



# **Workforce Training and Education: Driving the skill and knowledge development of internal resources to capitalise on the full capabilities of an IEC 61850 compliant system**

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Disclaimer: The person making this presentation is not responsible for what he says because he has no idea what he is talking about

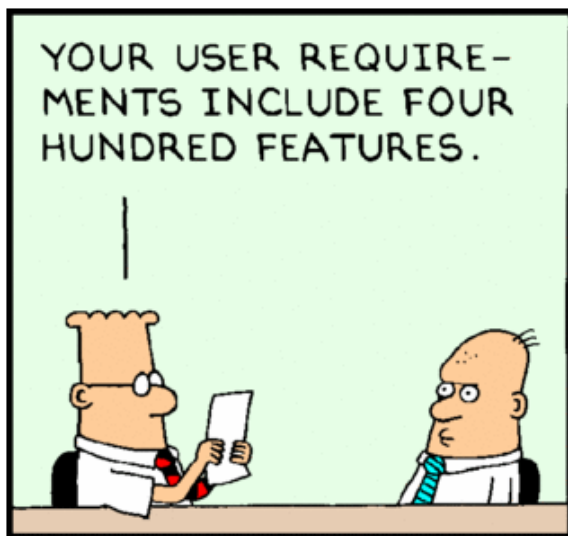
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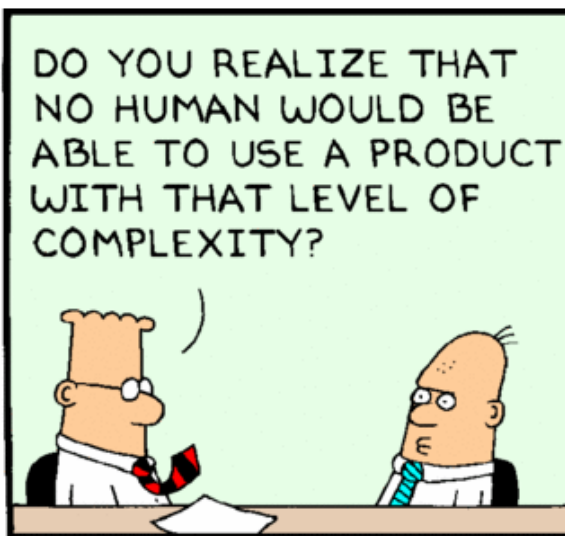
## Introduction

- IEC 61850 has been identified as a cornerstone technology for the smart grid
- It is changing the way protection automation and control systems are engineered, commissioned, tested and maintained
- It requires a new set of skills from the workforce in utilities and suppliers in order to deal with the complexity of the standard

# Easy to Use



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# Questions?

# Questions

- What are we doing?
- Why are we doing it?
- How are we doing it?

# Achievement



**ACHIEVEMENT**

YOU CAN DO ANYTHING YOU SET YOUR MIND TO WHEN YOU HAVE VISION,  
DETERMINATION, AND AN ENDLESS SUPPLY OF EXPENDABLE LABOR.

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# Workforce Performance Requirements

- Improvements in quality
- Improvements in efficiency



# Efficiency

- Effectiveness – the degree to which objectives are achieved, without consideration of the resources being used.
- Efficiency – the extent to which a resource is used in order to effectively achieve an objective.

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# Teamwork



## Roles in Electric Utilities

- Protection, automation and control specialists
- Telecommunications specialists
- System operators
- IT specialists
- Asset management specialists
- Substation specialist
- Power plant specialist
-

# Roles in Electric Utilities

- Standardization specialists
- Design specialists
- Commissioning specialists
- Maintenance specialists
- Event analysis specialists

# Improving Efficiency

- Standardization
- Integration
- Automation
- Testing versus Monitoring
- Documentation
- Object-Oriented Design (OOD)

# PACS Engineering Tools Functions

- Engineering is an important part of asset management
- Determine and document the application specific functionality
- Determine and document the integration of devices into the PACS
- Configure the system
- Test the system
- Monitor the system

# SAS Engineering Tools

- Project design tools
- Configuration tools
- Documentation tools
- Testing tools
- Monitoring tools
- Analysis tools



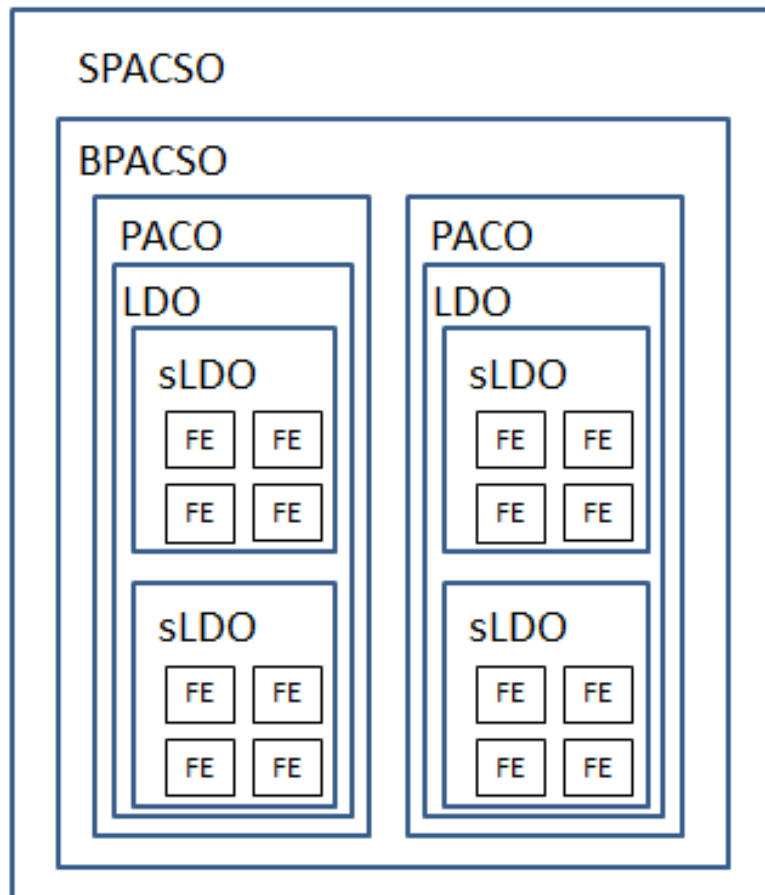
# Engineering Tools Requirements

- Improvements in the engineering process is one of the key requirements for the success of IEC 61850
- Tools that support different steps in the engineering process are being developed
- The dream: completely automatic engineering process

# Engineering Process Requirements

- Requires the implementation of an engineering process based on:
  - Knowledge of the problem domain
  - Knowledge of the state-of-the-art technology
  - Utility standards
  - Industry standards
  - Object-oriented design
  - State-of-the-art tools

# Object-Oriented Engineering





# SCL Files

- Substation Specification Description **\*.SSD**
- IED Capability Description **\*.ICD**
- Substation Configuration Description **\*.SCD**
- Instantiated IED Description **\*.IID**
- Configured IED Description **\*.CID**

# Skills

- What skills are required?
- Who needs to have the skills?
- Where does it fit within the organization?
- Centralized versus local expertise (hierarchical)
- Role-based skills requirements definition

# Skills

- Centralize champions
- Standardization
- Authority of the specialized unit
- Automation
- Training and certification
- Environment supporting personal development
- Environment supporting innovation
- Accountability and responsibility

# Skills

- UML
- XML
- Ethernet communications
- Windows
- Programmable scheme logic  
(including IEC 81131 and 81499)
- Cyber security



# Skills

- Software development
- Software version control/management
- Wide area communications
- Wireless communications
- IEC 61850
- Tools

## Training the trainers

- Trainers should be experts in the subject of the training
- Training on IEC 61850 principles, applications and benefits
- Training on engineering tools
- Training on testing tools
- Training on troubleshooting tools

# Methods for training

- Self-training
- Webinars
- Seminars
- Workshops
- Training classes
- Pilot projects
- IEC 61850 industry working groups
- IEC 61850 standards development

# Training



# Playground



# Stop Dreaming



**GET TO WORK**

YOU AREN'T BEING PAID TO BELIEVE IN THE POWER OF YOUR DREAMS.

# Questions?