New industrialized Substation Automation System
Project goals

New industrialized SAS

- IEC 61850 Ed. 2
- Fut proof
- Exportable
- Competition
- Cybersecurity
- One data origin (data quality)
- Standardization & Automation
- Industrialization & efficiencies
- Simple solutions
- Stay close to the market
- Crucial role of our central systems
Why use an SCT tool for the Engineering?

Industrialization

Traditional approach
Why an industrialized SAS?

Investment in Substations will increase dramatically

Industrializing SAS

- Increased productivity, reliability & predictability
- Lower engineering and testing costs → efficiencies
- Delivering investments on time and budget

PAC SYSTEM LIFECYCLE COSTS (Iberdrola Distribución, 2014)

APPLICABLE FOR NEW SUBSTATIONS, EXTENSIONS AND REFURBISHMENTS
Breakdown of Protection and Control Engineering

- Basic Engineering: 20%
- Selection of PAC devices: 10%
- Engineering and Integration of Substation UCS: 15%
- Detailed Engineering: 55%
Does our engineering process follow the standard?
Is the SSD sufficient input to the SCT tool?
Engineering process

SPECTRUM

Central systems
- SS & SW database
- IP repository
- Standard rules
- Standard files
- Etc.

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- IP repository
- Standard rules
- Standard files
- Etc.

Corporate dictionary

SSD

bin
.icd

SSD

others

SSD

61850

TO

104 + HMI AL

& EV

ICT

ICT

HMI

Gateway (RTU)

IED
Project scope

Central Systems

ST

Central Units

SCU

IED

Switchgear

Control Center (Spectrum)

Remote users

Central management systems

Gateway (RTU)

Local console (HMI)

Firewall

Firewall

SUBSTATION IEC61850 ETHERNET LOCAL AREA NETWORK

IEDs

Measurement Units

Bay Control Units

P+C Relays

Protection Relays & Disturbance recorders

Teleprotection Units

Conventional Wiring

Remote Control IEC 60870-104

Remote Access
SAS configuration process

STANDARDIZATION
Bay type & IED type definition

QUALIFICATION (supplier)
IED template generation

Template library

Central SAS systems (SCT)

Template library

Control System (SCADA)

ONE-CLICK CONFIG.
Local console (HMI)
Gateway (RTU)

ONE-CLICK CONFIG.

One-click config.
Central system developments

Great development effort: data integration, process automation
### Requirement overview

#### ICT
- Goose Engineering
- Command line
- Integrity check
- Total configuration file
- IP comparison
- Configuration comparison
- Remote FW upgrade
- No memory – external repository

#### IED
- Flexible product naming
- Protection functionalities
- Analog/counter functionalities
- Control functionalities
- Mechanical & electrical req. ROADMAP
- IEC 61850 services
- Log management (syslog)
- File management (secure)
Maintenance & refurbishment

MAINTENANCE
Use original SCD file without changes

DOES NOT REQUIRE RECONFIGURATION OF OTHER DEVICES

REFURBISHMENT
By voltage levels / modules to maximize industrialization
Separated HMI&Gateway (not shared for legacy protocols)
Benefits, Planning & Conclusions
Benefits

- **Dramatic decrease** in engineering & Testing costs.

  PAC SYSTEM LIFECYCLE COSTS (Iberdrola i-DE, 2014)

- Much easier renewal of electronic devices (different asset life cycles).
- **Optimized maintenance processes** (remote access, monitoring & support).
- **More simple solutions** for the user, managed by more generalist departments.
- **Could be applied** Exportable to other utilities
Schedule

Ongoing Work

2018 - 2019 Specifications

2019-2020 P&C Standardization

2021/23 Pilot projects

2019 - 2020 Developments & Validations

Industrialization
Summary

Standardization to pull industrialization & automation

One data origin $\rightarrow$ data quality

Creation of efficiencies

Simplification & automation $\rightarrow$
↓↓ errors, tests, costs, time↓↓

Good approach for other parties / to be extended inside Iberdrola