SMART GRID STANDARDISIERUNG

Salzburg, 12.05.2014

T · · Systems ·

GLIEDERUNG

- Internationales System der Standardisierung
- EU-Mandate M/490 - Standardization Smart Grid
- Beispiel: Beitrag zur europäischen Standardisierung
- EU FP7-Projekt
  Open System for Energy Services (OS4ES)

INTERNATIONALES SYSTEM DER STANDARDISIERUNG

LANDKARTE DER STANDADISIERUNG (DEUTSCHE SICHT)

INTERNATIONALES SYSTEM DER STANDARDISIERUNG

LANDKARTE DER STANDADISIERUNG (DEUT. SICHT)

Standardization	General	Electrotechnology	Telecommunication
International	ISO	IEC	ITU
Europe (regional)	cen	CENELEC	ETSI
Germany (national)	DIN	DKE VDE DIN	DKE VDE DIN
Austria (national)	Austrian Standards	OVE	?

INTERNATIONALES SYSTEM DER STANDARDISIERUNG

BEISPIEL:
STANDADISIERUNG IM THEMENFELD
"SMART GRID SECURITY"

INTERNATIONALES SYSTEM DER STANDARDISIERUNG

NATIONALE ARBEITSGRUPPEN IM VDE, DKE, DIN (AUSWAHL)

Standardization	General	Electrotechnology	Telecommunication
International	ISO	IEC	ITU
Europe (regional)	cen	CENELEC	ETSI
Germany (national)	DIN	DKE AK "Smart Grid Security" VDE/ITG "Energieinformationsnetze"	

INTERNATIONALES SYSTEM DER STANDARDISIERUNG

EUROPÄISCHE ARBEITSGRUPPEN BEI CEN, CENELEC & ETSI (AUSWAHL)

Standardization	General	Electrotechnology	Telecommunication
International	ISO	IEC	ITU
Europe (regional)	CEN	CENELEC	ETSI
Germany (national)	DIN	DKE VDE DIN	DKE VDE DIN

EU-Mandate M/490
Smart Grid Coordination Group (SG-CG)

INTERNATIONALES SYSTEM DER STANDARDISIERUNG

INTERNATIONALE ARBEITSGRUPPE BEI ISO, IEC, ITU (AUSWAHL)

Standardization	General	Electrotechnology	Telecommunication
International	ISO	IEC - TC 57 WG 15 (IEC 62351) - TC 65 WG 10 (IEC 62443)	ITU
Europe (regional)	cen	CENELEC	ETSI
Germany (national)	DIN	DKE VDE DIN	DKE VDE DIN

INTERNATIONALES SYSTEM DER STANDARDISIERUNG

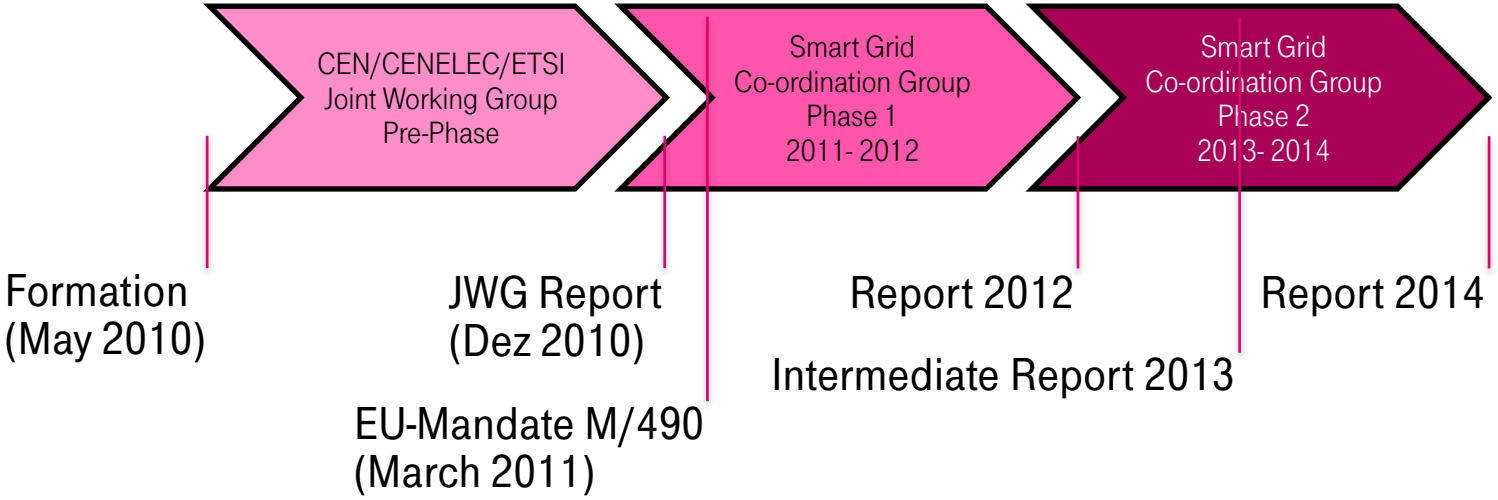
INTERNATIONALE ARBEITSGRUPPE BEI ISO, IEC, ITU (AUSWAHL)

Standardization	General	Electrotechnology	Telecommunication
International	ISO/IEC JTC1 / SC 27 => ISO/IEC TR 27019	IEC	ITU
Europe (regional)	cen	CENELEC	ETSI
Germany (national)	DIN	DKE VDE DIN	DKE VDE DIN

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

HISTORIE

EU-MANDATE M/490 - STANDARDIZATION SMART GRID
HISTORIE



EU-MANDATE M/490 - STANDARDIZATION SMART GRID
SCOPE OF M/490

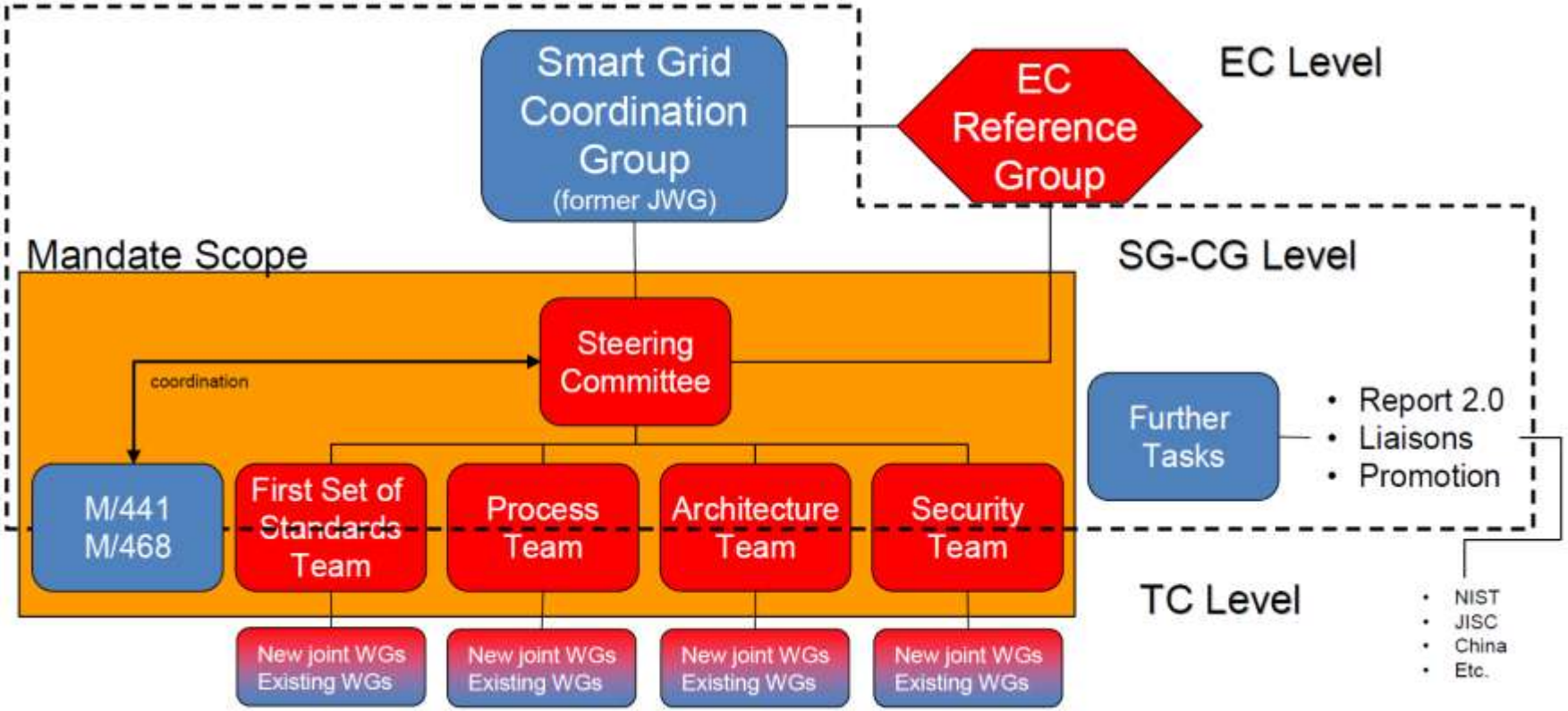
"The objective of this mandate is to develop or update a set of consistent standards within a common European framework that integrating a variety of digital computing and communication technologies and electrical architectures, and associated processes and services, that will achieve interoperability and will enable or facilitate the implementation in Europe of the different high level Smart Grid services and functionalities as defined by the Smart Grid Task Force that will be flexible enough to accommodate future developments.

Building, Industry, Appliances and Home automation are out of the scope of this mandate; however, their interfaces with the Smart Grid and related services have to be treated under this mandate."

EU-MANDATE M/490 - STANDARDIZATION SMART GRID
DELIVERABLES (EXPECTED)

1. A **technical reference architecture**, which will represent the functional information data flows between the main domains and integrate many systems and subsystem architectures.
2. A **set of consistent standards**, which will support the information exchange (communication protocols and data models) and the integration of all users into the electric system operation.
3. **Sustainable standardization processes** and collaborative tools to enable stakeholder interactions, to improve the two above and adapt them to new requirements based on gap analysis, while ensuring the fit to high level system constraints such as interoperability, security and privacy, etc. and to collect and harmonize use cases”

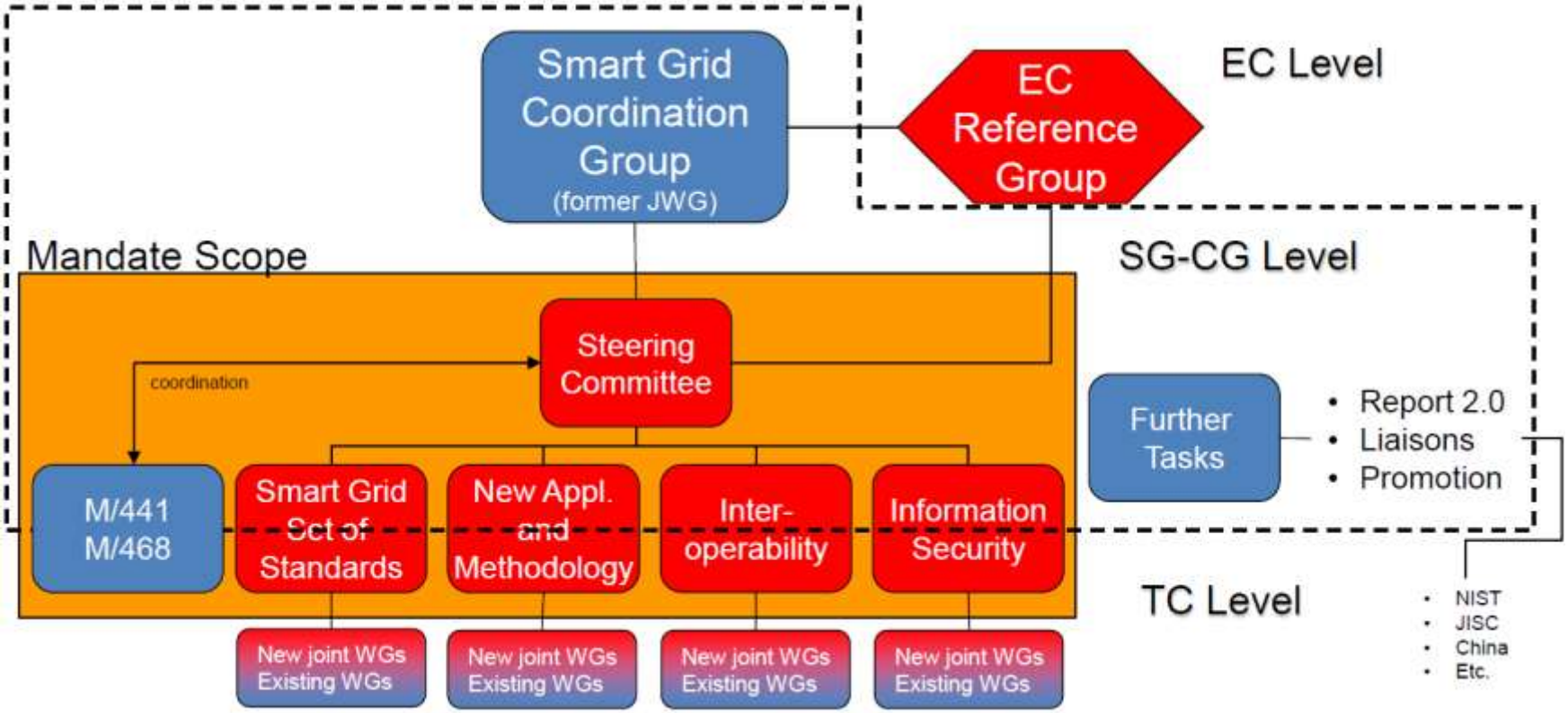
EU-MANDATE M/490 - STANDARDIZATION SMART GRID
STRUCTURE 2011-2012 (PHASE 1)



EU-MANDATE M/490 - STANDARDIZATION SMART GRID
WORKING GROUPS - PHASE 1

- Working Group: First Set of Standards (WG FSS)
  - General method for presenting Smart Grids standards for the European Smart Grid
  - List of (existing) Standards to start with the European Smart Grid
- Working Group: Sustainable Processes (WGSP)
  - analysis and harmonization of use cases
  - establishment of a Use Case Management process
- Working Group: Reference Architecture (WGRA)
  - Smart Grid Conceptual Model
  - Smart Grid Reference Architecture (SGAM)
- Working Group: Information Security (WGIS)
  - "... and the Smart Grid information and communication system should be inherently secure by design ..."

EU-MANDATE M/490 - STANDARDIZATION SMART GRID
STRUCTURE 20113-2014 (PHASE 2)



EU-MANDATE M/490 - STANDARDIZATION SMART GRID
WORKING GROUPS - PHASE 2

- Working Group: Set of Standards (WGSTD)
  - continuation of WGFSS
- Working Group: New Applications an Methodologie (WGMETH)
  - join of WG Reference Architecture (WGRA) and WG Sustainable Processes (WGSP)
- Working Group: Interoperability (WGINT)
  - new Working Group
- Working Group: Information Security (WGIS)
  - continuation of WGIS

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

SMART GRID CO-ORDINATION GROUP (SGCG)
INTERMEDIATE REPORT 2013
DELIVERABLES OF THE SGCG

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

WORKING GROUP
SET OF STANDARDS

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

FULL LIST OF GAPS

Contents

- Set of first Standards for the European Smart Grid
- General method for presenting Smart Grids standards for the European Smart Grid
- Gap Analysis, ranked by...
  - ... gap impact
  - ... standardization chance

Results of ranking sorted on Standardisation Chance

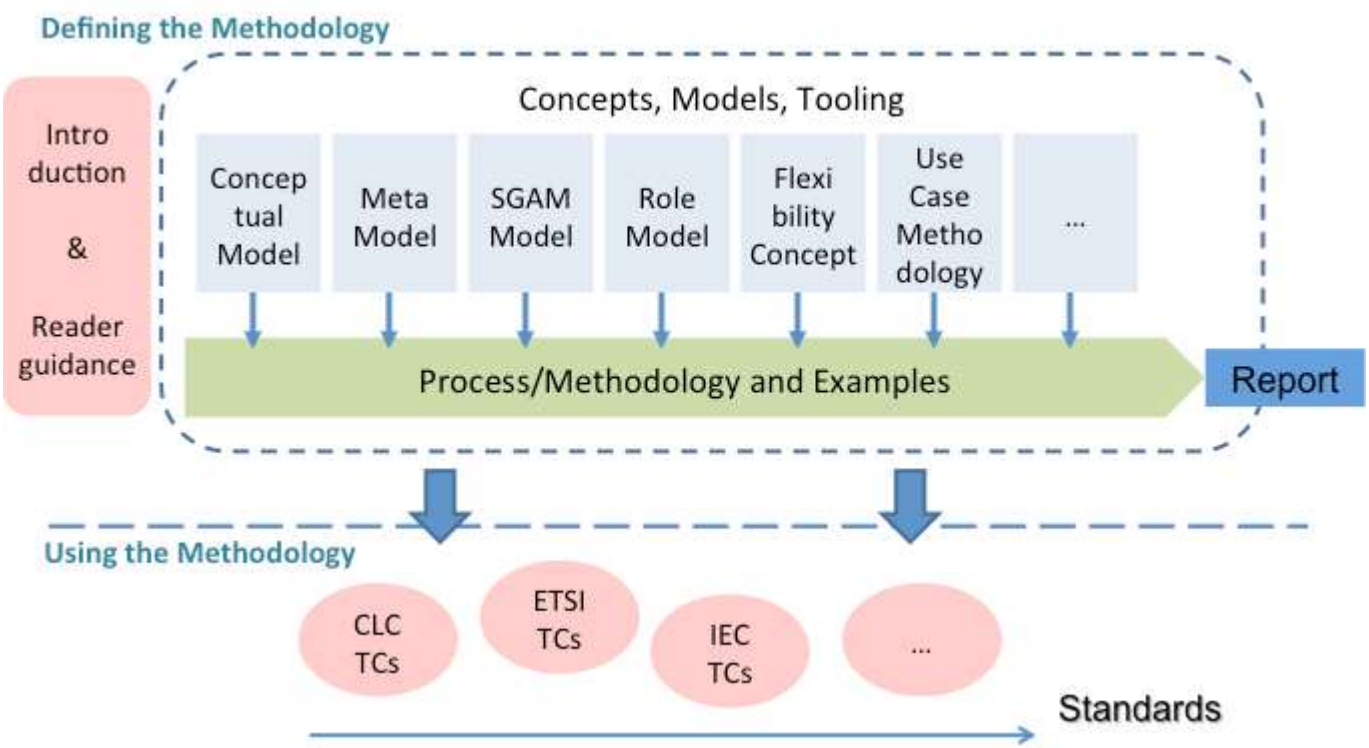
	ID	Gap summary (more details available in SGCG_Sec0059_DC_Request for New Gaps Prioritisation-20131005)	Gap Impact	Standardisa-tion chance	Consensus level
40		Power Quality implementation guide in IEC 61850 (profile)	3.6	3.9	5.0
4	Dep-1	Check relevance of existing methodologies on smart grids (dependability - functional safety)	2.8	3.6	3.0
21	SM-2	Smart metering for Electrical Vehicle (EV)	3.1	3.5	4.0
1	PPC-1	Electronic Data models (glossaries alignment)	3.4	3.4	6.0
15	T3	(transmission equipment fitting) offshore	3.0	3.4	3.0
49		Handling storage as a DER	3.9	3.3	8.0
13	T1	HV-DC grid architecture	3.2	3.2	3.0
46		Handling DER integration	4.5	3.2	10.0
2	Com-1	Further develop power/distribution line communication	4.3	3.2	10.0
44		Applicability of Requirement Standards for Operation and Implementation of Security and Privacy Measures	4.1	3.0	8.0
14	T2 Dis-6	Smart assets	3.9	3.0	6.0
45		Applicability of Solution Standards Implementation of IT Security Measures	4.3	2.9	11.0
43		Interoperable identification and billing capabilities in the Smart Grid	3.3	2.9	4.0
41		Data communication between EV supply equipment and EV operators and E-mobility Service Providers for E-mobility Smart Charging	3.2	2.9	3.0
47		Unified product data structure to support asset management	3.0	2.8	2.0
24	Ind-4	Energy management harmonised data model for industry and power grid	4.0	2.8	9.0
48		Data modelling for Micro Grid Management	3.5	2.8	5.0
19	Dis-5	Auxiliary power system standardisation	3.3	2.8	4.0
50		System management	3.8	2.7	8.0
42		Enabling to leverage on harmonized infrastructure security and administration standards across smart grid sectors and layers	3.8	2.4	6.0

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

WORKING GROUP
NEW APPLICATIONS AND METHODOLOGY

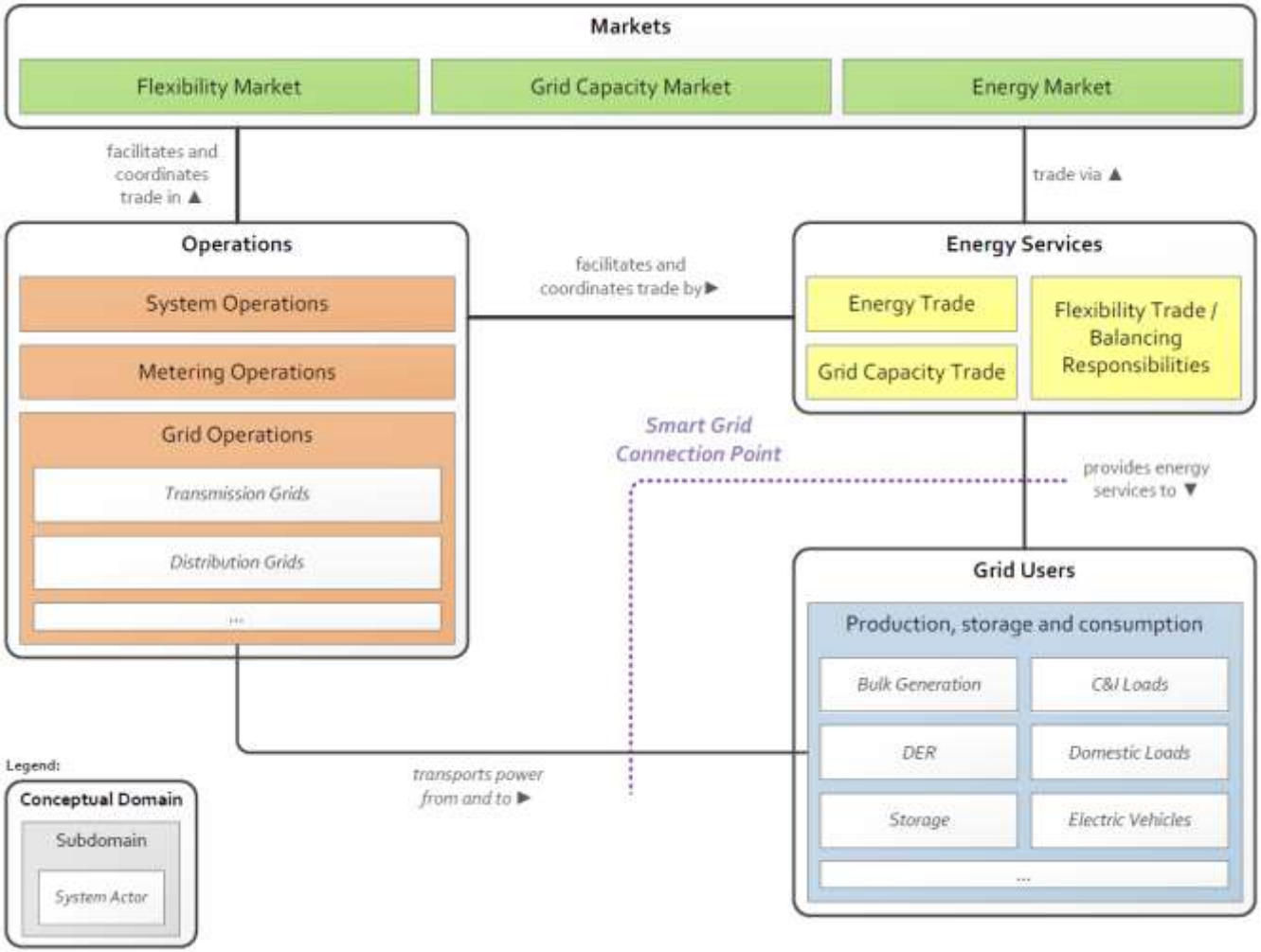
EU-MANDATE M/490 - STANDARDIZATION SMART GRID

ELEMENTS OF THE SMART GRIDS METHODOLOGY

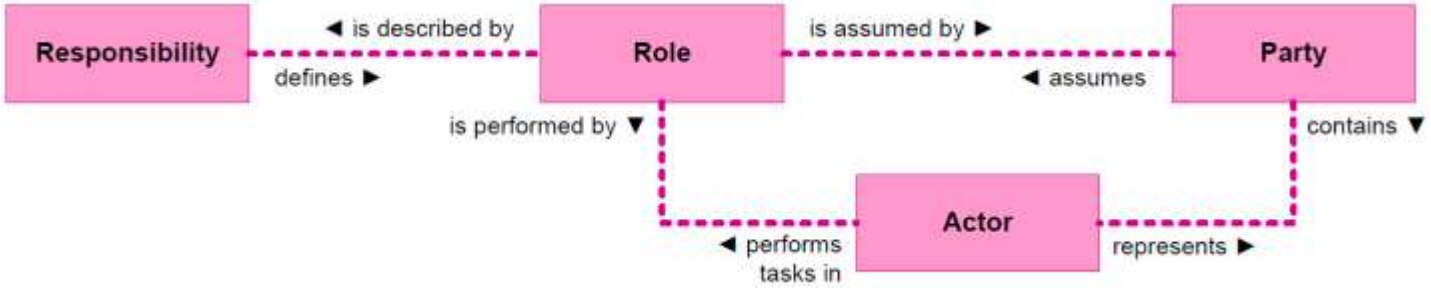


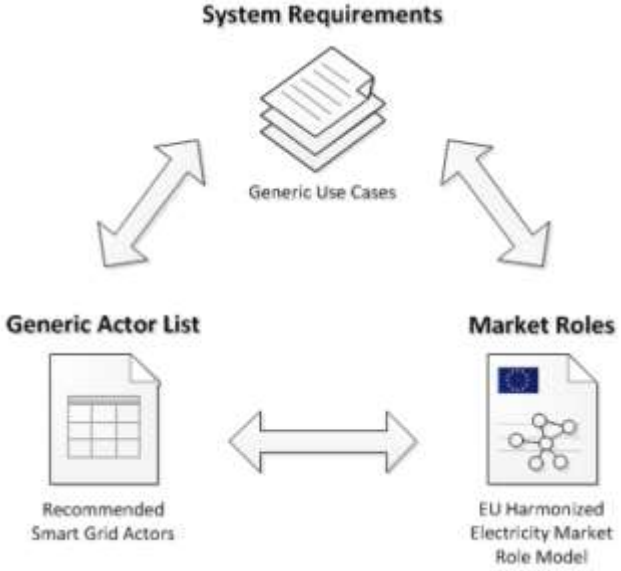
EU-MANDATE M/490 - STANDARDIZATION SMART GRID

EU-CONCEPTUAL MODEL



EU-MANDATE M/490 - STANDARDIZATION SMART GRID
METAMODELL

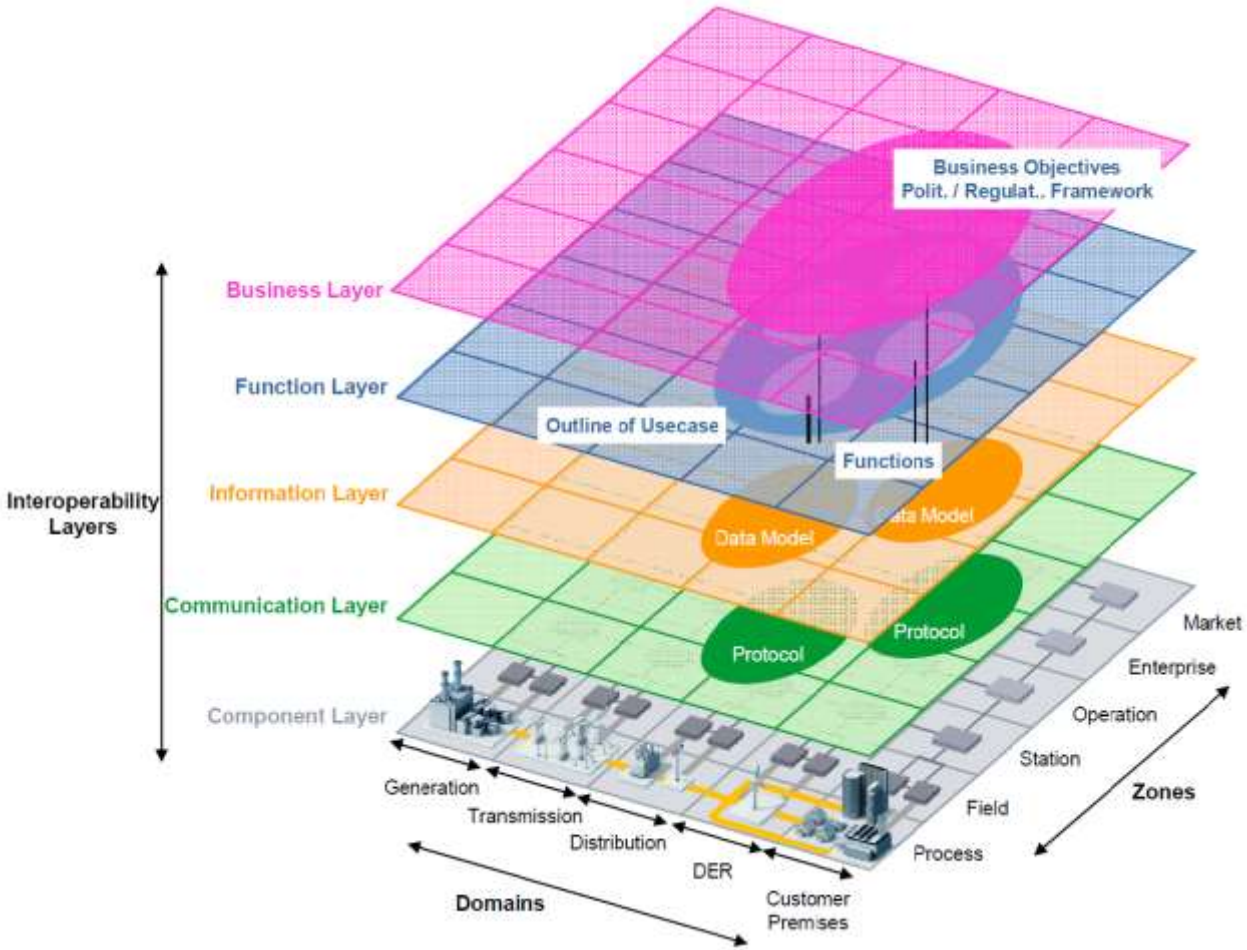




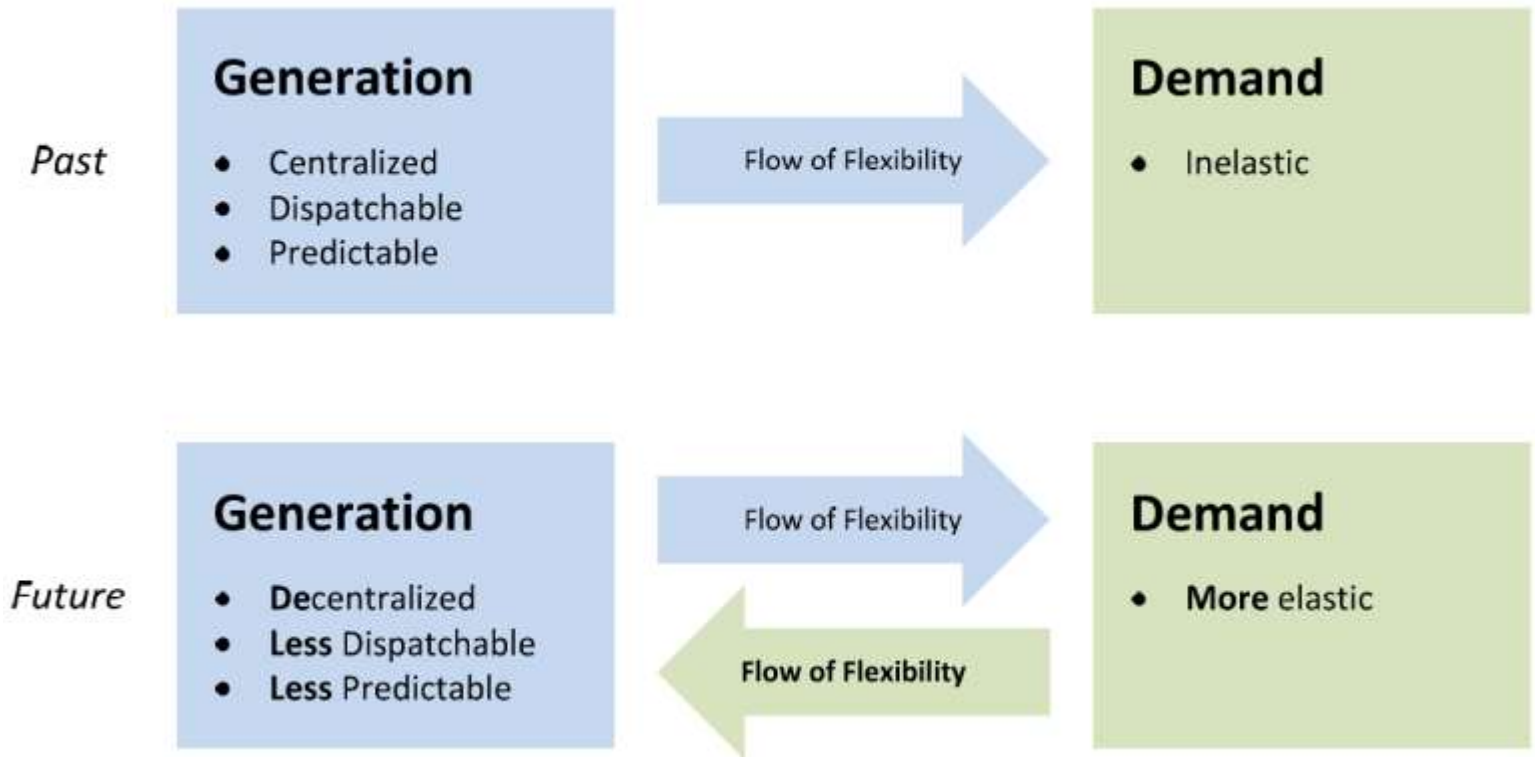
Party	Parties are legal entities, i.e. either natural persons (a person) or juridical persons (organizations). *Examples: Dong Energy, Liander, APX Group*
Responsibility	Responsibilities define external behavior to be performed by parties. *Examples: Nominate Energy, Operate a grid, Determine the market energy price after applying technical constraints*
Role	A Role represents the intended external behavior (i.e. responsibility) of a *party*. *Parties* cannot share a *role*. Parties carry out their activities by assuming *roles*, e.g. system operator, trader. *Roles* describe external business interactions with other *parties* in relation to the goal of a given business transaction. *Examples*: Balance Responsible Party, Grid Operator, Market Operator.
Actor	An Actor represents a *party* that participates in a business transaction. Within a given business transaction an *actor* performs tasks in a specific *role* or a set of *roles*. *Examples: Employee, Customer, Electrical vehicle, Demand-response system.*

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

SMART GRID REFERENCE ARCHITECTURE (SGAM)

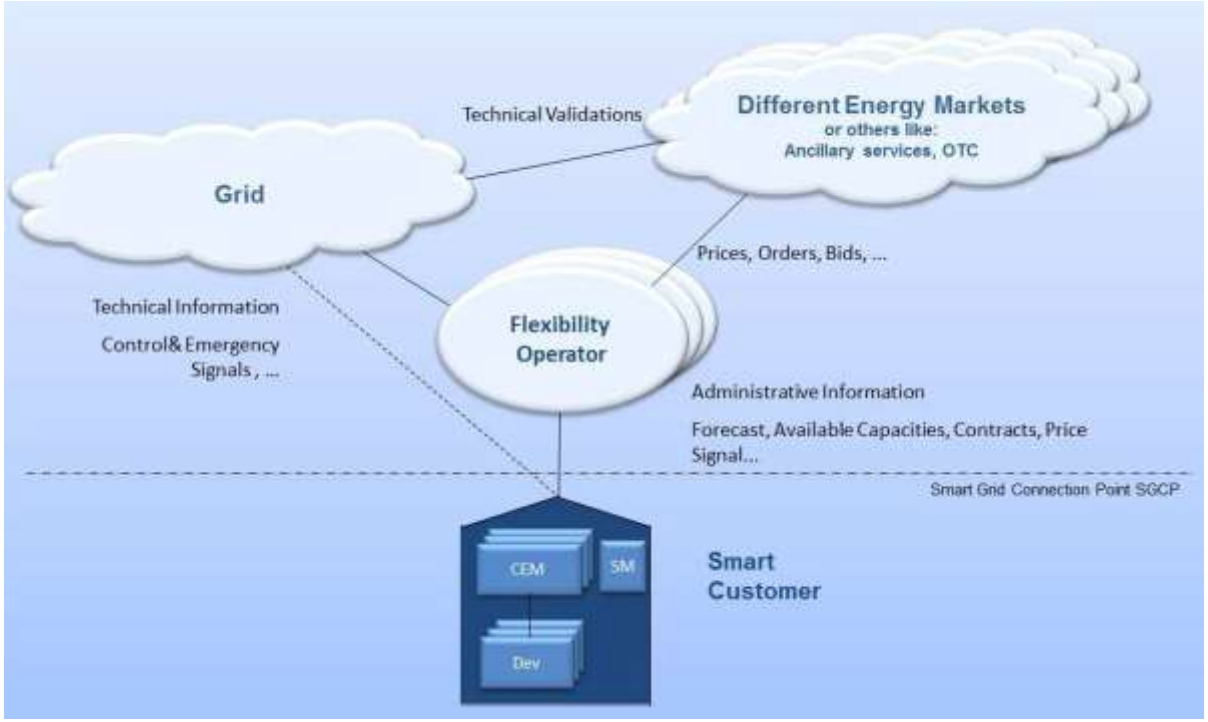


EU-MANDATE M/490 - STANDARDIZATION SMART GRID
FLEXIBILITY CONCEPT



Two way flow of flexibility

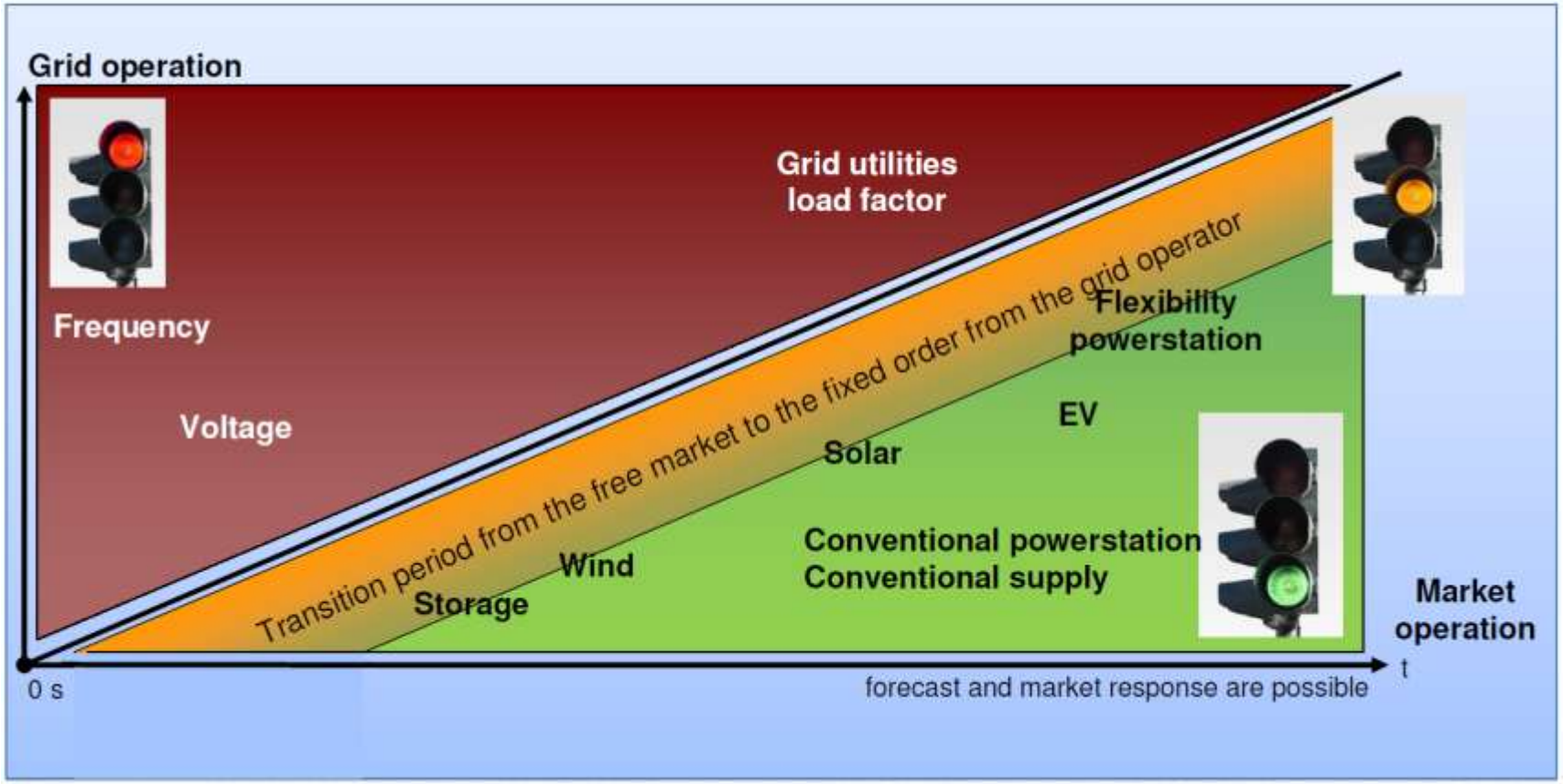
EU-MANDATE M/490 - STANDARDIZATION SMART GRID
FLEXIBILITY CONCEPT



Flexibility operator gathering flexibilities from different customers and 'sells' them to the 'end-users of flexibility' (grid / system operators, commercial entities, etc.)

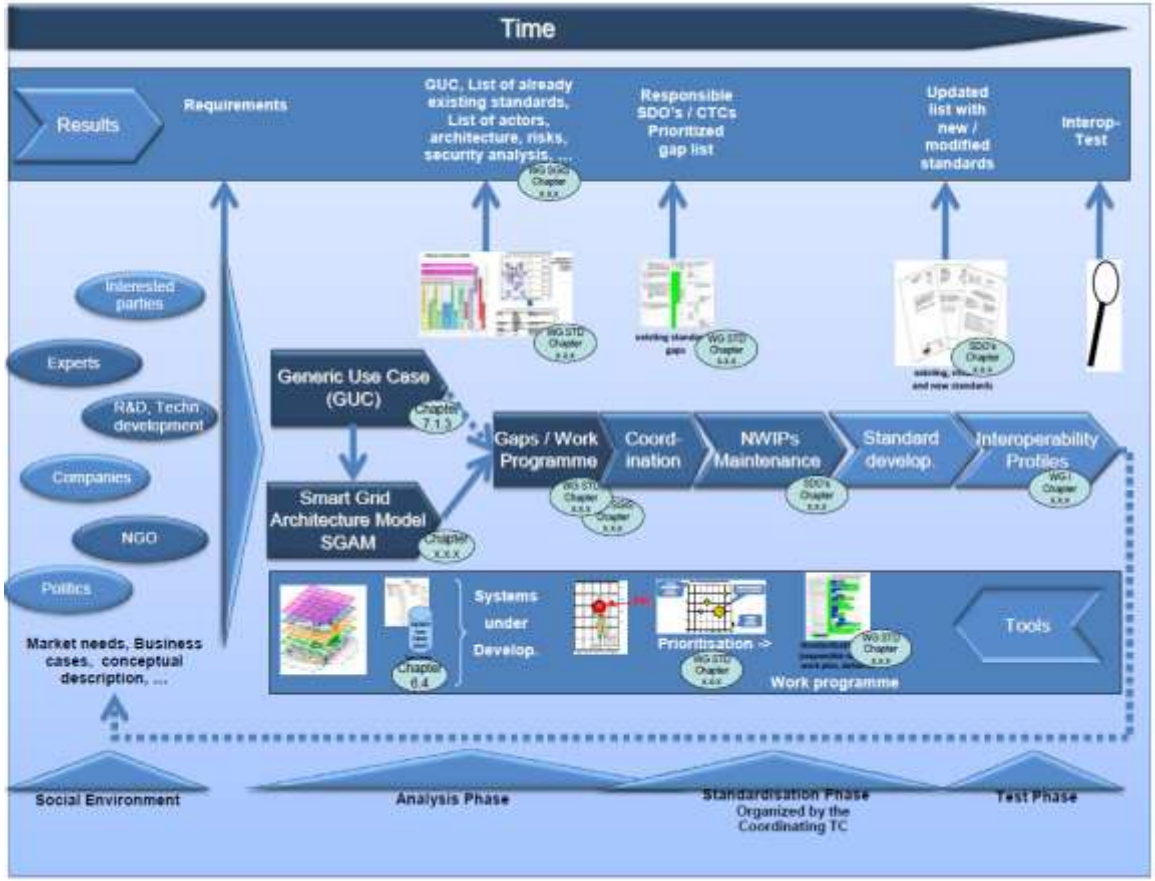
EU-MANDATE M/490 - STANDARDIZATION SMART GRID

TRAFFIC LIGHT CONCEPT



EU-MANDATE M/490 - STANDARDIZATION SMART GRID

GENERIC PRE-STANDARDIZATION PROCESS



Smart Grids Generic Pre-standardization Process

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

WORKING GROUP INTEROPERABILITY

EU-MANDATE M/490 - STANDARDIZATION SMART GRID
SCOPING

- **Methodology for interoperability**
  A system interoperability design and testing method including testing, "profiles" and "test use cases"
- **Recommendations for deployment**
  An assessment of needed profiles (limiting implementation options given by the standards to improve interoperability).
- **Development of an Interoperability Tool (IOP)**

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

WORKING GROUP INFORMATION SECURITY

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

SGIS SECURITY LEVELS (SGIS-SL)

Security Level	Security Level Name	Europeans Grid Stability Scenario Security Level Examples
5	Highly Critical	Assets whose disruption could lead to a power loss above 10 GW Pan European Incident
4	Critical	Assets whose disruption could lead to a power loss from above 1 GW to 10 GW European / Country Incident
3	High	Assets whose disruption could lead to a power loss from above 100 MW to 1 GW Country / Regional Incident
2	Medium	Assets whose disruption could lead to a power loss from 1 MW to 100 MW Regional / Town Incident
1	Low	Assets whose disruption could lead to a power loss under 1 MW Town / Neighborhood Incident

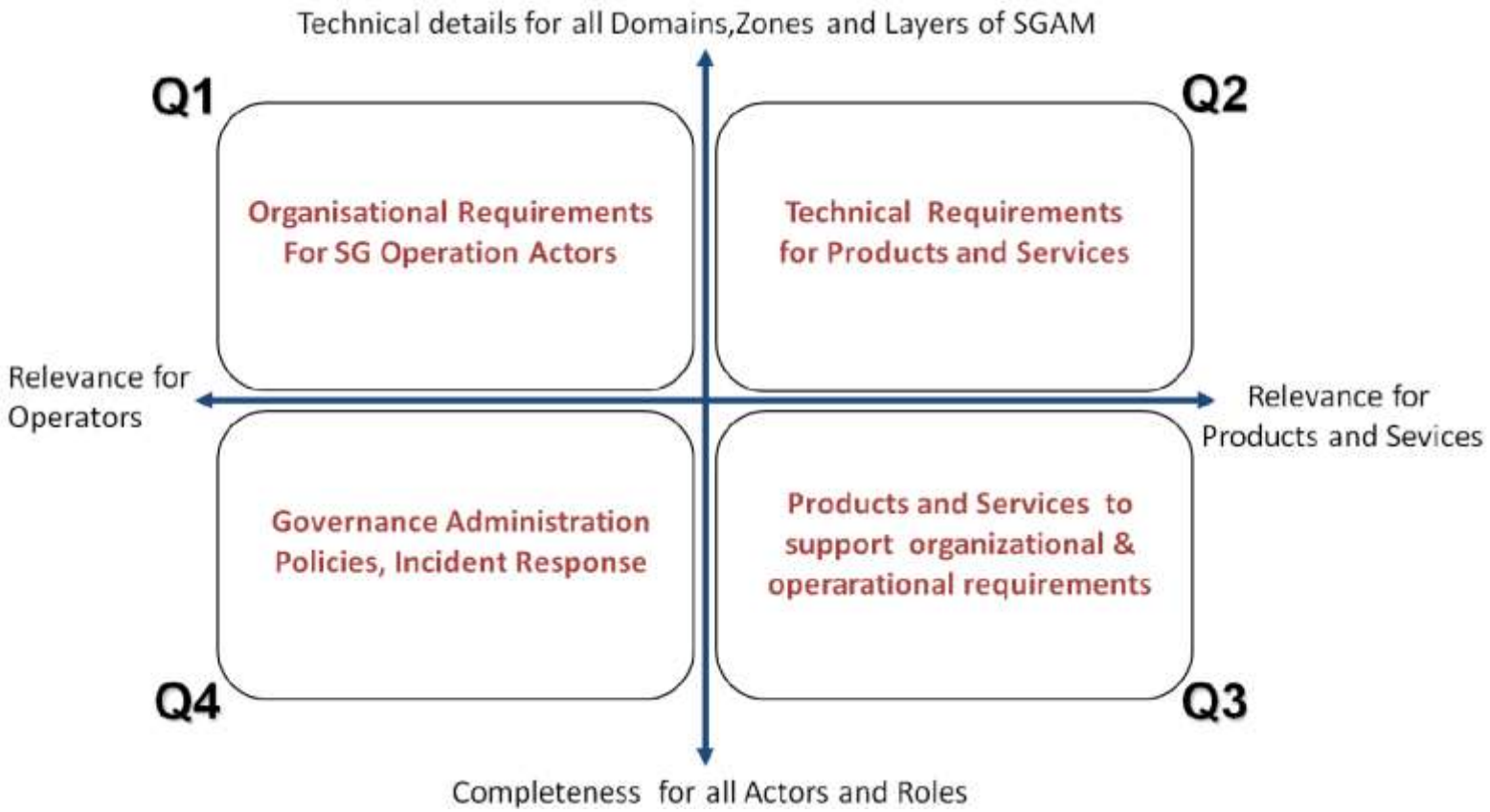
EU-MANDATE M/490 - STANDARDIZATION SMART GRID

SGIS-SL HIGH LEVEL RECOMMENDATIONS

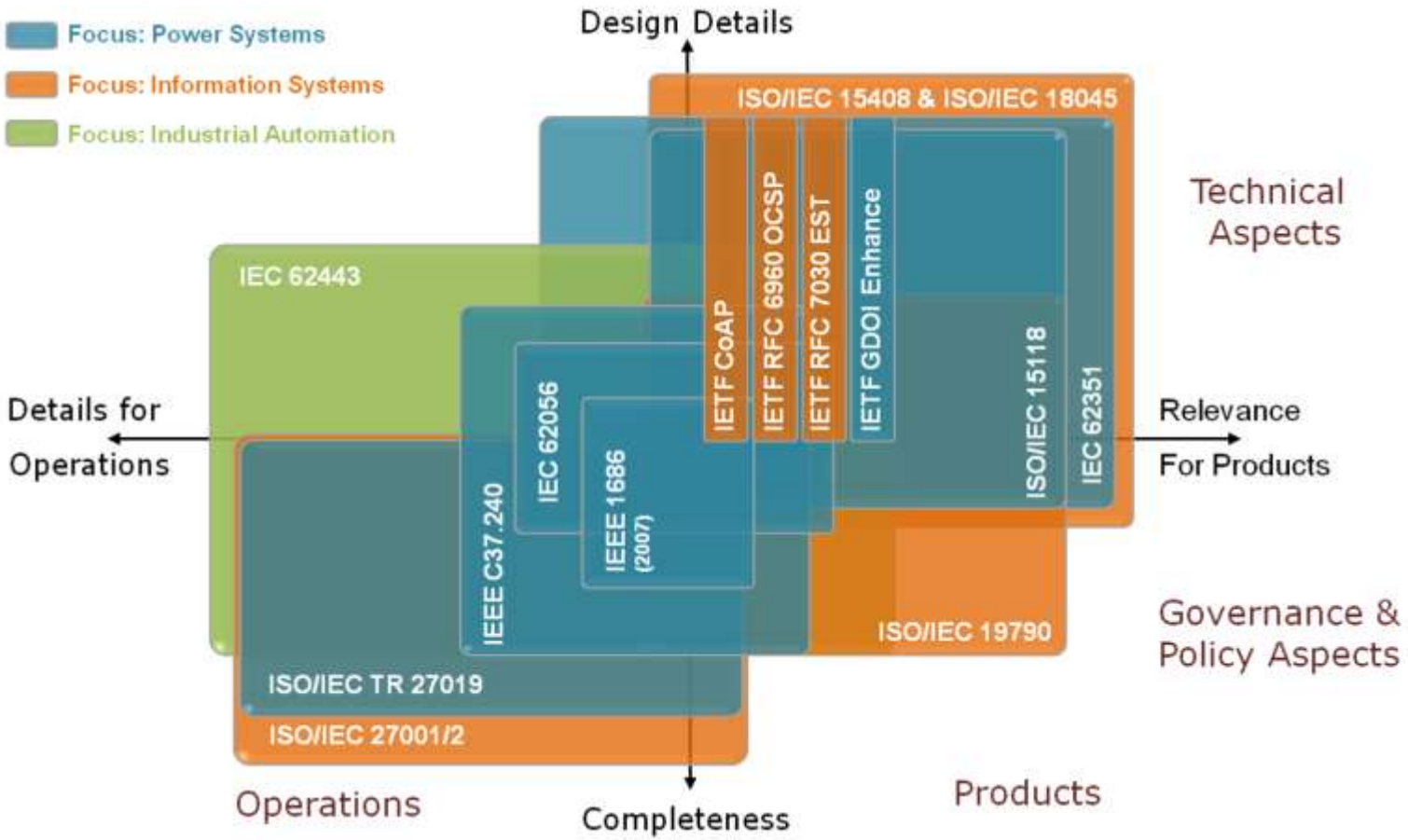
SGIS-SL HIGH LEVEL GUIDANCE*					
3 – 4	3 – 4	3 – 4	2 – 3	2 – 3	MARKET
3 – 4	3 – 4	3 – 4	2 – 3	2 – 3	ENTREPRISE
3 – 4	5	3 -4	3	2 – 3	OPERATION
2 – 3	4	2	1 – 2	2	STATION
2 – 3	3	2	1 – 2	1	FIELD
2 - 3	2	2	1 - 2	1	PROCESSES
GENERATION	TRANSMISSION	DISTRIBUTION	DER	CUSTOMER	
DOMAINS					

Mapping der Security Levels auf die SGAM-Architektur

EU-MANDATE M/490 - STANDARDIZATION SMART GRID
SECURITY STANDARD AREAS



EU-MANDATE M/490 - STANDARDIZATION SMART GRID
SECURITY STANDARD COVERAGE



EU-MANDATE M/490 - STANDARDIZATION SMART GRID

EUROPEAN SET OF RECOMMENDATIONS APPROACH

EU-MANDATE M/490 - STANDARDIZATION SMART GRID

EUROPEAN SET OF RECOMMENDATIONS APPROACH

	European Set of Recommendations Domains	SGIS Security Levels					SGAM		
		1	2	3	4	5	Domains	Zones	Layers
ENISA Security Measures Domains	Security governance & risk management	***	***	***	***	***	All	All	Business, Function
	Third parties management	*	*	**	**	**	All	Station, Operation, Enterprise, Market	Business, Function
	Secure lifecycle process for smart grid components and operating procedures	**	**	***	***	***	All	All	Business, Function, Component
	Personnel security, awareness and training	*	*	**	**	***	All	All	Business, Function
	Incident response & information knowledge sharing	*	**	**	***	***	All	Station, Operation, Enterprise, Market	Business, Function
	Audit and accountability capability	*	*	**	**	***	All	Station, Operation, Enterprise, Market	All
	Continuity of operations capability	***	***	***	***	***	All	All	All
	Physical security	*	**	**	***	***	All	Process, Field, Station, Operation	Business, Function
	Information systems security	**	**	***	***	***	All	All	All
	Network security	**	**	***	***	***	All	All	Function, Information, Communication, Component
New	Situational Awareness	**	**	***	***	***	All	All	All
	Liability	*	**	**	***	***	All	All	Business, Function

STANDARDISIERUNG

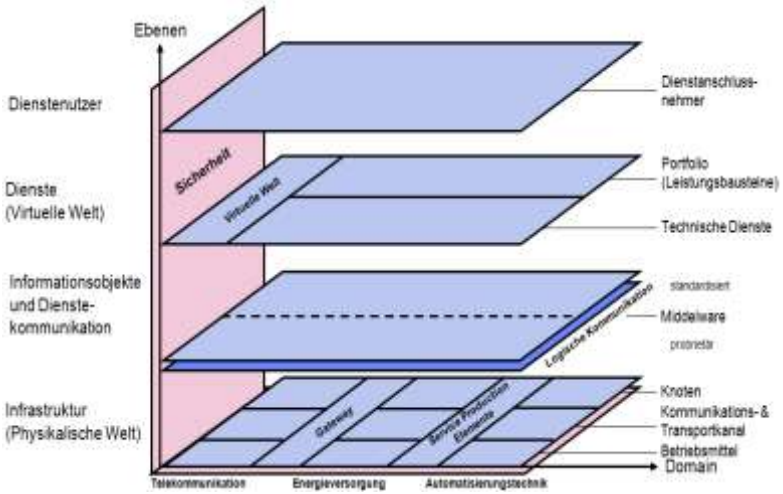
BEISPIEL:

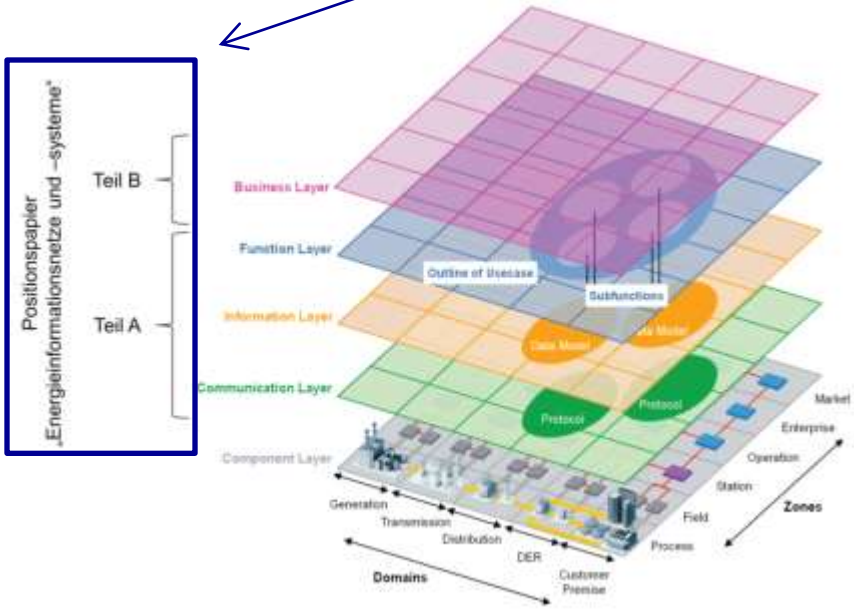
BEITRAG ZUR EUROPÄISCHEN
SMART GRID STANDARDISIERUNG

Beitrag zur europäischen Smart Grid Standardisierung

FOKUSGRUPPE VDE-ITG ENERGIEINFORMATIONSNETZE

Motivation und Einordnung des 2. Positionspapiers (Teil A und Teil B)





VDE/ITG Referenzarchitektur Smart Grid (1. Positionspapier - Dezember 2010) → **EU Smart Grid Architecture Model (Oktober 2012)**

VDE

PRAXISTEST

EU-FÖRDERPROJEKT (FP7) ZUR ENTWICKLUNG EINES CLOUD-ENERGIEMANAGEMENTSYSTEMS

OPEN SYSTEMS FOR ENERGY SERVICES (OS4ES)

PRAXISTEST (OS4ES)
MOTIVATION

- **Situation today:**
  Non-forecastable variable generation from RES is causing critical challenges in grid management at all levels because the needed proper intelligent communication and data sharing between DERs and DSOs is difficult or even absent, and services for energy grid management that are able to exploit the aggregated flexibility of DERs are lacking.
- **Key questions for the Smart Grid:**
  How can mass presence of DERs in the grid actively support distribution grid management by DSOs and other BRPs? And how can the DER aggregated flexibility support rather than hinder technical smart grid management on a dynamic and continuous basis?
- **OS4ES central aim:**
  Provide a solution that closes the current big gap between DERs and DSOs, and instead make them cooperate dynamically so that the aggregated DER flexibility informs and provides added value to active electricity network management.

PRAXISTEST (OS4ES)
PARTNERS

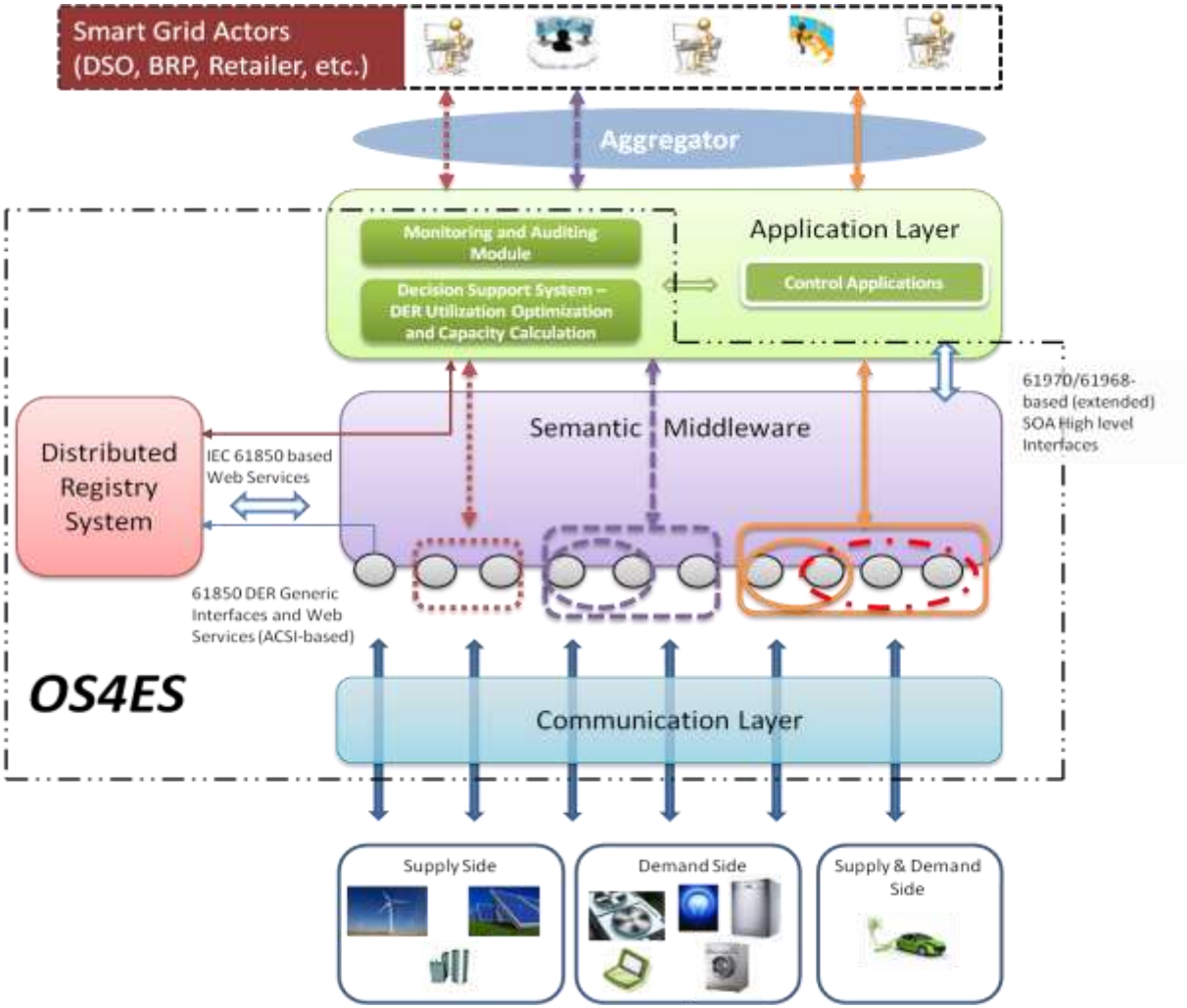
Organisation name	Short name	Nationality
Forschungsgemeinschaft für Elektrische Anlagen und Stromwirtschaft e.V.	FGH e.V.	
Hamburg University of Applied Science	HUAS	
Hypertech IT Solutions	Hypertech	
It4power	IT4	
KONČAR-Power Plant and Electric Traction Engineering Inc.	KONCAR	
Stedin Netbeheer B.V.	Stedin	
Fundación Tecnalia Research and Innovation	Tecnalia	
The Netherlands Organisation for Applied Scientific Research	TNO	
T-Systems Multimedia Solutions GmbH	T-Systems MMS	

PRAXISTEST (OS4ES)
OBJECTIVES

- An Open System Architecture for Energy Services, adopted as standards: API for energy application, DER communication interface and DER Registry standard.
- Energy Services Enabling Platforms being offered by ICT service providers or related companies.
- Algorithms that run on the architecture for dynamic assignment of DER capabilities to energy management service needs.
- DER System Registry and other communication technology functionality being offered by telecommunication companies to for example DSOs.
- New energy services being built based on the OS4ES use case scenarios and offered to DSOs, ESCOs, suppliers, retailers, users, customers, and prosumers.

PRAXISTEST (OS4ES)

HIGH-LEVEL ARCHITECTURE OF OS4ES OPEN SYSTEM



PRAXISTEST (OS4ES)
FACTS

- estimated project start in summer 2014
- expected establishment of an open stakeholder group in late summer 2014

… UND ZUM SCHLUSS

THIRD-CLASS COMPANIES PRODUCE PRODUCTS;
SECOND-CLASS COMPANIES DEVELOP TECHNOLOGY;
FIRST-CLASS COMPANIES SET STANDARDS.

(CHINESE SAYING)

VIELEN DANK!

Dr.-Ing. Jörg Benze

T-Systems Multimedia Solutions GmbH
Corporate Unit Branchen Business Development
Riesaer Straße 5
D-01129 Dresden

E-Mail: joerg.benze@t-systems.com
www.t-systems-mms.com

T · · Systems ·