**Digital Twin Structure:**

DT1 consists of three main engines:

1. Real-time Security Assessment Engine (RSAE) – Monitors network status and security in real-time.
2. Contingency Assessment Engine (CAE) – Evaluates potential critical events (e.g., N-1 contingencies).
3. **Security Management and Flexibility Activation Engine (SMFAE)** – Determines upward/downward regulations for network nodes, validates flexibility, and deploys corrective measures when needed.

The first two engines are developed. The focus now is on the **Security Management and Flexibility Activation Engine (SMFAE)**, which will also leverage outputs from the first two engines.

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| **Feature** | **Notes** |
| SMFAE\_1 “Locational flexibility margins for real-time operation” | The upward and downward regulations for each node will be determined, integrating real-time data flow from Synergies EDS to monitor network status. |
| SMFAE\_2 “Flexibility requirements for critical contingencies” | The locational flexibility reserve margins for all critical N-1 scenarios are computed and will be complete integration with data from the EDS. |
| SMFAE\_3 “Flexibility validation for real-time operation” | The engine identifies voltage violations, and overloads based on the available flexibility provided by EApp3 and market-cleared quantities. The definition and development of SMFAE\_3 has been modified from the roadmap presented in ID4.1 due to a restructuring of the flexibility flow following discussions with relevant DTs and EApps. |
| SMFAE\_4 “Alternative security control measures” | If security violations are detected, alternative countermeasures will be suggested for PV installations, requiring fast action within a 15-minute interval. The development of SMFAE\_4 has been adjusted in line with changes to SMFAE\_3, deviating from the original roadmap in ID4.1 due to restructuring of the flexibility flow after discussions with relevant DTs and EApps. |
| SMFAE\_5 “Actual activation checks and publish” | This engine verifies the actual activation of alternative measures, depending on whether they are accepted or not. The development of SMFAE\_5 was introduced as a result of recent changes to SMFAE\_3 and SMFAE\_4, following the restructuring of the flexibility flow after discussions with relevant DTs and EApps. |

You can also see below the flexibility framework diagram for reference to get a better idea for the interactions.

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AI-generated content may be incorrect.