



SEESGEN-ICT

4° GENERAL WORKSHOP

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WP3 - ICT for Energy Efficiency Monitoring in Smartgrids

**Interoperability Issues – Scope, General issues,
Application Priorities**



PARIS 14/04/2011



Scope of the presentation

Overview

1. Background material from EU and US
2. Introduction: Interoperability in a Smart Grid context
3. General issues
4. List of concerns



Background Material (I)

■ EU

- *European Commission Climate Action. The “20-20-20” Targets.* (http://ec.europa.eu/clima/policies/brief/eu/package_en.htm)
- *The European Electricity Grid Initiative (EEGI. Roadmap 2010 – 18 and Detailed Implementation Plan 2010 – 12.* (<http://www.smartgrids.eu/?q=node/170>)
- *The European Strategic Energy Technology Plan. SET-Plan Towards a low-carbon future.* (http://ec.europa.eu/energy/technology/set_plan/set_plan_en.htm)
- *European Technology Platform SmartGrids: Strategic Deployment Document for Europe’s Electricity Networks of the Future.* April 2010.
- *European Commission SETIS Strategic energy technologies information systems,* (http://setis.ec.europa.eu/about_old)
- *SmartGrids ETP Forum.* (<http://www.smartgrids.eu/?q=node/160>)
- *European Technology Platform SmartGrids: Strategic Deployment Document (SDD) for Europe’s Electricity Networks of the Future,* ETP Forum report, April 2010.
- *Smart Grid Mandate. Standardization Mandate. M/490,* March 2011.
- *Evaluation of selected SmartGrid projects, e.g., INTEGRAL on implementation of three pilots.* (<http://integral-eu.com/>)



Background Material (II)

■ US

- GridWise Architecture Council (GWAC), *GridWise® Interoperability Context- Setting Framework*, v.1, March 2008. (<http://www.gridwiseac.org/>)
- *NIST Framework and Roadmap for Smart Grid Interoperability Standards*, Release 1.0. Office of the National Coordinator for Smart Grid Interoperability, January 2010. NIST Special publication 1108. (<http://www.nist.gov/smartgrid/>)
- Introduction to NISTIR 7628. *Guidelines for Smart Grid Cyber Security*. The Smart Grid Interoperability Panel, Cyber Security Working Group, September 2010. (<http://www.nist.gov/smartgrid/>)



Interoperability definitions

- *“The capability of two or more **networks, systems, devices, applications** or **components** to **exchange** and readily **use** information, securely, effectively and with little or no inconvenience to the user. The system will share a **common meaning** of the exchanged information and this information will elicit **agreed-upon types of response**.” [NIST]*

- The following **additional requirements** are put forward by **GridWise Architecture Council (GWAC)**:
 - *“an agreed **expectation for the response** of the information exchange”*
 - *“requisite **quality of service** in information exchange: reliability, fidelity, security”*
 - *“the results of such interactions enables a **larger system capability that transcends the local perspective** of each participating subsystem”*



Interoperability between SmartGrids Domains

- NIST Architecture of Smartgrid Domains. Systems of Systems (SoS)

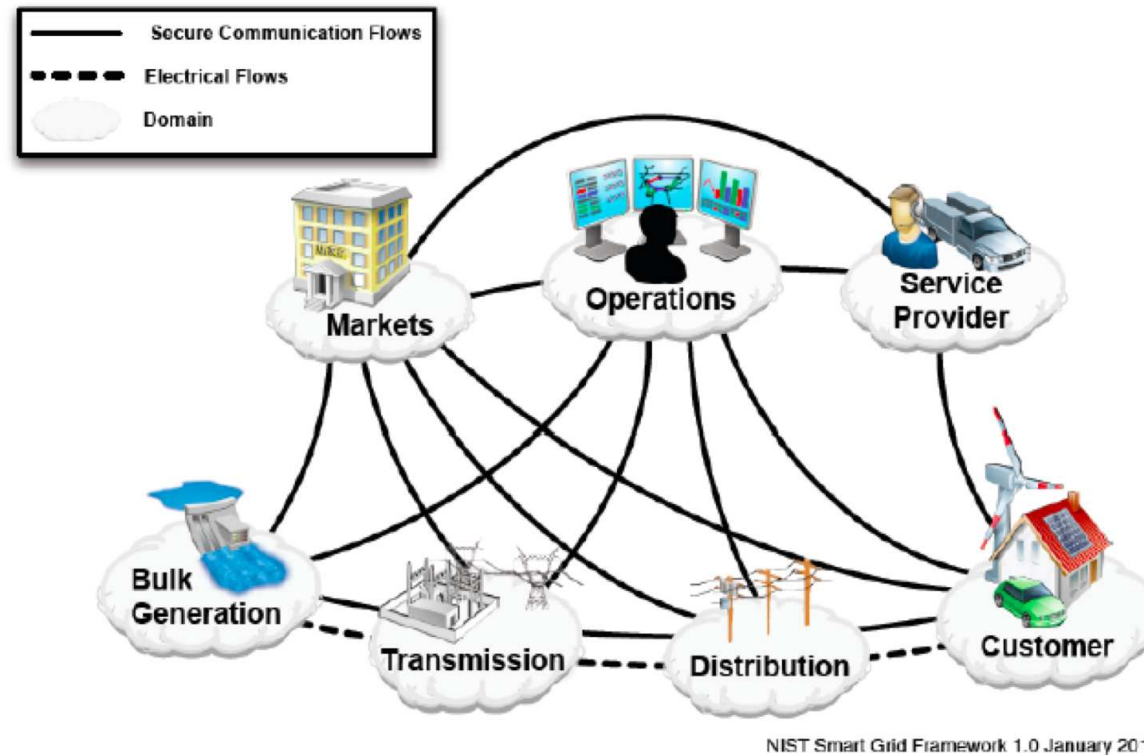


Figure 3-1 Interaction of actors in different Smart Grid Domains through Secure Communication Flows and Electrical Flows.



Interoperability Cross-Cutting Framework

- Issues of Quality of Service (QoS) and Interoperability

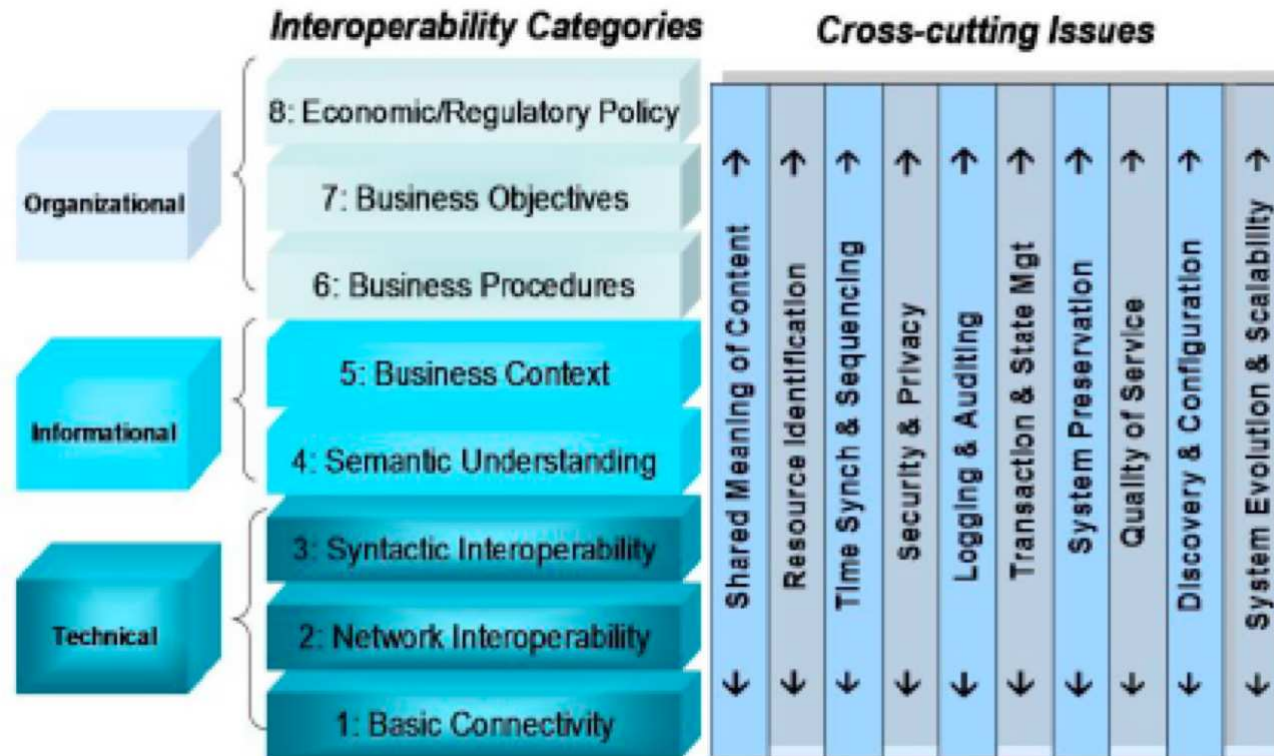


Figure 6: Interoperability Context-Setting Framework Diagram



Issues

- Interoperability is layered into **eight Categories**. The **non-functional system requirements** are defined as **vertical crosscutting Issues across Categories**.
- Challenges are related to proper implementations of **horizontal coordination within Categories** and **vertical coordination across categories** taking into account the cross-cutting issues. The vertical integration will require **transformation of data content, while maintaining contextual meaning** interpreted by sender-receiver
- **Local interoperability** is enabled by **enforcing standards**. However, **global end-to-end interoperability** require **implementation and monitoring message exchange and content across organizational boundaries**.



Issues addressed in WP3

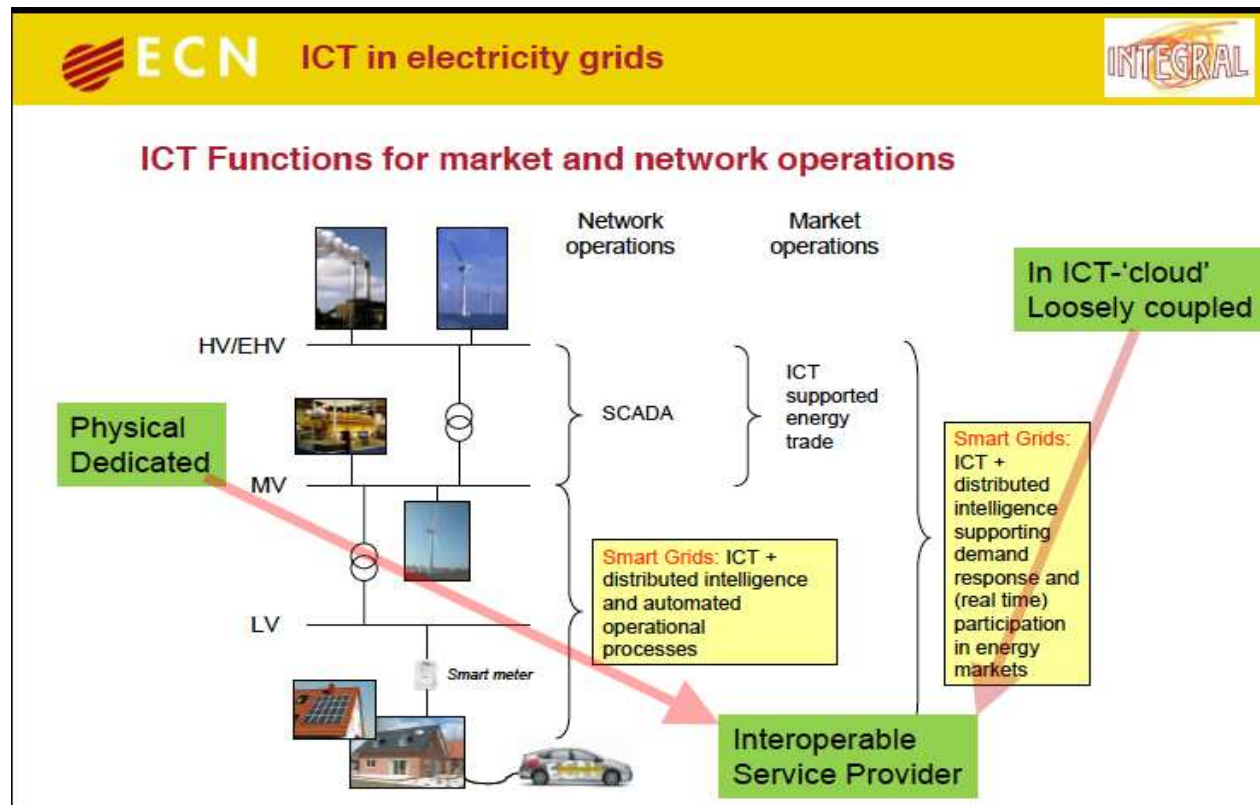
- Service Level Agreements (SLAs)
- Monitoring
- Evolution of Smartgrids
- Enforcement of standards

We will return to those issues and application priorities later!



Pilot studies from EU Project INTEGRAL

- Three Pilots with **different ICT solutions** meeting requirements of **Normal, Critical and Self-Healing operations**.
- Systems of Systems are designed and implemented as **Service Oriented Systems**.





Concerns

- Implementing and validating Interoperability in Smartgrids
- Interoperability between SCADA systems and supporting ICT systems in contexts of Smartgrids
- Lessons learned from Smartgrids Pilots
- A Roadmap of designing and implementing ICT enabled Interoperable Smartgrids

We will return to “Recommendations and concrete actions”!