Smartgrids in Europe, CIM usage, EDF feedback

ERIC LAMBERT
EDF R&D

Measurements & Information Systems of Electrical Networks

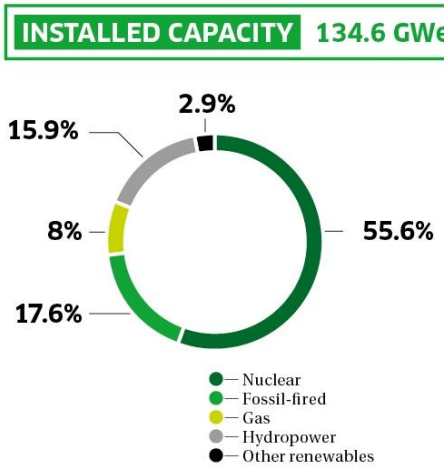
UCA CIMUg October 2012 – New Orleans

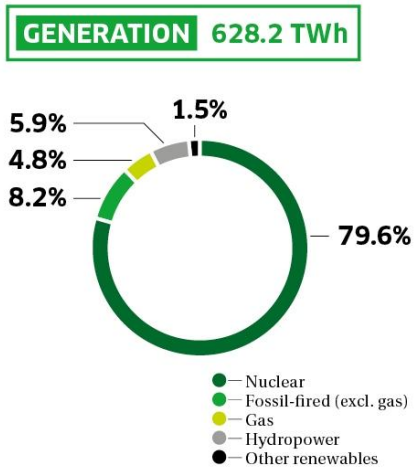
Outline

- EDF
- Introduction : the international energy context
- How smartgrids are structured in Europe ?
- Is CIM used in European Smartgrids Projects ?
- Is EDF using CIM ?
- Which IEC Technical Committees EDF is involved in ?
- Conclusion

EDF : A GLOBAL LEADER IN ELECTRICITY

- **37.7 million** customers
- **156,168** employees worldwide
- **€65.3 billion** in sales
- **87% carbon-free** generation





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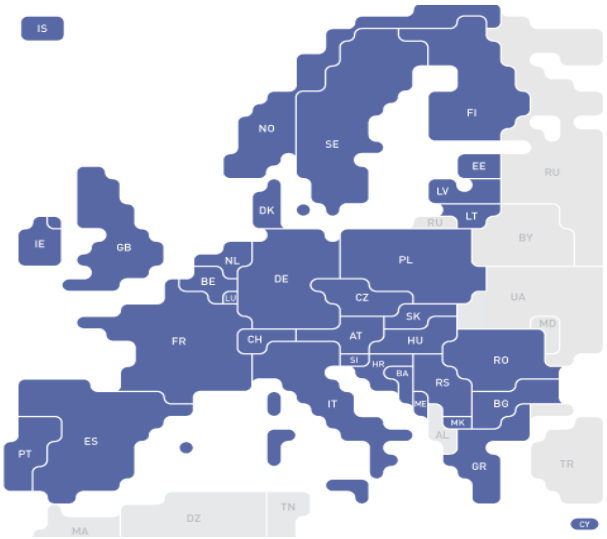
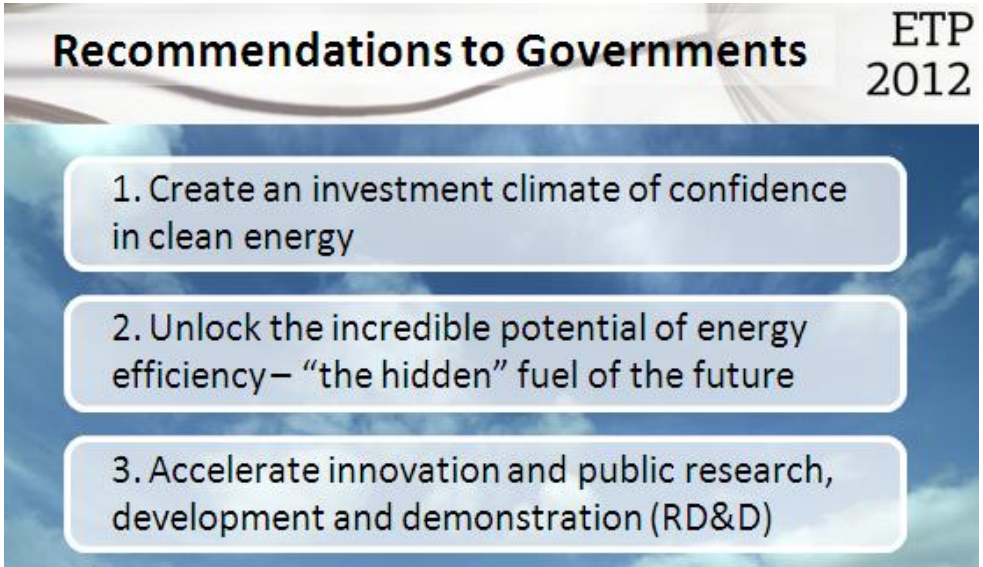


ISGAN :Energy Technology Perspective 2012

Implementing Agreement for a Co-operative Program on Smart Grids

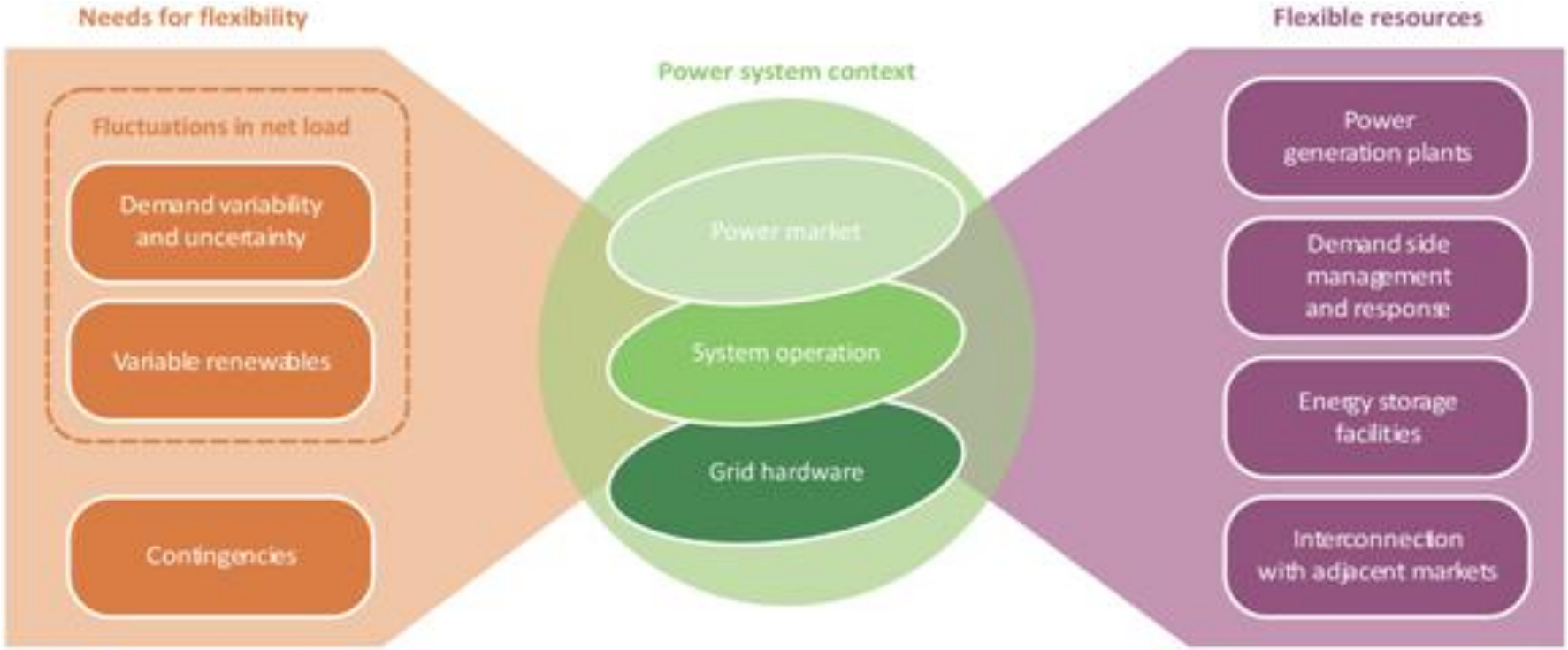
ISGAN was launched as the **International Smart Grid Action Network**
by 23 countries and the European Union held in Washington, D.C on July 19 and 20, 2010.



International Energy Agency

EDF

IEA ISGAN : Flexibility needs and resources



Existing and new flexibility needs can be met by a range of resources in the electricity system – facilitated by power system markets, operation and hardware.

International Energy Agency

EDF

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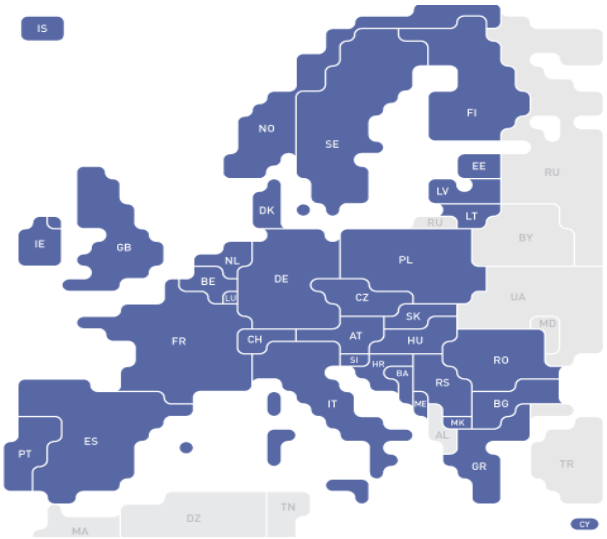


European Energy Action

ENERGY

European Commission

Communication on renewable energy

Energy Roadmap 2050

Energy 2020

Energy Security in Europe

Energy Efficiency Directive

After Fukushima EU Stress Tests

Renewable Energy: Progressing towards the 2020 target

Energy market integrity & transparency

The future Role of Regional Initiatives

http://ec.europa.eu/energy

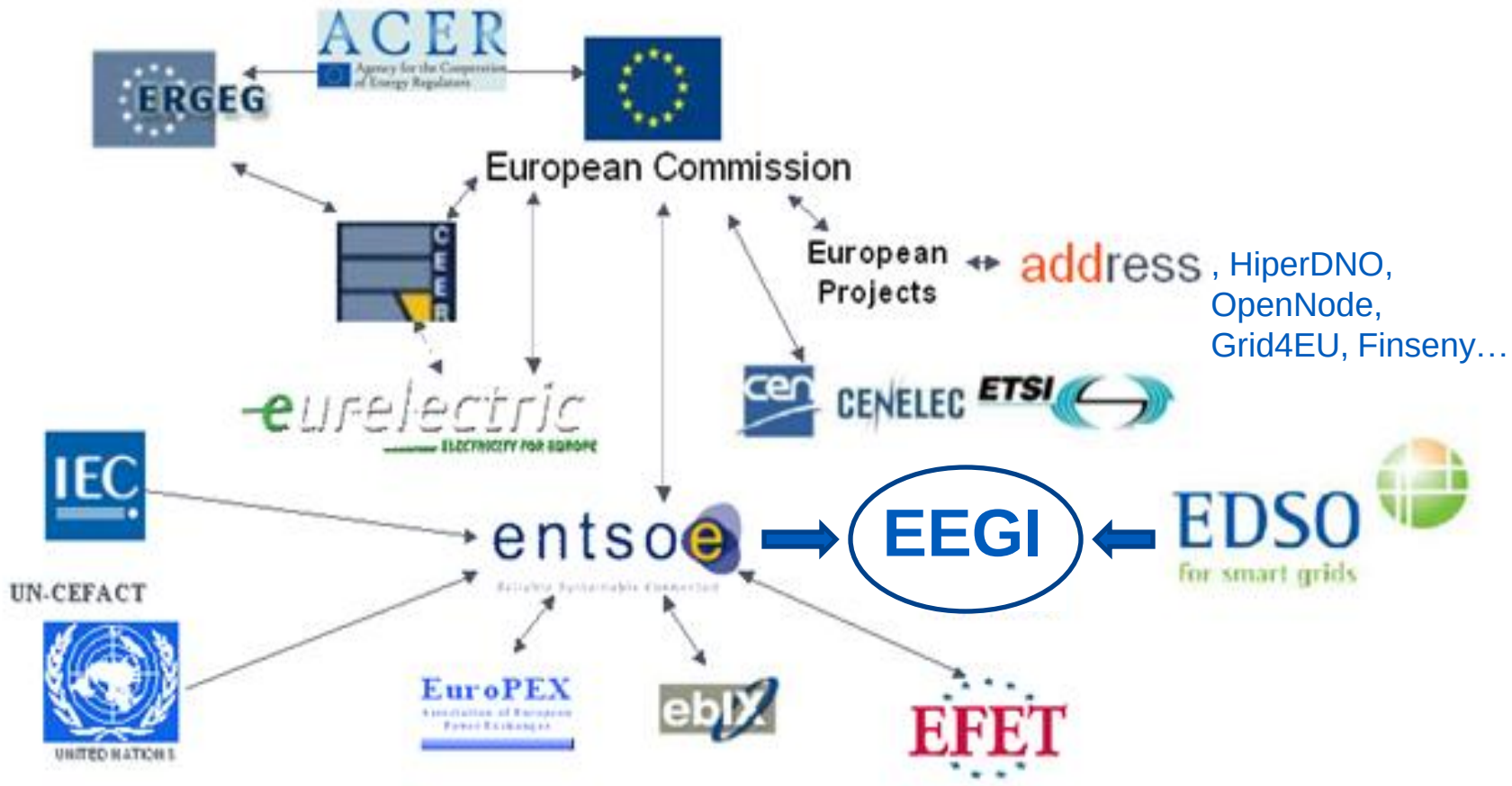
EDF

Towards a European integrated energy market

TSO : Transmission System Operator – NRA : National Regulatory Authority

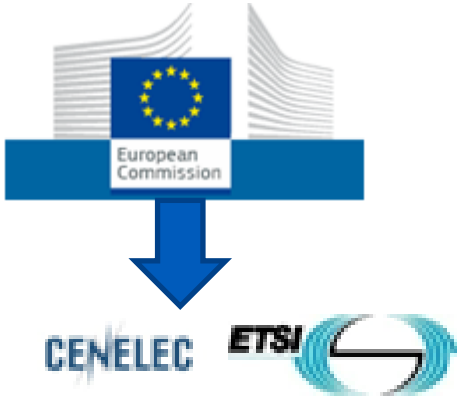
Towards more TSOs and DSOs interactions
The European Electricity Grid Initiative (EEGI)

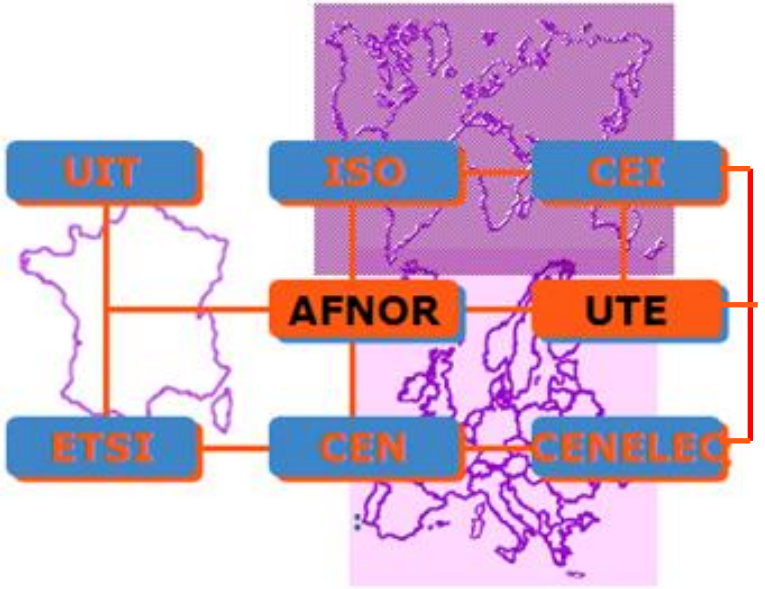
- 2010-2018 Roadmap

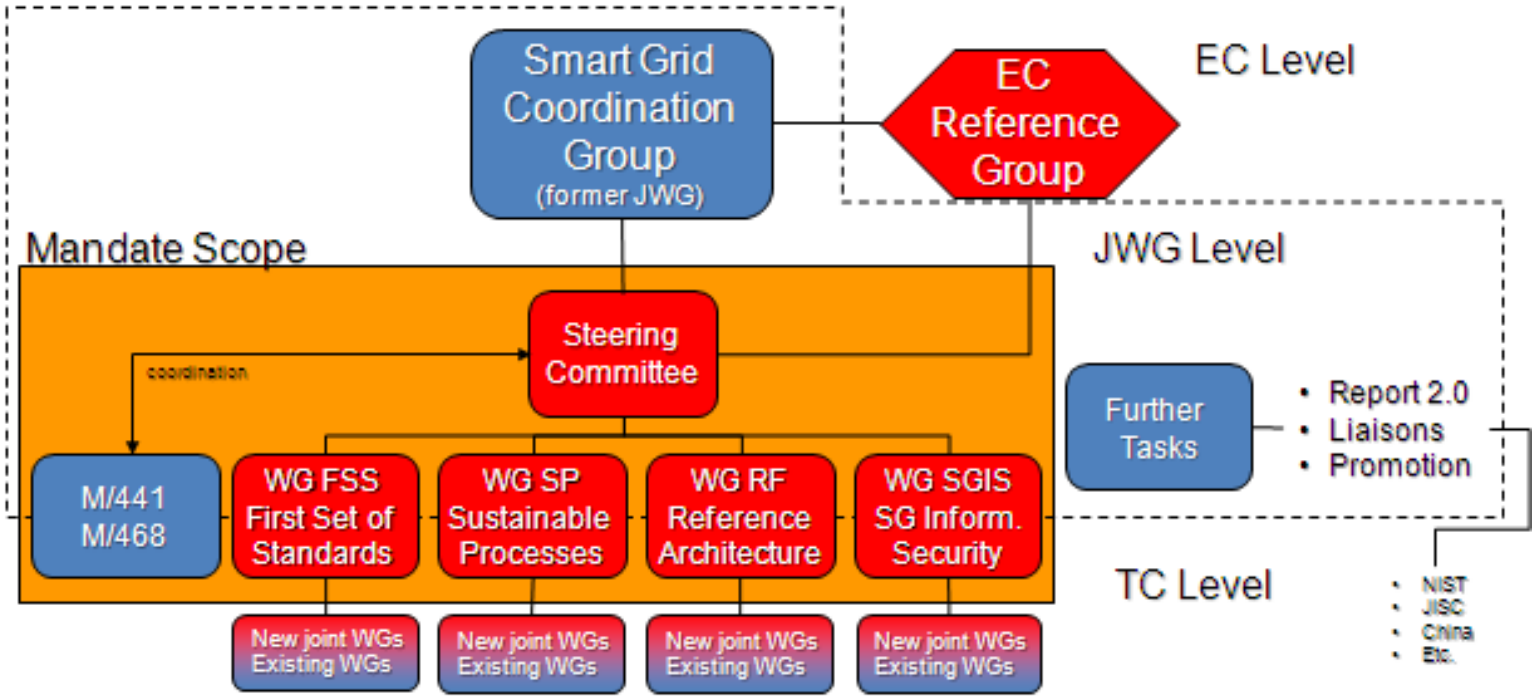


Smartgrid European Mandate

M490



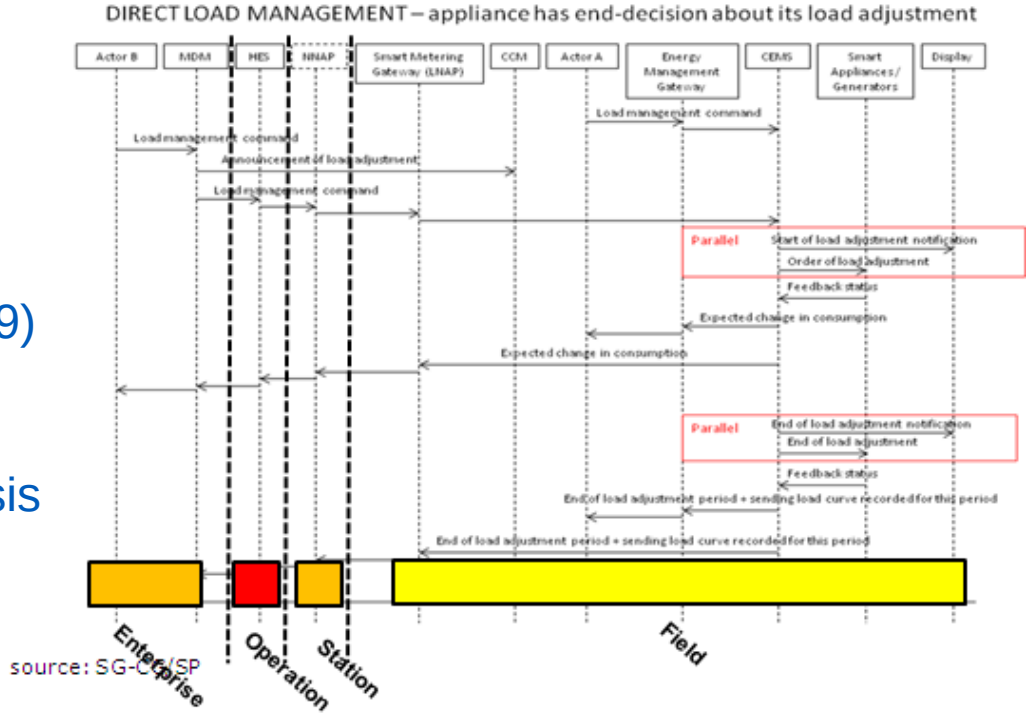




Final Reports
End of 2012

Artefacts

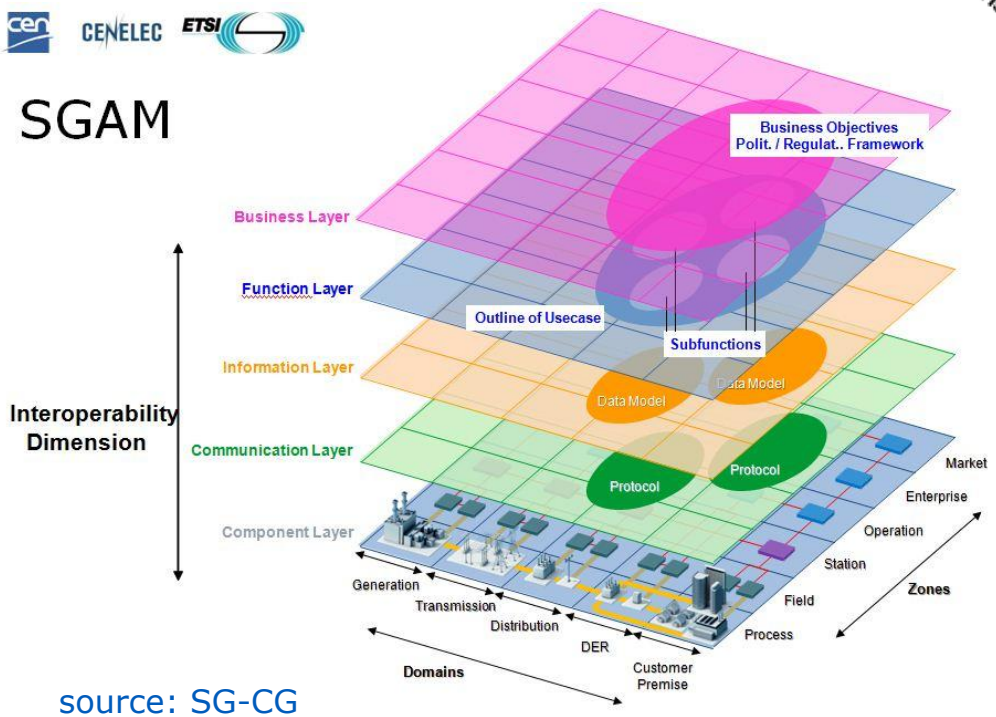
Use cases SG collection (IEC 62559)
Security level
UC mapping to SG Architecture
Standard identification &Gap analysis

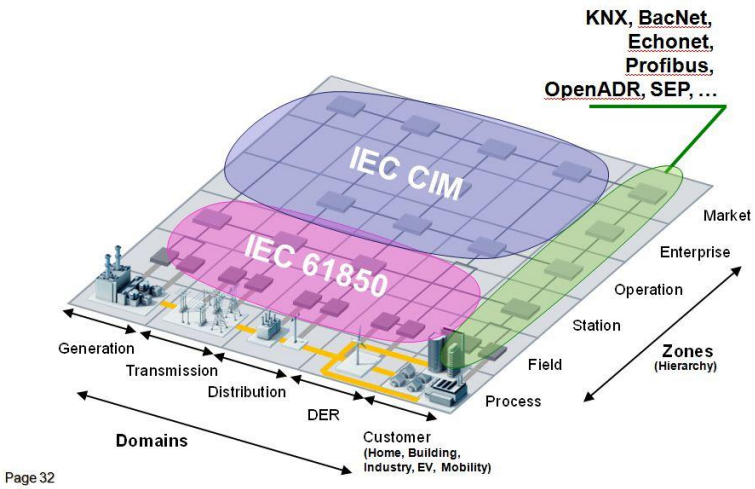


source: SG-CG/SP

cen CENELEC ETSI

SGAM





source: SG-CG

EDF

Overall process

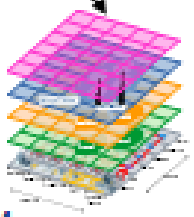
Time Horizon

Process set end 2012
Iteration ongoing from 2013

2. Step
Map UCs to SGAM

Use Cases

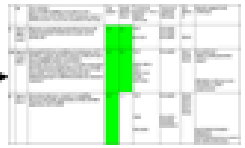
Generic Use Cases Repository



SGAM

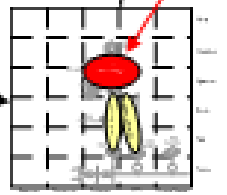
4. Step
Identify new gaps

Expected outcome



Target date from 2013

NEW Gap List
(follow process 2. from here)



SGAM

3. Step
Locate requirements for standards

Source

Further findings:
R&D, Pilots, Implementation

1. Step
Identify New Generic Use Cases from findings

Result

- Identification of "new gaps"
- Systematically investigate need for new standardization according to the new process established by SG-CG

source: SG-CG/SP

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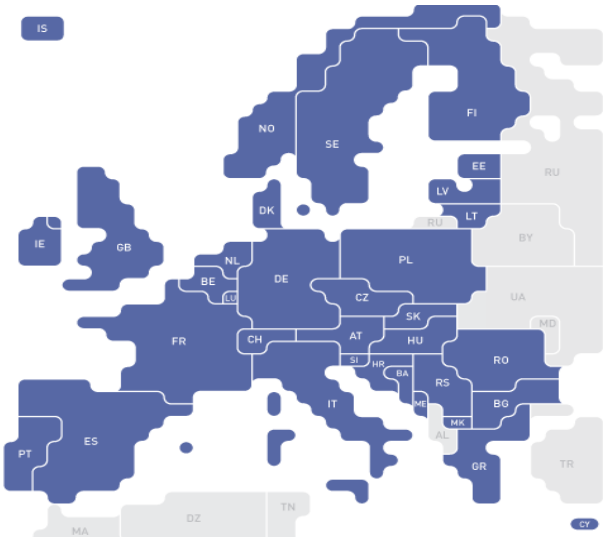
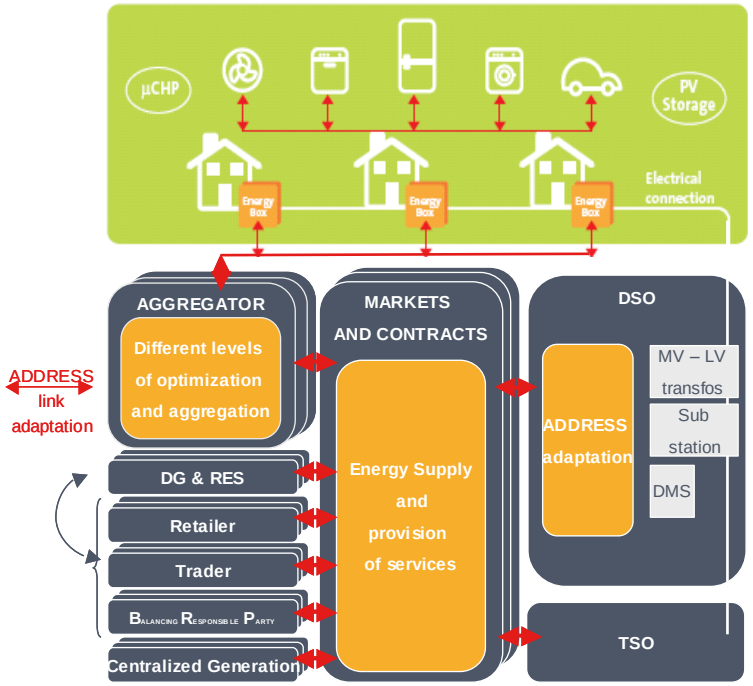


Is CIM used in Europe ?

- M490, eDSO, Eurelectric, ENTSO-E recommandations have/ will have more and more impacts

- **ADDRESS project is the first European Smartgrid project to use CIM**



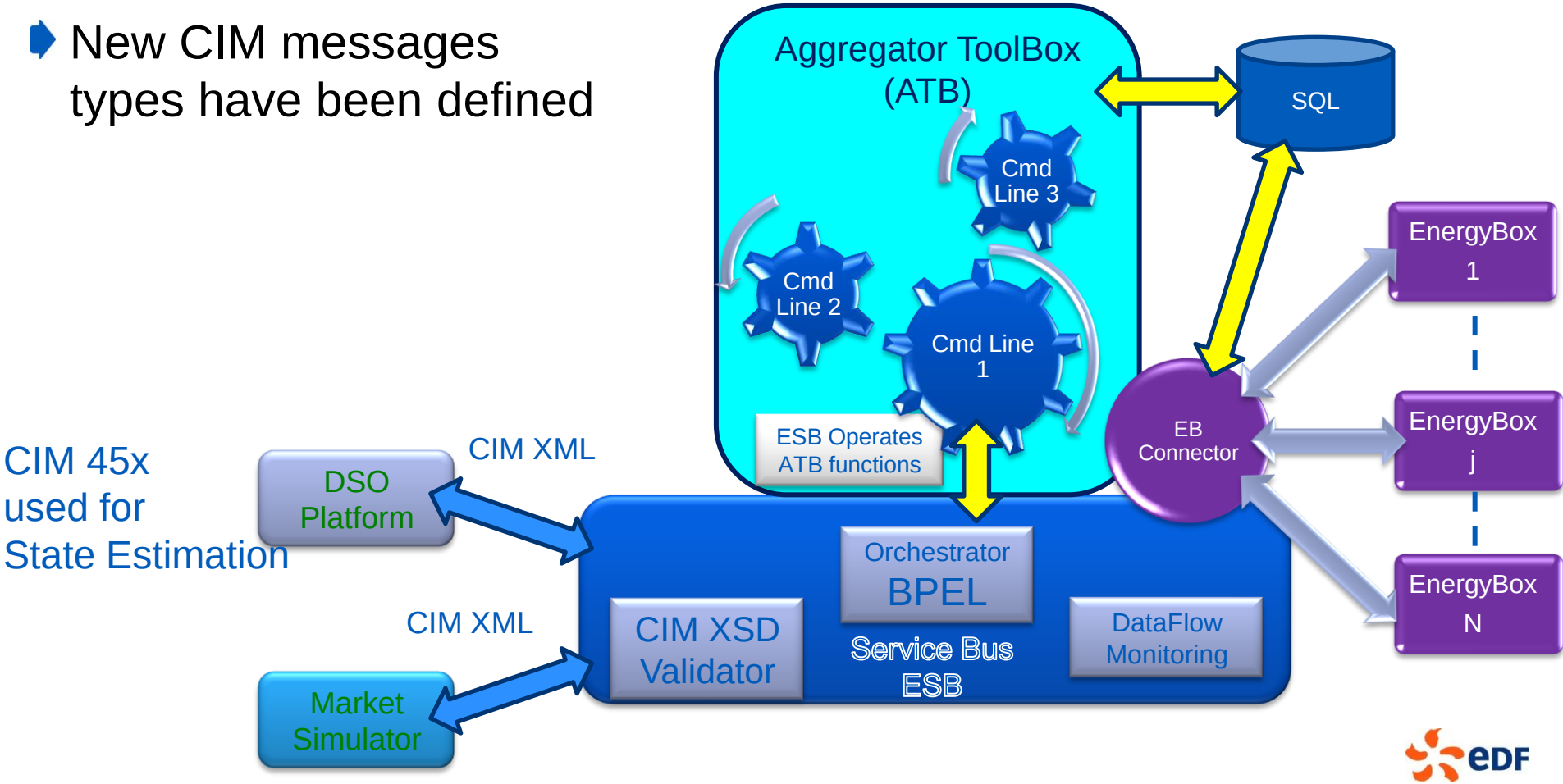
The goal is to enable Active Demand through Active participation of domestic and small commercial consumers in the electricity system markets and the provision of services to the different participants

25 partners, 11 European Countries
Management : ENEL
Technical Management : EDF
3 fields tests

From 2008 to May 2013

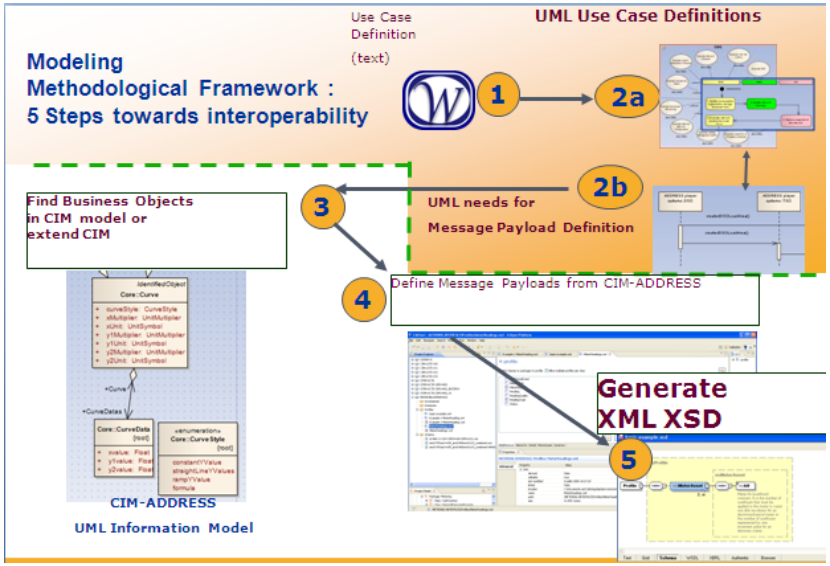
How CIM has been used in ADDRESS ?

- Use cases have been defined leveraging Intelligrid Methodology (IEC TC8 PAS 62559)
- CIM profiles like CDPSM (61968-13) & 61970-45x profiles have been used. 61968-100 has been used.
- New CIM messages types have been defined



Lessons learned & next steps

- EDF and ABB CIM experts were involved in a Task « Methods and Tools to ensure interoperability »
- Education on CIM & Good Working Practices were reused



- Feedback to IEC has to be done
  - The life cycle of a Use Case : from business process to its CIM implementation
  - Use cases on Load Configuration Management, AD Technical validation by TSO/DSO
  - CIM extensions, Profiles usage, New Message Types
- Other DSOs like ENEL, and IBREDROLA are supporting CIM

Grid4EU

« Grid4EU » project

Large-Scale Demonstration
of Advanced Smart GRID Solutions with wide Replication
and Scalability Potential for EUROPE

GRID4EU
INNOVATION FOR ENERGY NETWORKS

KICK-OFF MEETING
NOVEMBER 21ST - 22ND 2011

A European Smart Grids Project

(under EC FP7 negotiation)

- Lead by 6 DSOs (covering more than 50% of the metered electricity customers in Europe)
- 27 partners (Utilities, Energy Suppliers, Manufacturers, Research Institutes)
- Duration: 4 years (November 2011 - November 2015)
- Project Coordination: ERDF
- Technical Director: ENEL
- Chairman of General Assembly: IBERDROLA

EDF

27 partners from 12 European Union Member States

Utilities	Manufacturers	Universities & Research institutes
CEZ DISTRIBUCE	ABB	ARMINES (France)
ENEL	ALSTOM GRID	COMILLAS (Spain)
ERDF	CISCO	KTH (Sweden)
IBERDROLA DISTRIBUCION	CURRENT	KUL (Belgium)
RWE	EMETER	RSE (Italy)
VATTENFALL ELDISTRIBUTION	ITRON	TUD (Germany)
CEZ SA	LANDIS&GYR	
EDF SA	ORMAZABAL	
IBREDROLA GENERATION	SELTA	
	SIEMENS	
	TELVENT	
	ZIV	

GRID4EU
INNOVATION FOR ENERGY NETWORKS

EDF

Grid4EU is standard oriented

R&D Topics

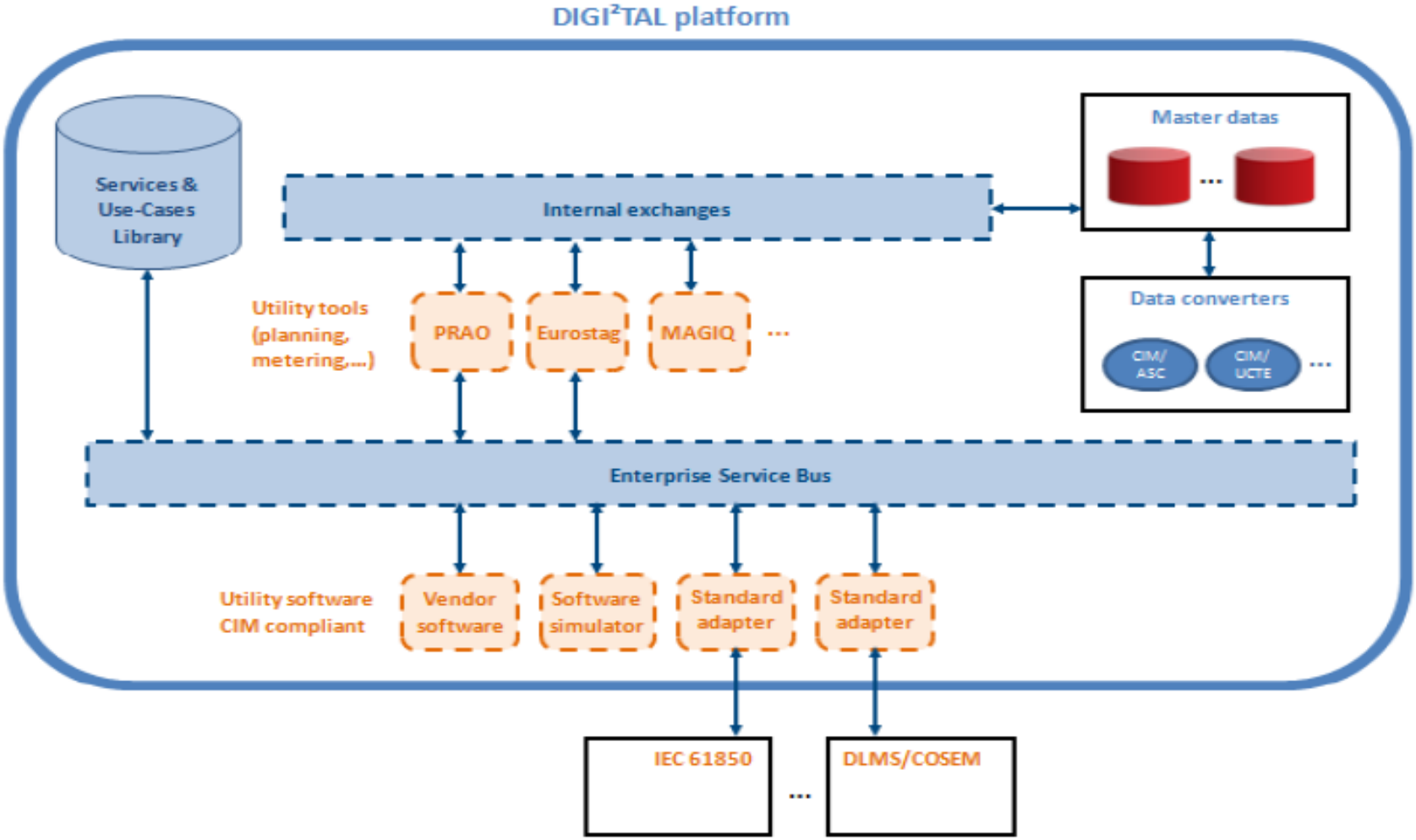
- Using more Renewable Energy Sources connected to distribution networks
- Implementing active, more efficient participation of customers to electricity markets (Active Demand)
- Secure energy supply - Network reliability
- MV / LV network Supervision & Automation
- Improving peak load management through increased interactions between network operation and electricity customers
- Electric Vehicles, Storage
- Micro Grids & islanding

Technology and Communication Standard (EDF lead)

GWP4.1	• Guidelines defining the most recent standards potentially applicable within the six demonstration definitions
GWP4.2	• Qualitative validation of the benefits and costs of implementing the appropriate standards with the demonstration participants
GWP4.3	• Monitoring the standards implementation in each of the demonstrations
GWP4.4	• Drawing periodic conclusions about the practical issues faced by DSOs and manufacturers when implementing standards
GWP4.5	• Feed-back of the lessons learnt during the demonstrations to the standardization bodies

Demonstrate Standard : The Digi²tal platform

Distribution Grid Intelligent InTegrAtion Laboratory



Contribution to EEGI and ISGAN

GRID4EU is a key project for the European Commission, which is expected to become a **"showcase" of the European state of the art on smart grids**

At European level, Grid4EU will actively contribute to knowledge sharing among projects in the framework of EEGI (European Electricity Grid Initiative) knowledge sharing activities

At international level, Grid4EU will also provide **an active contribution of Europe to ISGAN** (International Smart Grid Action Network), which aims at accelerating the development and deployment of smart electricity grids around the world

EEGI

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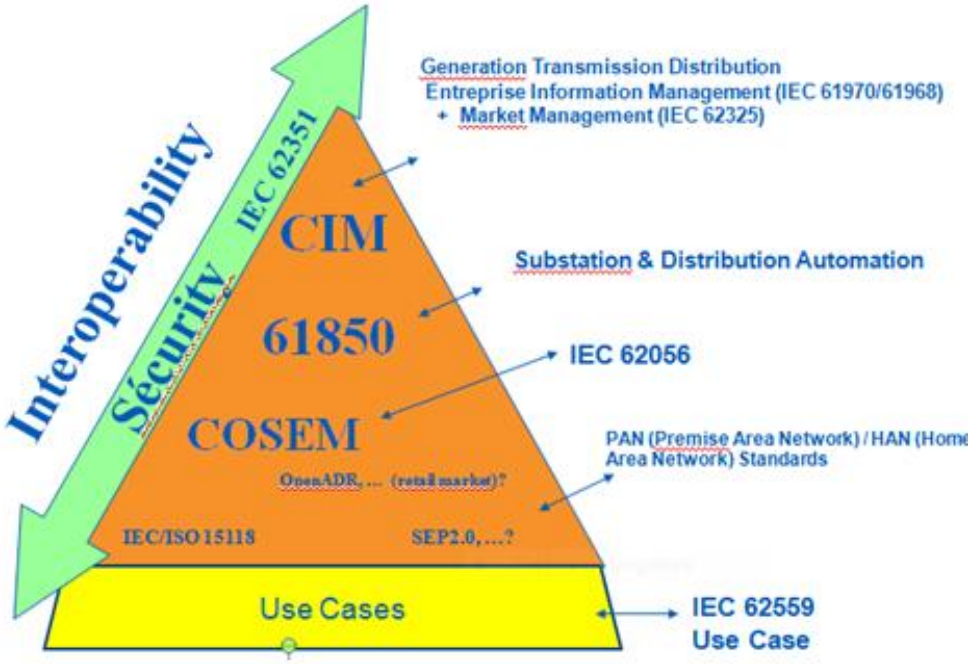


EDF R&D « CIM » background

- 1998 : Contribution to 61968-1 Interface Reference Model
- Since 2004 : funded R&D projects
  - Contribution to CIM Profile Methodology
  - Participation in several IOP tests since 2004
- 2006 : First CIM Interfaces in operation (GIS / MV-LV Functions)
- 2008 : 61968-13 (CDPSM) is an IEC international standard
- 2009 : First ENTSO-E IOP tests
  - EDF CIMConverters provided to ENTSO-E to help TSO Migration
- 2009 : decision to go with CIM in ADDRESS european project
- Participation in 61968-6, Naming & Design rules TF
- 2011 : First CIM (for Distribution) & 61850 IOP tests in Europe
  - EDF R&D supplies Data Sets, and participates with tools (ESB, Load Flow on Digi²tal)
- 2012 : First test of ENTSO-E CIM Market Extension
  - EDF R&D worked on 62325 parts from 2004 until end of 2011, TC57 WG16
- 2012 : Decision to lead of 61968-5 (Operational Planning)

ERDF

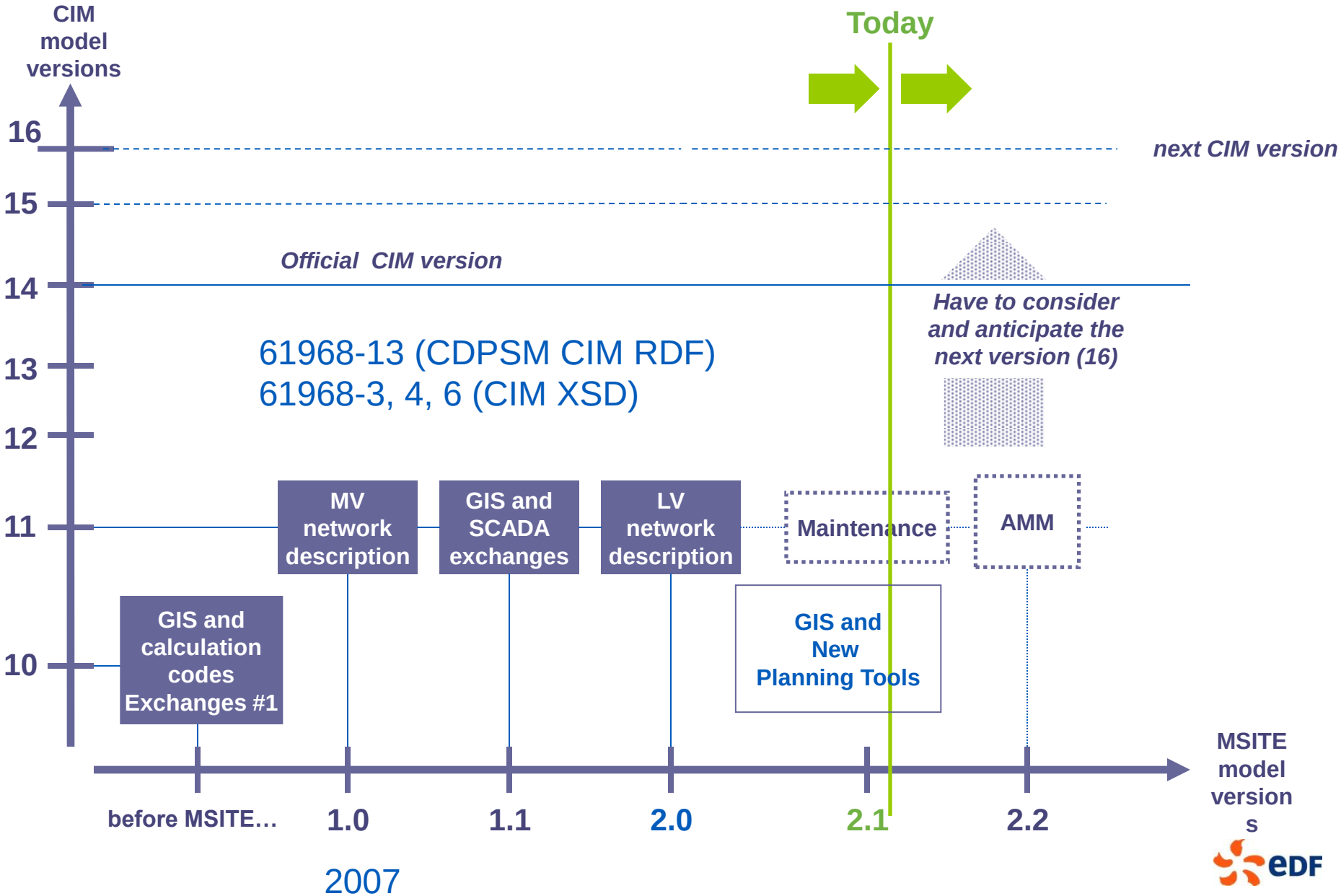
- French distribution subsidiary of EDF group

- Manages regulated activities for the distribution network
  - 2200 distribution primary substations (HV/MV)
  - 570.000 km of MV network
  - 730.000 MV/LV substations
  - 630.000 km of LV network
  - 29 millions customers
  - 40000 employees

ÉLECTRICITÉ RÉSEAU DISTRIBUTION FRANCE

A challenge : managing MSITE/CIM versions

MSITE = CIM subset + ERDF extensions



CIM & other EDF operational divisions

- RTE (TSO) as member of ENTSO-E is on its own on CIM
  - Eurostag and Convergence platform
- EDF Generation Divisions
  - Interest to follow CIM for Generation (61970-458)
- SEI : Renewal of the Remote Control System

  GIS to SCADA interfaces using CIM information model exchanges (based on 61968-13)

France not connected to the continental network

SEI: 1 million customers

- Energy savings, renewables, reinforcement of installed fossil-fired capacity and networks
- €730 million invested

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IEC Smartgrid related bodies

- SG3 : IEC Smart Grid Standardization Roadmap (June 2010, Ed 1.0)
- TC8 : System aspects for electrical energy supply
  - AHG4 (2011) : Generic Use cases for SmartGrids & Use case Methodology (PAS 62559)

International Generic Use Cases Domain Core Teams (DCT)

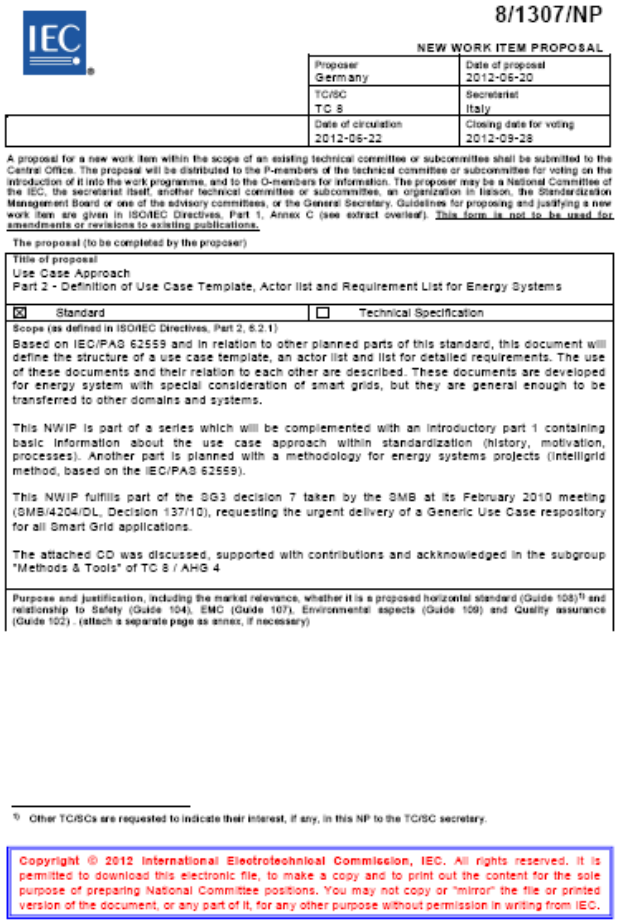
1. Transmission Grid Management
2. Distribution Grid Management / Micro grids
3. Smart Substation Automation
4. Distributed Energy Resources
5. Advanced (Smart Grid and) Metering Infrastructure
6. Smart Home / Commercial / Industrial / DR-Customer Energy Management
7. Energy Storage
8. Electric Transportation (ET)
9. Asset Management
10. Bulk Generation
11. Market

  - October 3rd 2012 : TC8 Plenary decisions …

IEC TC8-WG5 : Methodology and Tools

Update of IEC 62559

- Proposed Standard: Use Case Approach in Standardization
  - Part 1: Use Case Approach – Motivation and Processes
  - Part 2: Definition of Use Case Template, Actor List and Requirements List for Energy Systems -> 8/1307/NP
  - Part 3:
    Idea: XML schemes related to the use cases template in order to support tools which can provide a better import and export of use cases to UML tools
  - Part 4:
    e.g. Intelligrid Method for Projects,



8/1307/NP

NEW WORK ITEM PROPOSAL

Proposer	Date of proposal
Germany	2012-06-20
TC/SC	Secretariat
TC 8	Italy
Date of circulation	Closing date for voting
2012-06-22	2012-09-28

A proposal for a new work item within the scope of an existing technical committee or subcommittee shall be submitted to the Central Office. The proposal will be distributed to the P-members of the technical committee or subcommittee for voting on the introduction of it into the work programme, and to the O-members for information. The proposer may be a National Committee of the IEC, the secretariat itself, another technical committee or subcommittee, an organization in liaison, the Standardization Management Board or one of the advisory committees, or the General Secretary. Guidelines for proposing and justifying a new work item are given in ISO/IEC Directives, Part 1, Annex C (see extract overleaf). This form is not to be used for amendments or revisions to existing publications.

The proposal (to be completed by the proposer)

Title of proposal
Use Case Approach
Part 2 - Definition of Use Case Template, Actor list and Requirement List for Energy Systems

☒ Standard ☐ Technical Specification

Scope (as defined in ISO/IEC Directives, Part 2, 6.2.1)

Based on IEC/PAS 62559 and in relation to other planned parts of this standard, this document will define the structure of a use case template, an actor list and list for detailed requirements. The use of these documents and their relation to each other are described. These documents are developed for energy system with special consideration of smart grids, but they are general enough to be transferred to other domains and systems.

This NWIP is part of a series which will be complemented with an introductory part 1 containing basic information about the use case approach within standardization (history, motivation, processes). Another part is planned with a methodology for energy systems projects (Intelligrid method, based on the IEC/PAS 62559).

This NWIP fulfills part of the SG3 decision 7 taken by the SMB at its February 2010 meeting (SMB/4204/DL, Decision 137/10), requesting the urgent delivery of a Generic Use Case respository for all Smart Grid applications.

The attached CD was discussed, supported with contributions and ackknowledged in the subgroup "Methods & Tools" of TC 8 / AHG 4

Purpose and justification, including the market relevance, whether it is a proposed horizontal standard (Guide 108)[1] and relationship to Safety (Guide 104), EMC (Guide 107), Environmental aspects (Guide 109) and Quality assurance (Guide 102) . (attach a separate page as annex, if necessary)

[1] Other TC/SCs are requested to indicate their interest, if any, in this NP to the TC/SC secretary.

WG convenor : Johannes Stein (VDE Germany)

IEC TC8 wg5 decided during October TC8 plenary meeting (Oslo)

IEC TC8-WG6: Generic SG Requirements

- Proposed IEC publication :
  - Part 1 Specific application of Method &Tools for SG
  - Part 2 Business Process Generic Use Cases with options
  - Part 3 Smart Grid functions
  - Part 4 Annex : DCT reports (with leaders)

WG convenor : Arnaud Ulian (ERDF France)

International Generic Use Cases:
Domain Core Teams (DCT)

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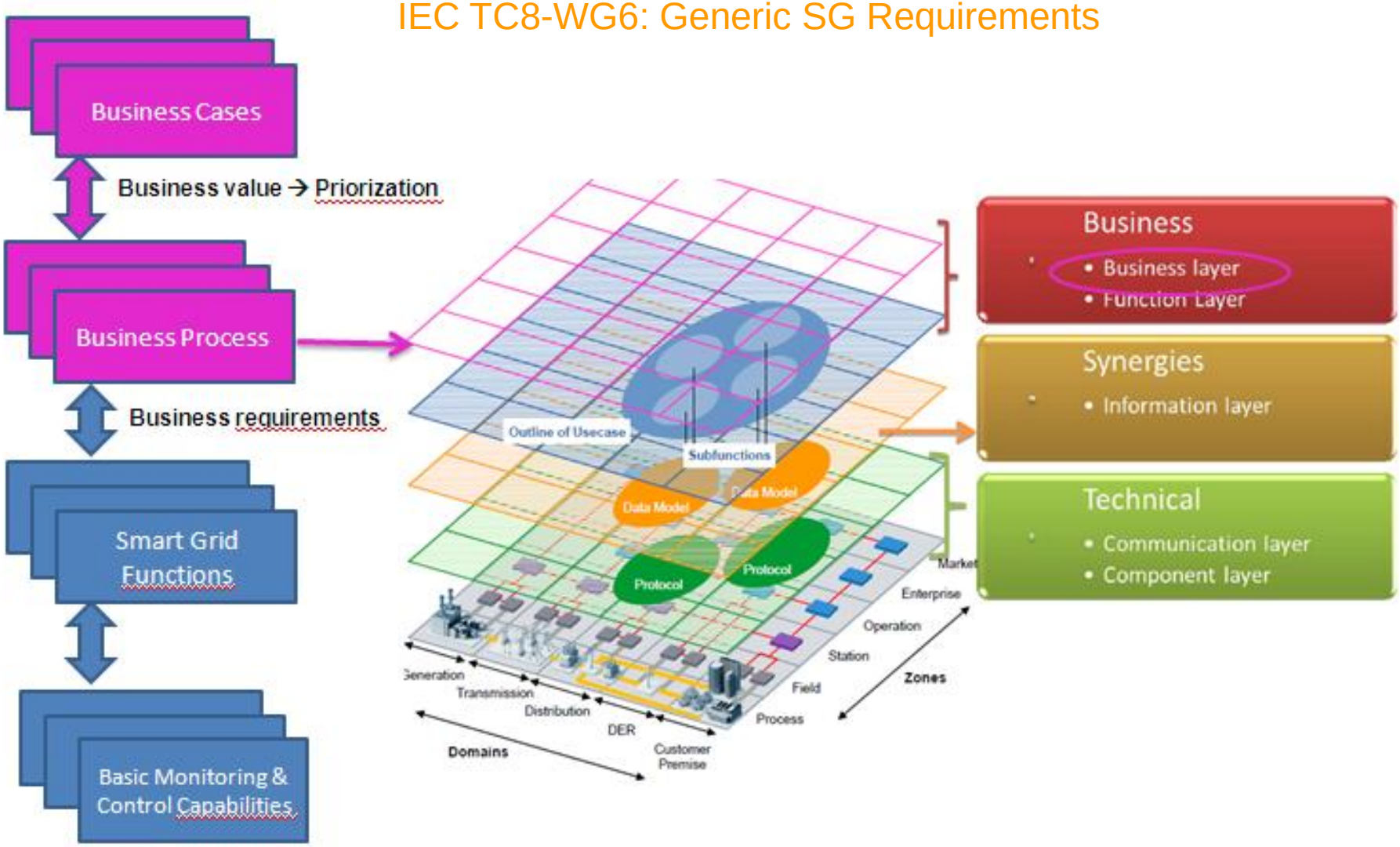
IEC TC8 wg6 decided during October TC8 plenary meeting (Oslo)

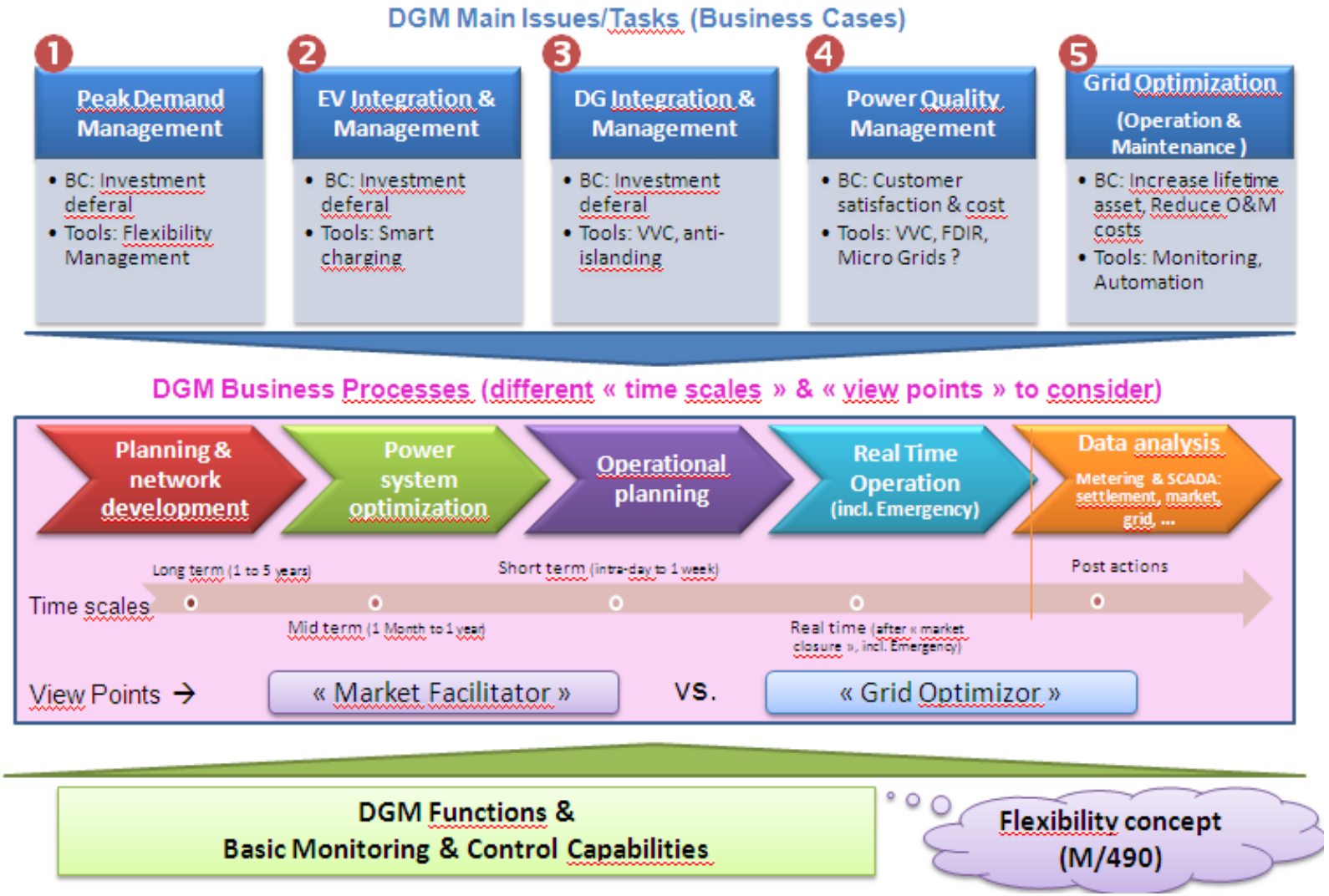
A NEED FOR A FIRST DESCRIPTION AT THE BUSINESS LAYER

IEC TC8-WG6: Generic SG Requirements



CHANGER L'ÉNERGIE ENSEMBLE

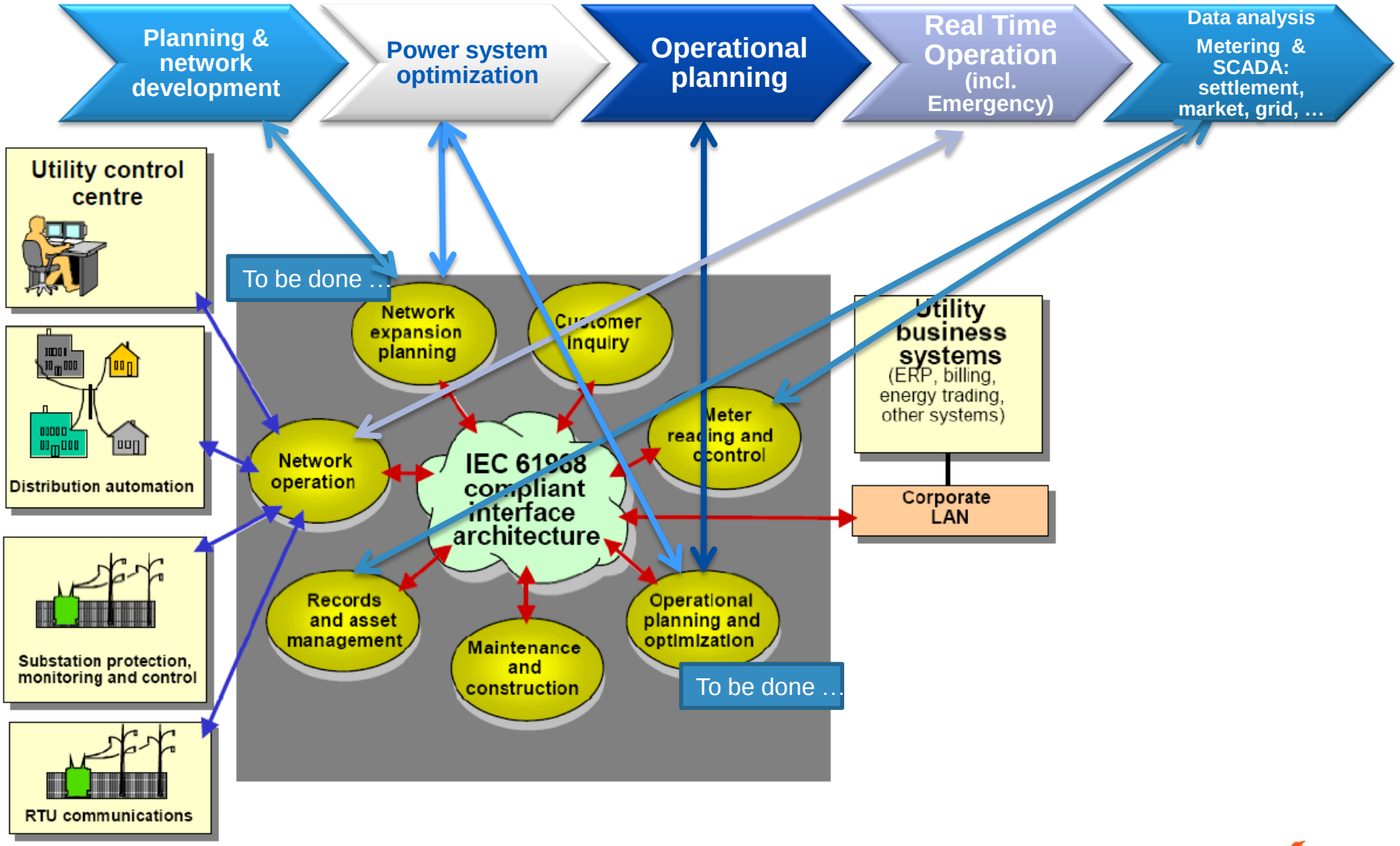
IEC TC8-WG6 – DCT2 Distribution Grid Management



CHANGER L'ÉNERGIE ENSEMBLE

IEC TC 8 WG6 – DCT2 Distribution Grid Management Use Cases

MAPPING WITH IEC TC57 61968 standards



IEC TC8 WG6 – DCT8 Electric Transportation

- **Role model proposal** : "Electric Transportation Vehicle Charging Role Model"
- One **Generic UC per domain**, using 62559 updated template short version, from which **more specific or detailed UC** are derived, e.g. :

Generic Use Case "Electrical Vehicle Charging Process"

- Specific UC "Company Fleet Electrical Vehicle Charging Process"
- Specific UC "Multi-Unit Residential Parking Electrical Vehicle Charging Process"
- Specific UC "Public Parking Electrical Vehicle Charging Process"
- Detailed UC "Uncontrolled charging"
- Detailed UC "Charging with demand response"
- Detailed UC "Smart Charging"
- Detailed UC "Customer Energy Management for Electrical Vehicle Charging Process"
- ...

UTILITY SmartGrid Business Process Experts are welcome to join WG 6 !
DCT 2, DCT6, DCT8 are the front runner and active

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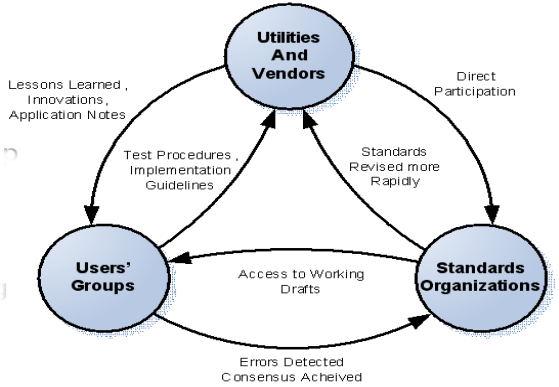
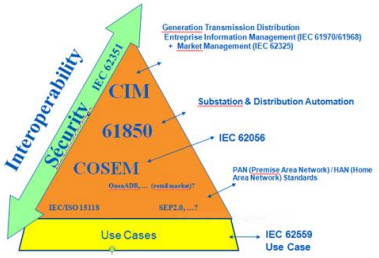
EDF R&D « CIM » lessons learned

Think global, Act local, reuse & improve



- Get a « CIM Team »
  - Work with Business experts & IT experts, Nominate a CIM Model Manager,
  - Organize « SmartGrid standards universities »
- Participate in IEC TC and User Associations
  - Web-conferences, Some F2F meetings (There is « one » CIM for T&D)
  - Lead some parts or contribute actively
- Participate in Interoperability tests
  - As witness, As CIM data set provider (better), As Tool participant (even better)
    - IOP test reports should be published in the same time frame than ENTSO-E ones
- Implement « CIM »
  - Promote Entreprise Information Management & MDA approaches
  - Implement CIM interfaces in Operational projects & R&D Smartgrid projects
  - Benchmark your potential « vendors » with CIM data sets

EDF R&D priorities & foreseen challenges



- IEC TC8 Smartgrid Use Cases development

- Insure Use case tracability between IEC TC8 and IEC TC57, TCxx

  liaisons to establish

- Help ERDF in 2013 : 61968-9 (Ed 3), get a draft on 61968-5

  outcomes of ADDRESS : load configuration area, T&D technical validation, energy profiles [reprofiling]

- Harmonization between IEC standards :
  CIM & 61850 & DLMS-COSEM & 15118 & …

  R&D platforms integration

- **Anticipate** our operational divisions needs

Thanks for your attention

Questions ?

Merci de votre attention !