



Smart TSO-DSO interaction schemes, market architectures and ICT
Solutions for the integration of ancillary services from demand side
management and distributed generation

EUW16 Barcelona – Interoperability session | 16.11.2016

Communication and ICT Requirements

Seppo Horsmanheimo, VTT



This project has received funding from the European Union's Horizon 2020
research and innovation programme under grant agreement No 691405

Motivation

- Intelligent interoperability sets new challenges for communications and security
- There is a need to elaborate communication architecture to support energy system requirements from the business layer down to the component layer
 - to fulfil monitoring aspects
 - to guarantee observability and
 - to control distributed generation, flexible demand and storage systems
 - to permit the participation of DER in energy markets



Communication

In general

- Evolved ICT opens new possibilities to develop advanced communication solutions to support TSO-DSO coordination and ancillary service provision in a reliable and secure way.

In practise, we need

- **To analyse** the need of information exchange and communication among different stakeholders in centralized and distributed coordination schemes.
- **To discover** what ICT technologies are available now and in the future, and understand possibilities and challenges associated with them.
- **To elaborate ICT architecture design** and provide communication layer specifications for the SmartNet simulation platform and pilots.



Approach for capturing ICT requirements

1. Identify the critical communication and security requirements for TSO-DSO and market interactions.
2. Map ICT requirements and functionalities to e.g. SGAM model.
3. Elaborate the ICT architecture design and prepare ICT specifications.
4. Provide communication layer specifications for the pilots and simulation platforms to be realized

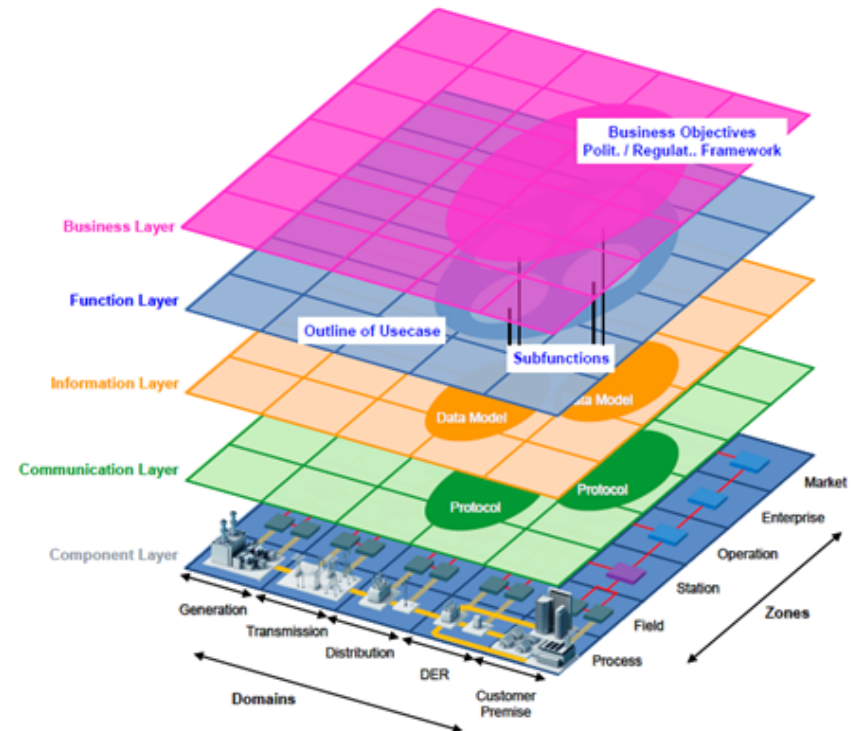
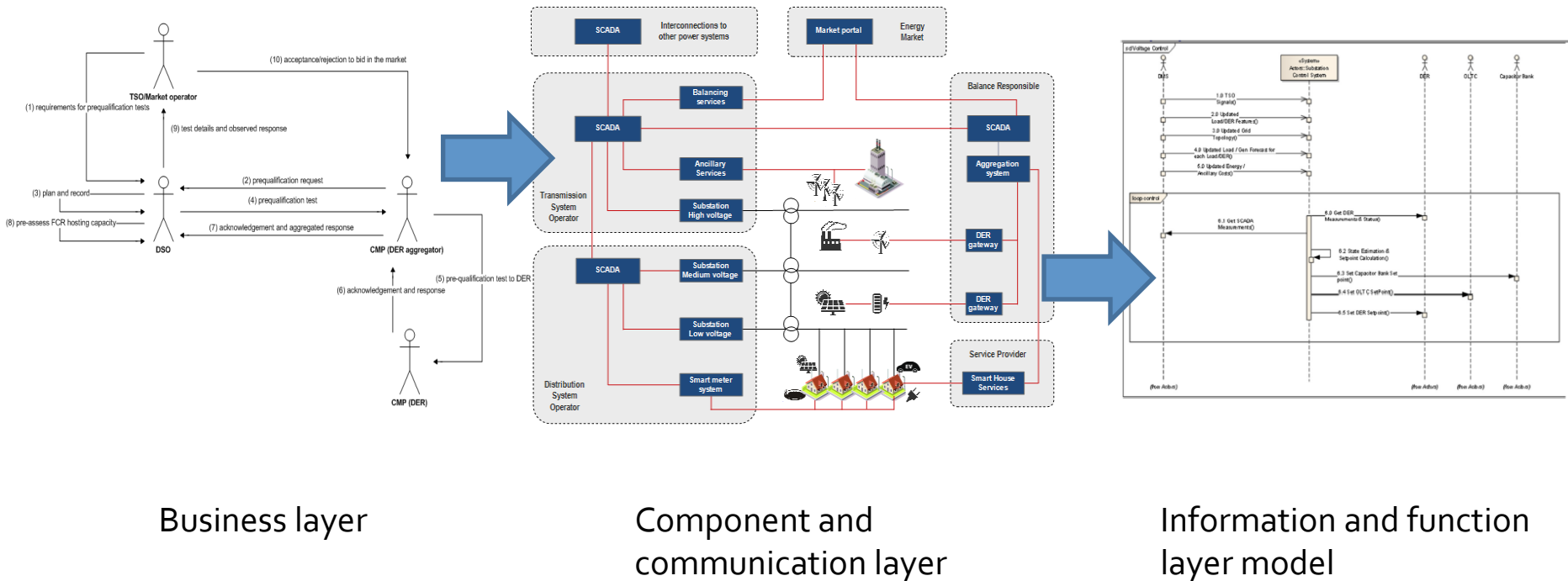
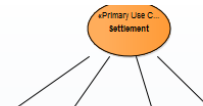
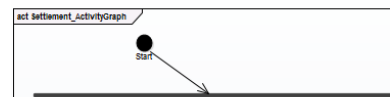


Figure 3 – Smart Grid Architecture Model (SGAM) [Source: SG-CG/M490/C]



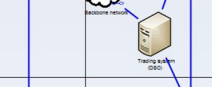
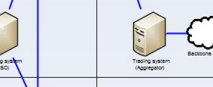

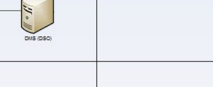
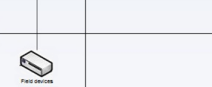
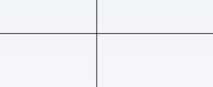


Transition from business actions to ICT specifications



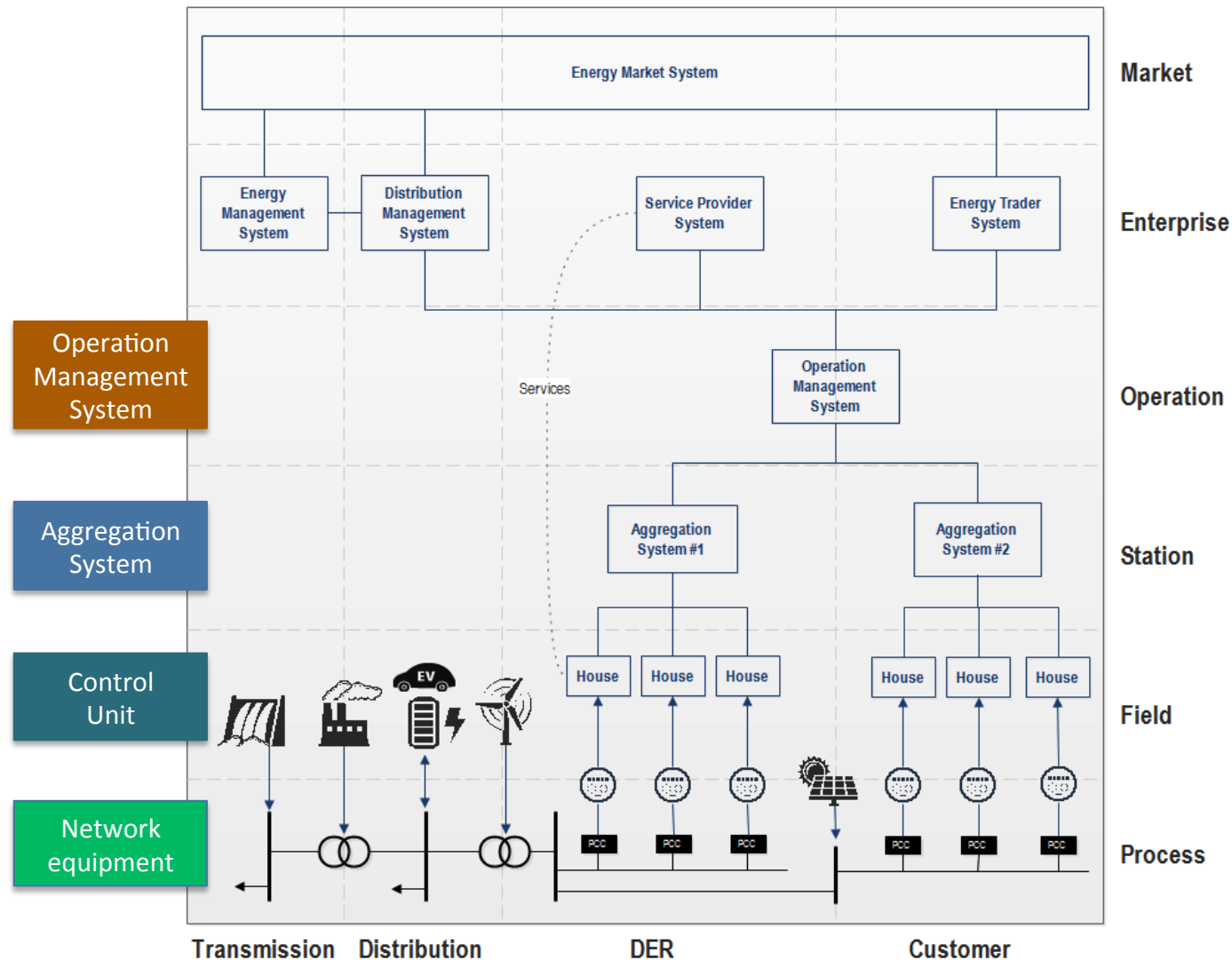
SGAM Modelling



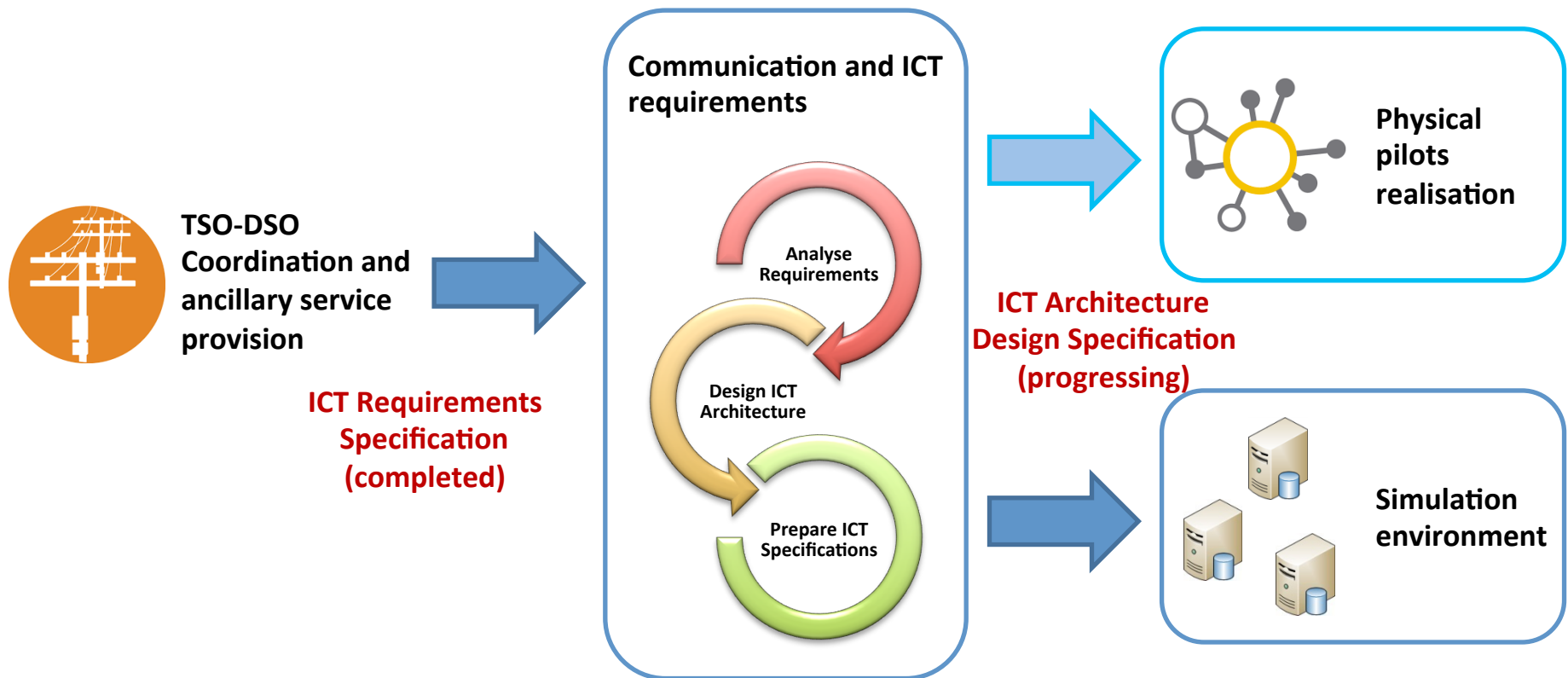
ICT Requirement SmartNet.xlsx - Microsoft Excel									
DER to CMP communication									
1	Description	ID	Networking properties	Security	Latency	Data size/data rate	Cost		
2	Requirements for prequalification assessment	RC_Prequalification_B	Two ways communication, TCP/IP P2P Multi technology support Maximum transfer time of the signal: 5 min	Security level: 3 - Integrity: 3 - Availability: 2 - Confidentiality: 3 - Authentication: 5 - Non-repudiation: 3	Type3	150 - 1000 Bytes / 9.6 kbps	Medium		
3	Requirements for prequalification assessment	RC_Prequalification_C	Two ways communication, TCP/IP P2P Multi technology support Maximum transfer time of the signal: 5 min	Security level: 2 - Integrity: 2 - Availability: 2 - Confidentiality: 2 - Authentication: 4 - Non-repudiation: 2	Type3	≤ 150 Bytes / 9.6 kbps	Low		
4	Market Communication (CMP to Market)	RC_CMPtoMarket_B	Two ways communication, TCP/IP P2P Multi technology support Maximum transfer time of the signal: 5 min	Security level: 3 - Integrity: 3 - Availability: 2 - Confidentiality: 3 - Authentication: 5 - Non-repudiation: 3	Type 3	150 - 1000 Bytes / 9.6 kbps	Medium		
5	Market Communication (CMP to Market)	RC_CMPtoMarket_C	Two ways communication, TCP/IP P2P Multi technology support Maximum transfer time of the signal: 5 min	Security level: 2 - Integrity: 2 - Availability: 2 - Confidentiality: 2 - Authentication: 4 - Non-repudiation: 2					
6	Market Communication (Market to CMP)	RC_MarketToCMP_B	Two ways communication, TCP/IP P2P Multi technology support Maximum transfer time of the signal: 5 min	Security level: 3 - Integrity: 3 - Availability: 2 - Confidentiality: 3 - Authentication: 5 - Non-repudiation: 3					
7	Market Communication (Market to CMP)	RC_MarketToCMP_C	Two ways communication, TCP/IP P2P Multi technology support Maximum transfer time of the signal: 5 min	Security level: 2 - Integrity: 2 - Availability: 2 - Confidentiality: 2 - Authentication: 4 - Non-repudiation: 2					
8	Market Communication (CMP to DER)	RC_MarketCMPtoDER	Two ways communication, TCP/IP P2P Multi technology support Maximum transfer time of the signal: 5 min	Security level: 2 - Integrity: 2 - Availability: 2 - Confidentiality: 2 - Authentication: 3 - Non-repudiation: 2					
8	Market Communication (DER to CMP)	RC_MarketDERtoCMP	Two ways communication, TCP/IP P2P Multi technology support	Security level: 2 - Integrity: 2 - Availability: 2 - Confidentiality: 2					

UC3 component layer	Generation	Transmission	Distribution	DER	Customer Premises
Market					
Enterprise					
Operation					
Station					
Field					
Process					

Model applied to pilot systems



Work package outcomes



SmartNet



SmartNet-Project.eu

This presentation reflects only the author's view and the Innovation and Networks Executive Agency (INEA) is not responsible for any use that may be made of the information it contains.



Thank You

Seppo Horsmanheimo

Contact Information

Affiliation:	VTT TECHNICAL RESEARCH CENTRE OF FINLAND LTD
Phone:	+358 40 5423 599
Email:	seppo.horsmanheimo@vtt.fi

