

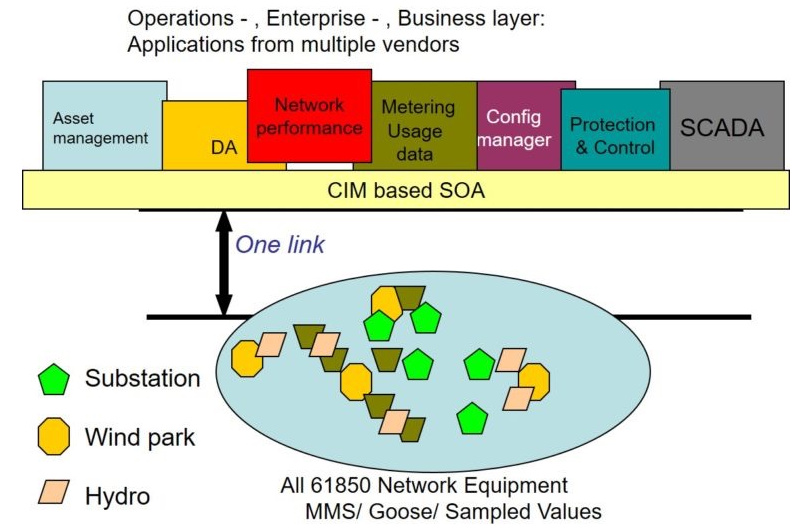


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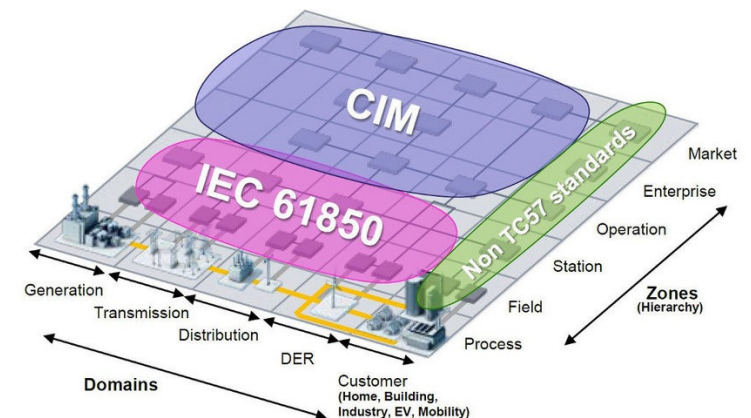
# Enhanced Information and Data Exchange to Enable Future TSO-DSO Coordination and Interoperability

## CIGRE JWG D2/C2.48

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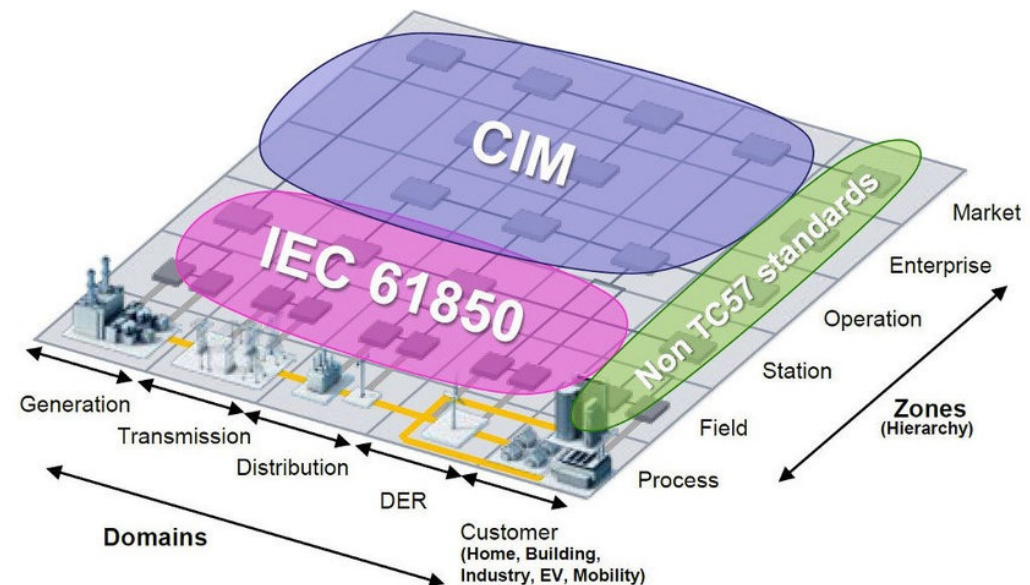


## Smart Grid Architecture Model SGAM



# Enhanced Information and Data Exchange

- Common Information Model (CIM)
- Fundamentals of CIM
- CIM Adoption
- Benefits of CIM

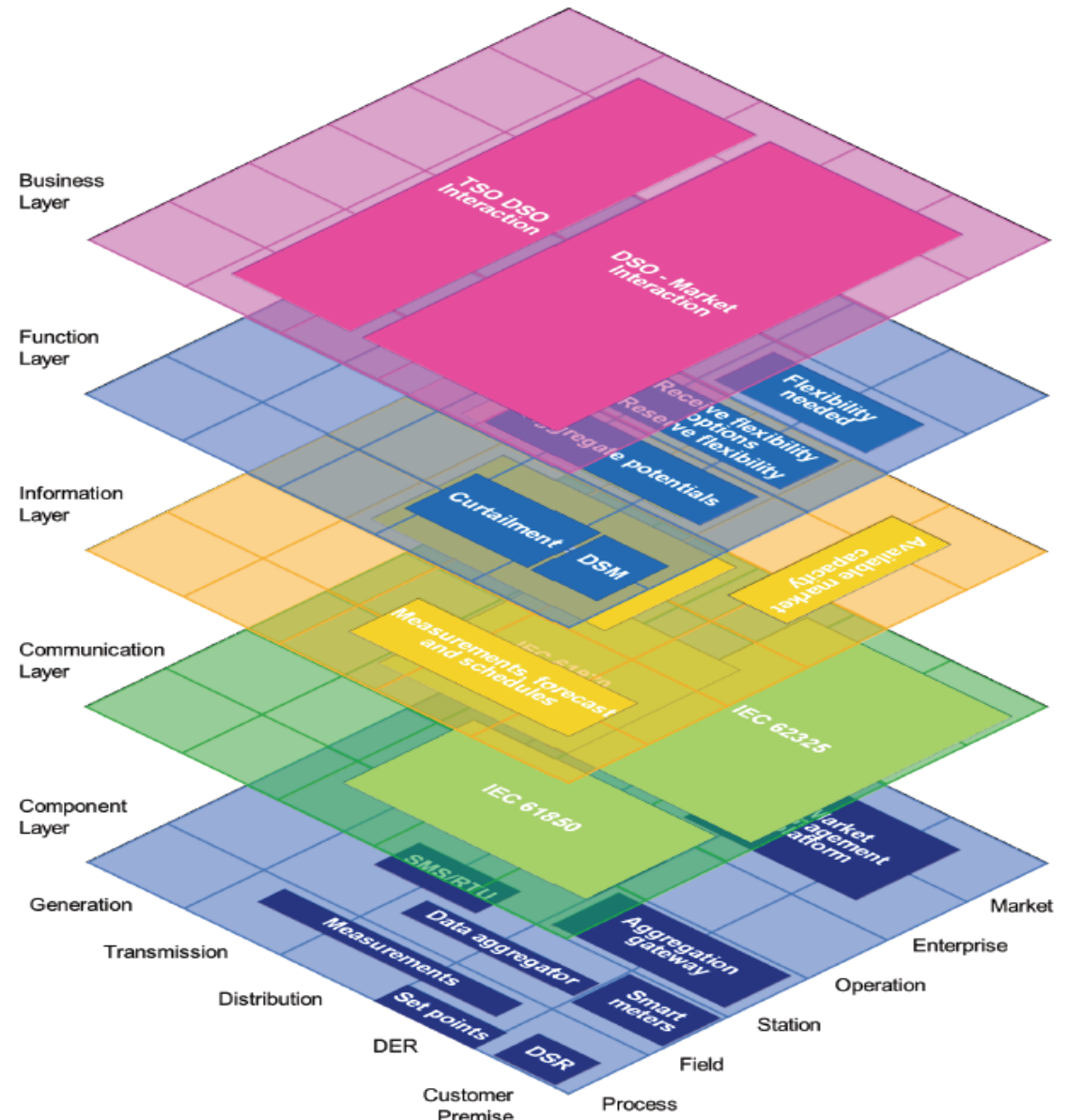


# Common Information Model (CIM)

- Started in the US as project by the **Electric Power Research Institute (EPRI)** as Control Centre API (CCAPI)
- Adopted by **International Electrotechnical Commission (IEC)**
  - Standardised as **IEC 61970-301** that is now developed by IEC Technical Committee **TC57 Working Group 13**
  - Standard defines “*Software interfaces for operation and planning of the electric grid*” as a series of packages and classes in the **Unified Modelling Language (UML)**
  - CIM now represents a wide series of related IEC standards as developed by multiple TC57 WGs

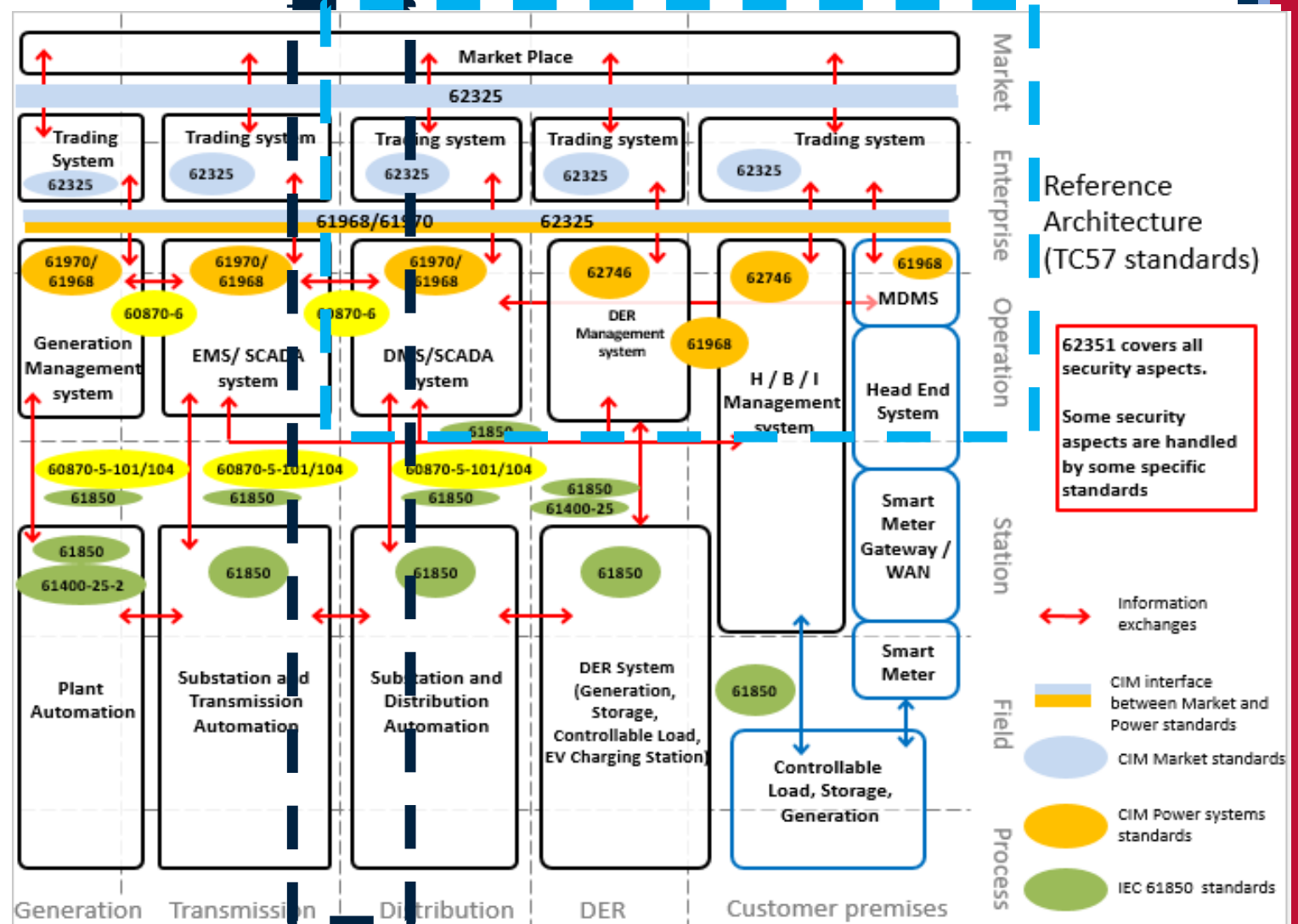
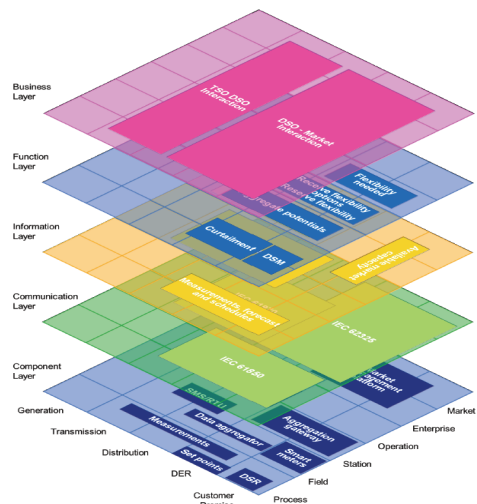
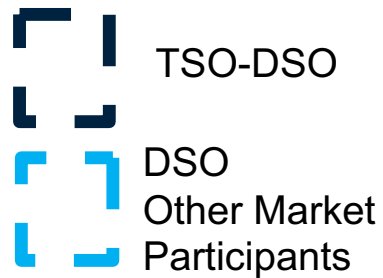
# Smart Grid Architecture Model (SGAM)

- CENELEC/IEC
- Standardised Reference Layer Architecture
- Business and Function Layer Based Use Cases
- Wide range of whole system use cases: online & offline

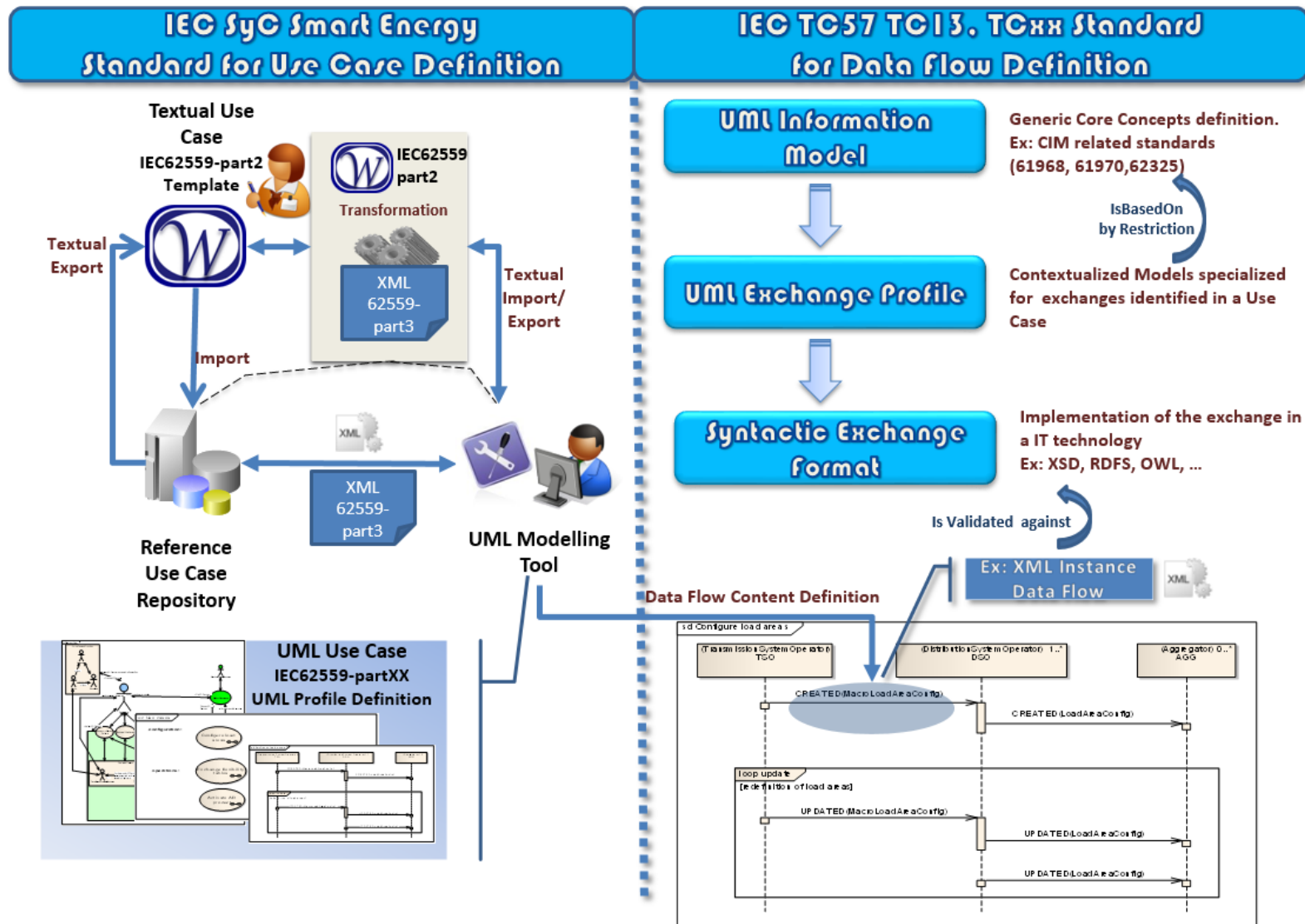


# Layered Reference Architecture

IEC TC57 62357-1 Power Systems & Information Exchanges Reference Architecture

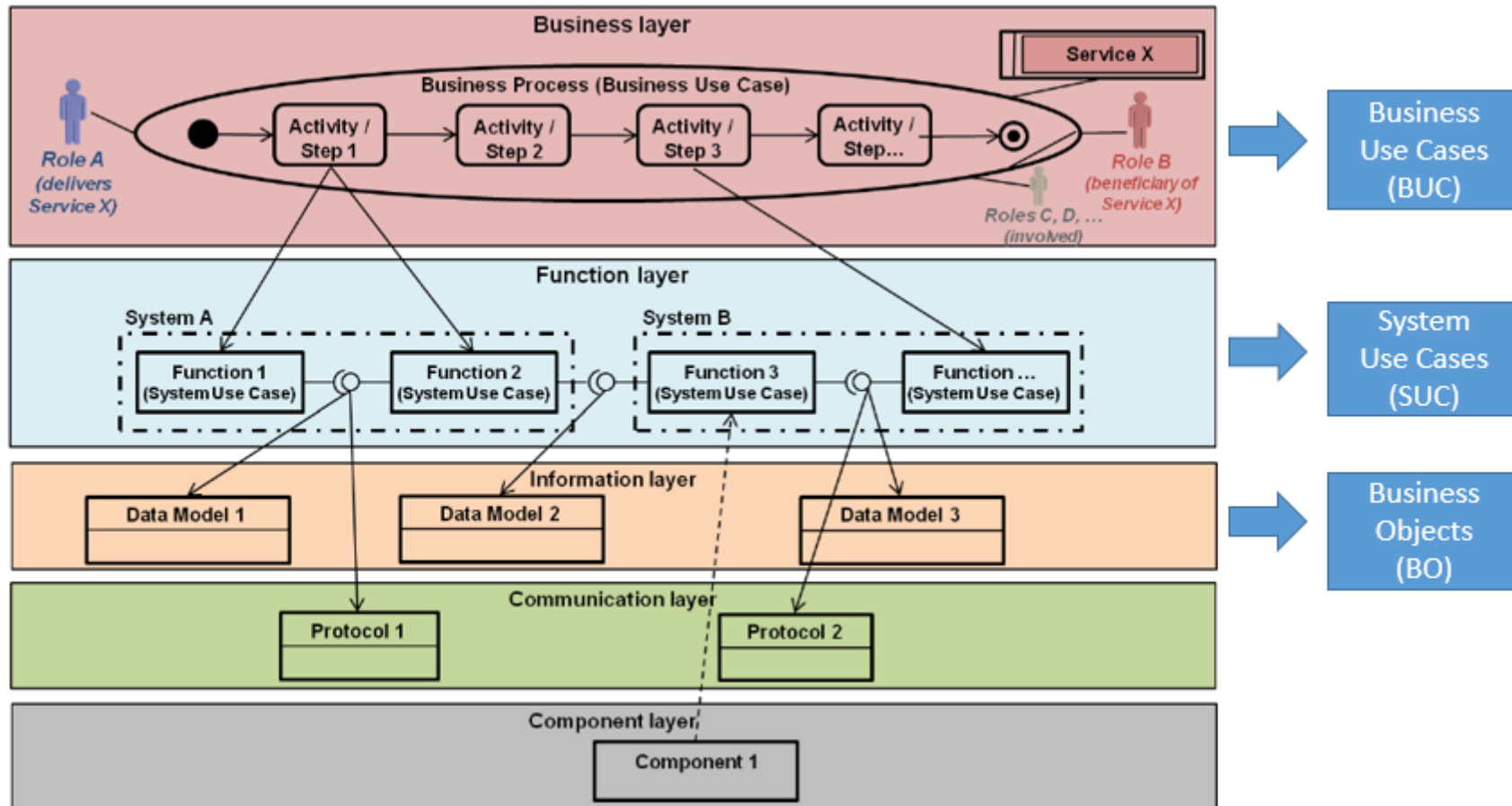


# CIM Adoption: Use Cases & Profiles

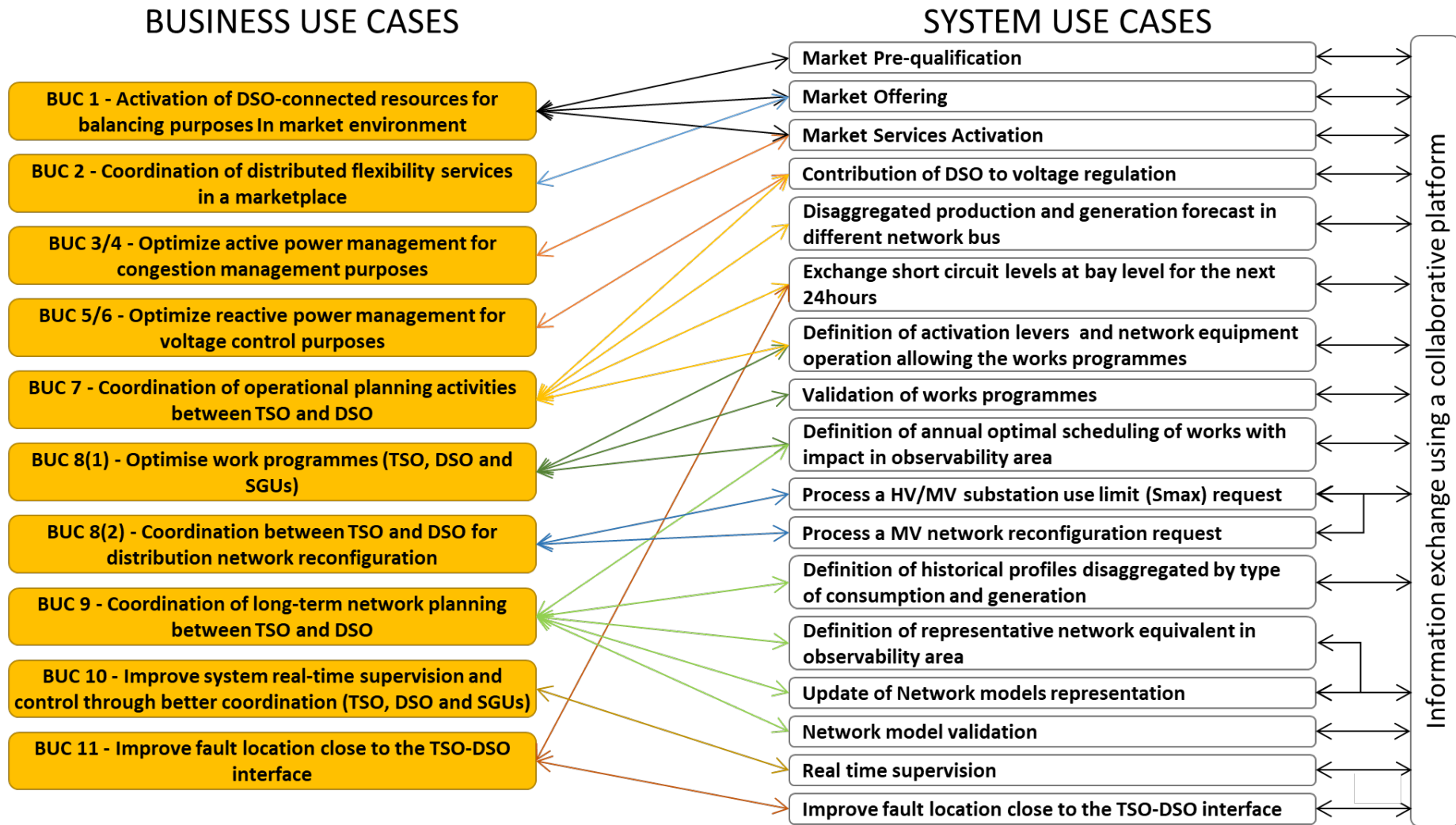


# Formal Use Case Definition

IEC SyC Smart Energy – 62913 & 62559 series



# TSO-DSO Business & System Use Cases





# Introduction to CGMES

Common Grid Model Exchange Specification (**CGMES v2.4.15**)

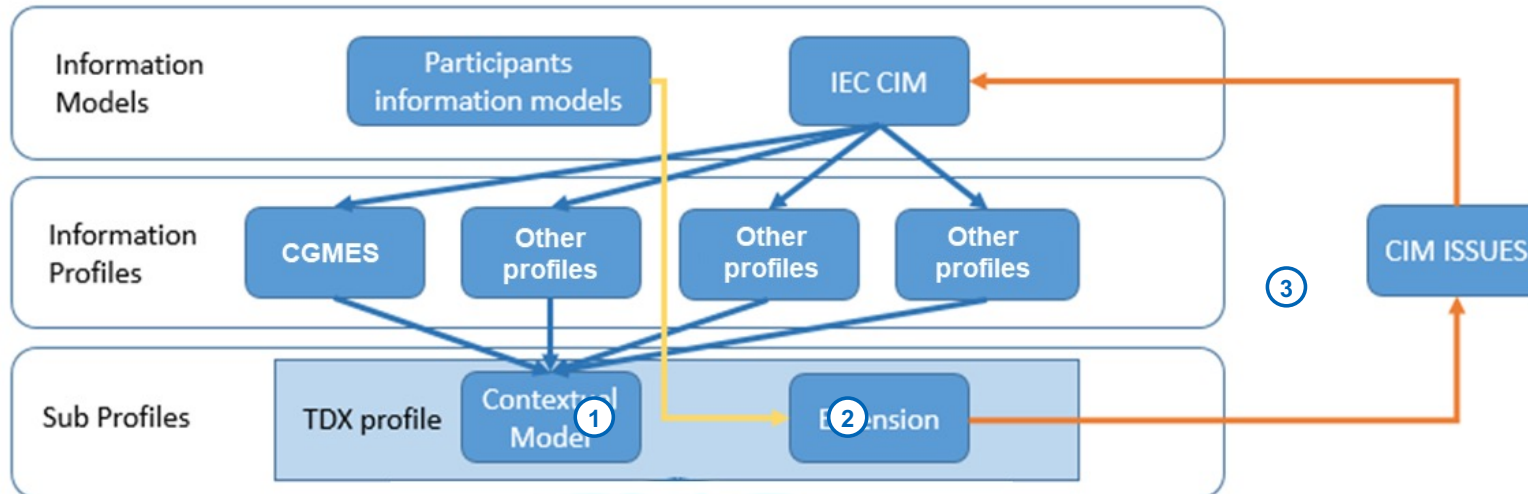
A **CIM profile group** developed by ENTSO-E, for the exchange of operational and grid planning data among TSOs

Contains **various CIM profiles** for e.g. equipment, topology, input for load flows, load flow results, geographic data, etc.

CIM and CGMES are focused upon as **standardized data formats** that **TSOs and DSOs could extend and adopt** for data exchange

Develop and propose **CGMES extensions** such that information **Business Objects in TSO-DSO Use Cases** can be expressed in CGMES

# CGMES extension method



1. For selected **Business Objects (BO)**, a CGMES **sub-profile** is derived.
2. If sub-profile cannot contain all Business Object data, a CGMES **extension** is proposed.
3. The proposal is presented to CGMES related working groups and developers

# CIM profiles based on ESMP (European Style Market Profiles)

## BUC 2 - Coordination of distributed flexibility services in a marketplace

Scope:

- Validation of TSO/DSO coordination mechanism to distributed flexibility resources procurement avoiding double or counter activation of the same flexibility resource by TSO and DSO
- Prevent the negative impact of offers activation in the networks
- Definition of the data that should exchange between the TSO, the DSO and the market operator.

# Planned UK Regulatory Adoption of CIM: OFGEM

## Overarching Aim:

Enable competition and innovation, which drive down prices and result in new products and services.

**Ensure data can be used as strategic asset.**

Deliver a net-zero economy, at the lowest cost to consumers

**Infrastructure and Asset Visibility.**

Revealing system assets and infrastructure, where they are located and their capabilities, to inform system planning and management.

**Support digitalisation and data exchange.**

Enabling cheaper/faster market participation, improved planning and coordination and innovation.

**Data Visibility**

Understanding the data that exists, the data that is missing, which datasets are important, and making it easier to access and understand data.

**The regulator's priority is to consumers. The goal is to stimulate regulated networks to digitalise, driving consumer benefits. The volume and complexity of data needed from DNOs to network users to drive these benefits, exceeds what can be shared with current data format.**

# Planned UK Regulatory Adoption of CIM: OFGEM

| Parties exchanging data | DNO -> ESO   | ESO -> DNOs   | DNOs to market Participants  |
|-------------------------|--|---|--|
| Data/Document names     | Week 24/50 data exchange   | Week 42 data exchange   | LTDS, NDP, DFES, Best View Scenario  |
| Brief Description       | Details of the sub transmission network inc. DER effects on energy flows at cardinal points. | Data describing the transmission system at switch level. Includes fault level, peak demand etc. | Planning data and network information for those looking to connect to the network.                   |
| Current exchange format | Exported from DNO systems in Excel, converted to CIM for ESO data ingestion.                 | Exported from ESO system in CIM, converted to Excel for DNO data ingestion.                     | Excel  |
| Future challenges       | Increasing data complexity, volumes, and exchange frequency.                                 | Increasing data complexity, volumes, and exchange frequency.                                    | Demand for Planning data is ever increasing as market participants look to optimise business models. |

# Planned UK Regulatory Adoption of CIM: LTDS

The Long Term Development Statement (LTDS) was designed to share high value planning data that would provide stakeholders with information for connecting to the Distribution networks.

## So, what is the LTDS?

- The LTDS gives a 0-5 year view of planned network changes,
- It is published annually by each DNO.
- It gives a summary report describing the design and operation of the network.
- Information on planned developments that have secured finance.
- Detailed technical information for 132 kV and 33kV EHV networks including schematics, load, transformer data, fault level, generation, circuit data etc.

## And what is wrong with it?

- Technical data is shared in an 11 year old MS excel spreadsheet template.
- Its very inaccessible, requiring registration.
- When it was designed flexibility markets were not anticipated.
- **It does not meet the needs of present users.**

# Benefits of CIM

## Digitalisation and Virtualisation of Energy Systems

- Information and data requirements are evolving rapidly **across the energy sector**
- **Effective end-to-end use of information and data** can provide valuable insight for consumers, system operators and energy market actors

# Interoperability Benefits of CIM

## Whole Energy System Operation and Management

- Enables interoperability across **whole energy systems**
- Interoperability with and across enterprises
- Supports optimum decarbonisation of whole energy systems
- Enables **scalable and secure integration of Renewable Energy Sources**





# Thank you for your attention

a special thanks  
to TDX-ASSIST R&D project  
participants...



The TDX-ASSIST project (2017-20) received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 774500

