XSICEL 2021

Transición energética en la 4ta revolución industrial

Universidad Tecnológica de Pereira

UNIVERSIDAD NACIONAL DE COLOMBIA

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Transición energética en la 4ta revolución industrial

Conceptual Design of Protection Scheme for Active Distribution Network using a Smart Grid Architecture Model framework

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I. Introduction

Motivation

EU mandate M/490

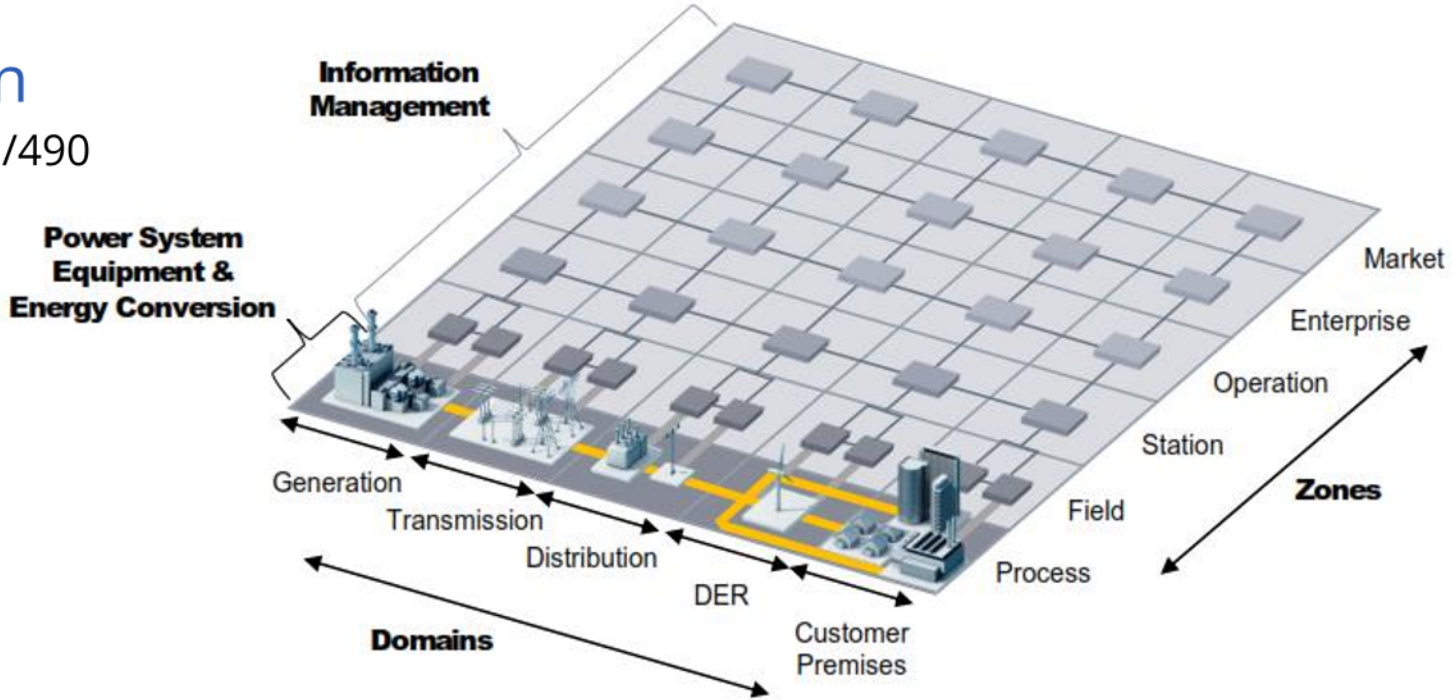

Fig. 1: Domains and Zones of the Smart Grid Architecture Model (SGAM) framework. Image taken from: CEN, CENELEC, & ETSI. (2014). Report on Smart Grid Coordination Group: Smart Grid Information Security.

II. Theoretical aspects

What is a network architecture?

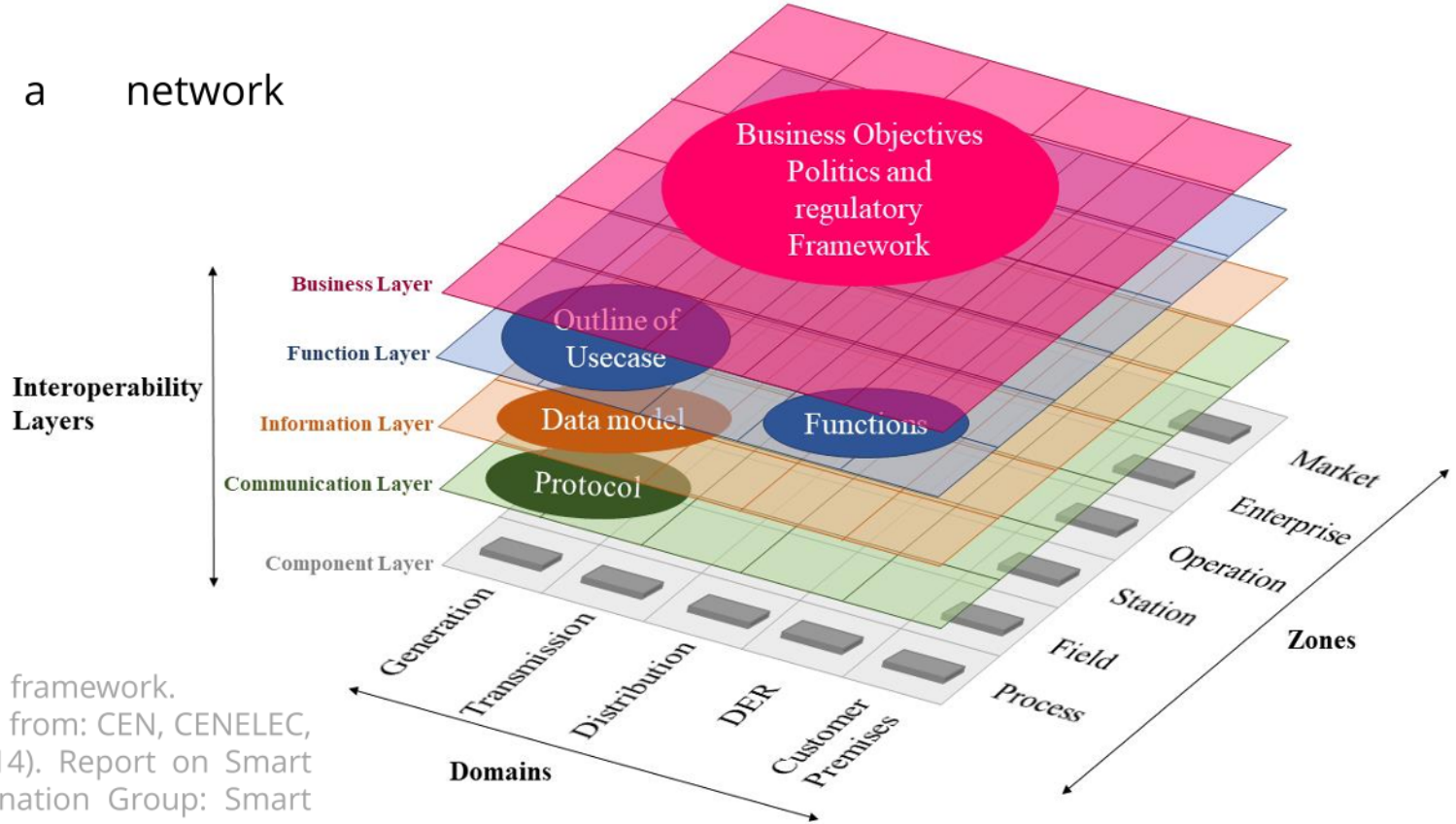

Fig. 2: SGAM framework. Image taken from: CEN, CENELEC, & ETSI. (2014). Report on Smart Grid Coordination Group: Smart Grid Information Security.

II. Theoretical aspects

The IEC 62559 methodology

What is an use case?

- Actor.
- Scenario.
- Event.

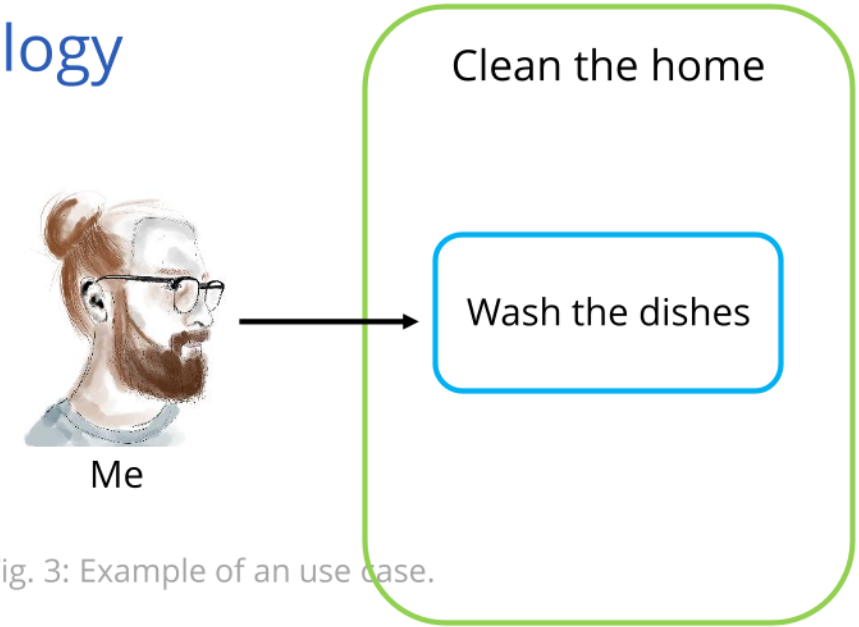

Fig. 3: Example of an use case.

III. Proposed methodology

Selected use case

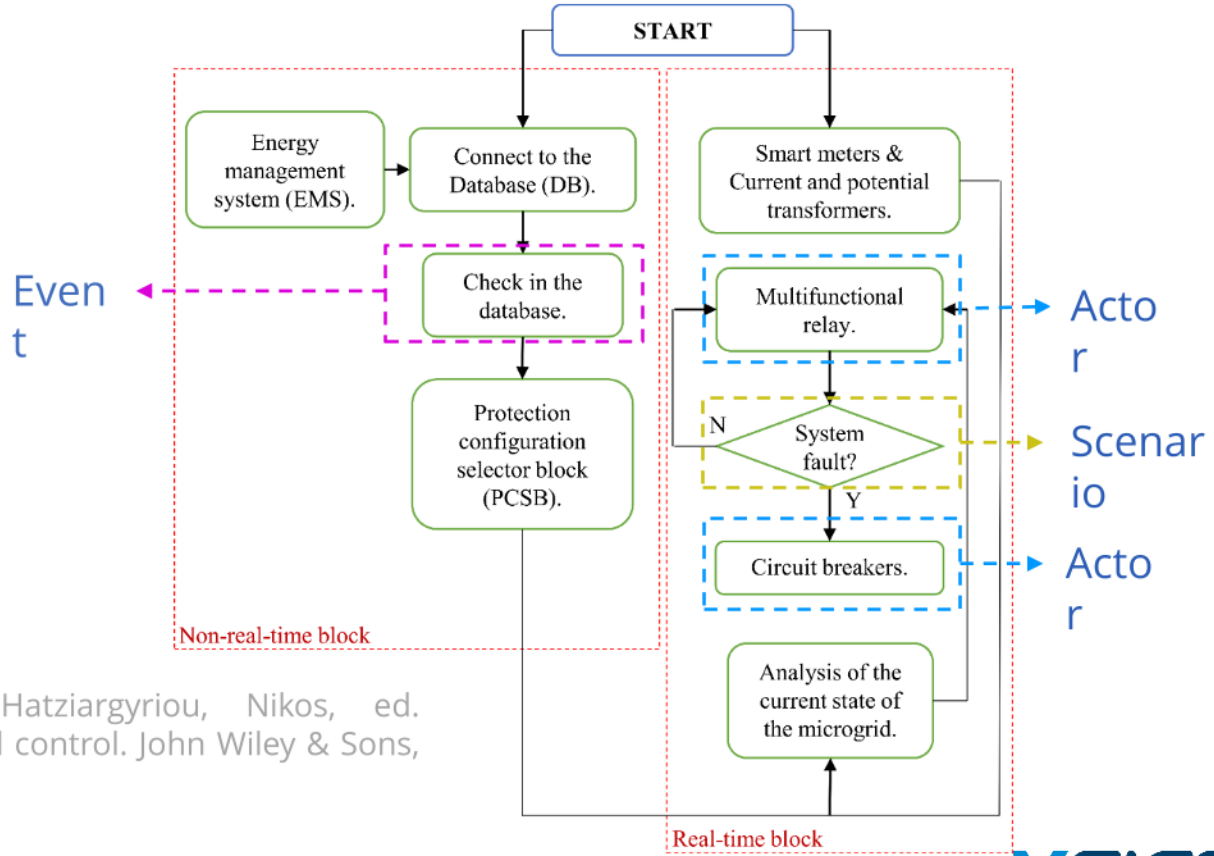

Fig. 4: Selected use case.
Use case taken from: Hatziargyriou, Nikos, ed. Microgrids: architectures and control. John Wiley & Sons, 2014.

III. Proposed methodology

IEC 62559 methodology

1. Describe the use case.

2. Make a diagram of use case.

3. Specify technical details.

4. Step-by-step analysis of the use case.

5. Identify the information being exchanged.

6. Define the requirements necessary to make the communication effective.

7. Define common terms and

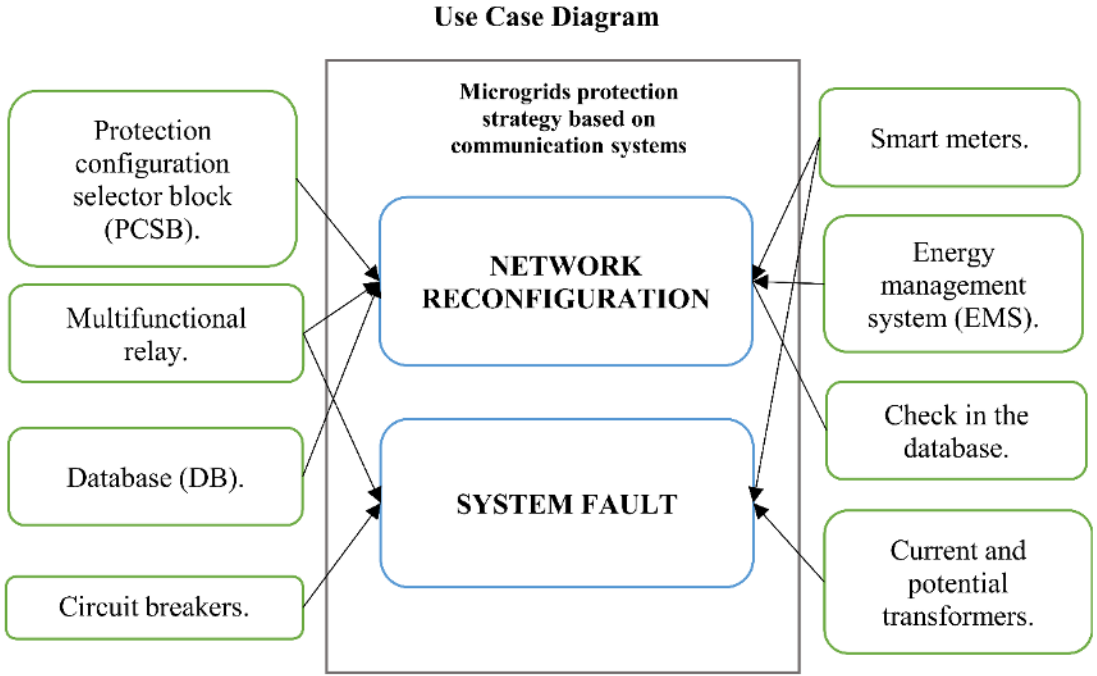

Fig. 5: Use case diagram.

III. Proposed methodology

IEC 62559 methodology

1. Describe the use case.

2. Make a diagram of use case.

3. Specify technical details.

4. Step-by-step analysis of the use case.

5. Identify the information being exchanged.

6. Define the requirements necessary to make the communication effective.

7. Define common terms and definitions.

STEPS - SCENARIOS

Scenario			
Scenario name: Network reconfiguration			
No.	**Event**	**Name of the process/activity**	**Description of the process/activity**
1	Continuous measurement of microgrid parameters.	Monitoring the current status of the network.	The smart meters send information to the multifunctional relays.
2	Storage of DER data and network configurations in the database.	Preparation of availability of distributed generation sources.	The EMS provides predictive data on the availability of distributed generation sources.
3	The database sends stored data and network settings.	Continuous communication between DB and multifunctional relays.	The databases receive information from the EMS and communicate with the multifunctional relays.

Table 1: Step-by-step analysis of the use case.

IV. Results

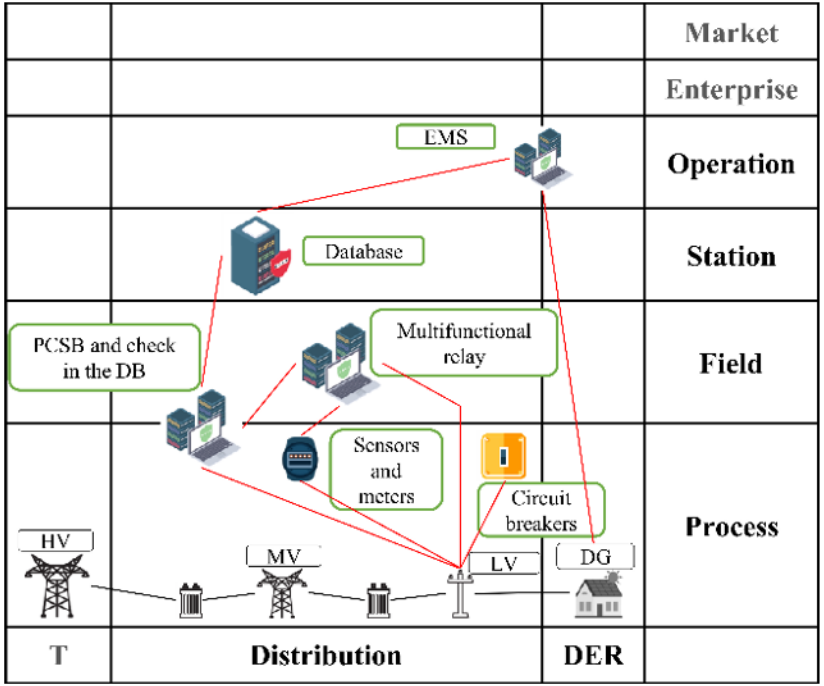

Fig. 6: Component Layer.

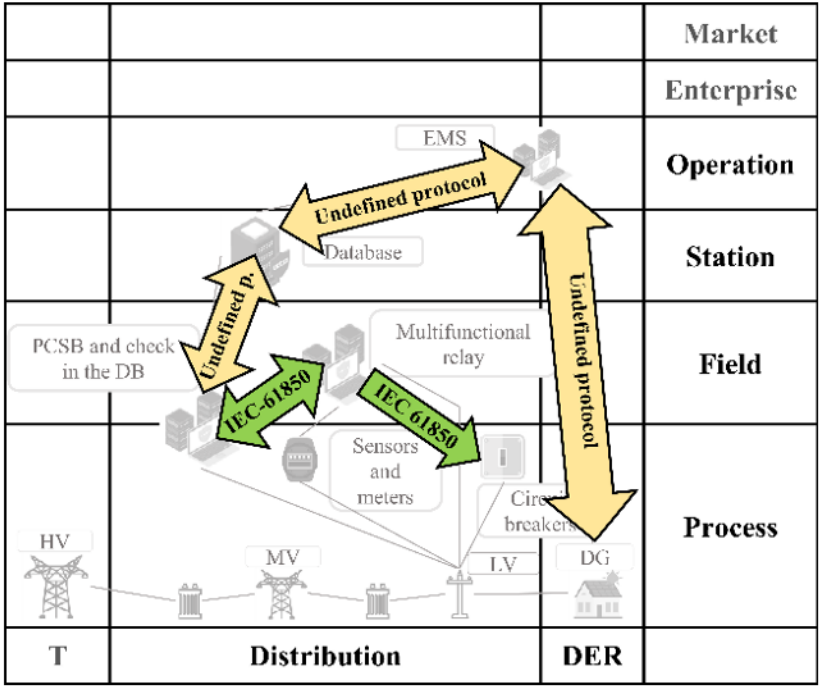

Fig. 7: Communication Layer.

IV. Results

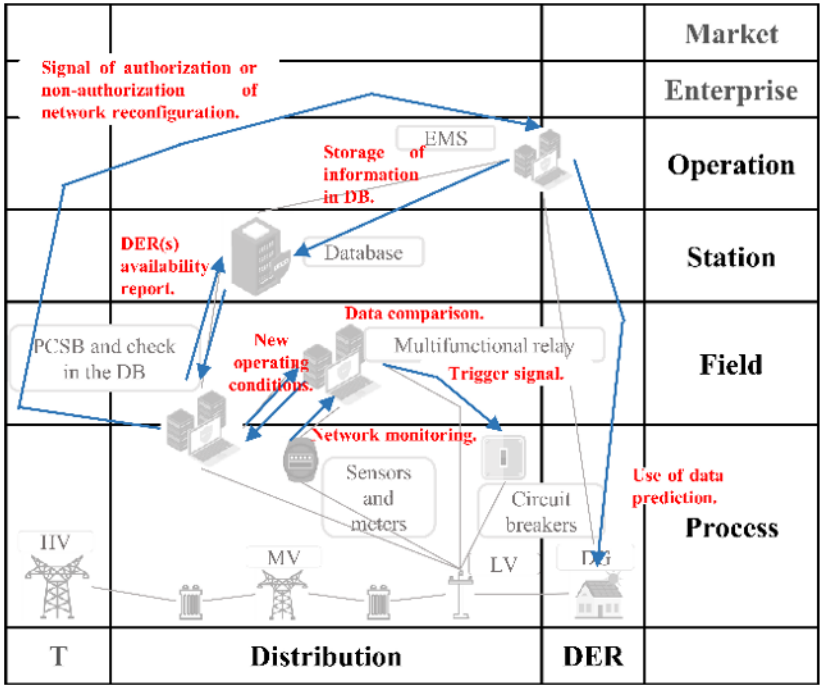

Fig. 8: Information Layer.

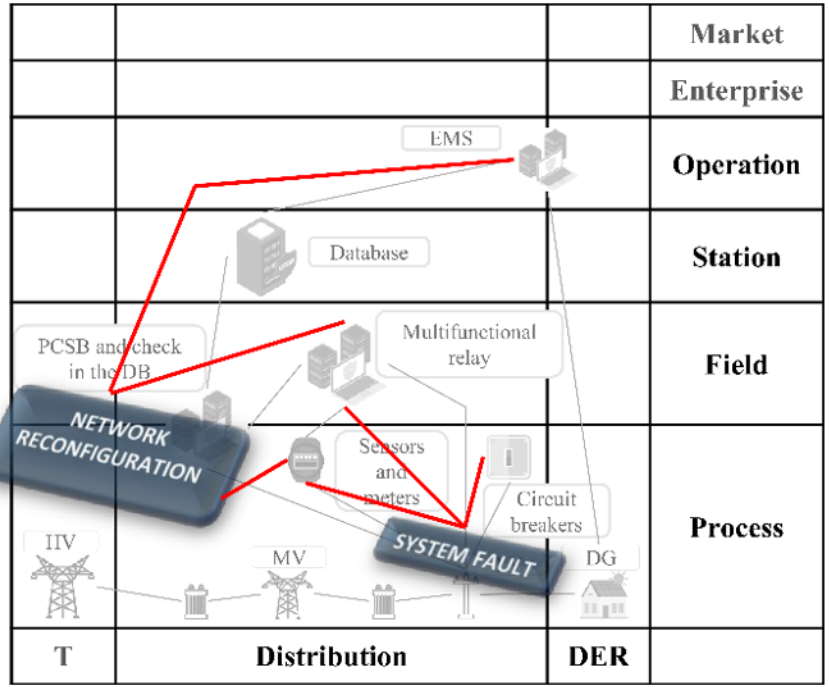

Fig. 9: Function Layer.

IV. Results

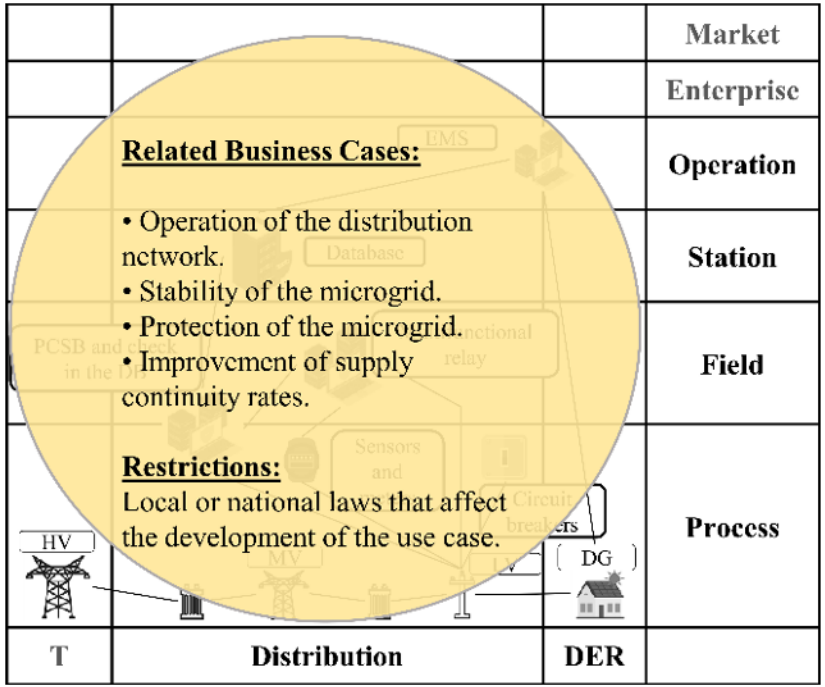

Fig. 10: Business Layer.

V. Conclusions

- Following the template proposed by the IEC 62559-2 standard makes it possible to recognize devices, events, and scenarios to develop the reference architecture.

- The description of any process within the generation chain allows the standardization of the processes described there, making a process inter-operable.

- Research on the IEC 62559 standard allows the identification of constraints and standards to be considered when implementing systems using new technologies.

VI. Questions