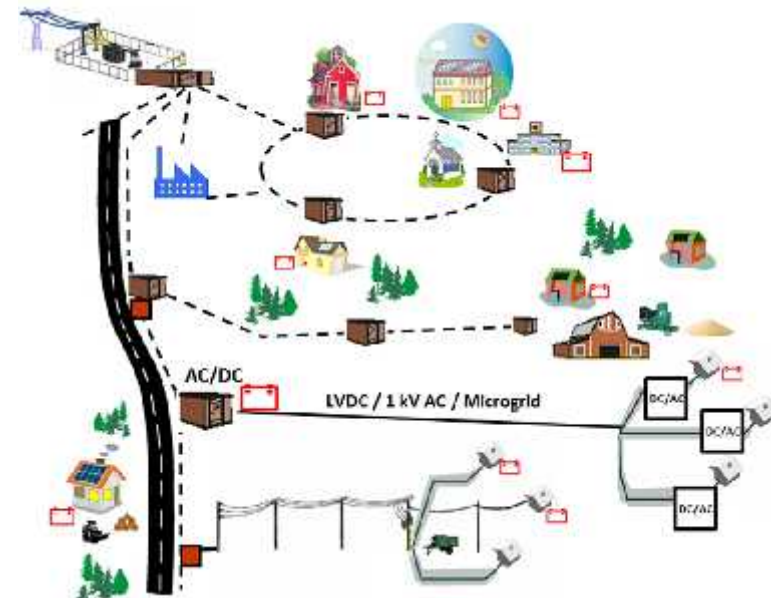
- Protection and fault location
- Compensation of the earth-fault current
- Reactive power compensation
- Smart secondary substations

Microgrids

- New control and management functions
- Integration to Smart Home

Big Data

- Applications in power systems
- Local data processing

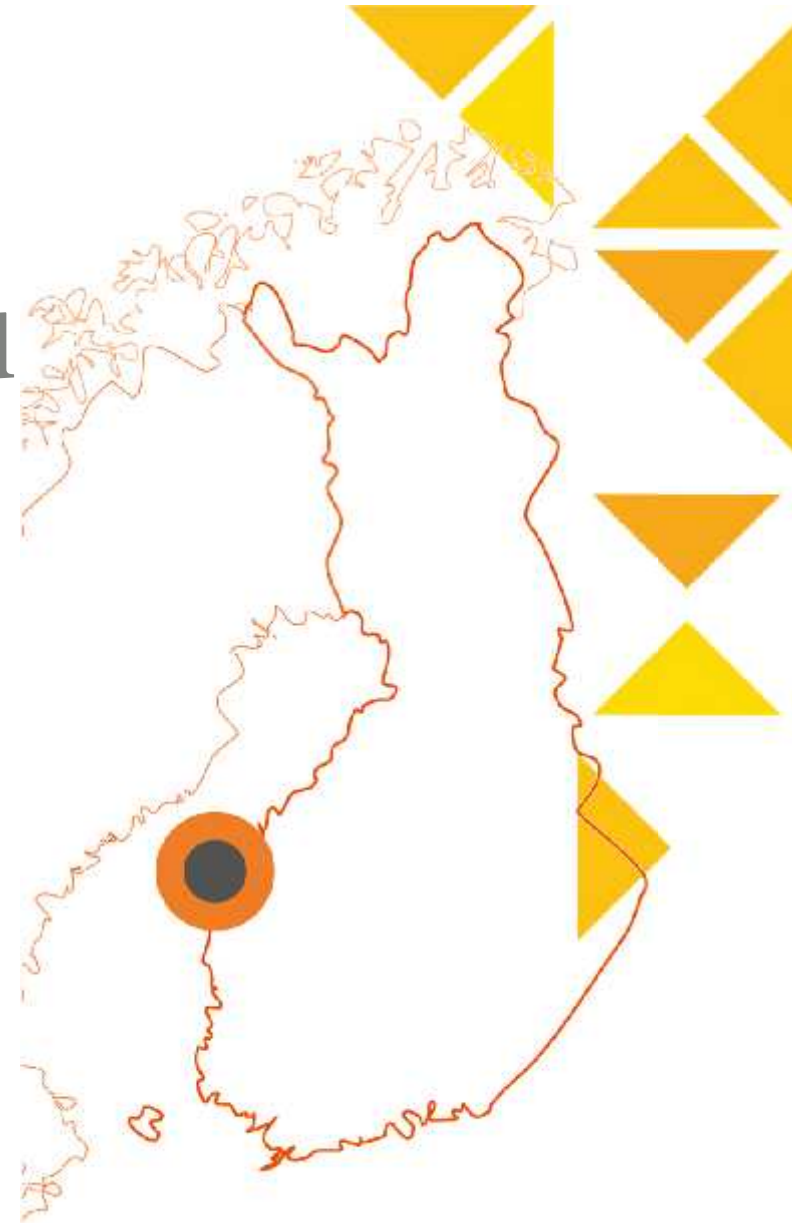




Vaasan yliopisto
UNIVERSITY OF VAASA

The 4th Nordic Workshop in Power System Protection and Control

- ▶ At the University of Vaasa,
Finland
- ▶ In May 2019 (date will be
announced later)





Vaasan yliopisto
UNIVERSITY OF VAASA

Thank you!

