



SEESGEN-ICT

4° GENERAL WORKSHOP

Paris - SAP Office, April 14th – 15th 2011

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*Recommandation for supporting
ICT use for Demand Side Integration
(WP4)*





Recommendation for WP4



R1) To develop standardization and shared practises for interoperability



R2) To develop solutions for reliability, safety and security



R3) To ensure the required technical ecosystem



R4) To follow approach complying with the end-user

- rules for protection of privacy
- segmentation of end-user and uses
- compliance with rights to choose his of way of life
- need complement by economist and sociologist



R5) To build a new regulation

Rf) To develop an ICT platform able to assembly this
The DSSP : The Demand Side Service orient ed Platform



Recommendation for WP4

Actions :

- A1) Create and Mandate a Working Group for the DSSP
- A2) Support research and development initiatives
- A3) Support Demonstrators for experimentation at real and significant scale
- A4) Building social consensus
- A5) Complementary evolution of regulation?



R1) To develop standardization and practises for interoperability

To enable interoperability between

- Devices on the end-user side

- Smart appliances / smart system : Home management System, smart electrical panel, etc...
- Smart generators / smart battery management system (Electrical Vehicle)

- Tools on the system side

- SCADA, DMS on the DSO side
- Commercial management tools on the intermediaries entities side

→ **Gateway** is required (partially or completely via the smart meter) : ICT standards and practises has to ensure That any end-users devices and any tools of systems could interact via this gateway

- Interoperability consist in

- recognition of devices on system
- physical capability to exchange signals
- capability to ensure coherent communication
- capability to exchange information: data, signals → required a level of mutual understanding
- capability to exchange service, transaction → required another level of mutual understanding

- Issues are

- **Operationnal interoperability** : Any devices could participate to the system with enough level of reliability.
 - develop robustness, simplicity and plug and play systems.
- **Compromise between constraint and openness**
 - Degree of constraint to ensure reliability of interoperability and compliance with system constraints
 - Degree of flexibility to be open to actual and futur system participant and end-user devices suppliers
- **Consensus between all the stakeholders (leader ICT providers, standardisation bodies)**
 - End-users representative
 - Electricity network and market participant: DSO, intermediaries entities and energy suppliers
 - Technology providers for the systems
 - Technology and device providers for the end-user : domestic appliance, EV, distributed generation



R1) To develop standardization and practises for interoperability

- Actions are

- Specific initiative about coordination of standardization action
- Support Demonstrators for experimentation at real and significant scale (for experimentation and validation)
- Mandate of a working group about DSSP
- Building of such standards tools through initiative about DSSP

The objectif is to deliver

- technical reference architecture
- set of consistent standards
- sustanaible standardization processes and collaborativet tools

-Such initiative could be relayed by the standardization mandate to the European Standardisation Organisations 5ESOs) to support European Smart Grid deployment: CEN, CENELEC and ETSI are madated (involved both Electrotechnical and Telecommunication standards)



R2) To develop solutions for reliability, safety and security

To provide

- reliability, security and safety of information exchange between end-user and system
- reliability, security and safety of service supplying from the DSI

To consist in

- Develop **cybersecurity and reliability technological solution** for ICT security, especially on the end-user side
 - Specific protocol, virtual network, dedicated channel + redundancy in strategic area, etc...
 - Innovative approach (see CRISP project)
- Develop **innovative security strategies**
 - To secure ICT infrastructure
 - To secure electrical system and market management (including use of service from DSI)

Issues are

To create security, safety and reliability solution in a system

- Combining end-user side and systems side (network+market)
- with multiple stakeholders and disseminated responsibilities
- To ensure security of the whole system security
 - No ICT flaw should threaten the DMS, the operating an network, to preserve energy balancing, frequency and voltage regulation, to minimize risk of black-out
 - No ICT flaw should threaten the availability, the quality of system service provide by the DSI and use for the balance of the system
- To ensure security, safety of the end-user environment
 - No ICT flaw should threaten the access of end-user to its energy and to its
 - No ICT flaw fail should threaten the privacy of the end-user
- To ensure the security of the energy market
 - Confidentiality of the commercial information, including for the end-user
 - Confidentiality of the information on the regulated side.
 - Safety and security of the commercial exchange
- To ensure security of all participants (leaders : DSO, regulators)



R2) To develop solutions for reliability, safety and security

Actions are

- **Specific R&D initiative about security , safety and security of distribution network integrating**
- **Coordination of initiative about security, reliability of the electrical systems and networks**
- Support Demonstrators for experimentation at real and significant scale (validation only)
 - Anticipate eventual future need of regulation
- **Mandate of a working group about DSSP for these problematic**
- **Building of such security, safety, reliability solutions tools through initiative about DSSP**



R3) To develop a technological ecosystem

To provide technological ecosystem including all required device for ICT use for DSI

To consist in

- smart meters : minimal functionalities deployment
minimal roll out deadlines, including at local level.
- smart devices, captors, smart local energy management system

Issues are

- To enable exploiting of DER by smart metering and additional information exchange
- To enable management of DER by driving the devices

Actions are

- **Coordination of initiative about smart metering and smart appliance**
- **Coordination of ICT for DSI and smart meters/devices roll out**
- Anticipate eventual future need of regulation (about smart metering especially)
- **Mandate of a working group about DSSP for these problematic**



R4) To follow approach complying with societal requirements

To ensure ICT solution for DSI

- Which comply with the needs of the end-user (in all point of view)
- which comply with the rights of the end-users
- which provide adhesion of the end-users (and the success of the DSI)

To consist in

- segmentation of users and use : specific category of end-users should be targeted to take account of economic technical and sociological factors. Well focused pilot categories are essential to create successful dynamic.
- privacy protection: specific rules are required about properties, acces, storage, use and control of data and data systems: for example
 - minimization of categories, accuracy and quantity of acquired data (restricted to which is essential for the sy)
 - priority to aggregating data rather than individual data
 - effective access of the end-user to individual data
- Investigation of societal issues (sociological issue, human engineering issues) by independent experts.

Issues are

- The adaption with the laws of the end-user rights, as individual and as consumer (both at European and nation level)
- The acceptance of the DSI through the ICT and so the success of the DSI

Actions are

- **Specific R&D initiative about societal and economical issues**
- **Support Demonstrators for experimentation at real and significant scale (for experimentation and validation)**
- Evolution of regulation (about privacy for example)

- **Mandate of a working group about DSSP**
- **Building of such approach through initiative about DSSP**



R5) To develop a DSSP: ICT Demand Side Service oriented Platform

To develop a DSSP

→ To develop concept (virtual) ICT infrastructure allowing to interface the Distribution Electric System and the electricity market with active end-user, in order to deploy the potential of DSI in a Service Oriented Approach: The potential of DSI is deployed acting on: flexibility of loads; availability of Distributed Generation; Storage.

The DSSP is essential to provide the practises, rules that have to be shared by the multiple participant to the DSI, both from the technical and business point of view

To consist in

Upper layer:

- Bi-directional Communication Infrastructure;
- Service Infrastructure

Lower Layer: Distribution side / Commercial side / Demand side

ICT shared practises: architecture, communication protocols, data management systems, etc...

Issues are

To provide transverse solutions for DSI through ICT for the whole electrical system

- Including all issues: interoperability, security-safety-reliability, technological ecosystem, societal and economical
- Including all the stakeholders and participants
- Including technical, operationnel and business issue

Actions are

- Mandate of a working group about DSSP

PARIS Support complete pannel of specific initiative (R&D initiatives, coordination initiative

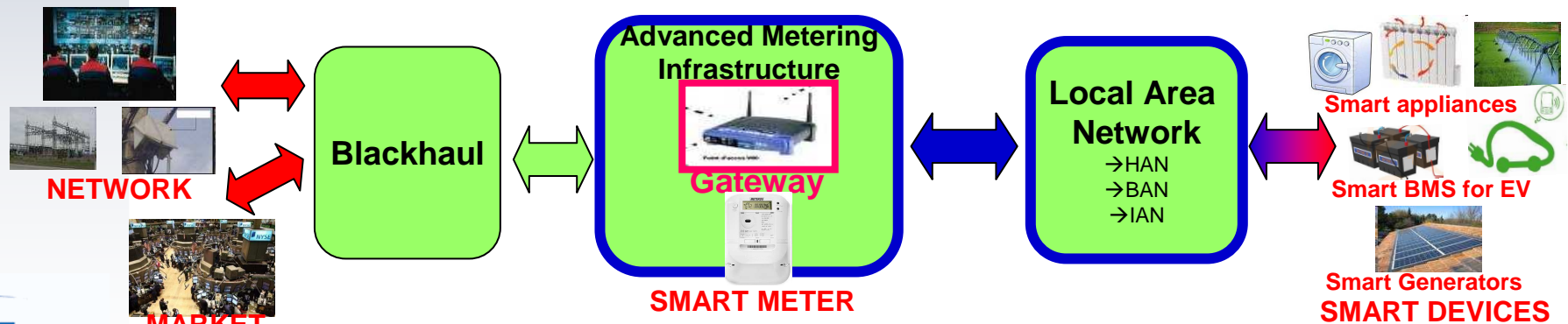


Demand Side Service oriented Platform

→ Several layers building up the ICT infrastructure for DSI

- + **ENERGY SERVICE LAYER** Advanced system service in new markets
Supported by
- + **APPLICATION LAYER** Mutual understanding tools
Secured by
- + **TRANSPORT LAYER** Data controlling protocol / energy flow procedure
encapsulating
- + **DATA LINK LAYER** Communication protocol
Ensuring working of
- + **PHYSICAL LAYER** Materials (ICT and Energy management)

= ICT INFRASTRUCTURE SUPPORTING DEMAND SIDE INTEGRATION





Demand Side Service oriented Platform: Presentation 1



Interoperability Guidelines

Objective:

To ensure interoperability on the global system

Issue

- Development European Market
- Industrial efficiency /Scale saving
- Facility for end-user
- Competitvity on worldwide market



Societal Guidelines

Objective:

- Protection of privacy and rights
- Support segmentation of end-users and uses
- Support user centric approach

Issue

- Creation of societal added value
- Rights of european citizen
- Societal integration
- Economical sucess



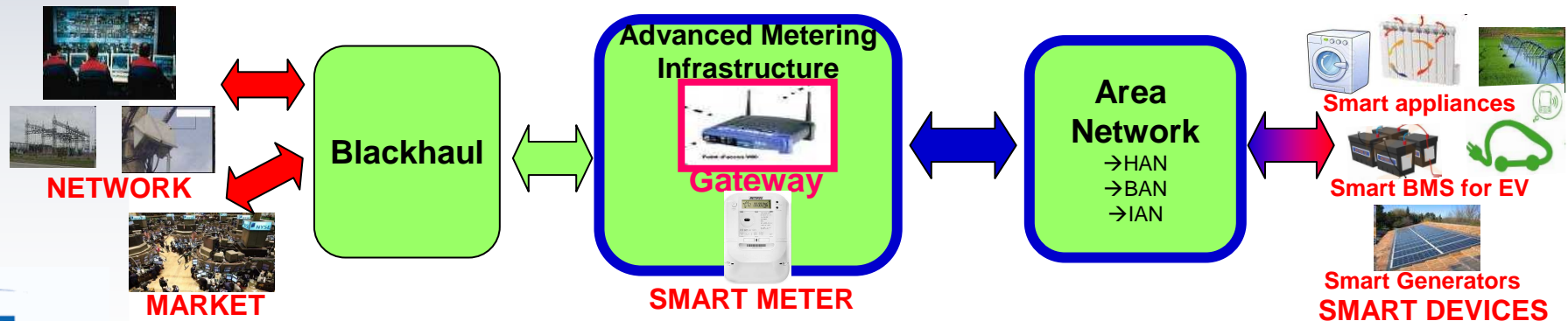
Safety / Security Guidelines

Objective

- Ensure Reliability, safety and security of the electrical system

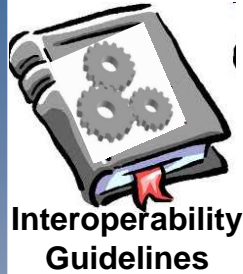
Issue

- Security the european electrical supply
- Development of electrical system and energy market at the european level





Demand Side Service oriented Platform: Presentation 1



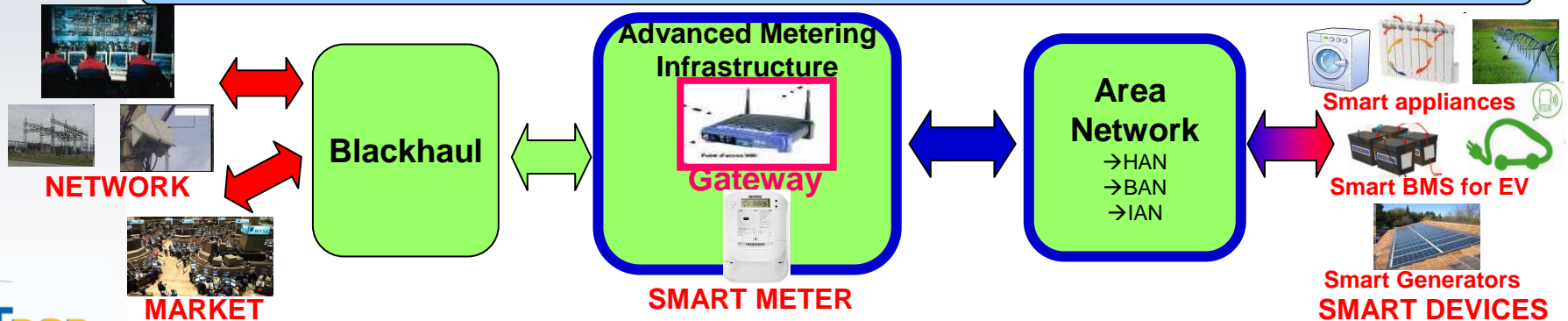
ENERGY SERVICE LAYER : Technical process (system service) and business process

APPLICATION LAYER: Syntactical and semantic for mutual understanding

TRANSPORT LAYER : Data control for reliability, safety, security

DATA/ ENERGY LINK LAYER : Communication and energy exchange between materials

PHYSICAL LAYER : Materials for fonctionnalites





Demand Side Service oriented Platform



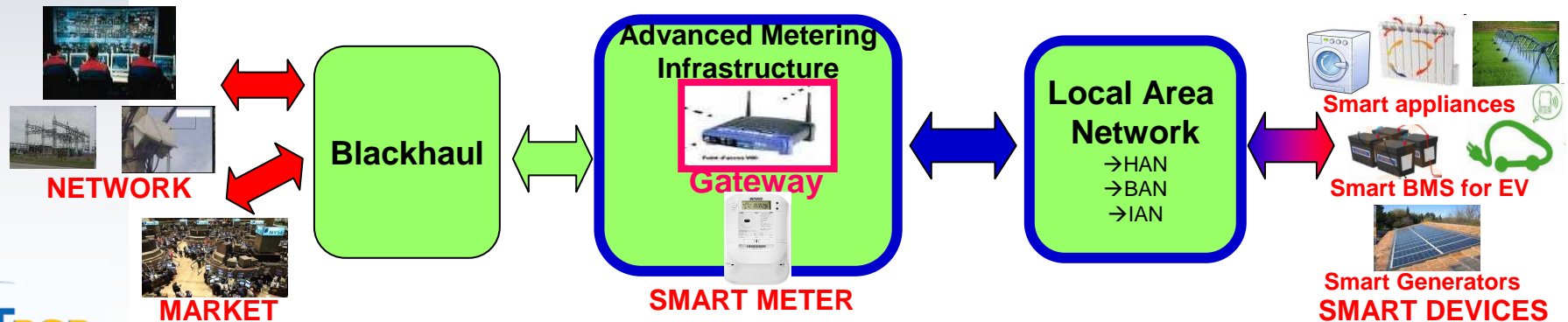
ENERGY SERVICE LAYER : Energy service and market procedure

APPLICATION LAYER : Data model, ontologies and other semantic web technologies

TRANSPORT LAYER : data controlling protocol

DATA LINK LAYER : Communication protocol

PHYSICAL LAYER : implementation of energy and ICT materials





Demand Side Service oriented Platform: Physical layer

How to implement materials

→ End-user devices

- Appliances and home management systems
- Batteries management system
- Distributed generators

→ Local area Network

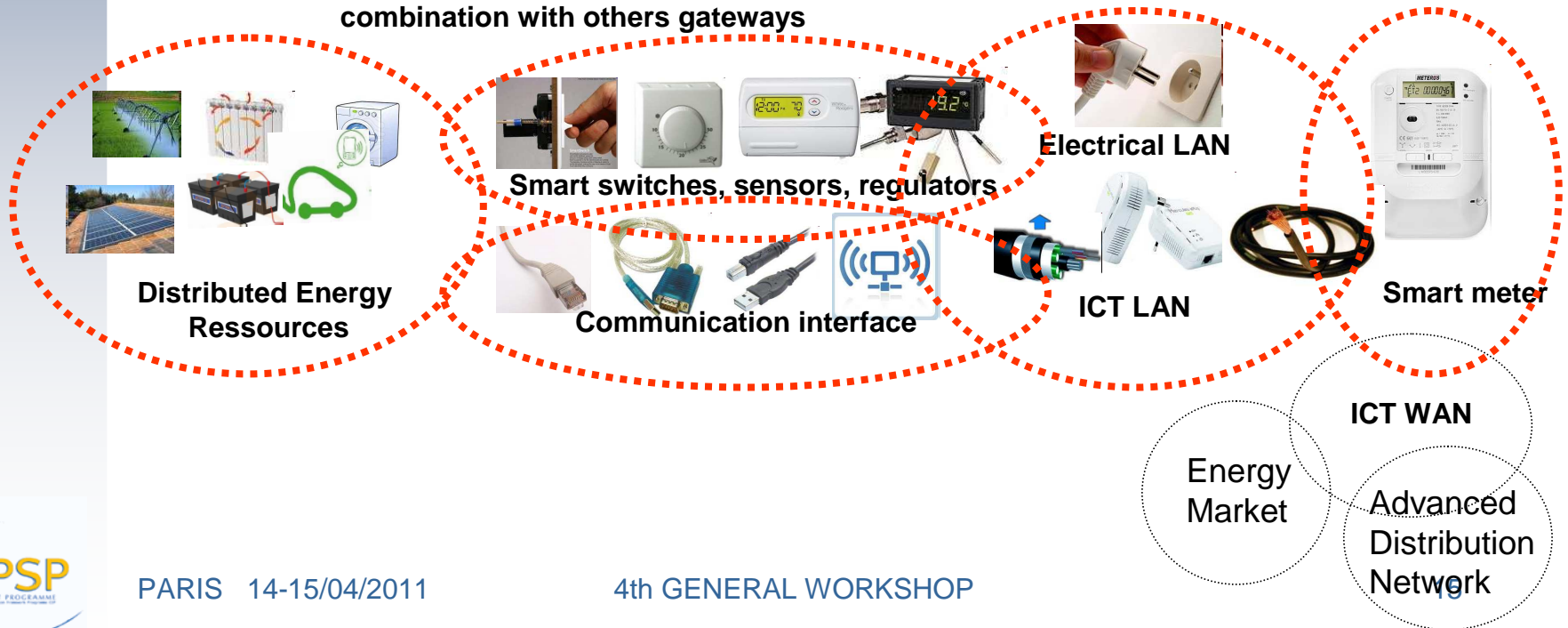
→ Gateway : smart meter, eventually energy box

-Involve

- Commandability of devices: smart switches, smart home controllers, etc...
- Regulation of parameters : smart thermostat, speed variators, active and reactive power control,...
- Communication interface of devices : connectors (RS232, RS449, RJ45, USB, ect...) wireless interface (bluetooth, etc...)
- Local area network infrastructure : PLC, Wireless, wired network (copper line or optical fiber)
- Smart meter: advanced metering fonctionnalites, control and monitoring fonctionnalites combination with others gateways

Minimal coherence with

- Distributed system infrastructure (reconfiguration system, advanced Voltage control)
- Energy market ; commercial VPP,...





Demand Side Service oriented Platform: network layer

How to ensure transfert information between the systems and the multiple end-users

→ Communication protocol

→for routing, relaying of information, information congestion treatment

Problematic : IP protocol on public communication network

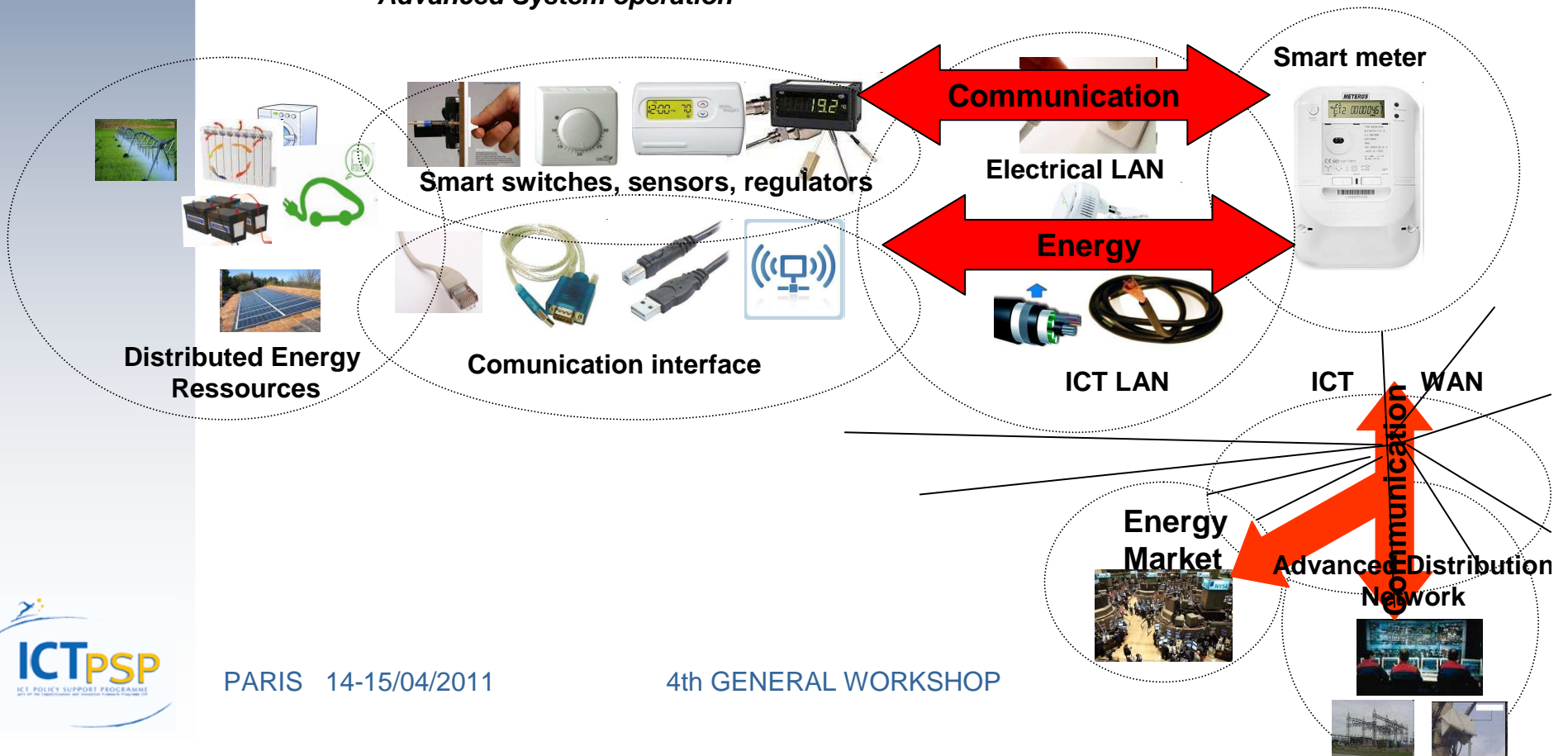
or specific protocol (and routing technologies) on dedicated communication network

↕ Coherence

Energy level : At DSO level

-Distributed Management System

- Advanced System operation

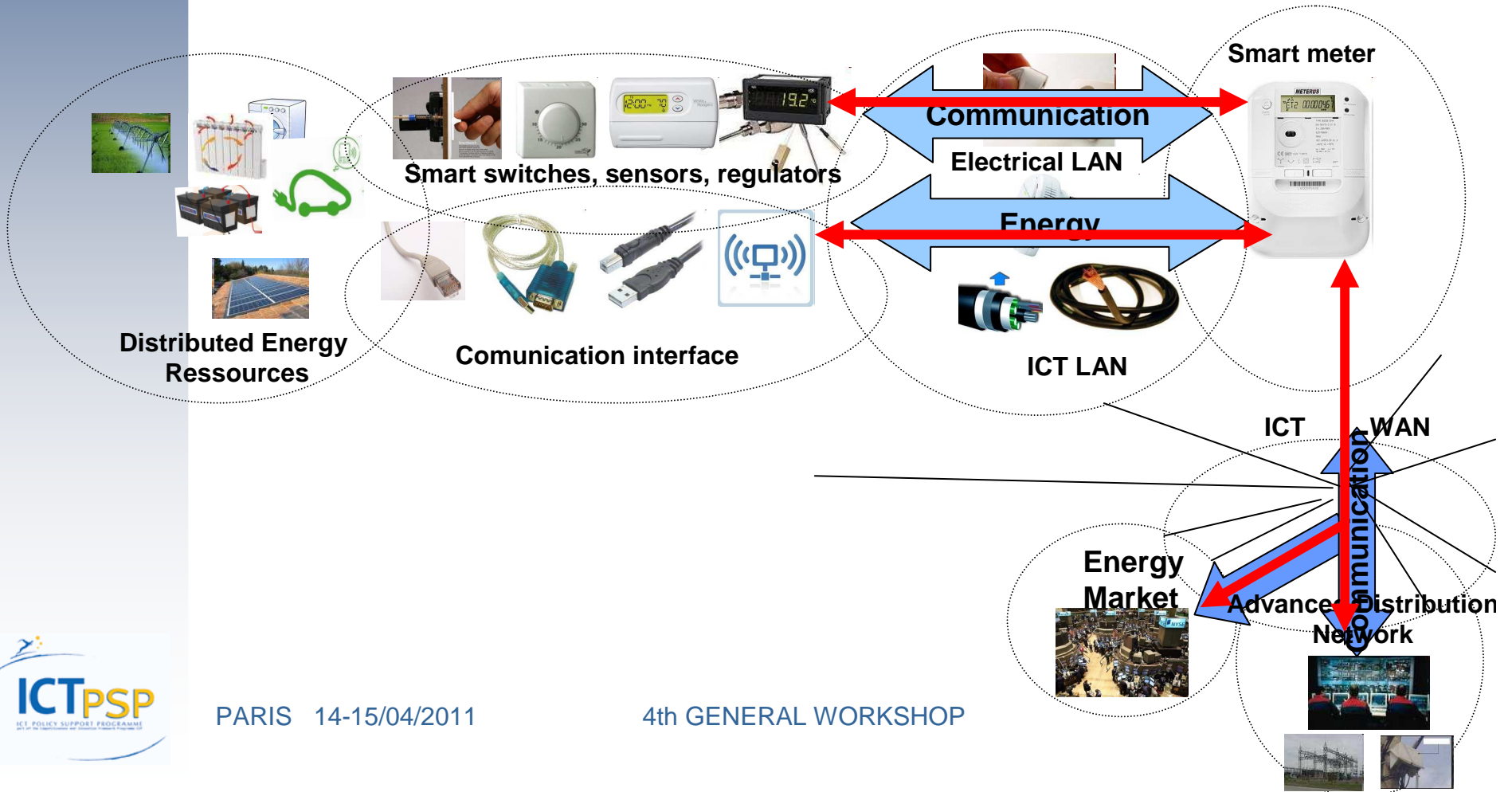




Demand Side Service oriented Platform: transport layer

ICT level: How to ensure reliability of exchanged information (during access and transfert)
 →for routing, relaying of information, information congestion treatment

Energy level: How to ensure reliability of exchanged energy
 → Data
 →for routing, relaying of information, information congestion treatment





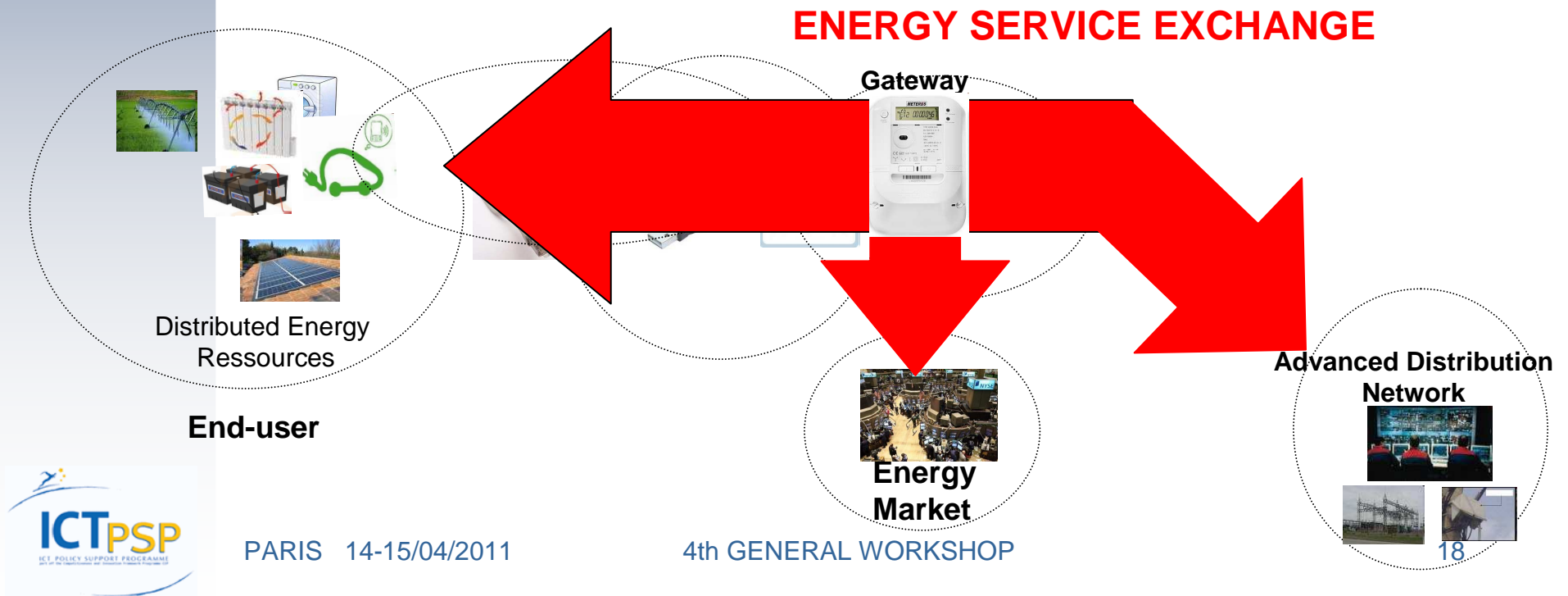
Demand Side Service oriented Platform: energy service layer

ICT level: How to ensure the ultimate step: service exchange

- building of service system from distributed energy resources
- building financial exchange into the energy market
- treat interactions between energy services for the system (system service) and energy service for the end-user (minimization of consumption)

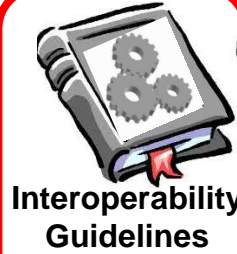
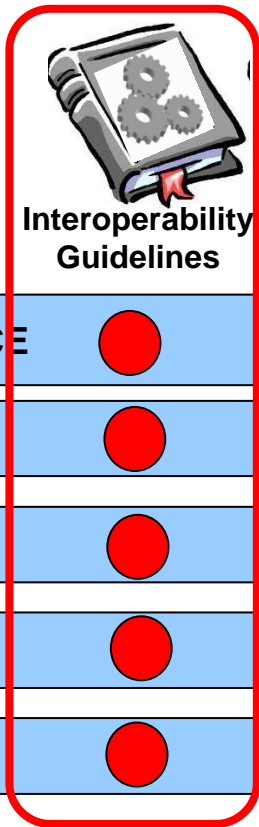
Energy service level

- Common semantic and data model
- Common technical and business procedure

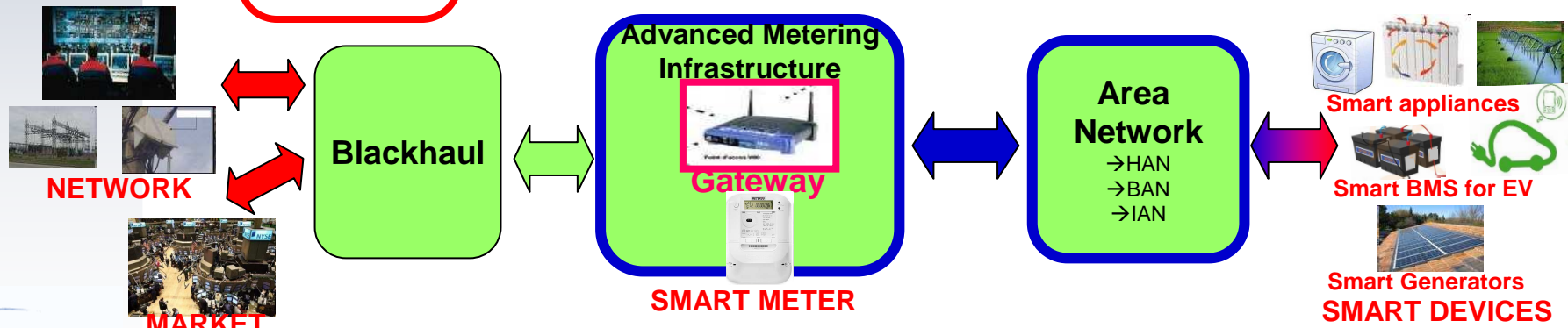




Demand Side Service oriented Platform : Interoperability Guideline

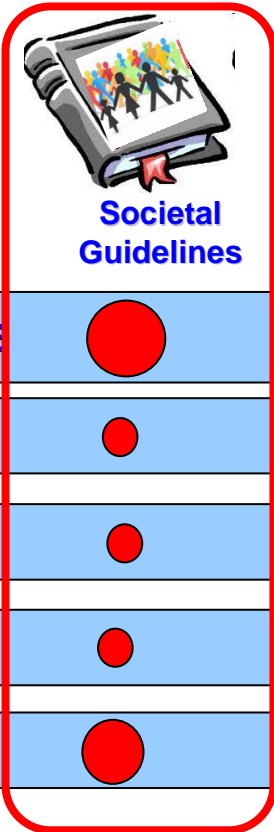


| | | |
|----------------|---|---|
| ENERGY SERVICE | ● | → Organizational level / technical and business procedure level |
| APPLICATION | ● | → Syntactical and semantic level |
| TRANSPORT | ● | → Transmission level (protocol) |
| LINK | ● | → Transmission level (protocol) |
| PHYSICAL | ● | → Transmission level (physical level) |

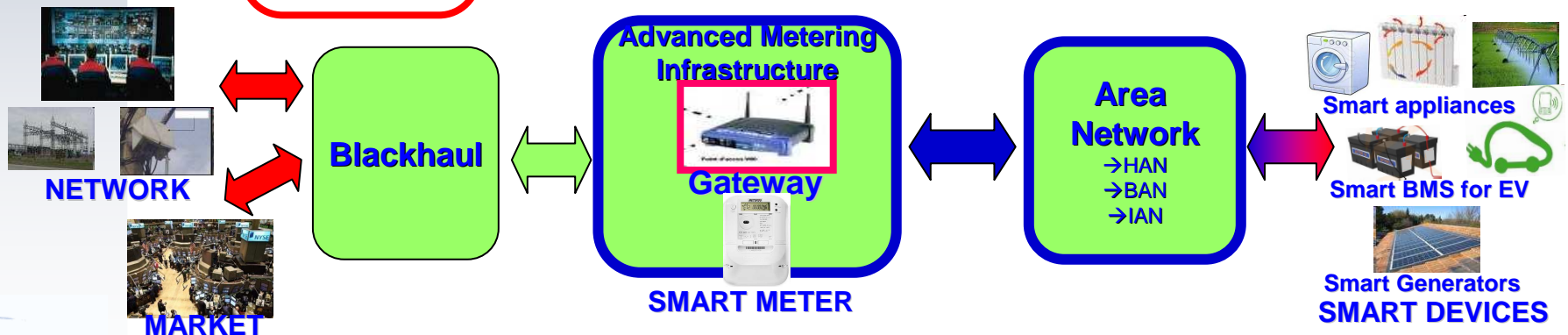




Demand Side Service oriented Platform: Societal Guidelines



| | | |
|-----------------------|---|--|
| ENERGY SERVICE | ● | → Protection of end-users as citizen, consumers, appliance users → Segmentation of end-users and uses |
| APPLICATION | ● | |
| TRANSPORT | ● | → Contribution to protection of privacy and to reliability |
| LINK | ● | → Contribution to protection of privacy and to reliability |
| PHYSICAL | ● | → Friendly use (easy to use, override, choice of way of life, etc...) |



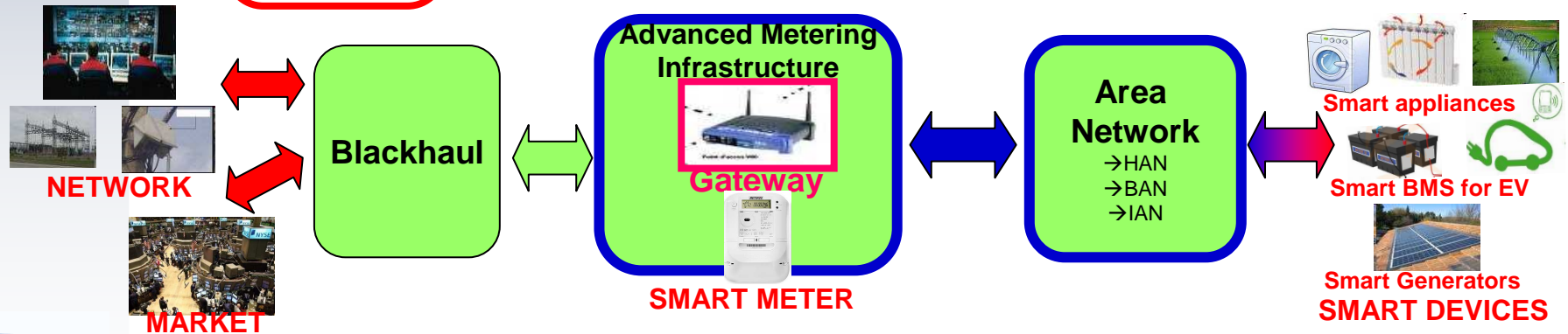


Demand Side Service oriented Platform: Safety / Security guidelines



Safety / Security Guidelines

| | | |
|----------------|---|---|
| ENERGY SERVICE | ● | → Example: Risk assessment strategies / Control / Data coding |
| APPLICATION | ● | |
| TRANSPORT | ● | → Example: dedicated channel, VPN, secured protocol |
| LINK | ● | → Example: cybertechnologies: access and data control |
| PHYSICAL | ● | → Example: Redundancy on the system side |

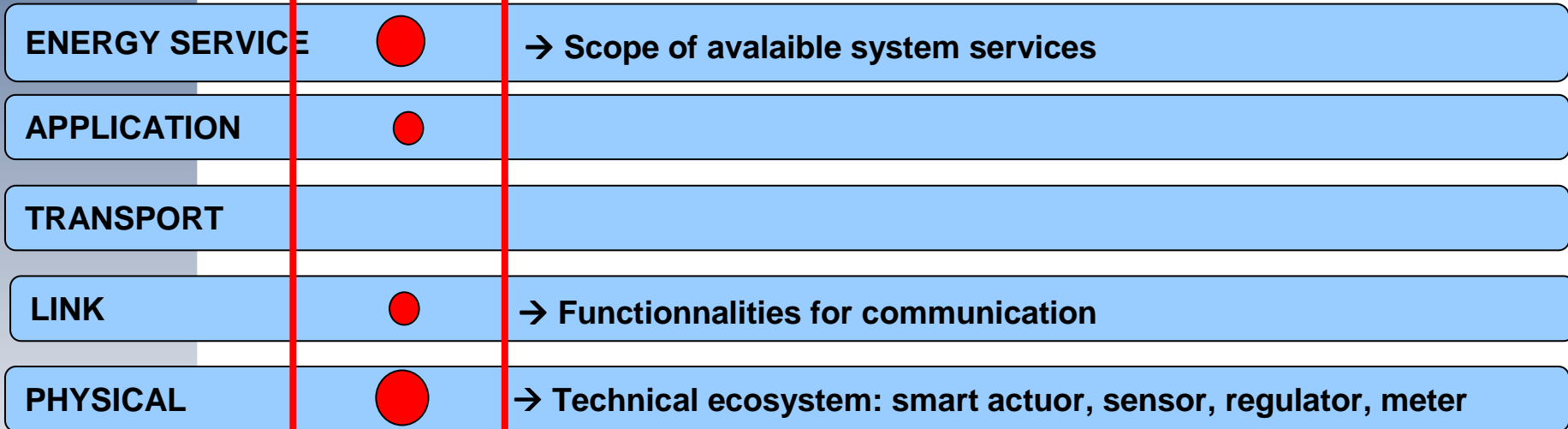




Demand Side Service oriented Platform: Technical ecosystem database

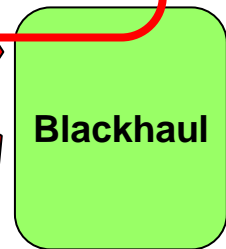


Technical Ecosystem Database

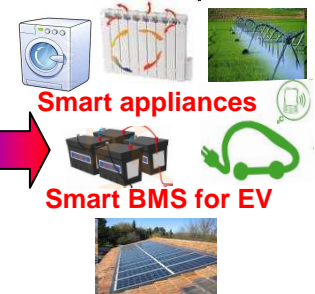
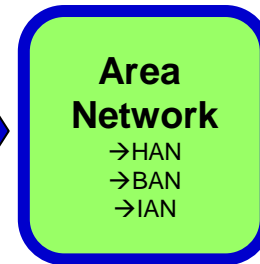


NETWORK

MARKET



SMART METER



Smart appliances

Smart BMS for EV

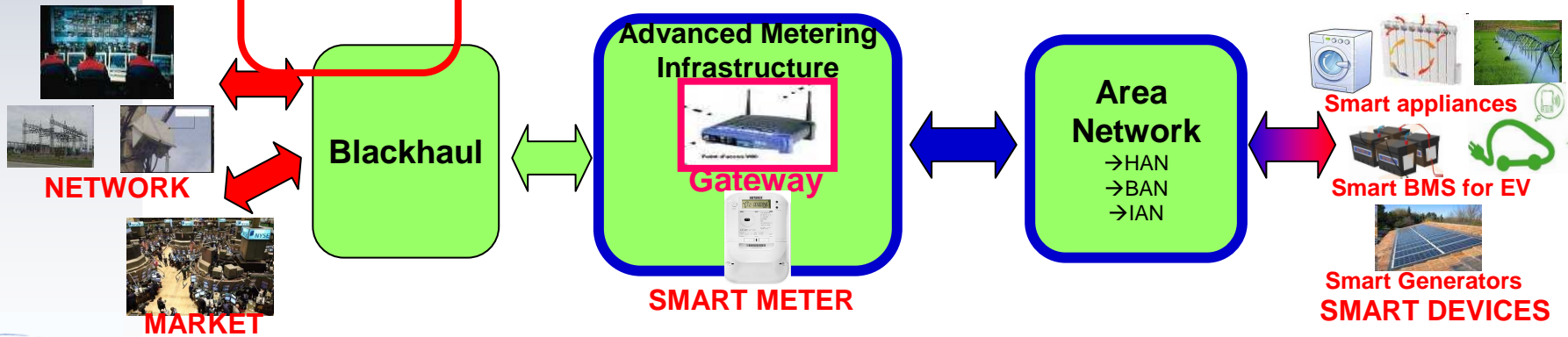
Smart Generators
SMART DEVICES



Demand Side Service oriented Platform



| | | |
|----------------|---|--|
| ENERGY SERVICE | ● | → Example: rules for data management evolution required by service system (storage, ...) |
| APPLICATION | | |
| TRANSPORT | ● | → Example: Minimal requirement for system security and privacy |
| LINK | ● | → Example: Minimal requirement for system security and privacy |
| PHYSICAL | ● | → Example: Minimal requirement for end-user protection |





Demand Side Service oriented Platform



Regulatory Evolution database

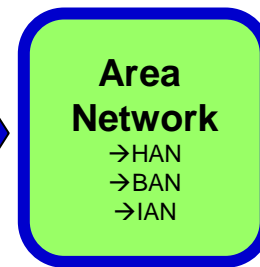
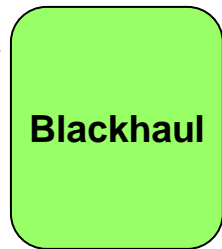
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NETWORK



MARKET



Smart appliances



Smart BMS for EV



Smart Generators
SMART DEVICES



Synthese of Recommendation for WP4

A analyse



-R1) To develop standardization and shared practises for interoperability



-R2) To develop solutions for reliability, safety and security



-R3) To ensure the required technical ecosystem



- R4) To follow end-user centric approach

→ privacy, segmentation of end-user and uses, etc...



R5) To prepare required evolution of regulation



Synthese of Recommendation for WP4

A suggested vision: The Demand Side Service Platform

- A “Platform” to build: Guidelines and Database



- Mandate working group to build this platform
 - Coordination with mandated group (standardization of smart grids)
- Support R&D initiatives
 - Initiative about systemique approach
 - Initiative about Security of system and societal aspects
- Support Demonstrators for experimentation at real and significant scale
 - Capitalize experiment (E-Energy,
 - Go further to completely reach the DSSP vision

An ICT infrastructure to develop and to implement

- Prepare incentive industrial policy
- Prepare evolution of the



All key actors are required



- ICT industry: represented by actors specifically able to support this system vision
- Expert : Academic and Research Center
- Key actors of the DSI: DSO, end-user representatives,
- Other actors : BR, TSO, Regulators
- PARIS 14-15/04/2011

4th GENERAL WORKSHOP



THANKS to SAP

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