IEC 61850 Europe 2017

RED ELÉCTRICA DE ESPAÑA

IEC61850
Maintenance approach

2017, September the 27th

Javier Figuera Pozuelo (Madrid, 1976) has been working in the Spanish TSO (**Red Eléctrica de España**) since 2.001.

First, as a **Protection and Control** (P&C) **Project Engineer** (2007-2013) in the Substation Engineering Department.

In 2013 he joined to the Engineering and Design Division, in the **Design** Department leading **PACS** standardization processes. He has carried out the design of new and refurbished HV Substations, and has been involved in some R&D projects mainly related with new technologies (IEC61850, WAMPAC, etc.)

He's been collaborating in different **CIGRE** WG's (B3 and B5)

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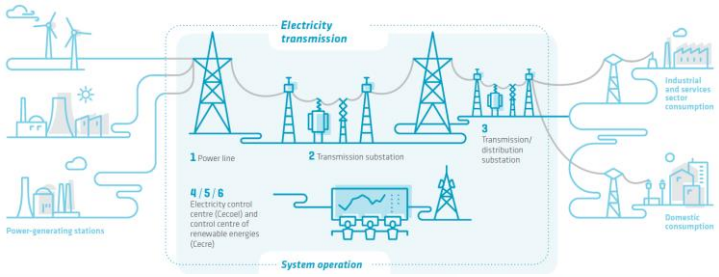
Agenda



- **REE`s overview**
- Today's objectives
- SAS (Substation Automation Systems) maintenance
  - How IEC61850 may affect to current maintenance processes?
- Maintenance view on IEC61850 proposed solutions
  - IEC61850 SAS design aspects related to the O&M works
- Conclusions and possible next steps

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REE's overview

Red Eléctrica **is the owner of the entire Spanish** high-voltage transmission grid and is a world reference in the integration of renewable energies.

MISSION

Red Eléctrica has the mission of ensuring the continuity and security of the electricity supply and the effective coordination of the electricity generation and transmission system. Additionally, it is responsible for the transmission of high voltage electricity and it builds, maintains and operates the facilities of the transmission grid.

VISION

The goal is to be one of the leading companies in the management of electricity systems, recognised for offering a quality service of the highest standards, implementing ethical management, maintaining a firm commitment towards sustainable development and generating value for all our stakeholders.

VALUES

Responsibility

Respect

Reliability

Environmental awareness

Leadership and creativity

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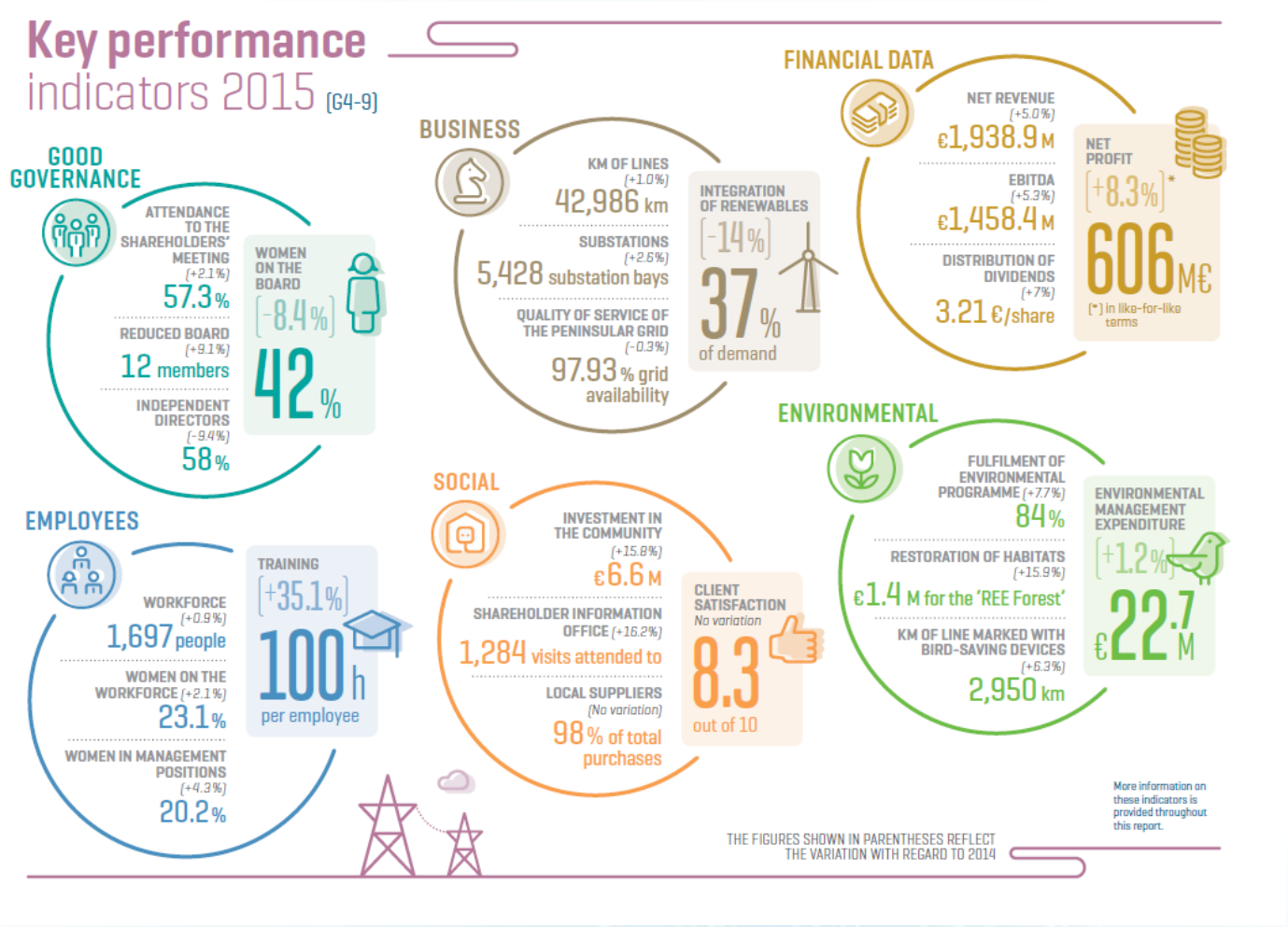
REE's overview



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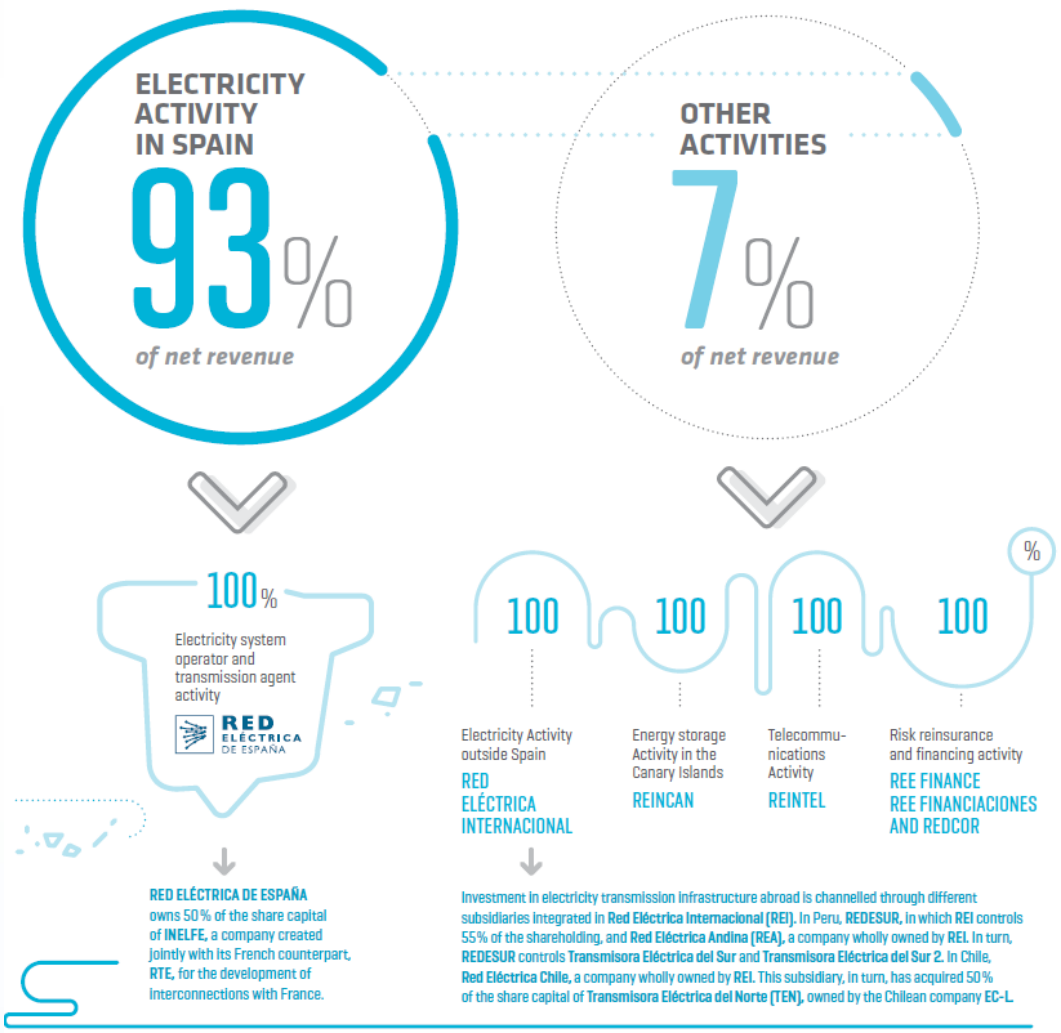
REE's overview



PRESENCE IN
SOUTH AMERICA

IN 2015
THREE NEW PROJECTS
Two in Peru and one in Chile

REINTEL
INFRASTRUCTURE

33,000 km
DARK OPTICAL FIBRE

And 800 points of presence and technical spaces

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- REE's overview

today's objective

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Today's objectives

Design a reliable SAS

- Whole Life Cycle analysis

Are we prepared to handle these systems?

- Adapt SAS IEC61850 to make it …
  - Efficient
  - Maintainable
  - Easy to use and standardize
- Adapt your ways of working

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- REE`s overview
- Today's objectives
- **SAS maintenance**
  - **How IEC61850 may affect to current maintenance processes?**
- Maintenance view on IEC61850 proposed solutions
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- Conclusions

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Maintenance feed back: Are we prepared?

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Maintenance feed back: Are we prepared?

Figure 4: Knowledge about IEC61850

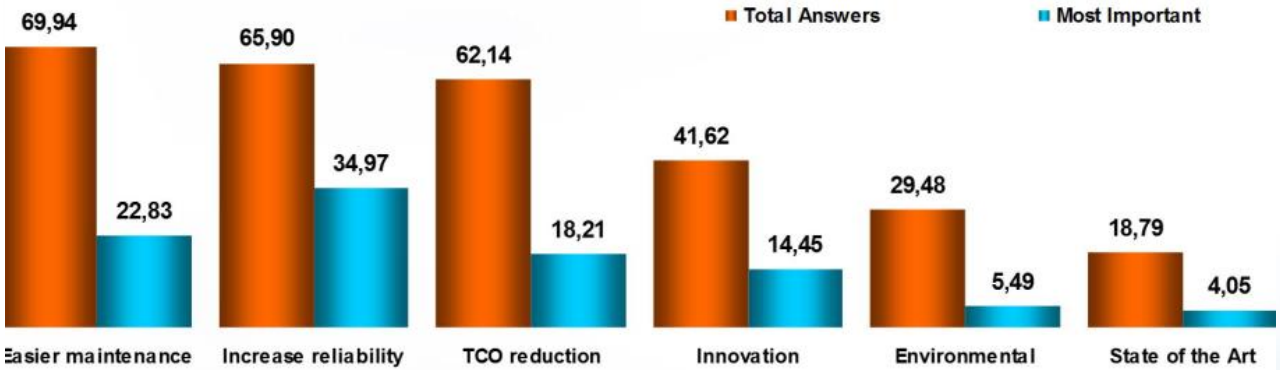
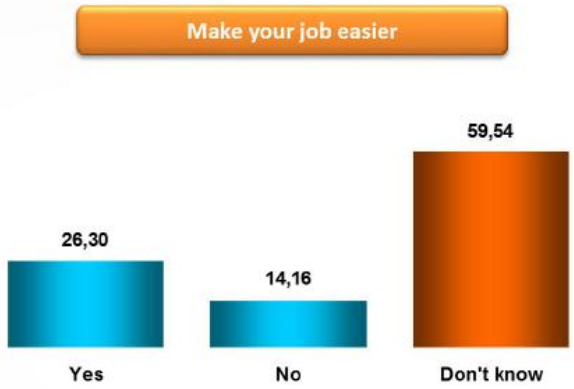


Figure 6: Design criteria



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Maintenance feed back

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Maintenance 'view'

Strengths	Weaknesses
Staff expertise Already Digital Want to improve	Different depts. IEC61850 knowledge Existing substations
Opportunities	**Threats**
Technology available Network control Moving to CBM Testing standardization	Cyber security Doc Management New ways of working

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IEC61850 design concepts

Optimizing SAS within REE

Challenges

- Reliability, availability, security and maintainability
- Tools handling
- Process bus (SPV)
- TCO Minimization
- Existing substations
- Towards CBM
- Vendor independency

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IEC61850 design concepts

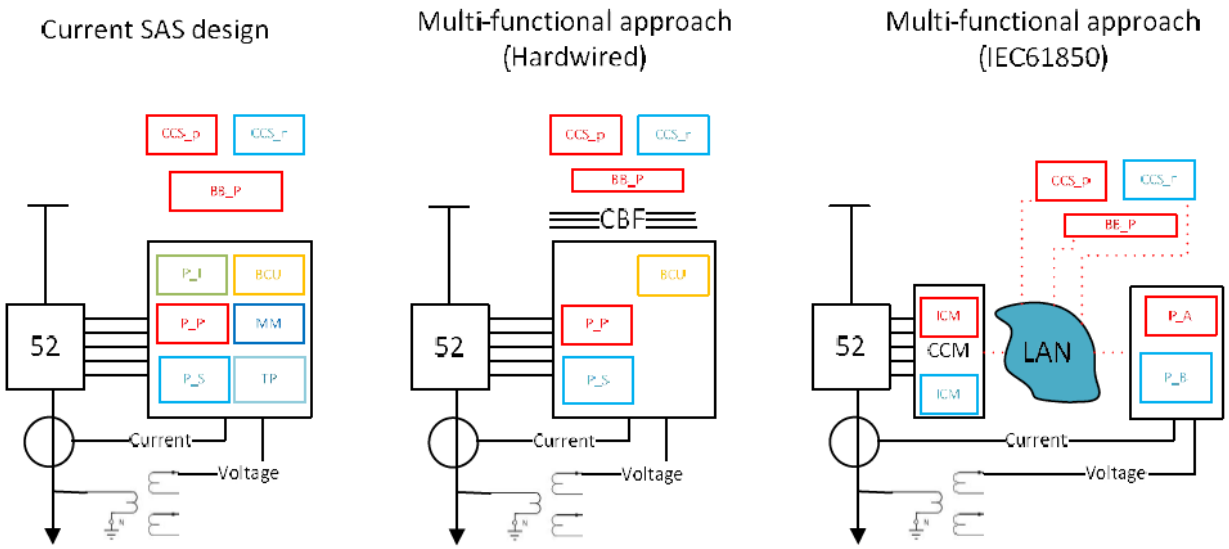

Figure 1: Step by Step PACS Design Process

- REE's design criteria
  - Simple & reliable & efficient
  - Multi-vendor
  - Protection / Control (segregated)

- Architecture
  - 1st Station Bus
  - 2nd Process Bus (trips & commands)
  - 3rd Process Bus including SPV

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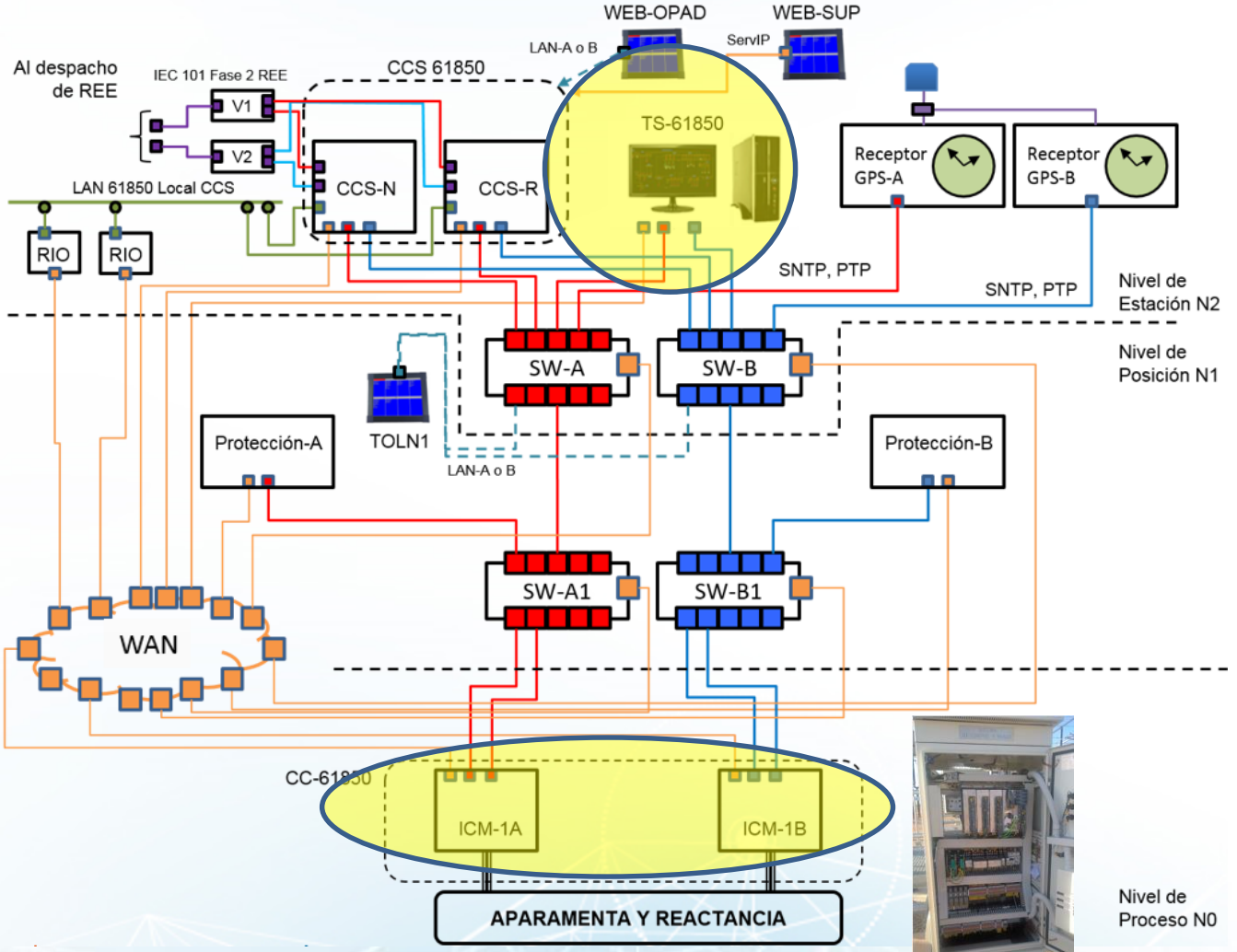
IEC61850 design concepts



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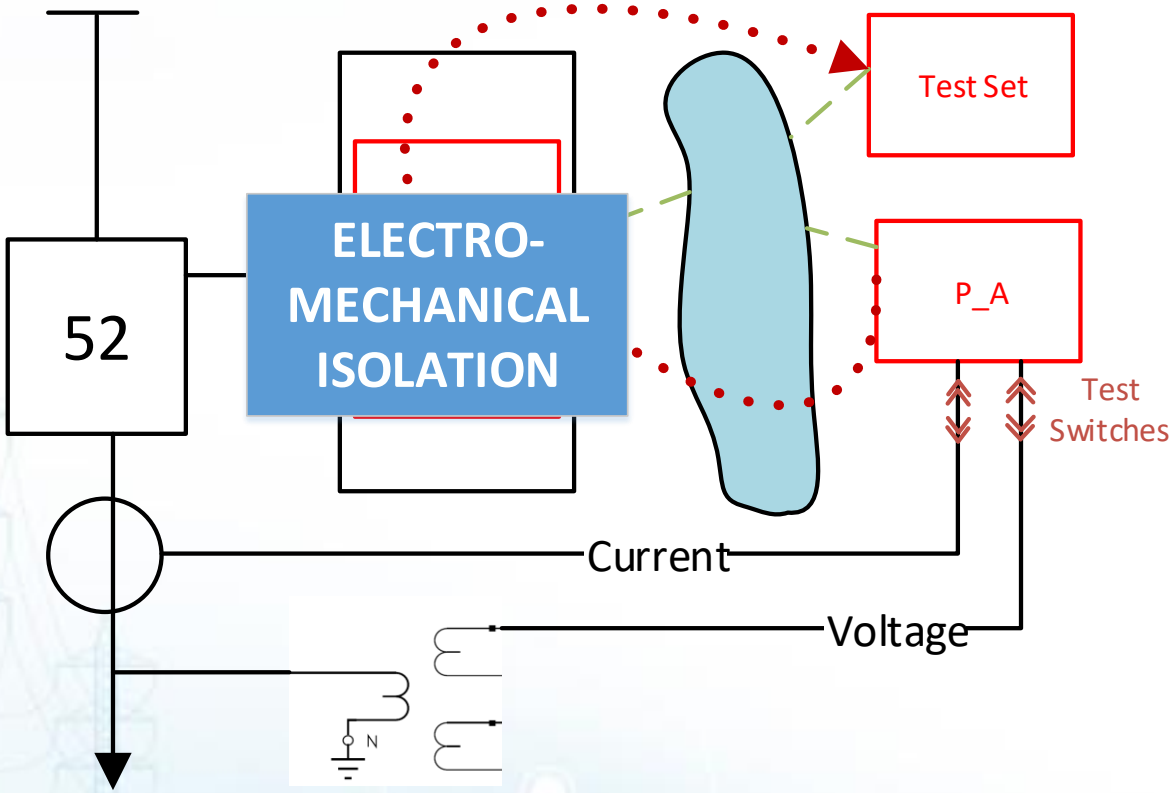
Isolation

Tests / Isolation

- Testing isolating steps
- 52/89 status & alarms
- Execute control and protection commands
- Breaker failure protection transfer
- Trip circuit monitoring
- Interlocking logics (CILO)



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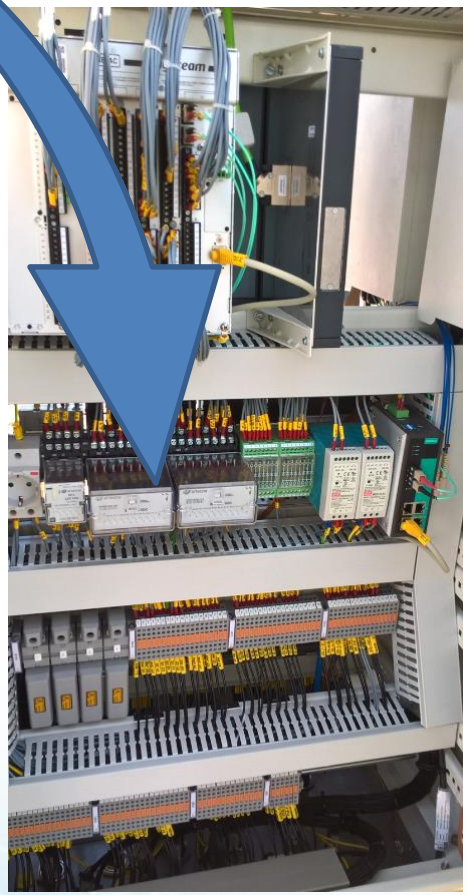
Isolation



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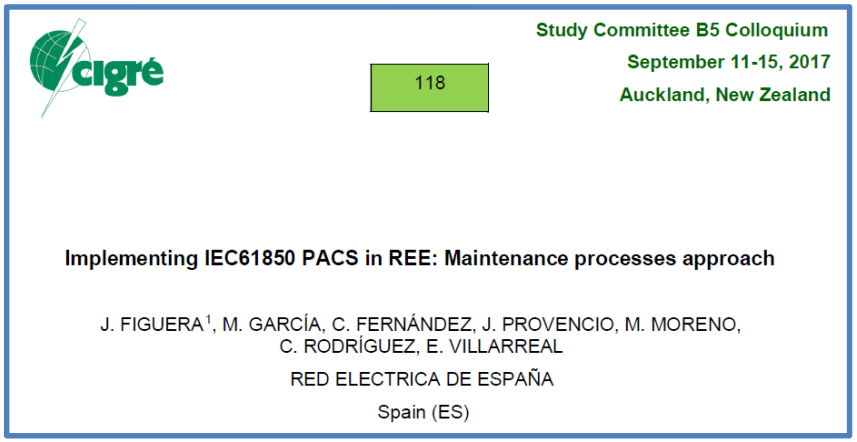
Conclusions

– IEC61850 technology is already **available**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Study Committee B5 Colloquium
September 11-15, 2017
Auckland, New Zealand

Implementing IEC61850 PACS in REE: Maintenance processes approach

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RED ELECTRICA DE ESPAÑA

Spain (ES)

– Working **processes** should be revised

– IEC61850 SAS can be considered as an **optimization driver** in terms of maintainability.

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Conclusions

– Considering **maintenance** needs from design steps

- C&P functions segregated
- **Isolation** and **testing**
- Cybersecurity
- Condition Based Maintenance.

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Conclusions

IEC61850
Testing & Training cubicle

- Learning by **doing**
- **Existing** substations
  - Refurbishment and renewal
  - Bay extensions
- **Interoperability** in multivendor Station and 'Process' bus solutions
  - GOOSE - MMS

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