Monthly Validation of works programs

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

1.1. Name of use case

Use case identification		
ID	***Area(s)/Domain(s)/Zone(s)***	***Name of use case***
	Transmission System, Distribution System, Operational planning, Long-term planning, Energy Markets, Users	Monthly Validation of works programs

1.2. Version management

Version management				
Version No.	***Date***	***Name of author(s)***	***Changes***	***Approval status***
1	2018-08-30	Hugo Morais, Belen Goncer & Jérôme Cantenot		Approved Version

1.3. Scope and objectives of use case

Scope and objectives of use case	
Scope	Works impacting the distribution network operation, namely: - In transmission network - In SGU - in primary substations (Border between TSO/DSO) - In distribution network
Objective(s)	Anticipate new constraints impacting the annual works schedule avoiding problems near-by real-time Maximise renewable energies production
Related business case(s)	

1.4. Narrative of Use Case

Narrative of use case
Short description
This SUC describes the process to validate the pertinence of the established works programs defined in the SUC 'Definition of annual optimal scheduling of works with impact in observability area'. The validation is performed based in the updated consumption and generation forecast and in the operation conditions of the network. The works should be scheduled at a day precision.
Complete description
The works planning in transmission and distribution network should be articulated between the TSO and DSO, if the works affect the power flows, in normal operation or contingency, either the distribution or the transmission network. The works planned in the SGU connected both in transmission and distribution networks should also be planned by the relevant system operator, taking into account the periods with less generation forecast and/or the periods with less consumption. The works programs should include the maintenance works but also the network evolution network.

In the present use case, it is considered that the list of the works to be executed is already defined. In "x" month ahead, the TSO and SGU, should provide more detailed information concerning the relevant works activities. The number of months before the works can be different in each country or a regular exchange of information can be agreed between the actors. In the end of this scenario, the works should be schedule at a day level.

1.5. Key performance indicators (KPI)

Key performance indicators			
ID	***Name***	***Description***	***Reference to mentioned use case objectives***
1	Reduction of the unavailability of the network		Anticipate new constraints impacting the annual works schedule avoiding problems near-by real-time
2	Increase DER production		Maximise renewable energies production

1.6. Use case conditions

Use case conditions	
Assumptions	
1	The annual planning of works should be validated
2	Forecasted consumption and generation profiles information available
Prerequisites	

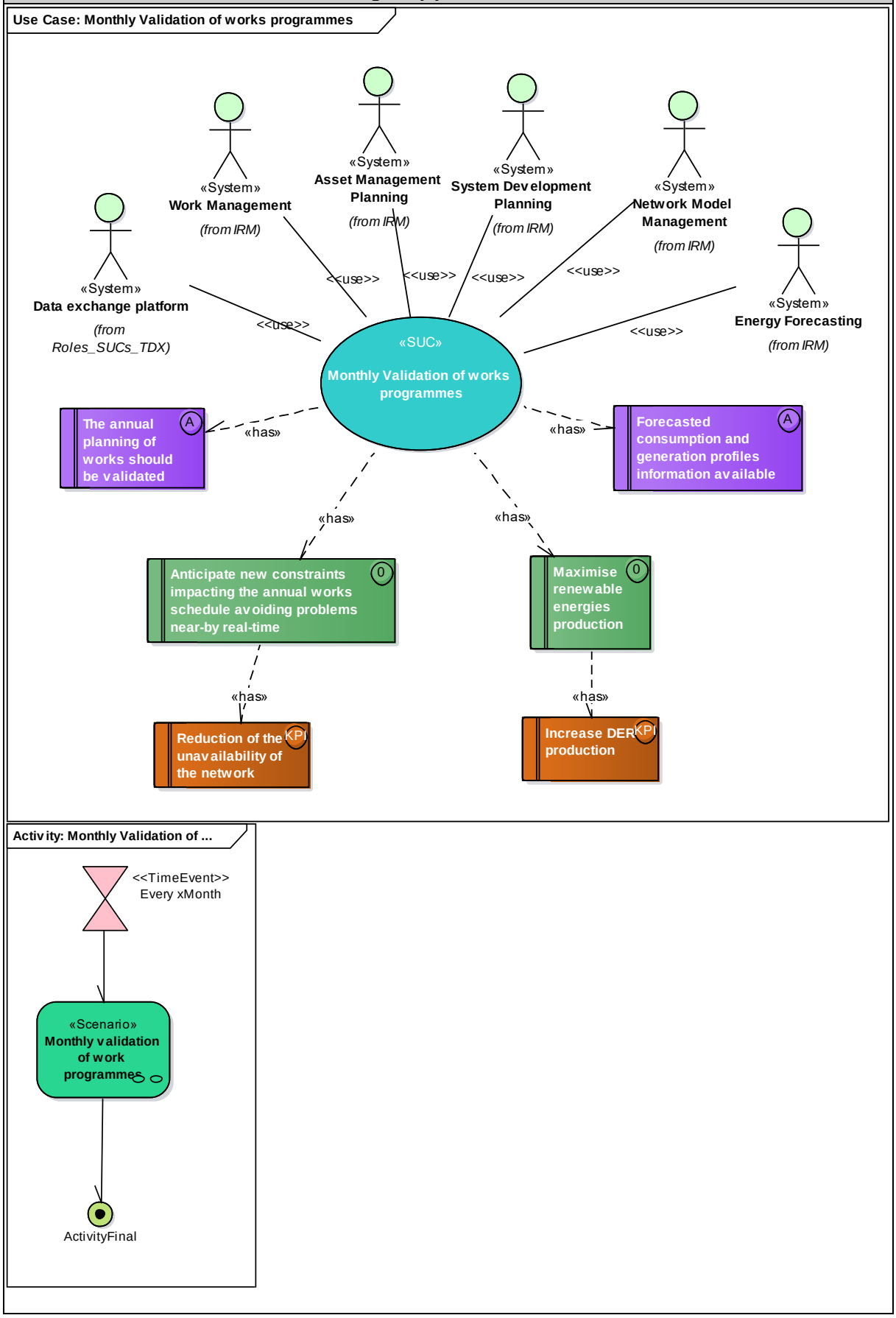
1.7. Further information to the use case for classification/mapping

Classification information
Relation to other use cases
<<BUC>> Optimise work programs (TSO, Producers, and DSO works) <<SUC>> Definition of annual optimal scheduling of works with impact in observability area <<SUC>> Validation of works programs in operational planning <<SUC>> Information exchange using a collaborative platform
Level of depth
Prioritisation
High
Generic, regional or national relation
Generic
Nature of the use case
SUC
Further keywords for classification
Works Programs, Operational planning

1.8. General remarks

2. Diagrams of use case

Diagram(s) of use case



3. Technical details

3.1. Actors

Actors			
Grouping (e.g. domains, zones)		***Group description***	
Actor name	***Actor type***	***Actor description***	***Further information specific to this use case***
Network Model Management	System	The Network Model Management (NMM) manages information for establishing and maintenance of the functional description of the network grid that is provided by current installed asset (as-built model), planned installed asset (future model) or potential installation (what-if/ hypothetical model). The focus is to provide a mathematical model of the network grid that can be used in different analysis of the grid, including but not limited to steady state power flow, state estimation, contingency analysis as part of security assessment and stability analysis. It maintains master representations of the power system for network analysis functions, so that all analysis shares the same source information. Network Model Management (NMM) handles both internal enterprise element and cross entity both in the horizontal and vertical domain, e.g. TSOs-TSOs and TSOs-DSOs coordination.	
Work Management	System	The Work Management (WM) business function involves the tracking of field service orders through request, schedule, dispatch, execution and completion. The focus is on efficient use of available resources to meet work requirement in regard to time and quality.	
Energy Forecasting	System	The Energy Forecasting business (EF) function involves the forecasting of one or more of the items consumption (load), production (primarily intermittent or price inelastic production), direct current and area inter-exchange. This also include energy forecast for intermittent or price inelastic production that is part of Distributed Energy Resources (DER).	
Data exchange platform	System	Platform used by several entities to exchange information for different proposes. The 3 types of data (Real-time; scheduled and structural data) can be exchanged in this platform. The operational/control data are not included in the real-time type. The exchange of information related with markets is included in the scheduled data. The data-agnostic ICT infrastructure enables a secure and reliable information exchange for different purposes and within different time scales.	
Asset Management Planning	System	The Asset Management Planning (AMP) business function involves the specification of the activities, resources and timescales required for an individual asset, or a grouping of assets, to achieve the organization's asset management objectives. Reliability trends and the evaluation of corrective actions needs to be performed. The grouping of assets may be by asset type, asset class, asset system or asset portfolio.	

		An asset management plan is derived from the strategic asset management plan.	
System Development Planning	System	The System Development Planning (SDP) business function involves network development and long term planning. The business function support cooperation and coordination to develop of a secure, environmentally sustainable and economic network system aimed at an adequate grid for the purpose of a well-functioning network operation and market operation. This is done through good planning with focus on future infrastructure characteristics, efficient asset management, critical infrastructure protection and system operability perspective.	

3.2. References

4. Step by step analysis of use case

4.1. Overview of scenarios

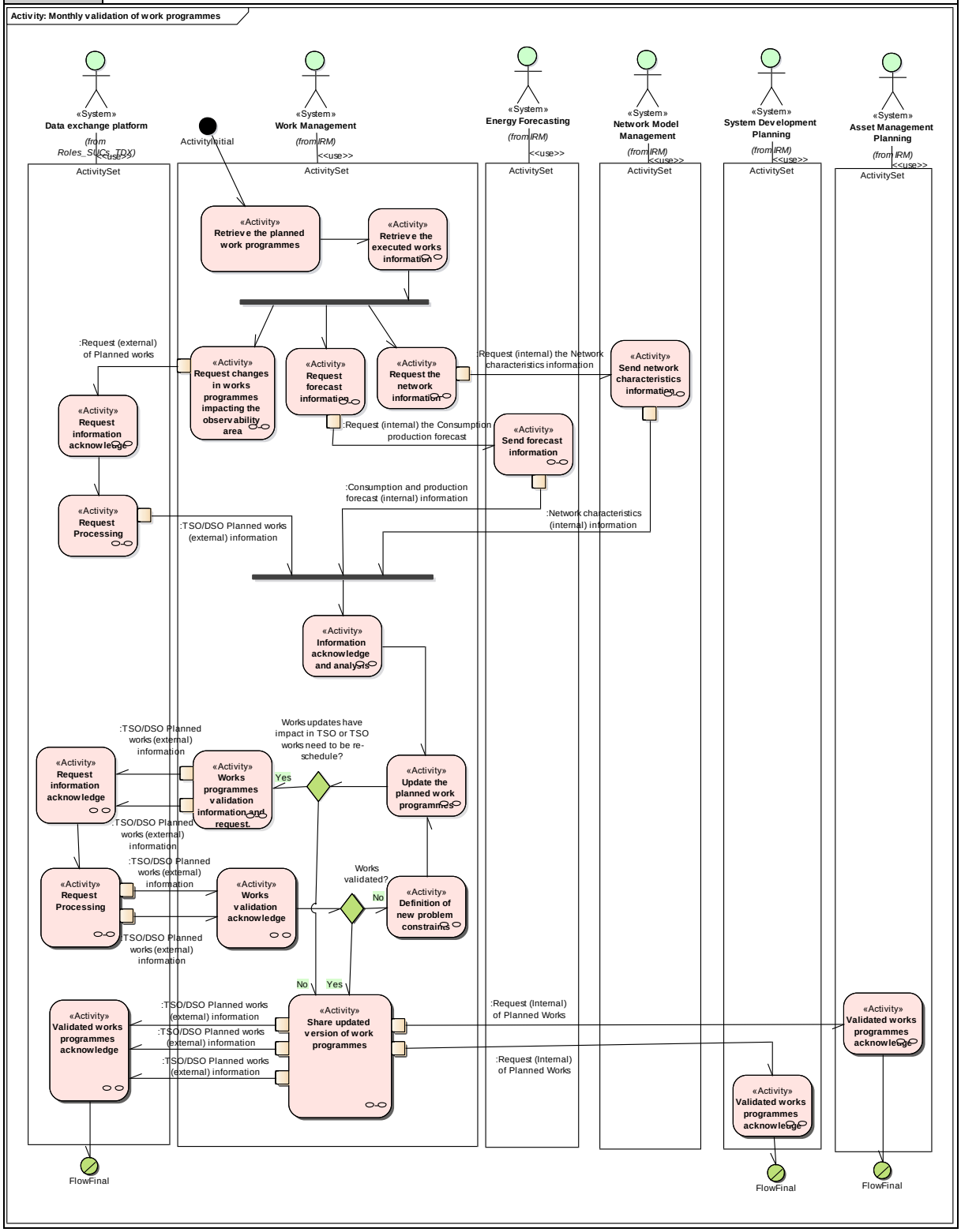
Scenario conditions						
No.	***Scenario name***	***Scenario description***	***Primary actor***	***Triggering event***	***Pre-condition***	***Post-condition***
1	Monthly validation of work programs			Every xMonth: The time can be different in each country		

4.2. Steps - Scenarios

4.2.1. Monthly validation of work programs

Scenario step by step analysis

Scenario	
Scenario name	Monthly validation of work programs



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		Retrieve the planned work programs	The system should re-validate the planned works. These works should be saved in a specific data-base.		Work Management			
1.2		Retrieve the executed works information	The entities responsible for the works should update the information concerning the works evolution. If new constraints exists, this information should also be included in the same data base.		Work Management			
1.3		Request changes in works programs impacting the observability area	The DSO should validate with the TSO if the planned works have some updates. At least, the TSO should include more details in the planned works.		Work Management	Data exchange platform	Info1-Request (external) of Planned works	
1.4		Request information acknowledge			Data exchange platform			
1.5		Request Processing	The data information exchange platform should send the request to the concerned actors (TSOs). When the information from the SOs was available, the data exchange platform should send it to the DSO. The TSO should detail the planned works (exact day to start) and provide information of		Data exchange platform	Work Management	Info2-TSO/DSO Planned works (external) information	

			new constraints (assets unavailability in observability area, apparent power limitation in TSO/DSO interface, reactive power setpoints) impacting the planned works in the observability area. The process is described in the SUC 'Information exchange using a collaborative platform' in the scenario 'Works Programs information exchange'.					
1.6		Request the network information			Work Management	Network Model Management	Info3-Request (internal) the Network characteristics information	
1.7		Send network characteristics information			Network Model Management	Work Management	Info4-Network characteristics (internal) information	
1.8		Request forecast information	The production and consumption forecast is needed to execute the method. The values should be provided until the end of the year. Some quantiles can be provided if stochastic methods are used.		Work Management	Energy Forecasting	Info5-Request (internal) the Consumption and production forecast	
1.9		Send forecast information			Energy Forecasting	Work Management	Info6-Consumption and production forecast (internal) information	

1.10		Information acknowledge and analysis	The system should evaluate if some changes introduced by the TSO have impact in the planned works and if the changes in the forecasts have impact in the mentioned plans.		Work Management			
1.11		Update the planned work programs	In this process the DSO should define with precision the works in the distribution system. The time of the works and the sequence of the operation of each equipment should be defined in this process. The possible network constraints should be evaluated and the planned works can be re-scheduled. If some major updates have been proposed by the TSO, the DSO should also re-validate these works.		Work Management			
1.12		Works programs validation information and request.	The DSO should validate with the TSO if the planned works have some updates. If necessary, the DSO can request some changes in the works planned by the TSO.		Work Management	Data exchange platform	Info2-TSO/DSO Planned works (external) information, Info2-TSO/DSO Planned works (external) information	
1.13		Request information acknowledge			Data exchange platform			

1.14		Request Processing	The data information exchange platform should send the request to the concerned actors (TSOs). When the information from the SOs was available, the data exchange platform should send it to the DSO. The TSO should change the planned works, if necessary, and check the feasibility of the works proposed by the DSO impacting the observability area. The process is described in the SUC 'Information exchange using a collaborative platform' in the scenario 'Works Programs information exchange'.		Data exchange platform	Work Management	Info2-TSO/DSO Planned works (external) information, Info2-TSO/DSO Planned works (external) information	
1.15		Works validation acknowledge			Work Management			
1.16		Definition of new problem constraints	If the works are not feasible, some time constraints and TSO/DSO communication should be considered.		Work Management			
1.17		Share updated version of work programs	The new schedule of the works, with daily or hourly detail, should be shared between the TSO and DSO. If the works have impact in SGU operation or in SGU works		Work Management	Data exchange platform	Info2-TSO/DSO Planned works (external) information, Info2-TSO/DSO Planned works	

			already scheduled, the SGU should also be informed about the new schedule of works (only the ones with impact in each SGU).				(external) information	
1.18		Share updated version of work programs	The new schedule of the works, with daily or hourly detail, should be shared between the TSO and DSO. If the works have impact in SGU operation or in SGU works already scheduled, the SGU should also be informed about the new schedule of works (only the ones with impact in each SGU).		Work Management	Asset Management Planning	Info7-Request (Internal) of Planned Works	
1.19		Share updated version of work programs	The new schedule of the works, with daily or hourly detail, should be shared between the TSO and DSO. If the works have impact in SGU operation or in SGU works already scheduled, the SGU should also be informed about the new schedule of works (only the ones with impact in each SGU).		Work Management	System Development Planning	Info7-Request (Internal) of Planned Works	
1.20		Share updated version of work programs	The new schedule of the works, with daily or hourly detail, should be shared between the TSO and DSO. If the works have impact in SGU operation or in SGU works		Work Management	Data exchange platform	Info2-TSO/DSO Planned works (external) information	

			already scheduled, the SGU should also be informed about the new schedule of works (only the ones with impact in each SGU).					
1.21		Validated works programs acknowledge			Data exchange platform			
1.22		Validated works programs acknowledge			System Development Planning			
1.23		Validated works programs acknowledge			Asset Management Planning			

5. Information exchanged

Information exchanged			
Information exchanged, ID	***Name of information***	***Description of information exchanged***	***Requirement, R-IDs***
Info1	Request (external) of Planned works	Request of planned works with impact in the distribution system. The request can be done in a specific observability area (for other SOs) or in a specific node (for SGU). Request ID Observability area ID Bus ID Year	
Info2	TSO/DSO Planned works (external) information	For each work planned by the TSO or by the DSO: - Request ID - Iteration / Related Request - Status [in Validation / Not validated / Validated] - Observability area - Work ID - Work Type* - Work description - Priority - Start week (Option 1)*** - Start week (Option 2)*** - Duration For an unavailability in the observability area: - Asset ID For a limitation: - Region ID** - Bus ID	

		- Apparent Power limit (TSO->DSO) - Apparent Power limit (DSO->TSO) - Reactive Power setpoint Works constraints: - Periods not allowed**** - Justification Work Type* - The identification of the type of works should be the same for the TSO and DSO. Region ID**-Some works can impose some limits in a region (group of substations). Start week*** - In same cases only one option can be provided depending of TSO/DSO agreements. Periods not allowed**** - If a SO does not validate the work, a time constraint should be included in the information exchange. It is recommended to include a small justification.	
Info3	Request (internal) the Network characteristics information	The structural information of the network characteristics are required to the computation process. This information is exchanged between different systems roles in the SOs. A structural network information request consists of: Internal Request ID Type of request Substation (All the information in downstream of substation) Transformer (All the information in downstream of transformer) Feeder (All the information in downstream of feeder)	
Info4	Network characteristics (internal) information	The structural information of the network characteristics are required to the computation process. This information is exchanged between different systems roles in the SOs. Structural network information request: Internal Request ID Substation Power Transformer Resistance Reactance Feeder Line Resistance Reactance Capacitance	
Info5	Request (internal) the Consumption and production forecast	Consumption and generation forecast (scheduled information) request. Internal Request ID Type of Request Substation Transformer	

		Feeder Start Time (day; hour; minute) End Time (day; hour; minute) The time should be done in intervals of 15 minutes.	
Info6	Consumption and production forecast (internal) information	The consumption and generation forecast (scheduled information). Internal Request ID Type of Request Substation Quantile Pconso_Substation Pprod_Substation Qconso_Substation Qprod_Substation Transformer Quantile Pconso_Transformer Pprod_Transformer Qconso_Transformer Qprod_Transformer Feeder Quantile Pconso_Feeder Pprod_Feeder Qconso_Feeder Qprod_Feeder Start Time (day; hour; minute) End Time (day; hour; minute) The time should be done in intervals of 15 minutes. If necessary, several quantiles (the number of quantiles depends of the request and the process needs) can be included in the forecast. With this information, more advanced algorithms leading with uncertainties can be adopted.	
Info7	Request (Internal) of Planned Works	Request of planned works in the distribution system. Request ID Year	

6. Requirements (optional)

7. Common terms and definitions

8. Custom information (optional)