Predict flexibility availability

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***
	Market for flexibilities	Predict flexibility availability

2. Version management

Version management				
Version No.	***Date***	***Name of author(s)***	***Changes***	***Approval status***
1	2018-05-08			
2	2018-05-08	Mitchell Curtis (Upside), Graham Oakes (Upside)	First Draft	
3	2018-07-04	Ricardo Jover (EDF), Eric Suignard (EDF)		
4	2018-07-10	Ricardo Jover (EDF), Eric Suignard (EDF)	Changes from Mitchell Curtis	
5	2018-08-02	Eric Suignard (EDF)		
6	2018-09-21	Eric Suignard (EDF)	Remarks from Innogy.	
7	2018-10-04	Eric Suignard (EDF)	Version post WP5&9 physical meeting in Tallinn	
8	2018-10-17	Eric Suignard (EDF)	Version reviewed by WP5&9 partners	
9	2019-05-07	Eric Suignard (EDF)	WP6-7-8 demos alignment and miscellaneous changes	
10	2019-06-05	Ricardo Jover (EDF), Eric Suignard (EDF)	Changes following WP5&9 workshop in Chatou	
11	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	The scope of this use case is the prediction of flexibility product availability.
Objective(s)	The objective of this use case is to detail how the prediction of flexibility product availability is undertaken.
Related business case(s)	

4. Narrative of Use Case

Narrative of use case
Short description
This use case describes how the prediction of flexibility availability is undertaken. Flexibility products are described as either slow (e.g. Manual Frequency Restoration Reserve (mFRR) and the UK Short Term Operating Reserve (STOR)) or semi-fast (e.g. Automatic Frequency Restoration Reserve (aFRR)) or fast (e.g. Frequency

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Containment Reserves (FCR) and Fast Frequency Response (FFR)) and can provide services for balancing and congestion management at local and national levels for TSOs and DSOs.
The assessment of flexibility availability in this use case is split into three timeframes:

- Investment planning (3+ years ahead) aims to understand future availability and if the predictions highlight insufficient capacity that needs addressing.
- Operation planning (days to years ahead) aims to predict the short, medium and long term availability of flexible products that have committed to provide service.
- Real time Planning (Intraday operation) aims to predict the current availability of flexible products for balancing and congestion management requirements for that day. This time frame is covered by DER-SCADA, flexibility bidding and flexibility activation SUCs. It relates to understand the real time flexibility availability which could be based on forecasting using historical data on how assets have performed. For example, the flexibility bidding SUC could say that today 10MW had been awarded for usage, the flexibility activation SUC could identify that, when called on, only 9MW responded. This information would be fed into the prediction forecaster, so that in the future it could tell the flexibility bidding SUC that, if it wants 10MW, then it should get 11MW as it is predicted that 10% will not respond.

Complete description

Summary of use case

- TSO Predicting Flexibility Availability for Investment Planning
  Description:
  - Assess the levels of expected generation and intermittent electricity supply
    Description: Assessment on transmission network.
    Example for intermittent electricity supply: renewables.
  - Assess the levels of expected inflexible and flexible electricity demand
    Description: Assessment on transmission network.
    Example for inflexible electricity demand: lights.
    Example for flexible electricity demand: electric vehicle charging.
  - Compare supply and demand assessments across the country and for individual areas
    Description: There should be sufficient capacity and flexibility, in order to maintain agreed KPI's (e.g. having a 10% reserve margin)
  - Signal to the market with appropriate mechanisms the national and local requirements
    Description: Examples of a national signal: flexibility market, demanding futures on flexibility
  - Forward the national and local requirements
    Description:
  - Register flexibility needs
    Description: National and local requirements to register:
    - Amount of firm electricity supply required
    - Amount of intermittent electricity supply required
    - Amount of fast (seconds response rate) flexibility product required
    - Amount of slow (minutes response rate) flexibility product required
- DSO Predicting Flexibility Availability for Investment Planning
  Description:
  - Assess the levels of expected generation connected to the distribution grid, inflexible and flexible electricity demand across all areas of its distribution network
    Description: Assessment on distribution network.
    Example for inflexible electricity demand: lights.

Example for flexible electricity demand: electric vehicle charging.
Examples of areas of distribution network: street, town, region.

- Assess the levels of expected distributed generation across all areas of its distribution network
  Description: Assessment on distribution network.
  Example for expected distributed generation: solar.
  Examples of areas of distribution network: street, town, region.

- Use the demand and distributed generation assessment to understand which areas could utilise flexible electricity demand to reduce the need for network reinforcement
  Description: Example for flexible electricity demand: electric vehicle charging

- Signal to the market with appropriate mechanisms the requirements
  Description: Example for signal: DSO flexibility calls for tenders

- Forward local requirements
  Description:

- Register flexibility needs
  Description: Requirements to register for network reinforcement:
  - Amount of reinforcement required that cannot be addressed with flexibility
  - Amount of fast (seconds response rate) flexibility product required
  - Amount of slow (minutes response rate) flexibility product required

- System Operator Predicting Flexibility Availability for Operational Planning
  Description: The System Operator can be a TSO or a DSO.

  - Publish the results of prequalification with additional restrictions information
    Description:

  - Forward prequalification results
    Description:

  - Register flexibility needs
    Description:

  - Predict fast and slow flexibility product availability for the short-term period
    Description: Based on the flexibility energy that has been awarded to providers. The flexibility energy is adjusted using forecasting models of actual delivery by the providers and historical data

  - Predict fast and slow flexibility product availability for the medium-term period
    Description: Based on the flexibility capacity that has been awarded.

  - Predict fast and slow flexibility product availability for the long-term period
    Description: Based on the flexibility capacity that has been already awarded and still to be awarded based on their acquisition mechanisms (e.g. capacity market)

  - Forward flexibility needs
    Description:

- System Operator Predicting Flexibility Availability for Real Time Planning
  Description: The System Operator can be a TSO (imbalance) or a DSO (congestions).

  - Send large FSPs real time signals about their current and near-term ability to provide flexibility
    Description: For large producers (FSPs): some data are already exchanged in real time between large producer's SCADA and network operator's SCADA.

- Send small FSPs real time signals about their current and near-term ability to provide flexibility
  Description: For FSPs who do not have a SCADA to exchange data directly with Network Operators. We will consider that data exchanges between small FSPs and system/network operators will be done in real time via Data Exchange Platforms.

- Forward small FSPs real time signals
  Description:

- Receive the flexibility predictions
  Description:

- For small FSPs that cannot provide real time signals, predict their current and near-term ability to provide flexibility availability
  Description: For FSPs that cannot offer real time signals.
  Flexibility availability is based on historical information and prediction parameters (e.g. weather).

- Combine the flexibility predictions
  Description: Done to understand availability over the day for both slow and fast flexibility products.

5. Key performance indicators (KPI)

6. Use case conditions

	Use case conditions
	Assumptions
1	Operational Planning timeframe requires data on the amount and type of flexibility that has been acquired
2	Real Time timeframe requires receiving high resolution data (e.g. updates every second or minute depending on product) directly from providers and from short term forecasting models when providers cannot provide the high resolution data.: We will consider that data exchanges: • Between large producers (FSPs) and System Operators are already done in real time between large producer's SCADA and System Operator's SCADA, • Between small FSPs and System Operators will be done in real time via Data Exchange Platforms.
3	Investment Planning timeframe requires data about future demand and supply scenarios that are not created in this use case
	Prerequisites
1	Flexibility products have been predefined and are being used
2	DSO obtains data on future (greater than 3 years) electricity demand and localised generation scenarios for all areas under its control
3	Prediction models that can utilise historical availability data must be available
4	System Operator obtains the amount of flexibility required for short-term (days/weeks ahead), medium-term (months ahead), and long-term (years ahead) periods
5	Models of how flexibility products interact with system parameters such as inertia and direction of energy flows are well defined, allowing the need for an impact of flexibility products to be reasonably well understood.: Uncertainty in these underlying models is compensated by provisioning additional flexibility contingency reserve.
6	TSO obtains data on future (greater than 3 years) electricity demand and supply scenarios for the country and individual areas

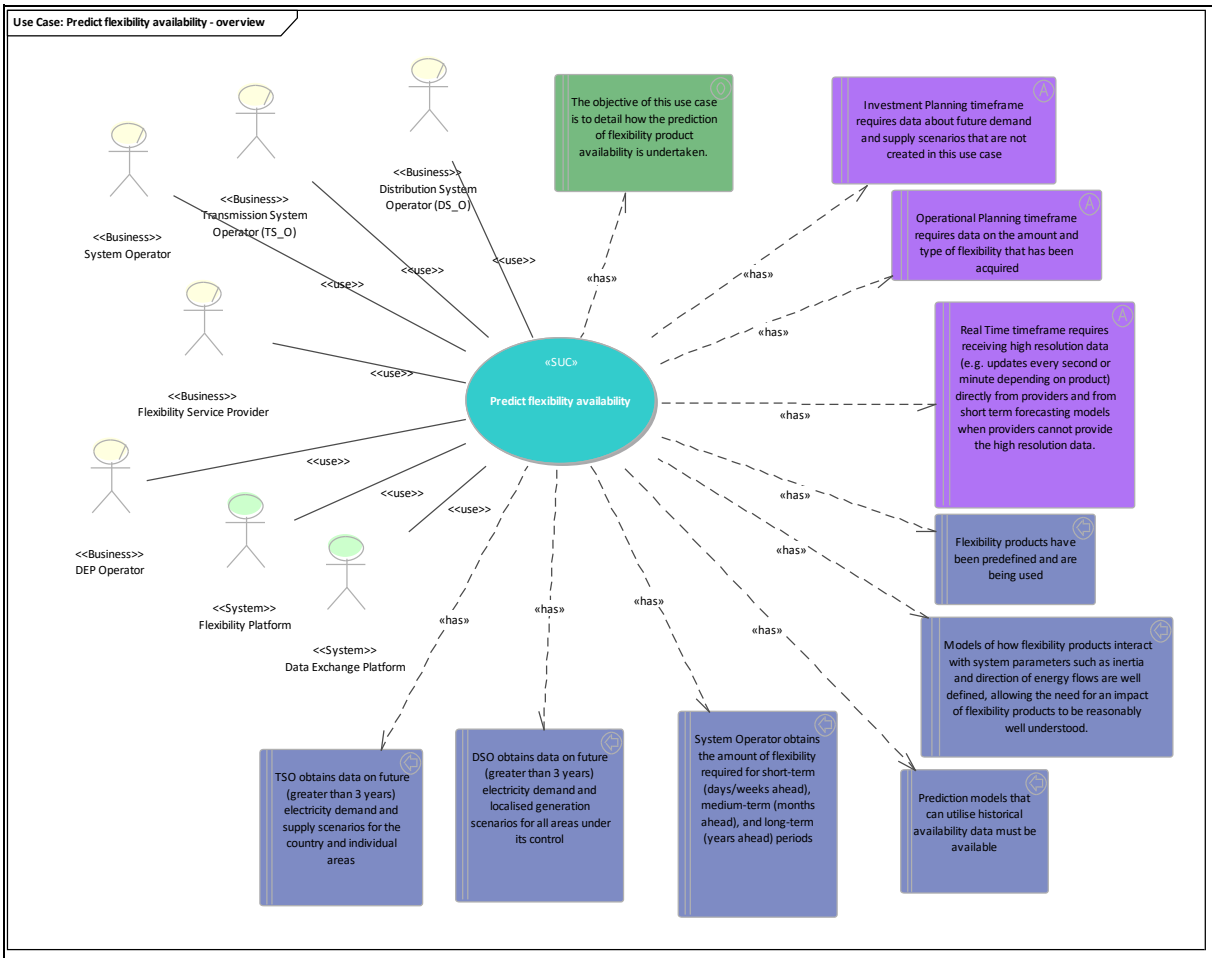
7. Further information to the use case for classification/mapping

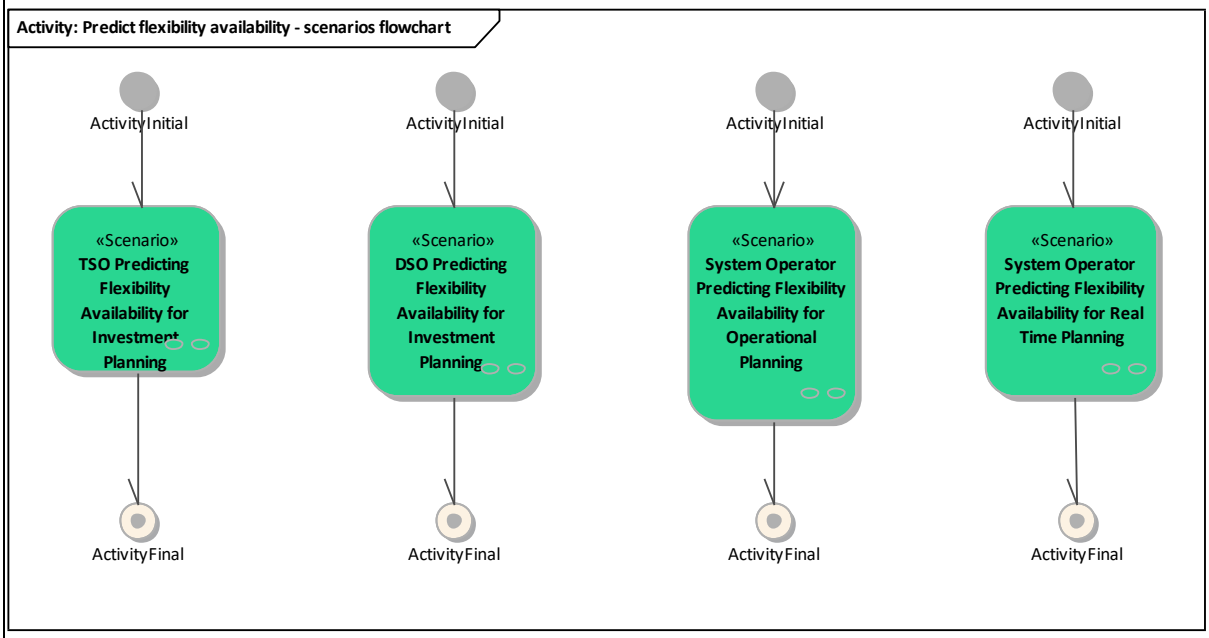
Classification information
Relation to other use cases
Level of depth
Prioritisation
Generic, regional or national relation
Nature of the use case
SUC
Further keywords for classification

8. General remarks

2. Diagrams of use case

Diagram(s) of use case


Use Case: Predict flexibility availability - overview
<<Business>>
System Operator
<<Business>>
Transmission System Operator (TS_O)
<<Business>>
Distribution System Operator (DS_O)
<<Business>>
Flexibility Service Provider
<<Business>>
DEP Operator
<<System>>
Flexibility Platform
<<System>>
Data Exchange Platform
<<use>>
«SUC»
Predict flexibility availability
«has»
The objective of this use case is to detail how the prediction of flexibility product availability is undertaken.
Investment Planning timeframe requires data about future demand and supply scenarios that are not created in this use case
Operational Planning timeframe requires data on the amount and type of flexibility that has been acquired
Real Time timeframe requires receiving high resolution data (e.g. updates every second or minute depending on product) directly from providers and from short term forecasting models when providers cannot provide the high resolution data.
Flexibility products have been predefined and are being used
Models of how flexibility products interact with system parameters such as inertia and direction of energy flows are well defined, allowing the need for an impact of flexibility products to be reasonably well understood.
Prediction models that can utilise historical availability data must be available
TSO obtains data on future (greater than 3 years) electricity demand and supply scenarios for the country and individual areas
DSO obtains data on future (greater than 3 years) electricity demand and localised generation scenarios for all areas under its control
System Operator obtains the amount of flexibility required for short-term (days/weeks ahead), medium-term (months ahead), and long-term (years ahead) periods


Activity: Predict flexibility availability - scenarios flowchart
ActivityInitial
«Scenario»
TSO Predicting Flexibility Availability for Investment Planning
ActivityFinal
ActivityInitial
«Scenario»
DSO Predicting Flexibility Availability for Investment Planning
ActivityFinal
ActivityInitial
«Scenario»
System Operator Predicting Flexibility Availability for Operational Planning
ActivityFinal
ActivityInitial
«Scenario»
System Operator Predicting Flexibility Availability for Real Time Planning
ActivityFinal

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***
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.	
Distribution System Operator (DS_O)	Business	Elaborate network development plan (including defining system needs for distribution) Ensure a transparent and non-discriminatory access to the distribution network for each user Operate the distribution grid over a specific region in a secure, reliable and efficient way Optimize system operation distribution grid from planning to real-time, using available levers (grid expansion, flexibility activation,...) Assess network status of the distribution grid and broadcast selected information of the network status to eligible actors (e.g. aggregators, other system operators) Support the Transmission System Operator in carrying out its responsibilities (including load shedding) and coordinate measures if necessary	
Transmission System Operator (TS_O)	Business	Elaborate network development plan (including defining system needs for transmission) Ensure a transparent and non-discriminatory access to the transmission network for each user Operate the transmission grid over a specific region in a secure, reliable and efficient way Secure and manage in real time the physical generation-consumption balance on a geographical perimeter, including ensuring the frequency control service Optimize transmission system operation from planning to real-time, using available levers (grid expansion, flexibility activation,...) Assess network status of the transmission grid and broadcast selected information of the network status to eligible actors (e.g. aggregators, other system operators) Provide data to the interconnection capacity market operator for the management of cross border transactions In critical situations, implement dedicated actions and deliver alerts during stress events If necessary, implement emergency measures (e.g. system defence plan) including load shedding	
System Operator	Business	System Operator means a natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long-term ability of the	

		system to meet reasonable demands for the distribution or transmission of electricity (cf. ENTSOE-EFET-ebIX harmonized role model 2019). Can be: • A Transmission System Operator (cf. definition in T3.3 deliverable), for frequency control, congestion management and voltage control on transmission network, • A Distribution System Operator (cf. definition in T3.3 deliverable), for congestion management and voltage control on distribution network. NB: In some countries (e.g. Germany and Poland), the high voltage network is part of the distribution grid and in other countries (e. g. France and Italy) the high voltage network is part of the transmission grid. A System Operator can be: • A Primary System Operator, • A Secondary System Operator.	
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.	
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.	
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

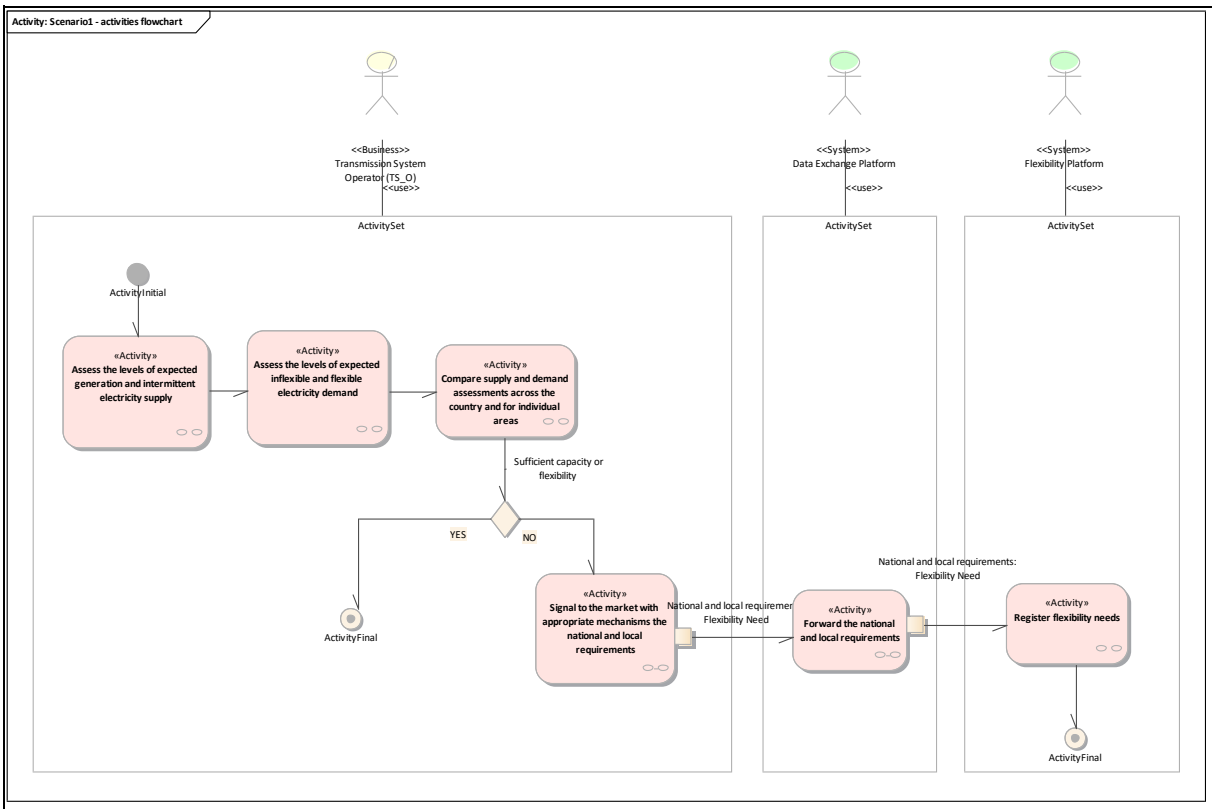
Scenario conditions						
No.	***Scenario name***	***Scenario description***	***Primary actor***	***Triggering event***	***Pre-condition***	***Post-condition***
1	TSO Predicting Flexibility Availability for Investment Planning				This scenario should start after the registration of the prequalification results (see "Prequalification of the Flexibility Service Providers and providers per service/product" scenario in "Manage flexibility bids" SUC).	

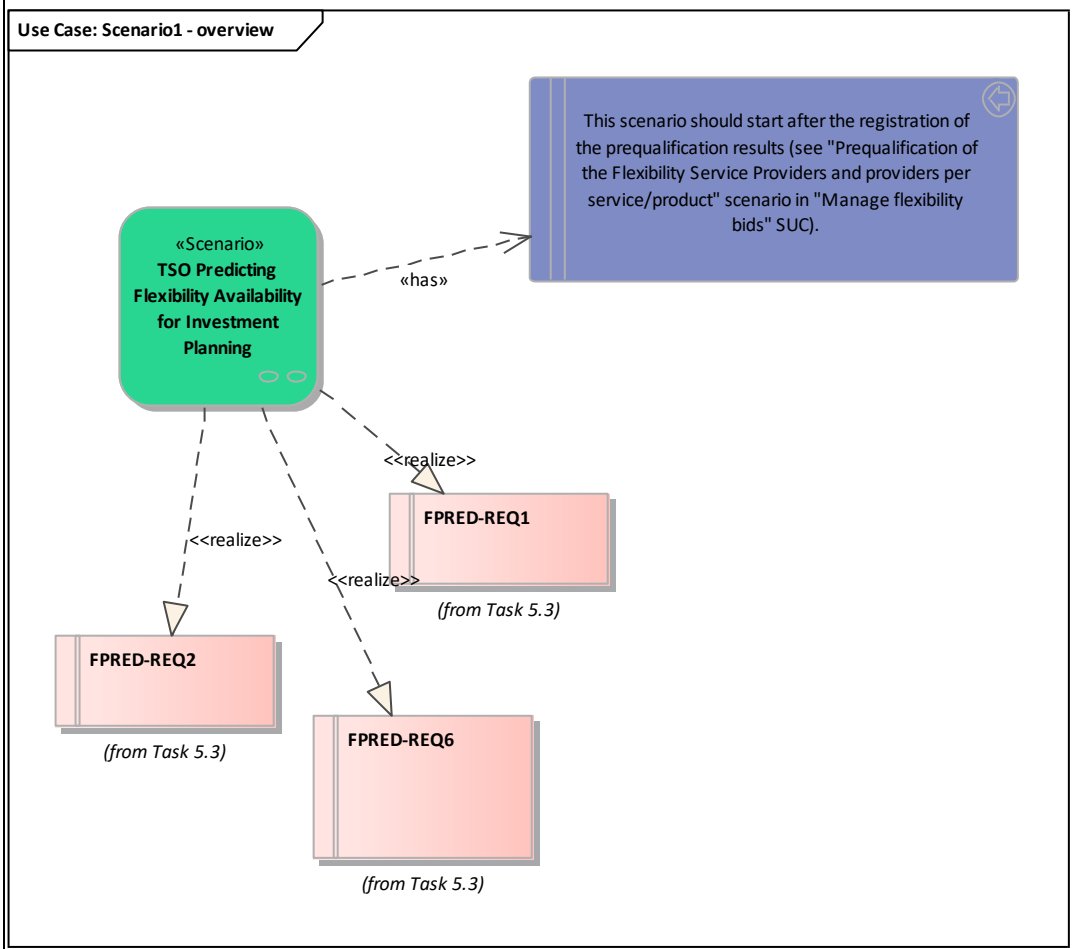
2	DSO Predicting Flexibility Availability for Investment Planning					
3	System Operator Predicting Flexibility Availability for Operational Planning	The System Operator can be a TSO or a DSO.			The scenario should start with "Prequalification results" last activity of the prequalification scenario described in "Manage flexibility bids" SUC.	
4	System Operator Predicting Flexibility Availability for Real Time Planning	The System Operator can be a TSO (imbalance) or a DSO (congestions).				

2. Steps - Scenarios

- **TSO Predicting Flexibility Availability for Investment Planning**

Requirement list (refer to "Requirement" section for more information)	
Requirement R-ID	***Requirement name***
Cat1.Req1	FPRED-REQ1
Cat1.Req2	FPRED-REQ2
Cat1.Req3	FPRED-REQ6


Activity: Scenario1 - activities flowchart
<<Business>>
Transmission System Operator (TS_O)
<<use>>
<<System>>
Data Exchange Platform
<<use>>
<<System>>
Flexibility Platform
<<use>>
ActivitySet
ActivitySet
ActivitySet
ActivityInitial
«Activity»
Assess the levels of expected generation and intermittent electricity supply
«Activity»
Assess the levels of expected inflexible and flexible electricity demand
«Activity»
Compare supply and demand assessments across the country and for individual areas
Sufficient capacity or flexibility
YES
NO
ActivityFinal
«Activity»
Signal to the market with appropriate mechanisms the national and local requirements
National and local requirements: Flexibility Need
«Activity»
Forward the national and local requirements
National and local requirements: Flexibility Need
«Activity»
Register flexibility needs
ActivityFinal


Use Case: Scenario1 - overview
This scenario should start after the registration of the prequalification results (see "Prequalification of the Flexibility Service Providers and providers per service/product" scenario in "Manage flexibility bids" SUC).
«Scenario»
TSO Predicting Flexibility Availability for Investment Planning
«has»
<<realize>>
<<realize>>
<<realize>>
FPRED-REQ1
(from Task 5.3)
FPRED-REQ2
(from Task 5.3)
FPRED-REQ6
(from Task 5.3)

Scenario step by step analysis

Scenario								
Scenario name		TSO Predicting Flexibility Availability for Investment Planning						
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		Assess the levels of expected generation and intermittent electricity supply	Assessment on transmission network. Example for intermittent electricity supply: renewables.		Transmission System Operator (TS_O)			
1.2		Assess the levels of expected inflexible and flexible electricity demand	Assessment on transmission network. Example for inflexible electricity demand: lights. Example for flexible electricity demand: electric vehicle charging.		Transmission System Operator (TS_O)			
1.3		Compare supply and demand assessments across the country and for individual areas	There should be sufficient capacity and flexibility, in order to maintain agreed KPI's (e.g. having a 10% reserve margin)		Transmission System Operator (TS_O)			
1.4		Signal to the market with appropriate mechanisms the national and local requirements	Examples of a national signal: flexibility market, demanding futures on flexibility		Transmission System Operator (TS_O)	Data Exchange Platform	Info1-Flexibility Need	
1.5		Forward the national and local requirements			Data Exchange Platform	Flexibility Platform	Info1-Flexibility Need	
1.6		Register flexibility needs	National and local requirements to register: - Amount of firm electricity supply required - Amount of intermittent electricity supply required - Amount of fast (seconds response rate) flexibility product required - Amount of slow (minutes response		Flexibility Platform			

			rate) flexibility product required					

5. 1.4. Signal to the market with appropriate mechanisms the national and local requirements

Business section: TSO Predicting Flexibility Availability for Investment Planning /Signal to the market with appropriate mechanisms the national and local requirements
Examples of a national signal: flexibility market, demanding futures on flexibility
Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Need	National and local requirements	

6. 1.5. Forward the national and local requirements

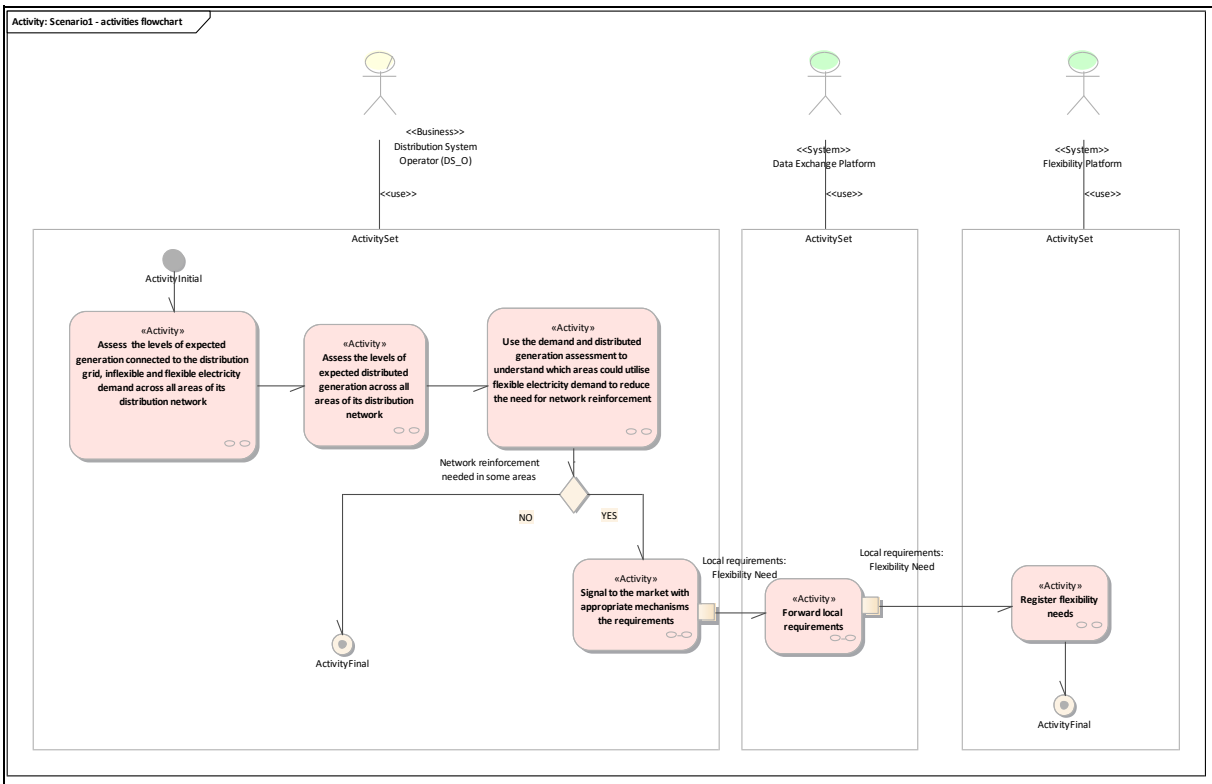
Business section: TSO Predicting Flexibility Availability for Investment Planning /Forward the national and local requirements

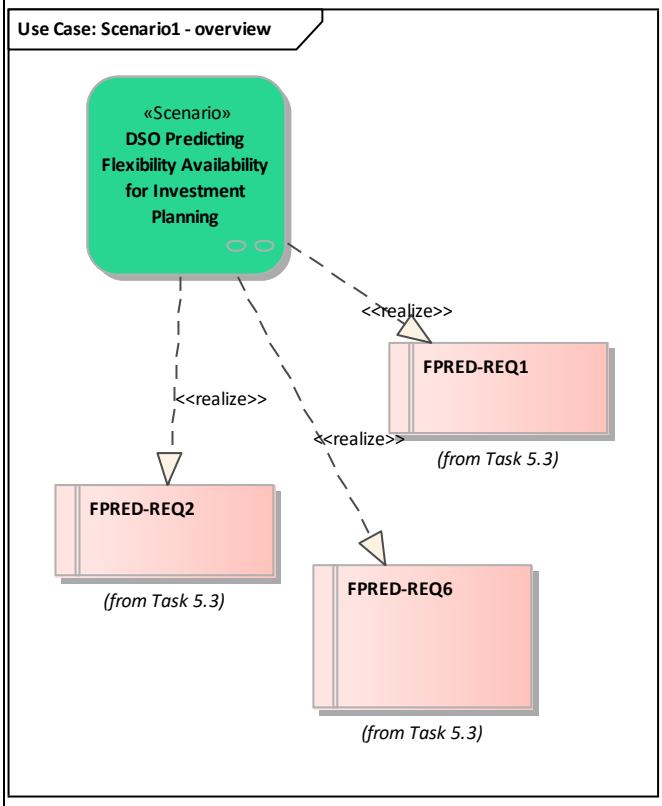
Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Need	National and local requirements	

- **DSO Predicting Flexibility Availability for Investment Planning**

Requirement list (refer to "Requirement" section for more information)	
Requirement R-ID	*Requirement name*
Cat1.Req1	FPRED-REQ1
Cat1.Req3	FPRED-REQ6
Cat1.Req2	FPRED-REQ2





Scenario step by step analysis

Scenario

Scenario name		DSO Predicting Flexibility Availability for Investment Planning						
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		Assess the levels of expected generation connected to the distribution grid, inflexible and flexible electricity demand across all areas of its distribution network	Assessment on distribution network. Example for inflexible electricity demand: lights. Example for flexible electricity demand: electric vehicle charging. Examples of areas of distribution network: street, town, region.		Distribution System Operator (DS_O)			
2.2		Assess the levels of expected distributed generation across all areas of its distribution network	Assessment on distribution network. Example for expected distributed generation: solar. Examples of areas of distribution network: street, town, region.		Distribution System Operator (DS_O)			
2.3		Use the demand and distributed generation assessment to understand which areas could utilise flexible electricity demand to reduce the need for network reinforcement	Example for flexible electricity demand: electric vehicle charging		Distribution System Operator (DS_O)			
2.4		Signal to the market with appropriate mechanisms the requirements	Example for signal: DSO flexibility calls for tenders		Distribution System Operator (DS_O)	Data Exchange Platform	Info1- Flexibility Need	
2.5		Forward local requirements			Data Exchange Platform	Flexibility Platform	Info1- Flexibility Need	
2.6		Register flexibility needs	Requirements to register for network reinforcement: - Amount of reinforcement required that		Flexibility Platform			

			cannot be addressed with flexibility - Amount of fast (seconds response rate) flexibility product required - Amount of slow (minutes response rate) flexibility product required					

- 2.4. Signal to the market with appropriate mechanisms the requirements

Business section: DSO Predicting Flexibility Availability for Investment Planning /Signal to the market with appropriate mechanisms the requirements
Example for signal: DSO flexibility calls for tenders
Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Need	Local requirements	

- 2.5. Forward local requirements

Business section: DSO Predicting Flexibility Availability for Investment Planning /Forward local requirements

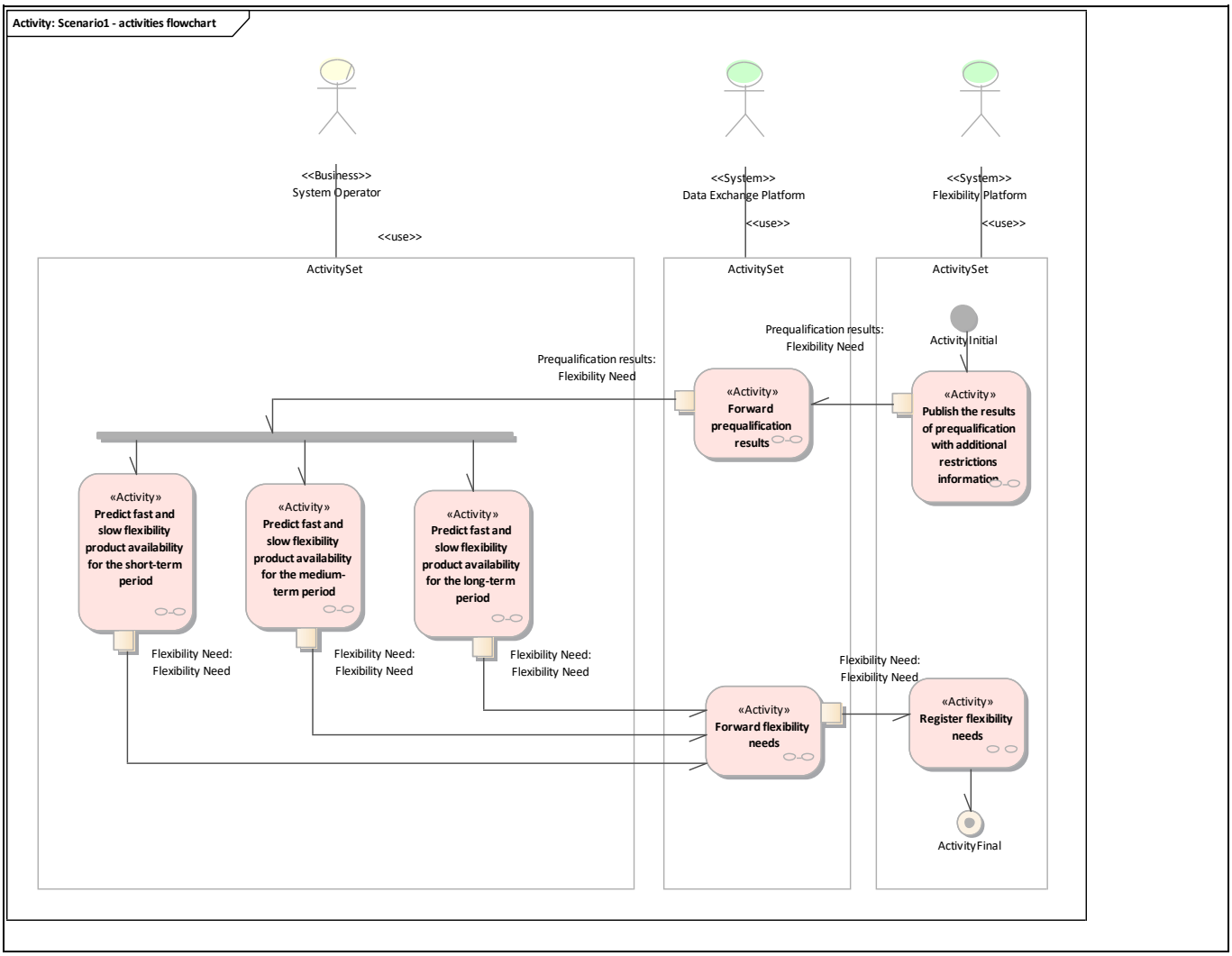
Information sent:

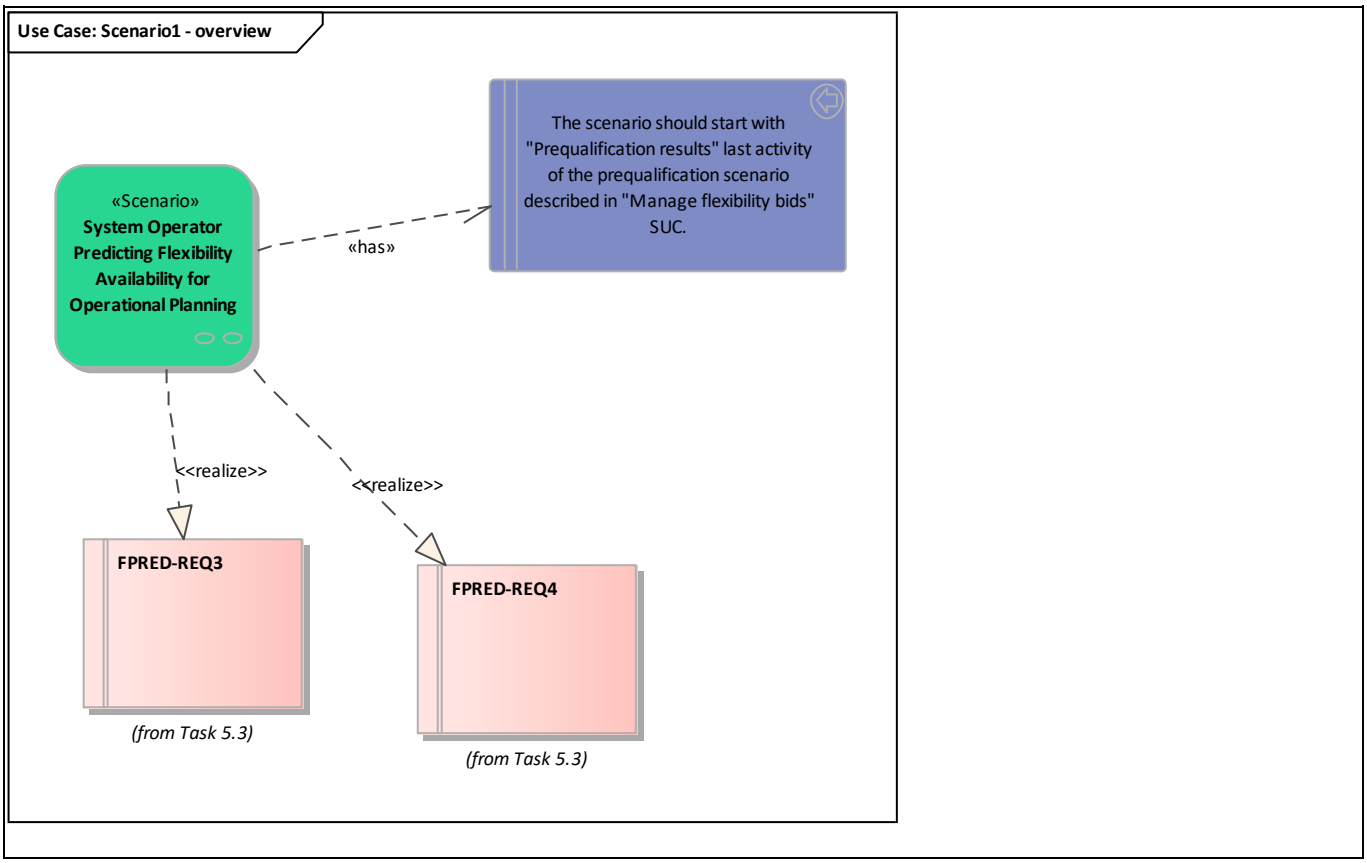
Business object	*Instance name*	*Instance description*
Flexibility Need	Local requirements	

- **System Operator Predicting Flexibility Availability for Operational Planning**

The System Operator can be a TSO or a DSO.

Requirement list (refer to "Requirement" section for more information)	
Requirement R-ID	*Requirement name*
Cat1.Req4	FPRED-REQ3
Cat1.Req5	FPRED-REQ4


Activity: Scenario1 - activities flowchart
<<Business>>
System Operator
<<System>>
Data Exchange Platform
<<System>>
Flexibility Platform
<<use>>
<<use>>
<<use>>
ActivitySet
ActivitySet
ActivitySet
ActivityInitial
Prequalification results:
Flexibility Need
Prequalification results:
Flexibility Need
«Activity»
Forward prequalification results
«Activity»
Publish the results of prequalification with additional restrictions information
«Activity»
Predict fast and slow flexibility product availability for the short-term period
«Activity»
Predict fast and slow flexibility product availability for the medium-term period
«Activity»
Predict fast and slow flexibility product availability for the long-term period
Flexibility Need:
Flexibility Need
Flexibility Need:
Flexibility Need
Flexibility Need:
Flexibility Need
Flexibility Need:
Flexibility Need
«Activity»
Forward flexibility needs
«Activity»
Register flexibility needs
ActivityFinal



Scenario step by step analysis

Scenario								
Scenario name	System Operator Predicting Flexibility Availability for Operational Planning							
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		Publish the results of prequalification with additional restrictions information			Flexibility Platform	Data Exchange Platform	Info1-Flexibility Need	
3.2		Forward prequalification results			Data Exchange Platform	System Operator, System Operator, System Operator	Info1-Flexibility Need	
3.3		Register flexibility needs			Flexibility Platform			
3.4		Predict fast and slow flexibility product availability for the short-term period	Based on the flexibility energy that has been awarded to providers. The flexibility energy is adjusted using		System Operator	Data Exchange Platform	Info1-Flexibility Need	

			forecasting models of actual delivery by the providers and historical data					
3.5		Predict fast and slow flexibility product availability for the medium-term period	Based on the flexibility capacity that has been awarded.		System Operator	Data Exchange Platform	Info1-Flexibility Need	
3.6		Predict fast and slow flexibility product availability for the long-term period	Based on the flexibility capacity that has been already awarded and still to be awarded based on their acquisition mechanisms (e.g. capacity market)		System Operator	Data Exchange Platform	Info1-Flexibility Need	
3.7		Forward flexibility needs			Data Exchange Platform	Flexibility Platform	Info1-Flexibility Need	

- 3.1. Publish the results of prequalification with additional restrictions information

Business section: System Operator Predicting Flexibility Availability for Operational Planning /Publish the results of prequalification with additional restrictions information

Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Need	Prequalification results	

- 3.2. Forward prequalification results

Business section: System Operator Predicting Flexibility Availability for Operational Planning /Forward prequalification results

Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Need	Prequalification results	

- 3.4. Predict fast and slow flexibility product availability for the short-term period

Business section: System Operator Predicting Flexibility Availability for Operational Planning /Predict fast and slow flexibility product availability for the short-term period
Based on the flexibility energy that has been awarded to providers. The flexibility energy is adjusted using forecasting models of actual delivery by the providers and historical data
Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Need	Flexibility Need	

- 3.5. Predict fast and slow flexibility product availability for the medium-term period

Business section: System Operator Predicting Flexibility Availability for Operational Planning /Predict fast and slow flexibility product availability for the medium-term period
Based on the flexibility capacity that has been awarded.
Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Need	Flexibility Need	

- 3.6. Predict fast and slow flexibility product availability for the long-term period

Business section: System Operator Predicting Flexibility Availability for Operational Planning /Predict fast and slow flexibility product availability for the long-term period
Based on the flexibility capacity that has been already awarded and still to be awarded based on their acquisition mechanisms (e.g. capacity market)
Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Need	Flexibility Need	

- 3.7. Forward flexibility needs

Business section: System Operator Predicting Flexibility Availability for Operational Planning /Forward flexibility needs

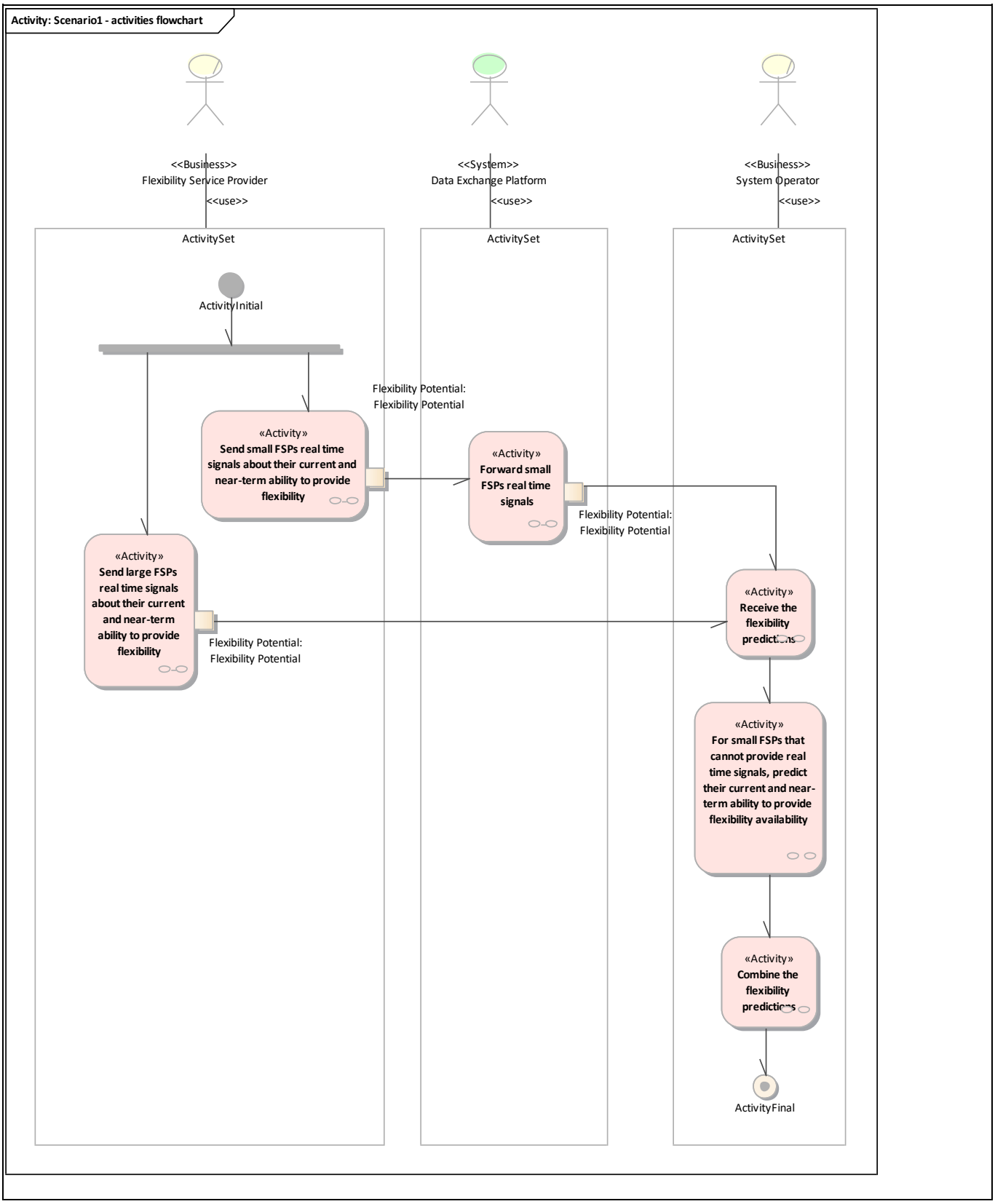
Information sent:

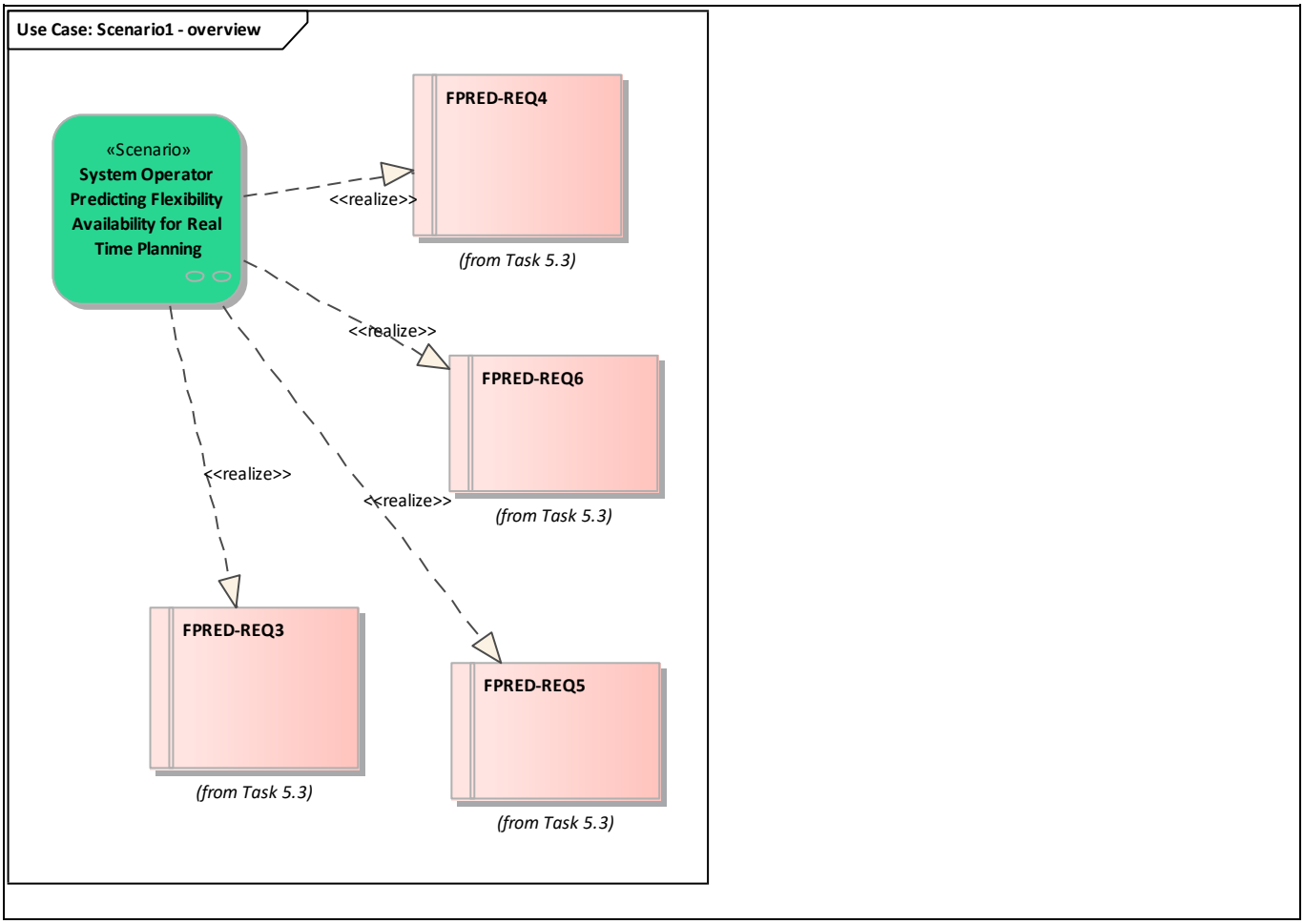
Business object	*Instance name*	*Instance description*
Flexibility Need	Flexibility Need	

- **System Operator Predicting Flexibility Availability for Real Time Planning**

The System Operator can be a TSO (imbalance) or a DSO (congestions).

Requirement list (refer to "Requirement" section for more information)	
Requirement R-ID	*Requirement name*
Cat1.Req5	FPRED-REQ4
Cat1.Req3	FPRED-REQ6
Cat1.Req4	FPRED-REQ3
Cat1.Req6	FPRED-REQ5


Activity: Scenario1 - activities flowchart
<<Business>>
Flexibility Service Provider
<<use>>
<<System>>
Data Exchange Platform
<<use>>
<<Business>>
System Operator
<<use>>
ActivitySet
ActivitySet
ActivitySet
ActivityInitial
Flexibility Potential:
Flexibility Potential
«Activity»
Send small FSPs real time signals about their current and near-term ability to provide flexibility
«Activity»
Forward small FSPs real time signals
Flexibility Potential:
Flexibility Potential
«Activity»
Send large FSPs real time signals about their current and near-term ability to provide flexibility
Flexibility Potential:
Flexibility Potential
«Activity»
Receive the flexibility predictions
«Activity»
For small FSPs that cannot provide real time signals, predict their current and near-term ability to provide flexibility availability
«Activity»
Combine the flexibility predictions
ActivityFinal



Scenario step by step analysis

Scenario								
Scenario name	System Operator Predicting Flexibility Availability for Real Time Planning							
Step No	**Event**	**Name of process/activity**	**Description of process/activity**	**Service**	**Information producer (actor)**	**Information receiver (actor)**	**Information exchanged (IDs)**	**Requirement, R-IDs**
4.1		Send large FSPs real time signals about their current and near-term ability to provide flexibility	For large producers (FSPs): some data are already exchanged in real time between large producer's SCADA and network operator's SCADA.		Flexibility Service Provider	System Operator	Info2-Flexibility Potential	
4.2		Send small FSPs real time signals about their current and near-term ability to provide flexibility	For FSPs who do not have a SCADA to exchange data directly with Network Operators. We will consider that data exchanges between small FSPs and system/network		Flexibility Service Provider	Data Exchange Platform	Info2-Flexibility Potential	

			operators will be done in real time via Data Exchange Platforms.					
4.3		Forward small FSPs real time signals			Data Exchange Platform	System Operator	Info2-Flexibility Potential	
4.4		Receive the flexibility predictions			System Operator			
4.5		For small FSPs that cannot provide real time signals, predict their current and near-term ability to provide flexibility availability	For FSPs that cannot offer real time signals. Flexibility availability is based on historical information and prediction parameters (e.g. weather).		System Operator			
4.6		Combine the flexibility predictions	Done to understand availability over the day for both slow and fast flexibility products.		System Operator			

- 4.1. Send large FSPs real time signals about their current and near-term ability to provide flexibility

Business section: System Operator Predicting Flexibility Availability for Real Time Planning/Send large FSPs real time signals about their current and near-term ability to provide flexibility
For large producers (FSPs): some data are already exchanged in real time between large producer's SCADA and network operator's SCADA.
Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Potential	Flexibility Potential	

- 4.2. Send small FSPs real time signals about their current and near-term ability to provide flexibility

Business section: System Operator Predicting Flexibility Availability for Real Time Planning/Send small FSPs real time signals about their current and near-term ability to provide flexibility
For FSPs who do not have a SCADA to exchange data directly with Network Operators. We will consider that data exchanges between small FSPs and system/network operators will be done in real time via Data Exchange Platforms.
Information sent:

Business object	*Instance name*	*Instance description*
Flexibility Potential	Flexibility Potential	

- 4.3. Forward small FSPs real time signals

Business section: System Operator Predicting Flexibility Availability for Real Time Planning/Forward small FSPs real time signals

Information sent:

Business object	***Instance name***	***Instance description***
Flexibility Potential	Flexibility Potential	

5. Information exchanged

Information exchanged			
Information exchanged, ID	***Name of information***	***Description of information exchanged***	***Requirement, R-IDs***
Info1	Flexibility Need		
Info2	Flexibility Potential		

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	FPRED-REQ1	Collection of data for prediction (long term - years)
Req2	FPRED-REQ2	Computation of predictions (long term - years)
Req3	FPRED-REQ6	Computation of predictions (long term - intraday operation)
Req4	FPRED-REQ3	Collection of data for prediction (medium-term - days to years ahead)
Req5	FPRED-REQ4	Computation of predictions (medium-term - days to years ahead)
Req6	FPRED-REQ5	Collection of data for prediction (short term - intraday operation)

7. Common terms and definitions

8. Custom information (optional)