

Exchange data between DERs and System Operators

Based on IEC 62559-2 edition 1

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1. Description of the use case

1. Name of use case

Use case identification	
ID	Area(s)/Domain(s)/Zone(s)
	Market for flexibilities, Operational planning and forecasting
Name of use case	
Exchange data between DERs and System Operators	

2. Version management

Version management				
Version No.	Date	Name of author(s)	Changes	Approval status
1	2018-04-05	Wojciech Lubczynski (PSE)		
2	2018-07-19	Ricardo Jover (EDF), Eric Suignard (EDF)		
3	2018-08-02	Eric Suignard (EDF)		
4	2018-09-21	Ricardo Jover (EDF)	Remarks from Elering (Narrative) and EirGrid.	
5	2018-10-04	Eric Suignard (EDF)	Version post WP5&9 physical meeting in Tallinn	
6	2018-10-17	Eric Suignard (EDF)	Version reviewed by WP5&9 partners	
7	2019-05-07	Eric Suignard (EDF)	WP6-7-8 demos alignment and miscellaneous changes	
8	2020-06-16	Eric Suignard (EDF)	innogy's and Elering's review	

3. Scope and objectives of use case

Scope and objectives of use case	
Scope	Data exchange between DER (Distributed Energy Resources) and SCADA systems of TSO and DSOs, using the Data Exchange Platform as an intermediary.
Objective(s)	Ensuring the observability and controllability of DER units providing electrical energy and flexibility services to the power system.
Related business case(s)	

4. Narrative of Use Case

Narrative of use case
Short description
The use case includes data exchange between distributed generators, demand response (DR) resources and energy storage devices, and a Data Exchange Platform (DEP) that communicates with TSO and DSO SCADA systems. DEP is not appropriate for time-critical data exchange (like activation of very fast products) thus being out of scope of this use case. It is assumed that the SCADA systems may require both schedule data for planning purpose and structural data (including connection diagrams) each time they are changed.
Complete description

Summary of use case

- **Exchange data from DERs to System Operators**

Description:

- Provide DER changes in schedule data and DER structural data
Description: Occasional provision of non-real-time data.
- Provide changes in aggregated DER schedule data and aggregated DER structural data
Description: Occasional provision of non-real-time data.
- Forward DER schedule and structural data
Description: Transmission of schedule and structural data when they are changed (push method). Data are sent to the SCADA systems of the TSOs and the DSOs which need such data.
- Forward DER real-time setpoint data
Description: Real-time data transfer for all DERs to SCADA systems (push method). Data are sent to the SCADA systems of the TSOs and the DSOs which need such data.
- Provide aggregated DER real-time setpoint data
Description: In the case of an aggregator that manages multiple DERs.
- Provide DER real-time setpoint data
Description: In case of the single DER unit.
- Take into account DER data
Description:

- **Exchange data from System Operators to DERs**

Description: Cf. "Manage flexibility activations" data exchange System Use Case.

5. Key performance indicators (KPI)

6. Use case conditions

<i>Use case conditions</i>	
<i>Assumptions</i>	
1	It is assumed that systems of authentication and access permission are implemented that allow data exchange with all individual DER units, even those that are part of the aggregator pool.
2	<p>Data are exchanged in both direction: This Use Case covers data exchanges:</p> <ul style="list-style-type: none"> • From individual DERs or aggregated DERs to TSO/DSO SCADAs for sending DER schedule, DER structural data and DER real-time setpoint data, • From TSO/DSO SCADAs to individual DERs or aggregated DERs for sending activation requests (except for very fast flexibility products). <p>It will not cover data exchanges from TSO/DSO SCADAs to DERs for remote control. It is assumed that activation itself is the responsibility of individual DER itself and/or its aggregator.</p>
<i>Prerequisites</i>	
1	Communication standards must be established
2	The legislative framework is needed (market)
3	Cross-border exchange is required in case of cross-border service provision: This is secondary to the provision of the cross-border service. In this case, it is necessary to implement international technical standards and meet the requirements arising therefrom.

4	The system roles involved in this system use case should be available:
	1) The DER unit should ensure the implementation of the functionality specified in KORRR art. 17. This means that the DER unit needs to provide real-time data.
	2) The aggregator should ensure the implementation of the functionality specified in KORRR art. 17 and, in particular, those referred to in SO GL art. 53. This means that the aggregator must have a system that collects in real-time the setpoints of individual DER units and their configurations.
	3) DEP should be able to handle real-time processes and should be able to handle numerous information streams coming from DER devices. At the same time, DEP should be able to immediately transfer this information to the SCADA systems of TSOs and DSOs.
	4) SCADA systems of TSOs and DSOs should be able to receive information from DEP.

7. Further information to the use case for classification/mapping

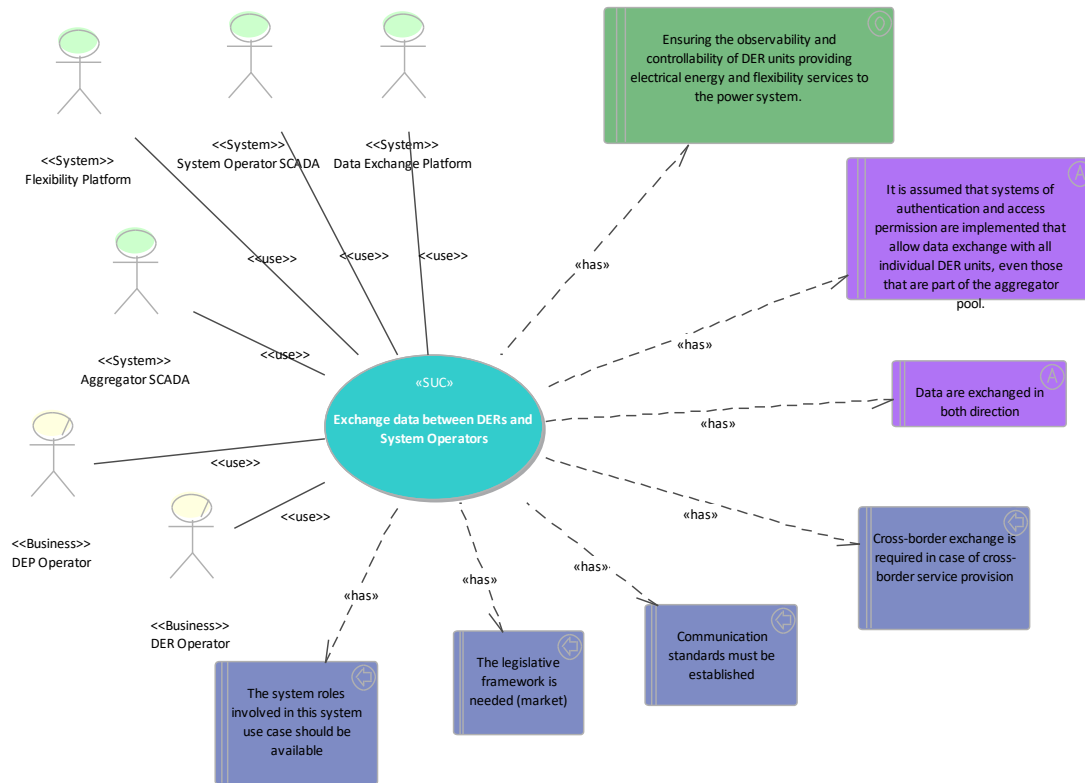
<i>Classification information</i>
Relation to other use cases
Level of depth
Prioritisation
Generic, regional or national relation
Nature of the use case
SUC
Further keywords for classification

8. General remarks

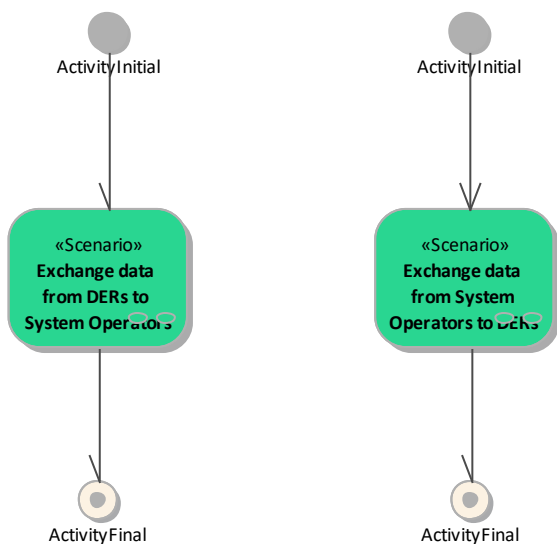
2. Diagrams of use case

<i>Diagram(s) of use case</i>

Use Case: Exchange data between DERs and Network Operators - overview



Activity: Exchange data between DERs and Network Operators - scena...



3. Technical details

1. Actors

Actors			
Grouping (e.g. domains, zones)		Group description	
Actor name	Actor type	Actor description	Further information specific to this use case
DER Operator	Business	Operates a single DER unit. Distributed Energy Resources can consist of generation sources, energy storage facilities and facilities participating in Demand Response. Are mainly connected to distribution power grids but can also be connected to transmission power grids (e.g. Portugal). Can be an Asset Operator, a Generator or a Generation Asset Operator (cf. definitions in T3.3 deliverable).	
System Operator SCADA	System	SCADA operated by a System Operator.	
Data Exchange Platform	System	Data exchange platform (DEP) is a communication platform the basic functionality of which is to secure data transfer (routing) from data providers (e.g. data hubs, flexibility service providers, TSOs, DSOs) to the data users (e.g. TSOs, DSOs, consumers, suppliers, energy service providers). DEP stores data related to its services (e.g. cryptographic hash of the data requested). The DEP does not store core energy data (e.g. meter data, grid data, market data) while these data can be stored by data hubs. Several DEPs may exist in different countries and inside one country.	
Aggregator SCADA	System	SCADA operated by an Aggregator.	
Flexibility Platform	System	Flexibility Platform (FP) for System Operators and Flexibility Service Providers that enables the trading of different flexibility products and services. A FP is operated by a Market Operator. Available to System Operators and Flexibility Services Providers. It is used to support the prequalification, the bidding, the activation and the verification processes, ensuring coordination between activities undertaken by several operators using the same flexible resources. Several national and regional FPs may exist.	
DEP Operator	Business	Data exchange platform operator owns and operates a communication system which basic functionality is data transfer.	

2. References

4. Step by step analysis of use case

1. Overview of scenarios

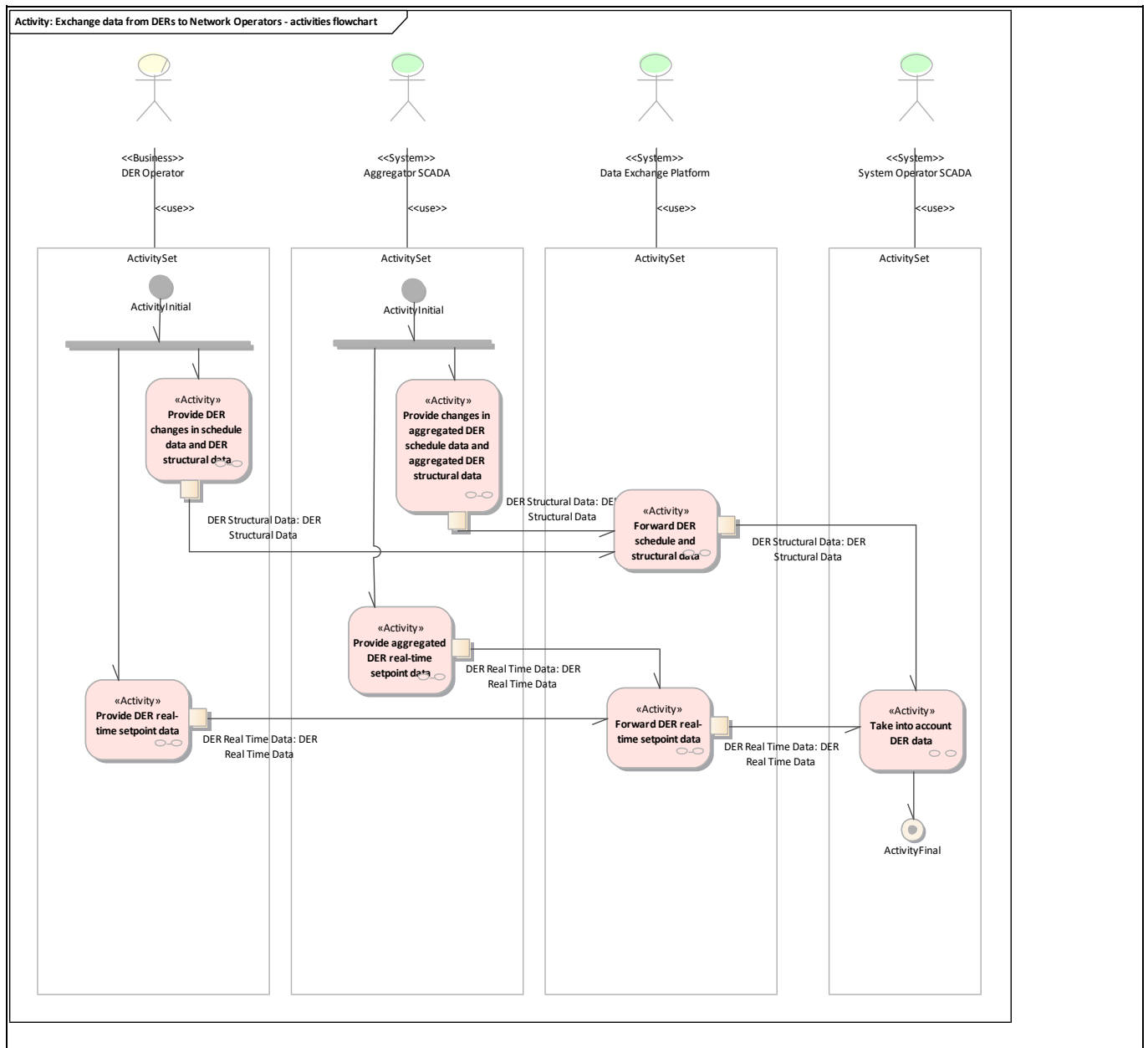
Scenario conditions						
No.	Scenario name	Scenario description	Primary actor	Triggering event	Pre-condition	Post-condition

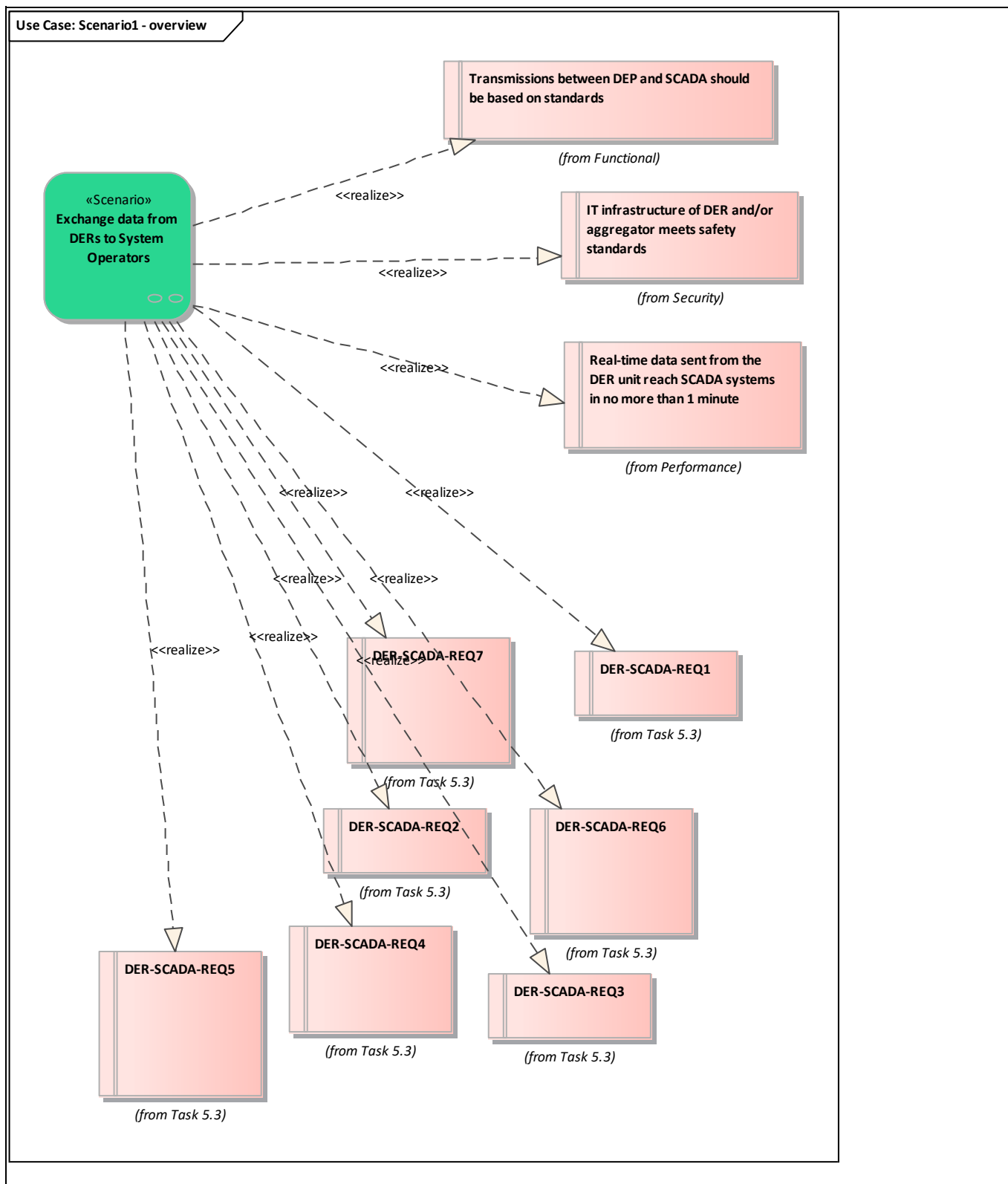
1	Exchange data from DERs to System Operators					
2	Exchange data from System Operators to DERs	Cf. "Manage flexibility activations" data exchange System Use Case.				

2. Steps - Scenarios

- Exchange data from DERs to System Operators

<i>Requirement list (refer to "Requirement" section for more information)</i>	
<i>Requirement R-ID</i>	<i>Requirement name</i>
<u>Cat1.Reg1</u>	Transmissions between DEP and SCADA should be based on standards
<u>Cat2.Reg2</u>	IT infrastructure of DER and/or aggregator meets safety standards
<u>Cat3.Reg3</u>	Real-time data sent from the DER unit reach SCADA systems in no more than 1 minute
<u>Cat4.Reg4</u>	DER-SCADA-REQ1
<u>Cat4.Reg5</u>	DER-SCADA-REQ7
<u>Cat4.Reg6</u>	DER-SCADA-REQ6
<u>Cat4.Reg7</u>	DER-SCADA-REQ4
<u>Cat4.Reg8</u>	DER-SCADA-REQ5
<u>Cat4.Reg9</u>	DER-SCADA-REQ2
<u>Cat4.Reg10</u>	DER-SCADA-REQ3





Scenario step by step analysis

Scenario	
Scenario name	Exchange data from DERs to System Operators

Step No	Event	Name of process/activity	Description of process/activity	Service	Information producer (actor)	Information receiver (actor)	Information exchanged (IDs)	Requirement, R-IDs
1.1		Provide DER changes in schedule data and DER structural data	Occasional provision of non-real-time data.		<u>DER Operator</u>	<u>Data Exchange Platform</u>	Info1-DER Structural Data	
1.2		Provide changes in aggregated DER schedule data and aggregated DER structural data	Occasional provision of non-real-time data.		<u>Aggregator SCADA</u>	<u>Data Exchange Platform</u>	Info1-DER Structural Data	
1.3		Forward DER schedule and structural data	Transmission of schedule and structural data when they are changed (push method). Data are sent to the SCADA systems of the TSOs and the DSOs which need such data.		<u>Data Exchange Platform</u>	<u>System Operator SCADA</u>	Info1-DER Structural Data	
1.4		Forward DER real-time setpoint data	Real-time data transfer for all DERs to SCADA systems (push method). Data are sent to the SCADA systems of the TSOs and the DSOs which need such data.		<u>Data Exchange Platform</u>	<u>System Operator SCADA</u>	Info2-DER Real Time Data	
1.5		Provide aggregated DER real-time setpoint data	In the case of an aggregator that manages multiple DERs.		<u>Aggregator SCADA</u>	<u>Data Exchange Platform</u>	Info2-DER Real Time Data	
1.6		Provide DER real-time setpoint data	In case of the single DER unit.		<u>DER Operator</u>	<u>Data Exchange Platform</u>	Info2-DER Real Time Data	
1.7		Take into account DER data			<u>System Operator SCADA</u>			

- 1.1. Provide DER changes in schedule data and DER structural data

Business section: Exchange data from DERs to System Operators/Provide DER changes in schedule data and DER structural data

Occasional provision of non-real-time data.

Information sent:

Business object	Instance name	Instance description
<u>DER Structural Data</u>	DER Structural Data	In case of changes in portfolio or changes in topology.

- 1.2. Provide changes in aggregated DER schedule data and aggregated DER structural data

Business section: Exchange data from DERs to System Operators/Provide changes in aggregated DER schedule data and aggregated DER structural data

Occasional provision of non-real-time data.

Information sent:

<i>Business object</i>	<i>Instance name</i>	<i>Instance description</i>
DER Structural Data	DER Structural Data	In case of changes in portfolio or changes in topology.

- 1.3. Forward DER schedule and structural data

Business section: Exchange data from DERs to System Operators/Forward DER schedule and structural data

Transmission of schedule and structural data when they are changed (push method).

Data are sent to the SCADA systems of the TSOs and the DSOs which need such data.

Information sent:

<i>Business object</i>	<i>Instance name</i>	<i>Instance description</i>
DER Structural Data	DER Structural Data	In case of changes in portfolio or changes in topology.

- 1.4. Forward DER real-time setpoint data

Business section: Exchange data from DERs to System Operators/Forward DER real-time setpoint data

Real-time data transfer for all DERs to SCADA systems (push method).

Data are sent to the SCADA systems of the TSOs and the DSOs which need such data.

Information sent:

<i>Business object</i>	<i>Instance name</i>	<i>Instance description</i>
DER Real Time Data	DER Real Time Data	At least P,Q,V.

- 1.5. Provide aggregated DER real-time setpoint data

Business section: Exchange data from DERs to System Operators/Provide aggregated DER real-time setpoint data

In the case of an aggregator that manages multiple DERs.

Information sent:

<i>Business object</i>	<i>Instance name</i>	<i>Instance description</i>
DER Real Time Data	DER Real Time Data	At least P,Q,V.

- 1.6. Provide DER real-time setpoint data

Business section: Exchange data from DERs to System Operators/Provide DER real-time setpoint data

In case of the single DER unit.

Information sent:

<i>Business object</i>	<i>Instance name</i>	<i>Instance description</i>
DER Real Time Data	DER Real Time Data	At least P,Q,V.

5. Information exchanged

<i>Information exchanged</i>			
<i>Information exchanged, ID</i>	<i>Name of information</i>	<i>Description of information exchanged</i>	<i>Requirement, R-IDs</i>
Info1	DER Structural Data		
Info2	DER Real Time Data		

6. Requirements (optional)

<i>Requirements (optional)</i>		
<i>Categories ID</i>	<i>Category name for requirements</i>	<i>Category description</i>
Cat1	Functional	Functional requirements
<i>Requirement R-ID</i>	<i>Requirement name</i>	<i>Requirement description</i>
Req1	Transmissions between DEP and SCADA should be based on standards	Applicable standards, in particular: <ul style="list-style-type: none"> • ICCP: Inter-Control Center Communications Protocol (IEC 60870-6/TASE.2), • Communication networks and systems for power utility automation (IEC 61850-8-2), • RESTful services.
<i>Requirements (optional)</i>		
<i>Categories ID</i>	<i>Category name for requirements</i>	<i>Category description</i>
Cat2	Security	Security requirements
<i>Requirement R-ID</i>	<i>Requirement name</i>	<i>Requirement description</i>
Req2	IT infrastructure of DER and/or aggregator meets safety standards	Applicable standards, in particular IEC 62351.
<i>Requirements (optional)</i>		
<i>Categories ID</i>	<i>Category name for requirements</i>	<i>Category description</i>
Cat3	Performance	
<i>Requirement R-ID</i>	<i>Requirement name</i>	<i>Requirement description</i>
Req3	Real-time data sent from the DER unit reach SCADA systems in no more than 1 minute	According to KORRR art. 10, the refresh rate for the real-time data exchanges shall not be longer than 1 minute. It should be defined by each TSO in its control area.
<i>Requirements (optional)</i>		
<i>Categories ID</i>	<i>Category name for requirements</i>	<i>Category description</i>
Cat4	Task 5.3	Requirements integrated from Task 5.3.
<i>Requirement R-ID</i>	<i>Requirement name</i>	<i>Requirement description</i>
Req4	DER-SCADA-REQ1	Encrypted data exchange
Req5	DER-SCADA-REQ7	Ability of DEP to forward activation requests from System Operators to DER
Req6	DER-SCADA-REQ6	Ability of DEP to forward near-real-time (up to 1 hour) data from DER's to System Operators
Req7	DER-SCADA-REQ4	Ability of DEP to forward real-time data from DER's to System Operators
Req8	DER-SCADA-REQ5	Ability of DEP to forward very-near-real-time (up to 1 minute) data from DER's to System Operators

Req9	DER-SCADA-REQ2	Communication link between DEP and SO's SCADA
Req10	DER-SCADA-REQ3	Safety of DER's IT infrastructure

7. Common terms and definitions

8. Custom information (optional)