

DistribuTech 2007

February 04, 2007
San Diego, CA



IMPACT OF IEC 61850 ON SYSTEM ENGINEERING, TOOLS, PEOPLEWARE, AND THE ROLE OF THE SYSTEM INTEGRATOR

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Content

- ▶ The three critical infrastructures
- ▶ The future power delivery system
- ▶ System integration
- ▶ Peopleware
- ▶ Summary



Three critical infrastructures

- ▶ Power delivery system
- ▶ IT and communication
- ▶ Workforce and education



The future power delivery system







- ▶ The quality of the power delivery system in the future is based on
 - ▶ **system requirements**
 - ▶ technical assets
 - ▶ **tools for system integration**
 - ▶ organization and
 - ▶ **people**

Growing requirements

- ▶ **Requirements** for information, information exchange and configuration **grow** like a volcano!
- ▶ IEC 61850 and IEC 61850 applications **can grow with new needs**



Almost everything grows

- ▶ Complexity of transactions, generation, transmission, distribution, ... 
- ▶ Complexity of IT and communication 
- ▶ Retiring “boomers” 
- ▶ Engineering students 
- ▶ Offerings for power system education 
- ▶ Work load per engineer 

European blackout Nov 4, 2006

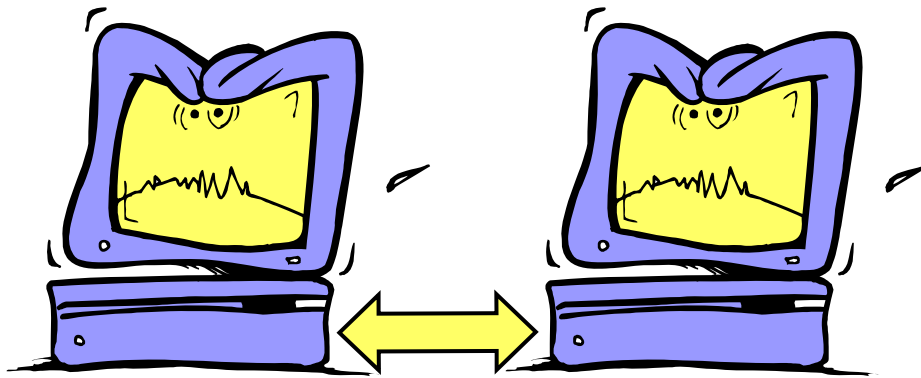
- ▶ Power delivery system of the future has **growing number of entities** (generators, IEDs, control, protection, monitors, ...) that impact the system seriously
- ▶ The **system** is more than the sum of its parts
- ▶ Need **much more** information and communication
- ▶ Need **more tools** (configuration, validation, ...)
- ▶ Need **more well educated and trained people**

Tools are key for system integration

- ▶ Design
- ▶ Engineering and configuration of substation, IEDs
- ▶ Validation of IED's information models
- ▶ Configuration of client data base
- ▶ Simulation of missing IEDs
- ▶ Simulation of process I/O driven
- ▶ Traffic engineering
- ▶ Documentation of information model
- ▶ Automation
- ▶ ...

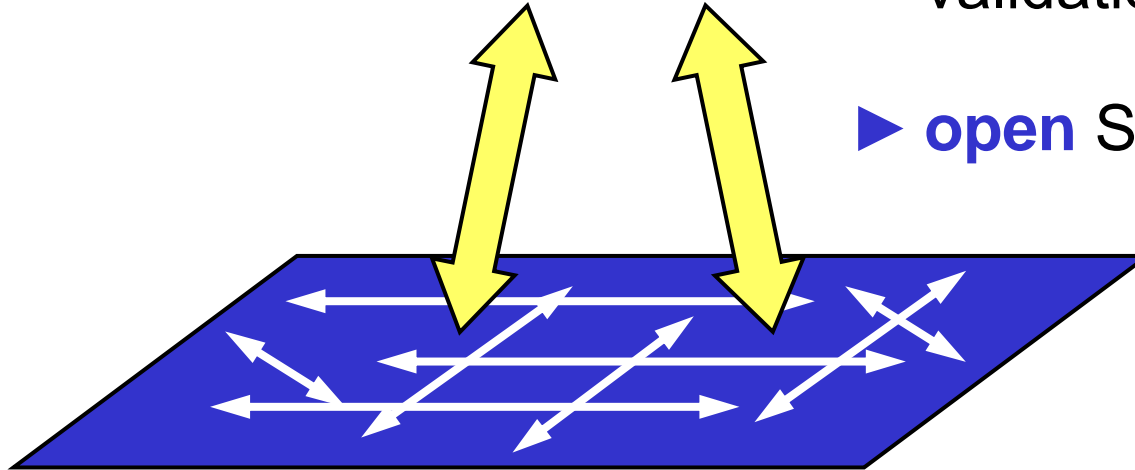


Open IEDs and closed tools!?



▶ (many) **CLOSED** system tools (design, engineering, automation, configuration, test, validation, ...)

▶ **open** SCL files

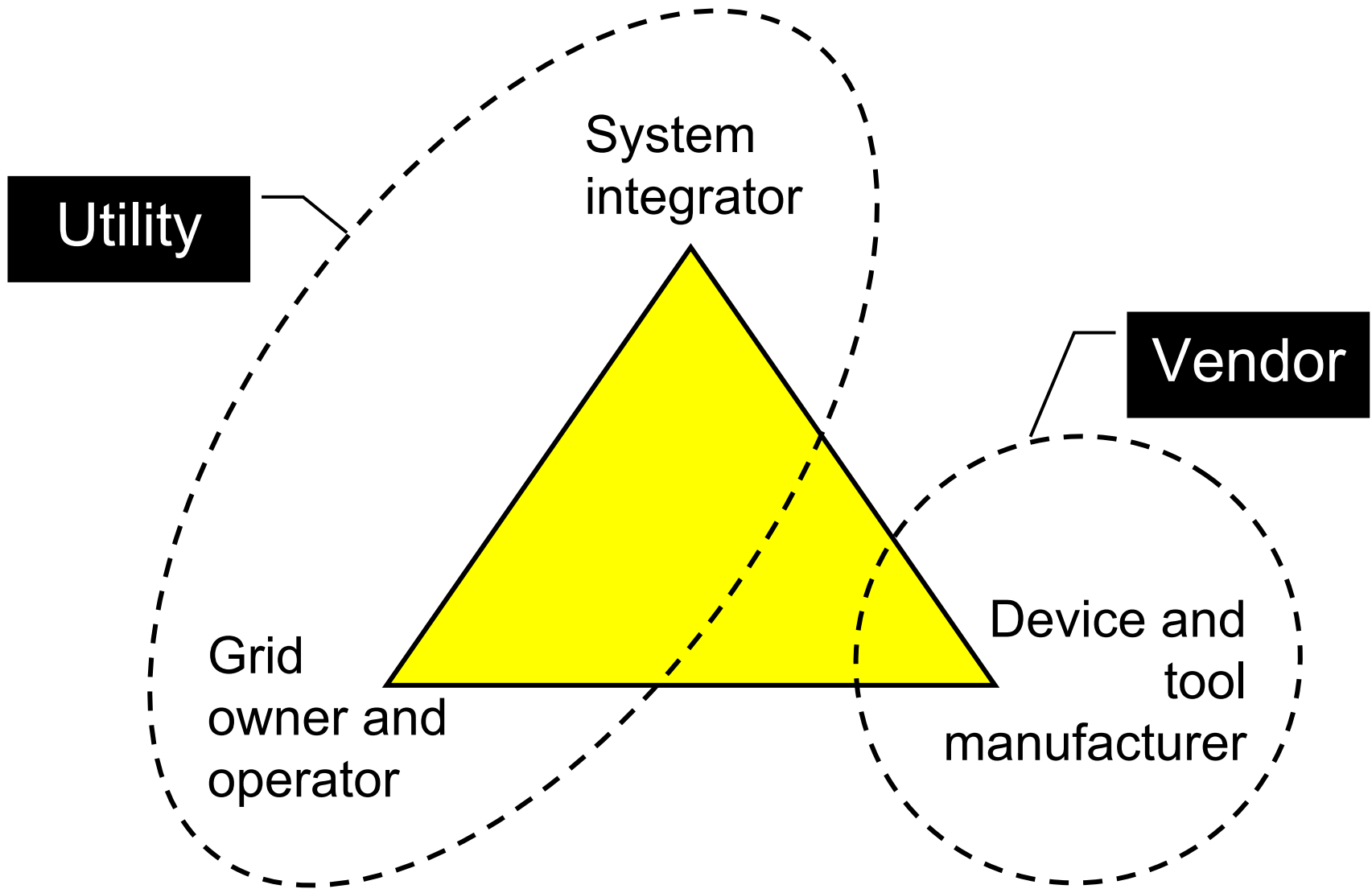


IEDs and network

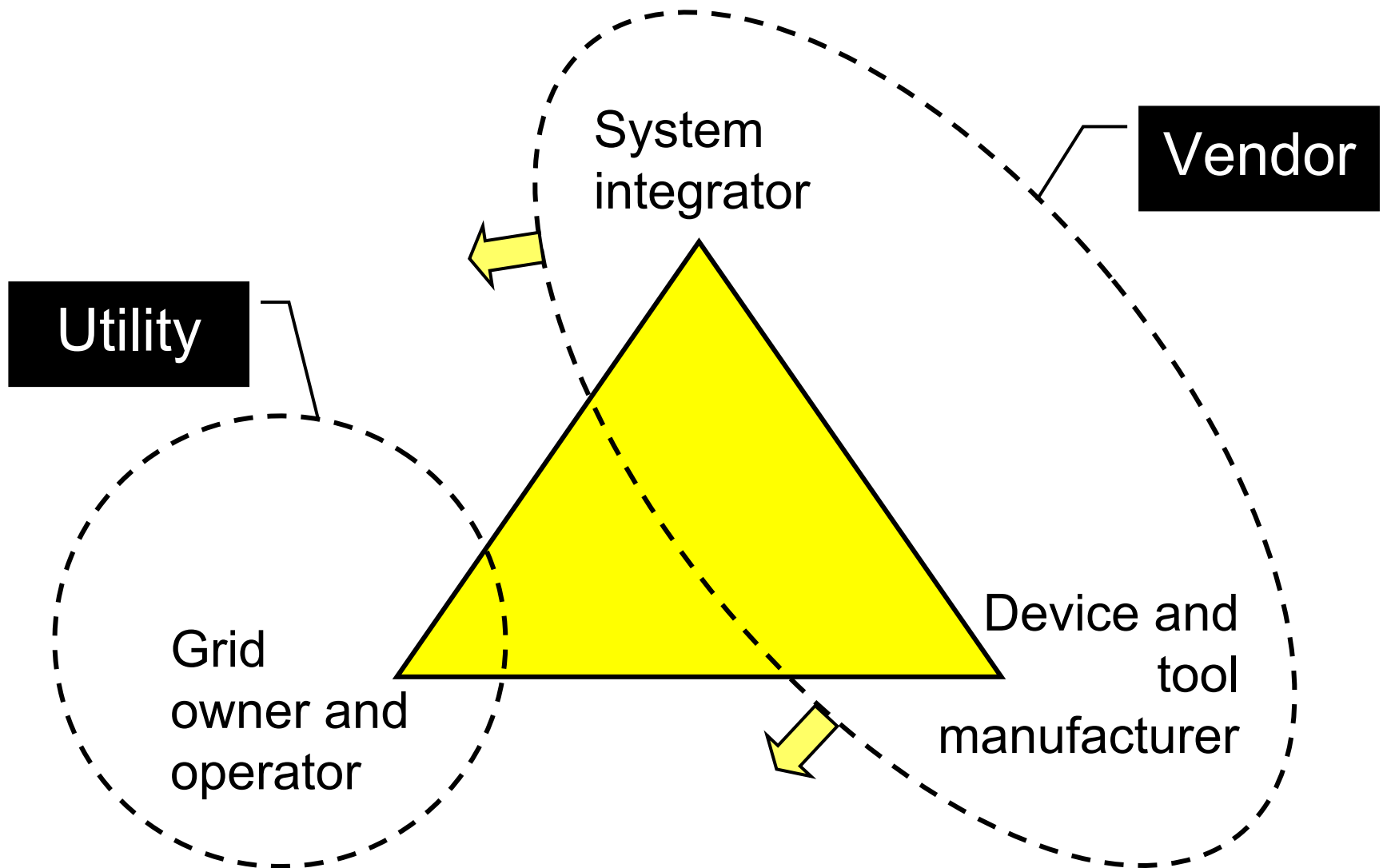
▶ **open** information

▶ **open** information exchange

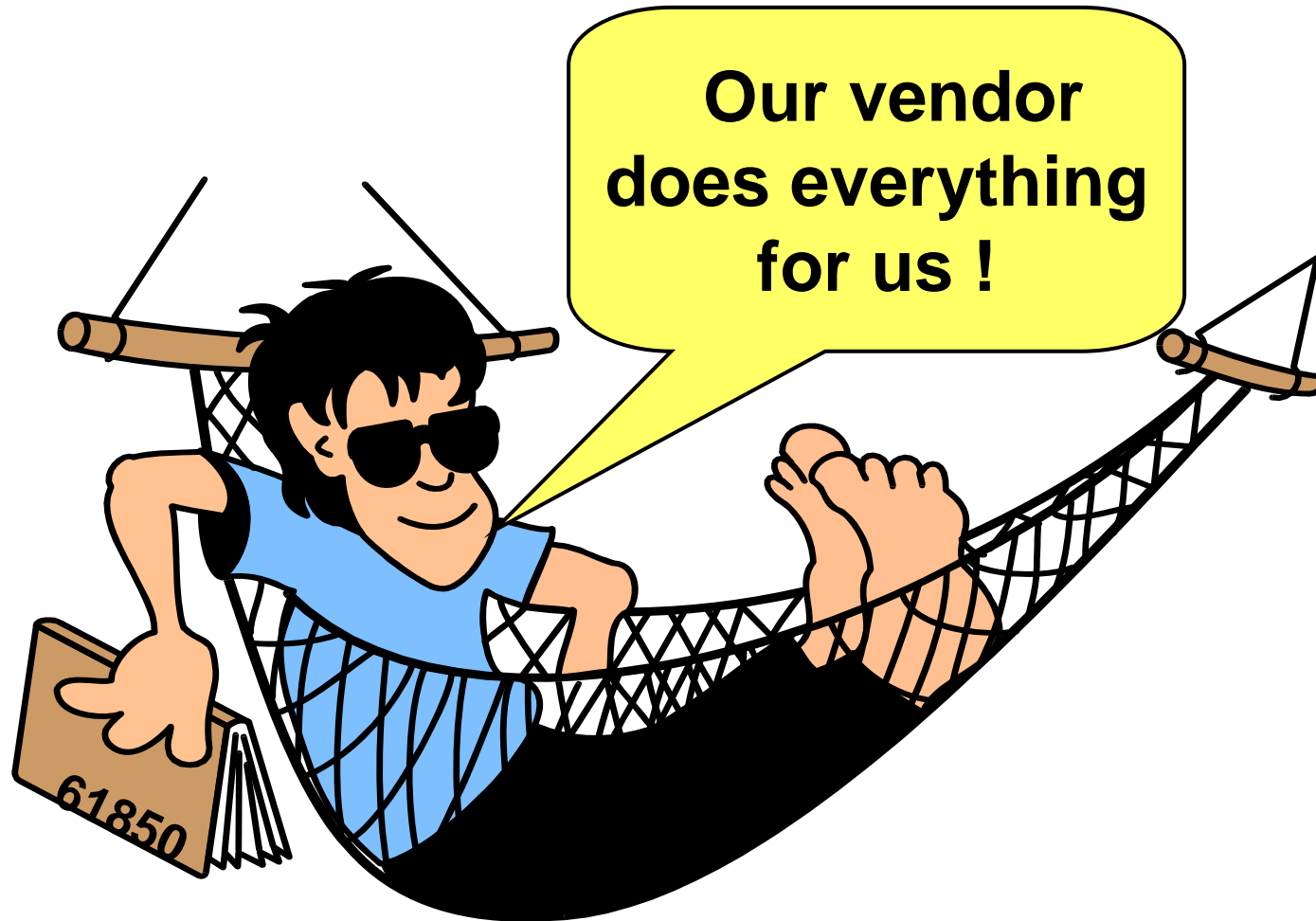
System integration (utility driven)



System integration (vendor driven)



Bright future of utility engineers



The future is about **tools**

- ▶ **Many** tools are under development
- ▶ Vendor and third-party tools may be **open or closed**
- ▶ Utility need to understand their **dependency on tools** (i.e., on vendors)
- ▶ Utilities to **speed up** awareness process



The future is about **people**

- ▶ A fool with a tool is **still a fool**
- ▶ A fool with a tool can **foul up** projects faster than a fool without a tool
- ▶ Tools require **well educated and trained people**



NERC 2006 Long-Term Reliability Assessment

- ▶ “The reliability of the North American electric utility grid is dependent on the accumulated **experience and technical expertise** of those who **design and operate the system**.
- ▶ As the rapidly aging workforce leaves the industry over the next five to ten years, the challenge to the electric utility industry will be to **fill this void**.”

See LTRA page 9



Future workforce (people)

- ▶ **Has to fill the void** to design and operate the system with the **current** moderate complexity
- ▶ **Has to get prepared** to design and operate the **growing complexity** of the future electric power delivery system

IEC 61850 and the future workforce

- ▶ The standard IEC 61850 and other IEC TC 57 standards will help the utility industry to:
 - ▶ **improve** management, automation and monitoring of the electric power delivery system
 - ▶ **reduce costs** for planning, engineering, operating, and managing
 - ▶ **reduce the proliferation** of solutions, most of which are proprietary



IEC 61850 and the future workforce

- ▶ Who needs to understand the **growing complexity** with regard to IEC 61850 and the tools supporting IEC 61850?
- ▶ Vendors often say: **only the vendors' experts** need to really understand the new and growing complexity
- ▶ Users should speed up to educate their engineers to **design and operate the growing complexity** of the **future information, information exchange, configuration, and communication system.**



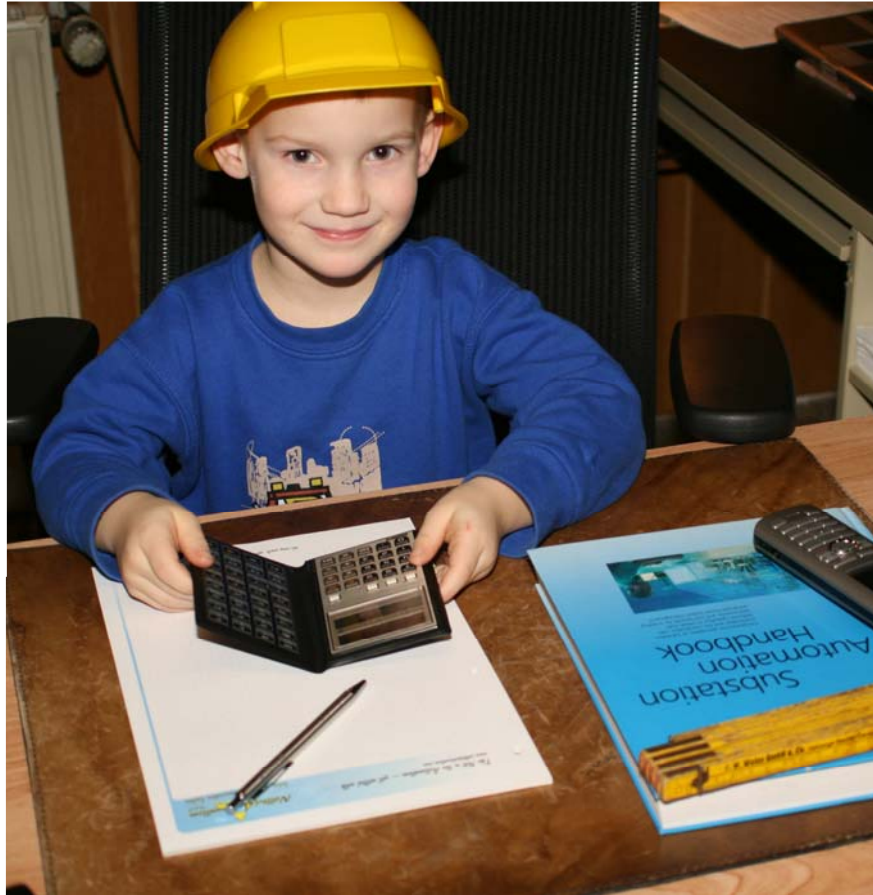
IEC 61850 and future power system

- ▶ Utilities to start migration planning soon
- ▶ Migration planning:
 - ▶ general training, awareness program
 - ▶ pilot lab test
 - ▶ real pilot project
 - ▶ plan to design and operate the future system
 - ▶ detailed procurement specification
 - ▶ build systems in large scale
- ▶ Duration of planning: three to five years



Long term education starts here

My grandson Joern (5) may become an engineer like his grandfathers and father ...



... he did not inherit our experience ... so I started to educate him

New education programs

Many Kindergartens in Germany have started with education in engineering ... really



Summary

- ▶ The big vendors are **speeding up** quite fast – they are **not waiting for other people** to **share the benefit** of the use of IEC 61850
- ▶ **Start now** with the awareness and education program of your most crucial asset: **PEOPLE**
- ▶ Think about a **migration plan** on how and when to migrate to the complex standardized solutions (not only because of IEC 61850, proprietary solutions will become complex and grow as well)
- ▶ Think about **YOUR role!**



Additional information

- ▶ Contact: schwarz@scc-online.de
- ▶ <http://www.nettedautomation.com>
- ▶ These slides: ...[nettedautomation.com/news](http://www.nettedautomation.com/news)
- ▶ Final report on huge blackout in Europe on 2006-11-04:
http://www.ucte.org/news/e_default.asp#30012007
- ▶ FERC 2006 Long-Term Reliability Assessment:
ftp://www.nerc.com/pub/sys/all_updl/docs/pubs/LTRA2006.pdf



Questions

