Manage sub-meter data

Based on IEC 62559-2 edition 1
Generated from UML Use Case Repository with Modsarus® (EDF R&D Tool)

1. Description of the use case

1. Name of use case

Use case identification		
ID	***Area(s)/Domain(s)/Zone(s)***	***Name of use case***
	Access to data,Market for flexibilities,Operational planning and forecasting,Services related to end customers	Manage sub-meter data

2. Version management

Version management				
Version No.	***Date***	***Name of author(s)***	***Changes***	***Approval status***
1	2018-04-12	Kalle Kukk (Elering)		
2	2018-05-07	Kalle Kukk (Elering), Ricardo Jover (EDF), Eric Suignard (EDF)		
3	2018-08-11	Kalle Kukk (Elering), Graham Oakes (Upside), Mitchell Curtis (Upside)		
4	2018-05-17	Ricardo Jover (EDF), Eric Suignard (EDF)		
5	2018-05-25	Kalle Kukk (Elering), Olav Rossøy (Enoco)		
6	2018-06-06	Ricardo Jover (EDF), Eric Suignard (EDF)		
7	2018-08-02	Eric Suignard (EDF)		
8	2018-09-21	Eric Suignard (EDF), Ricardo Jover (EDF)	Remarks from Innogy, Elering and EirGrid.	
9	2018-10-04	Eric Suignard (EDF)	Version post WP5&9 physical meeting in Tallinn	
10	2018-10-17	Eric Suignard (EDF)	Version reviewed by WP5&9 partners	
11	2019-05-07	Eric Suignard (EDF)	WP6-7-8 demos alignment and miscellaneous changes	
12	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	Using data exchange platform for exchanging sub-meter data. A sub-meter data is a data measured by a non-revenue grade meter and related to tariffs.
Objective(s)	Support easy access to sub-meter data
Related business case(s)	

4. Narrative of Use Case

Narrative of use case

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 773505.

Short description
Communication with different energy consuming and producing devices should be enabled in an organized way to satisfy the needs of different stakeholders. Customers need to monitor and control their devices. Flexibility service providers (flexibility aggregators) and other energy service providers need access for service provision based on these devices. TSOs and DSOs need information for flexibility settlement.
Complete description

Summary of use case

- Collect sub-meter data
  Description:
  - Send sub-meter data
    Description:
  - Check sub-meter data quality
    Description:
  - Store sub-meter data
    Description:
- Ensure data collection from sub-meter level devices to be made available over DEP
  Description:
  - Forward sub-meter data
    Description:
  - Process data request
    Description:
  - Receive sub-meter data
    Description:
  - Receive sub-meter data
    Description:
  - Request specific consumption or generation data of devices
    Description:
  - Request specific consumption or generation data of devices
    Description:
  - Check existence of valid consent
    Description:
  - Forward request on sub-meter data
    Description:
  - Send sub-meter data
    Description:
- Enable sending control signals to devices over DEP
  Description:
  - Send activation order
    Description: Customer (consumer/generator) can order directly the Sub-Meter Data Operator to activate his/her devices.

- Send activation order
  Description: An activation order can be sent by Energy Service Provider to Sub-Meter Data Operator (operating Automation Controller), based on the defined coordination mechanisms and TSO's or DSO's request to activate some flexibility.
- Check existence of valid consent
  Description:
- Forward control signal
  Description:
- Send control signal
  Description:

5. Key performance indicators (KPI)

6. Use case conditions

	Use case conditions
	Assumptions
1	Every individual and organization has the right to make the decisions regarding the data of their devices, incl. easy access to these data by themselves and granting access to third parties.
2	If the DEP maintains local copies of data or audit logs of transfers, then these are also subject to suitable data and privacy protections.
3	Rules for data protection and privacy are in place (authentication of users, consent management).
4	Most of the meter readings will be sent by certified meters. But certified meter data is not always enough: one may need more granular data (e.g. measurements on device level, measurements per second/minute) and take advantage of finer grained sub-meters
	Prerequisites
1	Sub-meter data operator is needed.
2	Cross-border service provision is required. : This assumes access by energy service provider of one country to sub-meter devices in another country.
3	Standardized/harmonized rules to communicate with the devices.

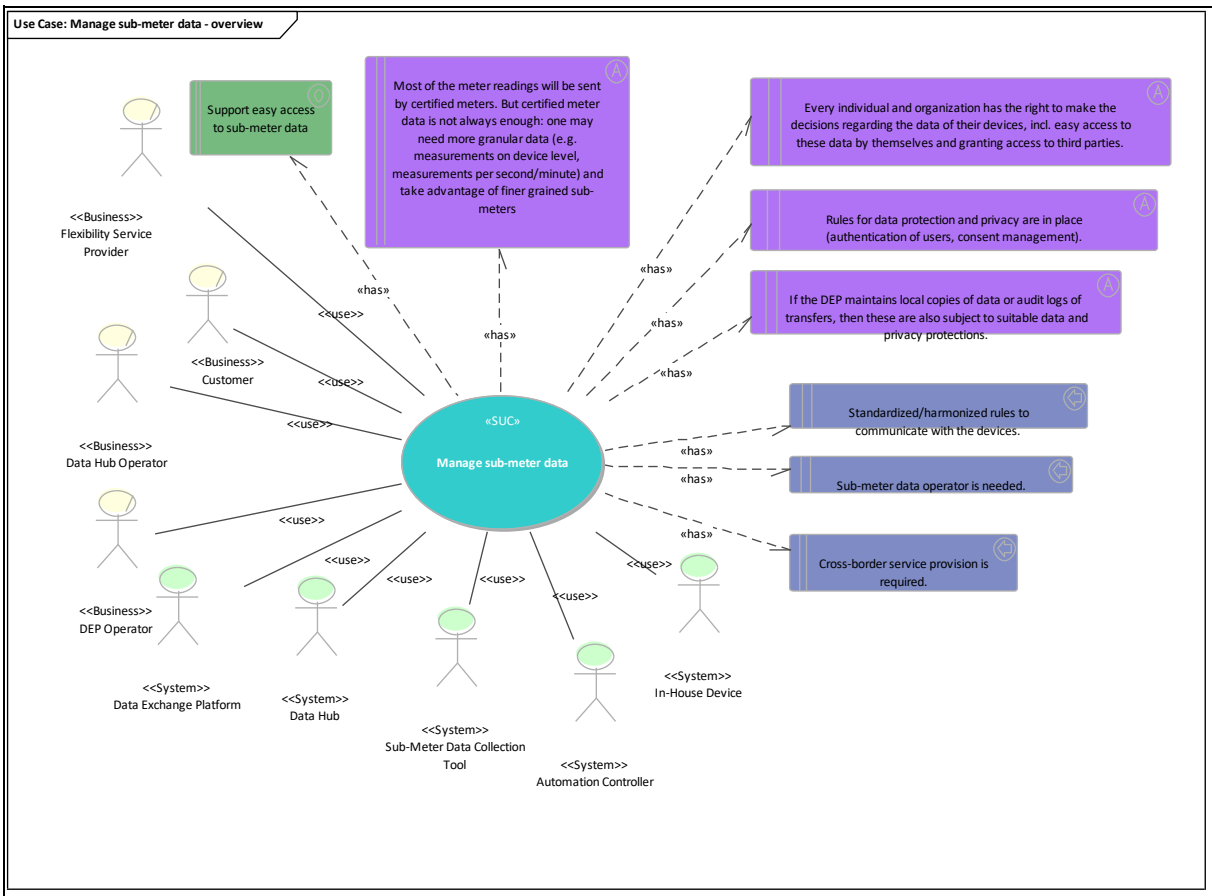
7. Further information to the use case for classification/mapping

Classification information
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

Diagram(s) of use case



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***
Customer	Business	Consumer, generator or storage facility owner.	
Sub-Meter Data Collection Tool	System	Sub-Meter Data Collection Tool is an information system which main functionality is to collect measurements from In-House Devices. Data is published to Sub-Meter Data Collection Tool, not requested by the tool.	

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.	
Automation Controller	System	Automation Controller is an information system which main functionality is to send activation signals to In-House Devices.	
In-House Device	System	Any kind of electrical device installed at a customer's location. E.g. heat pump, water boiler, EV charger.	
Data Hub	System	Data Hub is an information system which main functionality is to store and make available measurements (e.g. meter data, operational data) and associated master data. Data Hubs are not necessarily centralized in a country or in a region.	
Flexibility Service Provider	Business	Can be a Distribution Network Flexibility Provider or a Transmission Network Flexibility Provider (cf. definitions in T3.3 deliverable). Similar to Flexibility Aggregator. Can be both aggregator and individual consumer/generator. Type of Energy Service Provider.	
Energy Service Provider	Business	A party offering energy-related services to any other party (adapted from ENTSOE-EFET-ebIX harmonized role model). Energy service provider (ESCO – energy service company) is a market-based role which is responsible for delivering energy services to the customers (or to other parties of behalf of the customers). In case these services necessitate the access to customer's data, the consent of this customer is required. Examples of the executors of this role include aggregator, flexibility service provider, energy efficiency provider, energy monitoring provider. Can also be an Aggregator or a Generator (cf. definitions in T3.3 deliverable).	
Data Hub Operator	Business	Data hub operator owns and operates an information system which main functionality is to store and make available electricity (also gas, heat) metering data and associated master data. Can be : • Grid Data Hub Operator in the sphere of a System Operator • Market Data Hub Operator in the sphere of a Market Operator • Meter Data Hub Operator in the sphere of a Metered Data Operator • Sub-meter Data Hub Operator in the sphere of an Energy Service Provider	
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

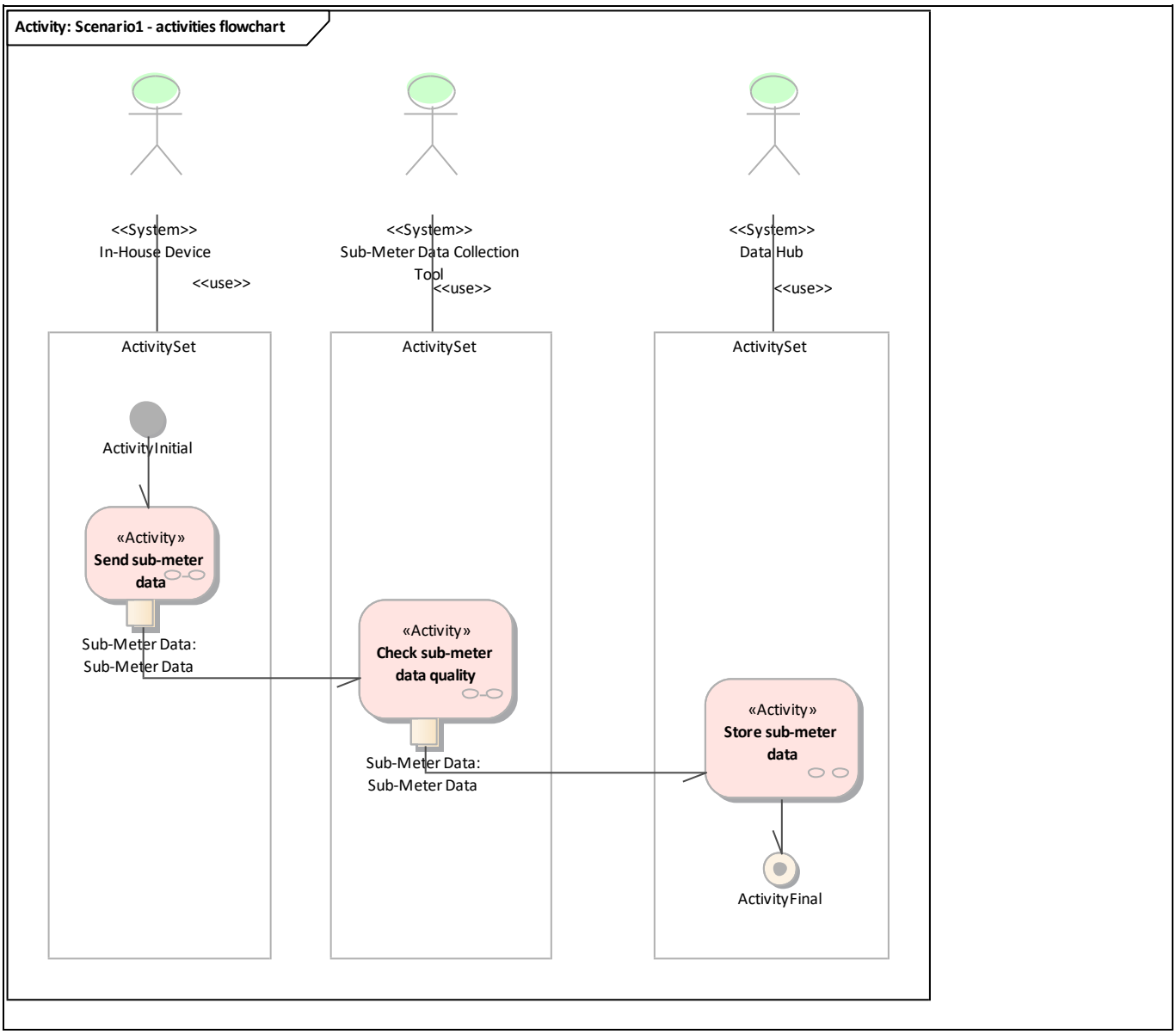
Scenario conditions						
No.	***Scenario name***	***Scenario description***	***Primary actor***	***Triggering event***	***Pre-condition***	***Post-condition***

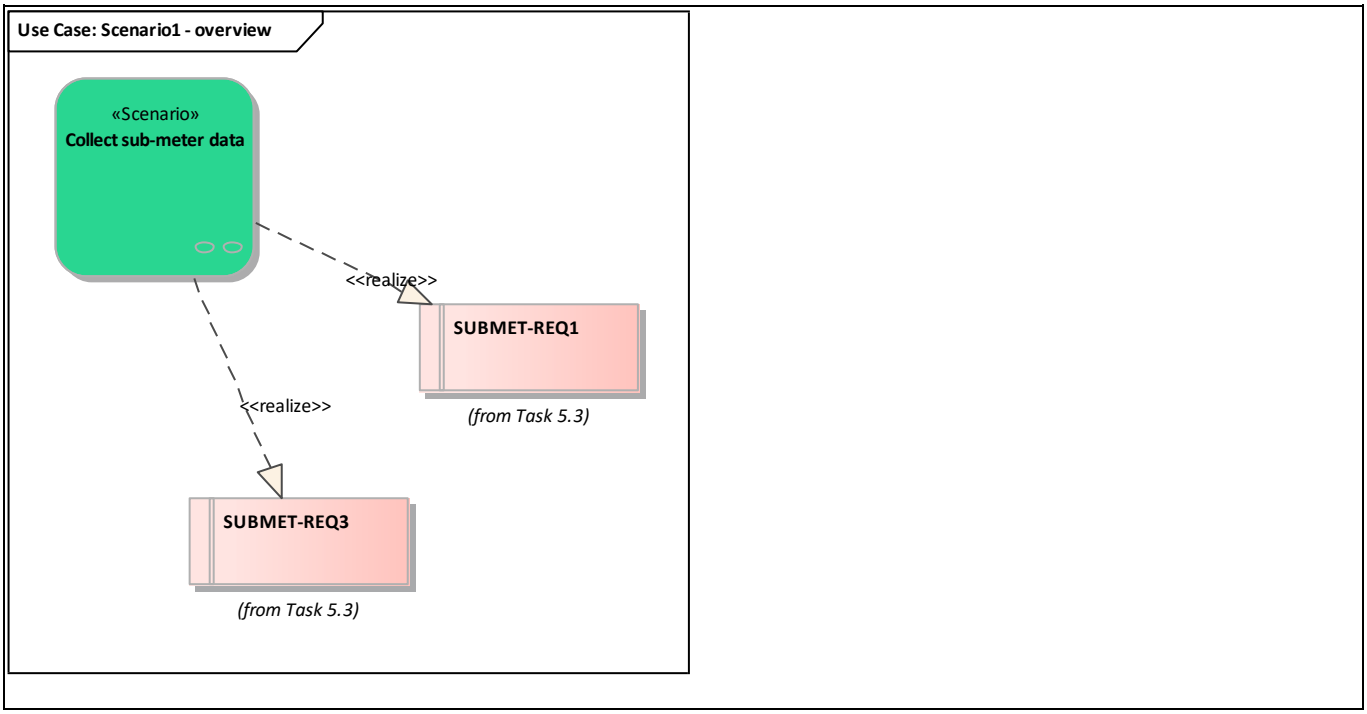
1	Collect sub-meter data					
2	Ensure data collection from sub-meter level devices to be made available over DEP				* A contract must exist between customer and flexibility service provider: i. Either customer finds the flexibility service provider in the list on DEP ii. Or flexibility service provider contacts potential customer directly * Sub-meter data collection tool must be already registered on DEP as an energy service provider application – see SUC 'Integrate new application' * Sub-meter data collection tool must appear in the list of applications on DEP – see SUC 'Provide list of suppliers and ESCOs'	
3	Enable sending control signals to devices over DEP					

2. Steps - Scenarios

1. Collect sub-meter data

Requirement list (refer to "Requirement" section for more information)	
Requirement R-ID	***Requirement name***
Cat1.Req1	SUBMET-REQ1
Cat1.Req2	SUBMET-REQ3


Activity: Scenario1 - activities flowchart
<<System>>
In-House Device
<<use>>
<<System>>
Sub-Meter Data Collection Tool
<<use>>
<<System>>
Data Hub
<<use>>
ActivitySet
ActivitySet
ActivitySet
ActivityInitial
«Activity»
Send sub-meter data
Sub-Meter Data:
Sub-Meter Data
«Activity»
Check sub-meter data quality
Sub-Meter Data:
Sub-Meter Data
«Activity»
Store sub-meter data
ActivityFinal



Scenario step by step analysis

Scenario								
Scenario name	Collect sub-meter data							
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		Send sub-meter data			In-House Device	Sub-Meter Data Collection Tool	Info1-Sub-Meter Data	
1.2		Check sub-meter data quality			Sub-Meter Data Collection Tool	Data Hub	Info1-Sub-Meter Data	
1.3		Store sub-meter data			Data Hub			

- 1.1. Send sub-meter data

  Business section: Collect sub-meter data/Send sub-meter data

  Information sent:

Business object	Instance name	Instance description
Sub-Meter Data	Sub-Meter Data	

- 1.2. Check sub-meter data quality

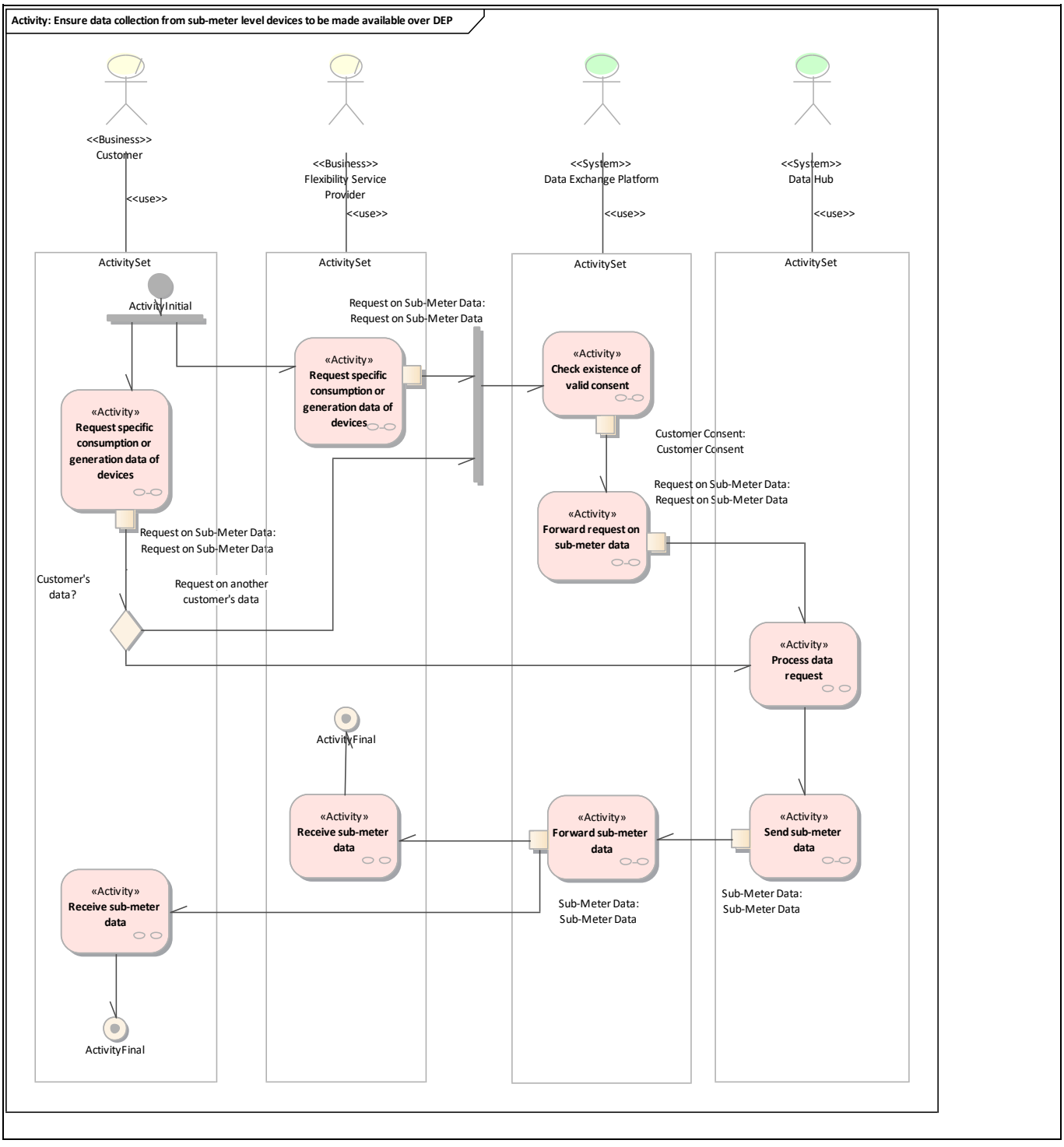
Business section: Collect sub-meter data/Check sub-meter data quality

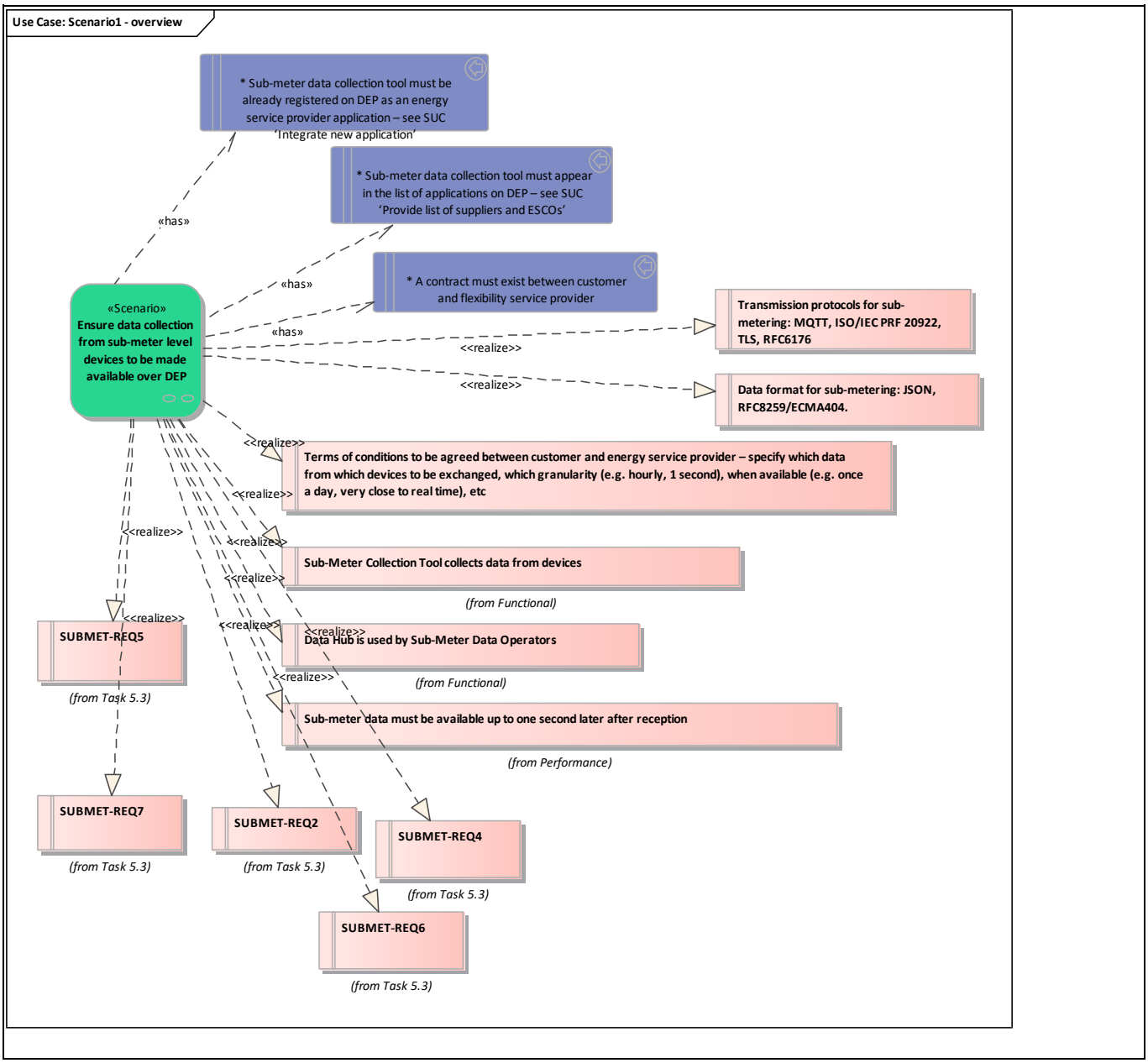
Information sent:

Business object	*Instance name*	*Instance description*
Sub-Meter Data	Sub-Meter Data	

2. Ensure data collection from sub-meter level devices to be made available over DEP

Requirement list (refer to "Requirement" section for more information)	
Requirement R-ID	***Requirement name***
Cat2.Req3	Sub-Meter Collection Tool collects data from devices
Cat3.Req4	Sub-meter data must be available up to one second later after reception
Cat2.Req5	Data Hub is used by Sub-Meter Data Operators
Req6	Data format for sub-metering: JSON, RFC8259/ECMA404.
Req7	Transmission protocols for sub-metering: MQTT, ISO/IEC PRF 20922, TLS, RFC6176
Req8	Terms of conditions to be agreed between customer and energy service provider – specify which data from which devices to be exchanged, which granularity (e.g. hourly, 1 second), when available (e.g. once a day, very close to real time), etc.
Cat1.Req9	SUBMET-REQ5
Cat1.Req10	SUBMET-REQ7
Cat1.Req11	SUBMET-REQ2
Cat1.Req12	SUBMET-REQ4
Cat1.Req13	SUBMET-REQ6


Activity: Ensure data collection from sub-meter level devices to be made available over DEP
<<Business>>
Customer
<<Business>>
Flexibility Service Provider
<<System>>
Data Exchange Platform
<<System>>
Data Hub
<<use>>
<<use>>
<<use>>
<<use>>
ActivitySet
ActivitySet
ActivitySet
ActivitySet
ActivityInitial
Request on Sub-Meter Data:
Request on Sub-Meter Data
«Activity»
Request specific consumption or generation data of devices
«Activity»
Request specific consumption or generation data of devices
«Activity»
Check existence of valid consent
Customer Consent:
Customer Consent
Request on Sub-Meter Data:
Request on Sub-Meter Data
«Activity»
Forward request on sub-meter data
Request on Sub-Meter Data:
Request on Sub-Meter Data
Customer's data?
Request on another customer's data
«Activity»
Process data request
ActivityFinal
«Activity»
Receive sub-meter data
«Activity»
Forward sub-meter data
«Activity»
Send sub-meter data
«Activity»
Receive sub-meter data
Sub-Meter Data:
Sub-Meter Data
Sub-Meter Data:
Sub-Meter Data
ActivityFinal



Scenario step by step analysis

Scenario								
Scenario name		Ensure data collection from sub-meter level devices to be made available over DEP						
Step No	**Event**	**Name of process/activity**	**Description of process/activity**	**Service**	**Information producer (actor)**	**Information receiver (actor)**	**Information exchanged (IDs)**	**Requirement, R-IDs**
2.1		Forward sub-meter data			Data Exchange Platform	Flexibility Service Provider, Customer	Info1-Sub-Meter Data	
2.2		Process data request			Data Hub			

2.3		Receive sub-meter data			Flexibility Service Provider			
2.4		Receive sub-meter data			Customer			
2.5		Request specific consumption or generation data of devices			Flexibility Service Provider	Data Exchange Platform	Info2-Request on Sub-Meter Data	
2.6		Request specific consumption or generation data of devices			Customer	Data Hub, Data Exchange Platform	Info2-Request on Sub-Meter Data	
2.7		Check existence of valid consent			Data Exchange Platform	Data Exchange Platform	Info3-Customer Consent	
2.8		Forward request on sub-meter data			Data Exchange Platform	Data Hub	Info2-Request on Sub-Meter Data	
2.9		Send sub-meter data			Data Hub	Data Exchange Platform	Info1-Sub-Meter Data	

- 2.1. Forward sub-meter data

Business section: Ensure data collection from sub-meter level devices to be made available over DEP/Forward sub-meter data

Information sent:

Business object	*Instance name*	*Instance description*
Sub-Meter Data	Sub-Meter Data	

- 2.5. Request specific consumption or generation data of devices

Business section: Ensure data collection from sub-meter level devices to be made available over DEP/Request specific consumption or generation data of devices

Information sent:

Business object	*Instance name*	*Instance description*
Request on Sub-Meter Data	Request on Sub-Meter Data	

- 2.6. Request specific consumption or generation data of devices

Business section: Ensure data collection from sub-meter level devices to be made available over DEP/Request specific consumption or generation data of devices

Information sent:

Business object	*Instance name*	*Instance description*
Request on Sub-Meter Data	Request on Sub-Meter Data	

- 2.7. Check existence of valid consent

Business section: Ensure data collection from sub-meter level devices to be made available over DEP/Check existence of valid consent

Information sent:

Business object	*Instance name*	*Instance description*
Customer Consent	Customer Consent	

- 2.8. Forward request on sub-meter data

Business section: Ensure data collection from sub-meter level devices to be made available over DEP/Forward request on sub-meter data

Information sent:

Business object	*Instance name*	*Instance description*
Request on Sub-Meter Data	Request on Sub-Meter Data	

- 2.9. Send sub-meter data

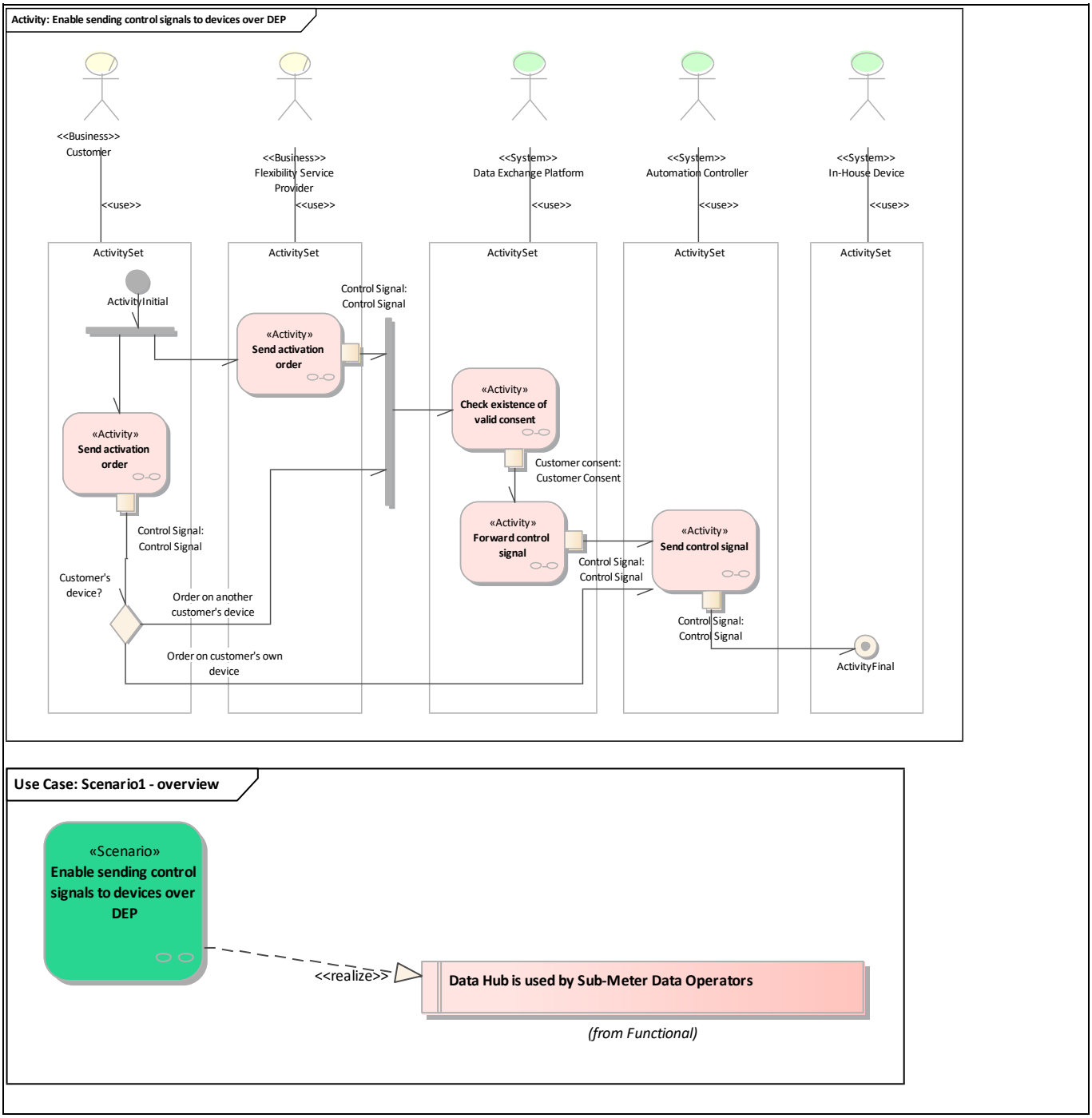
Business section: Ensure data collection from sub-meter level devices to be made available over DEP/Send sub-meter data

Information sent:

Business object	*Instance name*	*Instance description*
Sub-Meter Data	Sub-Meter Data	

3. Enable sending control signals to devices over DEP

Requirement list (refer to "Requirement" section for more information)	
Requirement R-ID	*Requirement name*
Cat2.Req5	Data Hub is used by Sub-Meter Data Operators



Scenario step by step analysis

Scenario								
Scenario name	Enable sending control signals to devices over DEP							
Step No	**Event**	**Name of process/activity**	**Description of process/activity**	**Service**	**Information producer (actor)**	**Information receiver (actor)**	**Information exchanged (IDs)**	**Requirement, R-IDs**
3.1		Send activation order	Customer (consumer/generator) can order directly the		Customer	Automation Controller, Data	Info4-Control Signal	

			Sub-Meter Data Operator to activate his/her devices.			Exchange Platform		
3.2		Send activation order	An activation order can be sent by Energy Service Provider to Sub-Meter Data Operator (operating Automation Controller), based on the defined coordination mechanisms and TSO's or DSO's request to activate some flexibility.		Flexibility Service Provider	Data Exchange Platform	Info4-Control Signal	
3.3		Check existence of valid consent			Data Exchange Platform	Data Exchange Platform	Info3-Customer Consent	
3.4		Forward control signal			Data Exchange Platform	Automation Controller	Info4-Control Signal	
3.5		Send control signal			Automation Controller	In-House Device	Info4-Control Signal	

- 3.1. Send activation order

Business section: Enable sending control signals to devices over DEP/Send activation order
Customer (consumer/generator) can order directly the Sub-Meter Data Operator to activate his/her devices.
Information sent:

Business object	***Instance name***	***Instance description***
Control Signal	Control Signal	

- 3.2. Send activation order

Business section: Enable sending control signals to devices over DEP/Send activation order
An activation order can be sent by Energy Service Provider to Sub-Meter Data Operator (operating Automation Controller), based on the defined coordination mechanisms and TSO's or DSO's request to activate some flexibility.
Information sent:

Business object	***Instance name***	***Instance description***
Control Signal	Control Signal	

- 3.3. Check existence of valid consent

Business section: Enable sending control signals to devices over DEP/Check existence of valid consent

Information sent:

Business object	***Instance name***	***Instance description***
Customer Consent	Customer consent	

- 3.4. Forward control signal

Business section: Enable sending control signals to devices over DEP/Forward control signal

Information sent:

Business object	*Instance name*	*Instance description*
Control Signal	Control Signal	

- 3.5. Send control signal

Business section: Enable sending control signals to devices over DEP/Send control signal

Information sent:

Business object	*Instance name*	*Instance description*
Control Signal	Control Signal	

5. Information exchanged

Information exchanged			
Information exchanged, ID	***Name of information***	***Description of information exchanged***	***Requirement, R-IDs***
Info1	Sub-Meter Data	Time resolution:1 second. Content: energy, active power, reactive power, time-stamp, sub-meter ID, type of device behind the sub-meter (e.g. car charger, heating facility), energy flow direction (generation or consumption).	
Info2	Request on Sub-Meter Data		
Info3	Customer Consent		
Info4	Control Signal		

6. Requirements (optional)

Requirements (optional)		
Categories ID	***Category name for requirements***	***Category description***
Cat1	Task 5.3	Requirements integrated from Task 5.3.
Requirement R-ID	***Requirement name***	***Requirement description***
Req1	SUBMET-REQ1	Collection of data from sub-meters
Req2	SUBMET-REQ3	Storing sub-meter data in a data hub
Req9	SUBMET-REQ5	Transmission protocols of sub-metering
Req10	SUBMET-REQ7	Ability of DEP to forward activation orders from a customer (data owner) or application (energy service provider) to devices
Req11	SUBMET-REQ2	Ability of DEP to forward sub-meter data from data hub to customer (data owner) and application (energy service provider)
Req12	SUBMET-REQ4	Data format of sub-metering
Req13	SUBMET-REQ6	SLA between customer and energy service provider
Requirements (optional)		

Categories ID	***Category name for requirements***	***Category description***
Cat2	Functional	Functional requirements
Requirement R-ID	***Requirement name***	***Requirement description***
Req3	Sub-Meter Collection Tool collects data from devices	Data is published to Sub-Meter Collection Tool, not requested by it. Sub-Meter Data Collection Tool checks quality of received data: check within the scope of the device, e.g. that data packets are well formed and within reasonable bounds for the device, and across multiple devices, e.g. that readings from sub-meters are consistent with the aggregate reading from the main meter in the location. This quality check is very dependent on the geometry/setup of the sub meters (sub-meters of sub-meters, generated power, thermal energy...). Validation is therefore highly application/use case specific. Then, Sub-Meter Collection Tool sends data to Data Hub for storing.
Req5	Data Hub is used by Sub-Meter Data Operators	

Requirements (optional)		
Categories ID	***Category name for requirements***	***Category description***
Cat3	Performance	
Requirement R-ID	***Requirement name***	***Requirement description***
Req4	Sub-meter data must be available up to one second later after reception	

Requirements (optional)		
Categories ID	***Category name for requirements***	***Category description***
Requirement R-ID	***Requirement name***	***Requirement description***
Req6	Data format for sub-metering: JSON, RFC8259/ECMA404.	
Req7	Transmission protocols for sub-metering: MQTT, ISO/IEC PRF 20922, TLS, RFC6176	
Req8	Terms of conditions to be agreed between customer and energy service provider – specify which data from which devices to be exchanged, which granularity (e.g. hourly, 1 second), when available (e.g. once a day, very close to real time), etc	

7. Common terms and definitions

8. Custom information (optional)