Validation of works programs in operational planning

Based on IEC 62559-2 edition 1
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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	Validation of works programmes in operational planning

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)	Maximise renewable energies production Anticipate new constraints impacting the annual works schedule avoiding problems in real-time operation
Related business case(s)	

1.4. Narrative of Use Case

Narrative of use case
Short description
This SUC should describe the process to define all the levers activation and the sequence of equipment operation to allow the works in the network minimizing the impact in the grid users.
Complete description
The works planning of assets within the observability areas of transmission and distribution network should be articulated between the TSO and DSO. The works planned in the SGU connected both in transmission and distribution networks should also be planned, taking into account the periods with less generation forecast and/or the periods with less consumption. The works programmes 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 and validated.

Day-ahead and intra-day works programming In day-ahead or intra-day, the TSO, DSO and SGU, within observability area, should confirm the scheduled works and the DSO or TSO should inform concerning the operations that will realize to enable the works. The SGU should be informed when the works have some impact in its activity. The DSO should validate the works taking into account the detailed planning of the TSO or DSO and the SGUs and the new forecasts of the consumption and generation. The DSO and TSO should also adjust the works in their networks, respectively. At this time, the works are validated by the operational planning system. At the same time, the operational planning system should pre-activate some levers and define the consumption and production profiles in each node in both the observability areas.

1.5. Key performance indicators (KPI)

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

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	An operational planning system should validate the works and schedule the activation of some levers

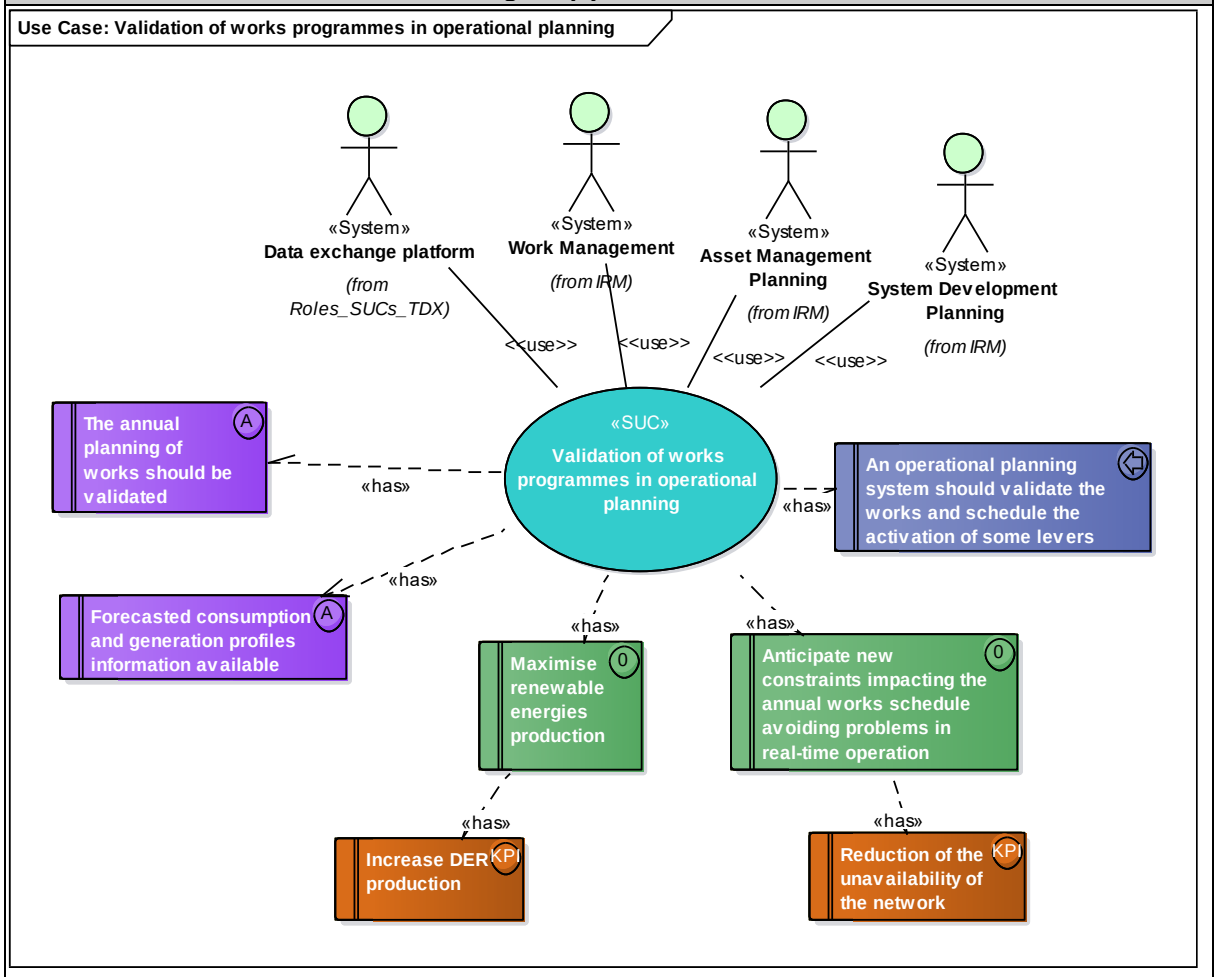
1.7. Further information to the use case for classification/mapping

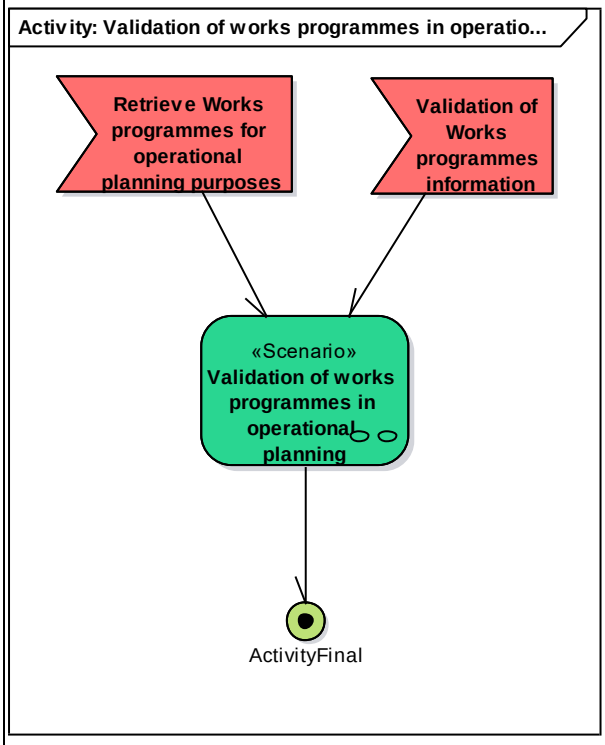
Classification information
Relation to other use cases
<<BUC>> Optimise work programmes (TSO, Producers, and DSO works) <<SUC>> Information exchange using a collaborative platform <<SUC>> Monthly Validation of works programmes <<SUC>> Disaggregated consumption and generation forecast for operational planning purposes
Level of depth
Prioritisation
High
Generic, regional or national relation
Generic
Nature of the use case
SUC
Further keywords for classification
Works Programmes, Operational Planning, Day-ahead, Intra-day

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***
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).	
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.	
Pre-Operation Planning	System	The Predictive Operation Planning (POP) business function involved in forecasting future operation situation with an acceptable level of reliability, the inclusion of what-if scenarios and risk assessment. This include the management of adequate that requires system operators and planners to take into account scheduled and reasonably expected unscheduled availability of equipment, while maintaining a constant balance between supply and demand.	
Data exchange platform	System	Platform used by several entities to exchange information for different proposes. The 3 type of data (Real-time; scheduled and structural data) can be exchanged in this platform. The operational/control data are not included in real-time type. The exchange of information related with the markets are included in the scheduled data. Data-agnostic ICT infrastructure that enables secured and reliable information exchange for different purposes and within different time scales.	

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.	
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.	

3.2. References

4. Step by step analysis of use case

4.1. Overview of scenarios

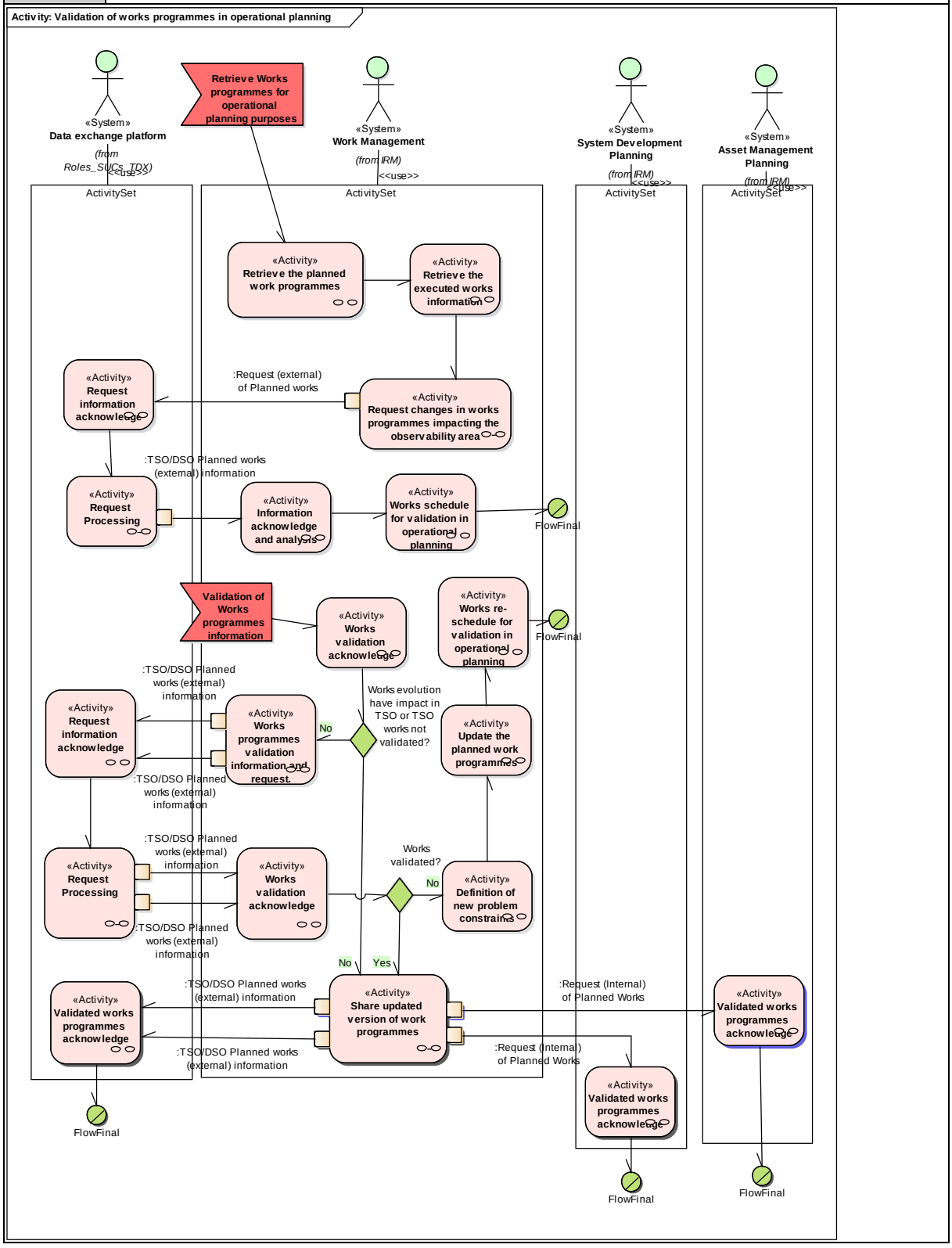
Scenario conditions						
No.	***Scenario name***	***Scenario description***	***Primary actor***	***Triggering event***	***Pre-condition***	***Post-condition***
1	Validation of works programmes in operational planning			Retrieve Works programmes for operational planning purposes Validation of Works programmes information		

4.2. Steps - Scenarios

4.2.1. Validation of works programmes in operational planning

Scenario step by step analysis

Scenario	
Scenario name	Validation of works programmes in 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
1.1		Retrieve the planned work programmes	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 programmes impacting the observability area	The DSO should validate with the TSO if the planned works have some updates.		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		Data exchange platform	Work Management	Info2-TSO/DSO Planned works (external) information	

			works (exact day to start) and provide information of 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 Programmes information exchange'.					
1.6		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 in the mentioned plans.		Work Management			
1.7		Works schedule for validation in operational planning	The updated information of internal and external works should be used in the operational planning process to estimate the consumption and productions profiles.		Work Management			

1.8		Works validation acknowledge	The information of the validation of works programmes should be provided in operational planning taking into account the forecast information the works evolution and the available levers.		Work Management			
1.9		Works programmes validation information and request.	The DSO should validate with the TSO if the planned works have some updates. The TSO should validate with the SO 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	
1.10		Request information acknowledge			Data exchange platform			
1.11		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		Data exchange platform	Work Management	Info2-TSO/DSO Planned works (external) information, Info2-TSO/DSO Planned works (external) information	

			works, if necessary, and validate 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 Programmes information exchange'.					
1.12		Works validation acknowledge			Work Manageme nt			
1.13		Definition of new problem constraints	If the works were not validated, some time constraints should be considered.		Work Manageme nt			
1.14		Update the planned work programmes	In this activity, the DSO should re-schedule the works in a very short-term taking into account the new constraints. In some cases, the works can be cancelled in short-term and re-defined in the medium-term works scheduling (SUC 'Monthly validation of work programmes'). The validation should be done by the operational planning		Work Manageme nt			

			process described in the SUC 'Disaggregated production and generation forecast for operational planning purposes'					
1.15		Works re-schedule for validation in operational planning			Work Management			
1.16		Share updated version of work programmes	The new schedule of the works, with daily or hourly detail, should be shared between the TSO and DSO. The information concerning the works with impact in SGUs operation should be also transmitted the concerned SGU.		Work Management	Data exchange platform	Info2-TSO/DSO Planned works (external) information, Info2-TSO/DSO Planned works (external) information	
1.17		Share updated version of work programmes	The new schedule of the works, with daily or hourly detail, should be shared between the TSO and DSO. The information concerning the works with impact in SGUs operation should be also transmitted the concerned SGU.		Work Management	Asset Management Planning	Info3-Request (Internal) of Planned Works	
1.18		Share updated version of work programmes	The new schedule of the works, with daily or hourly detail, should be shared between the TSO and DSO. The information concerning the		Work Management	System Development Planning	Info3-Request (Internal) of Planned Works	

			works with impact in SGUs operation should be also transmitted the concerned SGU.					
1.19		Validated works programmes acknowledge			Data exchange platform			
1.20		Validated works programmes acknowledge			System Development Planning			
1.21		Validated works programmes 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) 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)