7.11 Using CIM to produce a System Specification Document

7.11.1 Business requirements

The use case in Annex A describes how information described in SCL could be used to develop CIM based information models. The use case starts with requirements specification determined by a planning department e.g. following a request for a new connection or a review of assets or load growth. The annex describes the scenario where the requirements are defined in paper form.

This section describes the modelling requirements to allow CIM based systems to create a machine-readable system specification as shown in Figure 15.

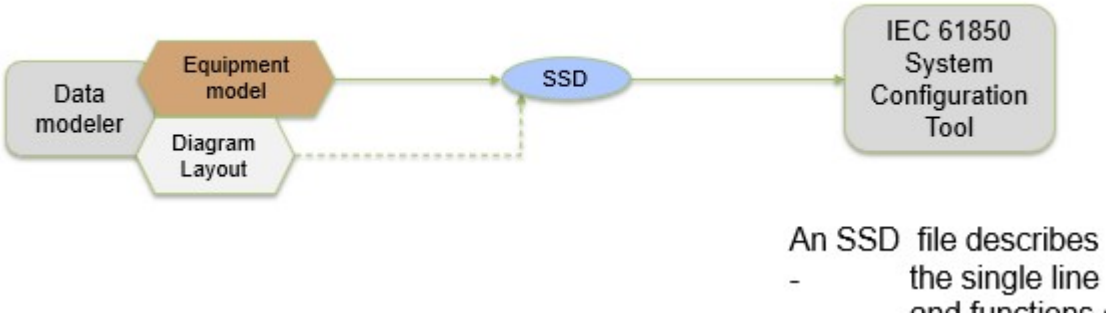

Figure 15 – CIM Profile(s) for System Specification Description

There are several scenarios where an existing CIM model is particularly useful as a starting point.

- Upgrade of an existing transmission substation with an IEC 61850 solution. This requires including the specification of the measurements for operation and/or asset management.
- Connection of local automation systems such as for controlling energy resources. This requires exchanging information between the CIM based studies and the facility detailed design. model.

7.11.2 Specification requirements

IEC 61850-6 states that a System Specification Description (SSD) file describes “the single line diagram and functions of the substation and the required logical nodes. It shall contain a substation description section and may contain the needed data type templates and logical node type definitions.”

In this context the “single line diagram” means the description of the electrical network, i.e., the structure, equipment and connectivity which is already modelled in the CIM.

may generated specification document with various levels of details. The minimum is to include the circuit breakers that are visible in the control centre.

Other detail may or may not be present:

- disconnectors and grounding switches,
- placement of VTs and CTs for measurements and protection,

- symbol placement and orientation for schematic diagrams.

If not defined in the CIM specification, then the automation and control designer must add what they need to complete the communications design.

7.11.3 Automation functions

The CIM models conducting equipment and some specific automation fcuntions such as on-load tap-changers. It does not have a generic way of modelling automation functions and generic automation equipment.

Some functions can be deduced from CIM classes, for example “Monitoring”, “Remote control”, “Automatic voltage control”, “Protection”, “Recloser”. Other local automation functions such as “Breaker failure monitoring” have no representation in the CIM.

7.11.4 Recommendation for harmonization: automation function models for CIM

IEC 61850 provides three concepts that could be added to the CIM models as shown in Figure 16.

- **AutomationScheme** is the high-level description of a set of automation functions. Instances of AutomationScheme may be organised in a hierarchy.
- **FunctionBlock** models low-level functions. They may be associated with instances of Equipment. A CIM FunctionBlock would correspond to one or a group of logical nodes in an IEC 61850 system.
- **AutomationEquipment** models the physical equipment implementing the function blocks. These may correspond to individual IEDs in an IEC 61850 system, or it may correspond to a gateway device that provides proxy information for the physical devices and logic controllers.

An automation scheme is a generalization of various types of scheme.

- Protection scheme
- Voltage control scheme
- DER coordinated control

Automation schemes use a combination of pre-defined functions and user defined function blocks. Pre-defined (built-in) functions could be defined by CIM classes with specific sub-types for example:

- Protection functions
- Regulating control functions
- Logic functions
- Grid interface functions

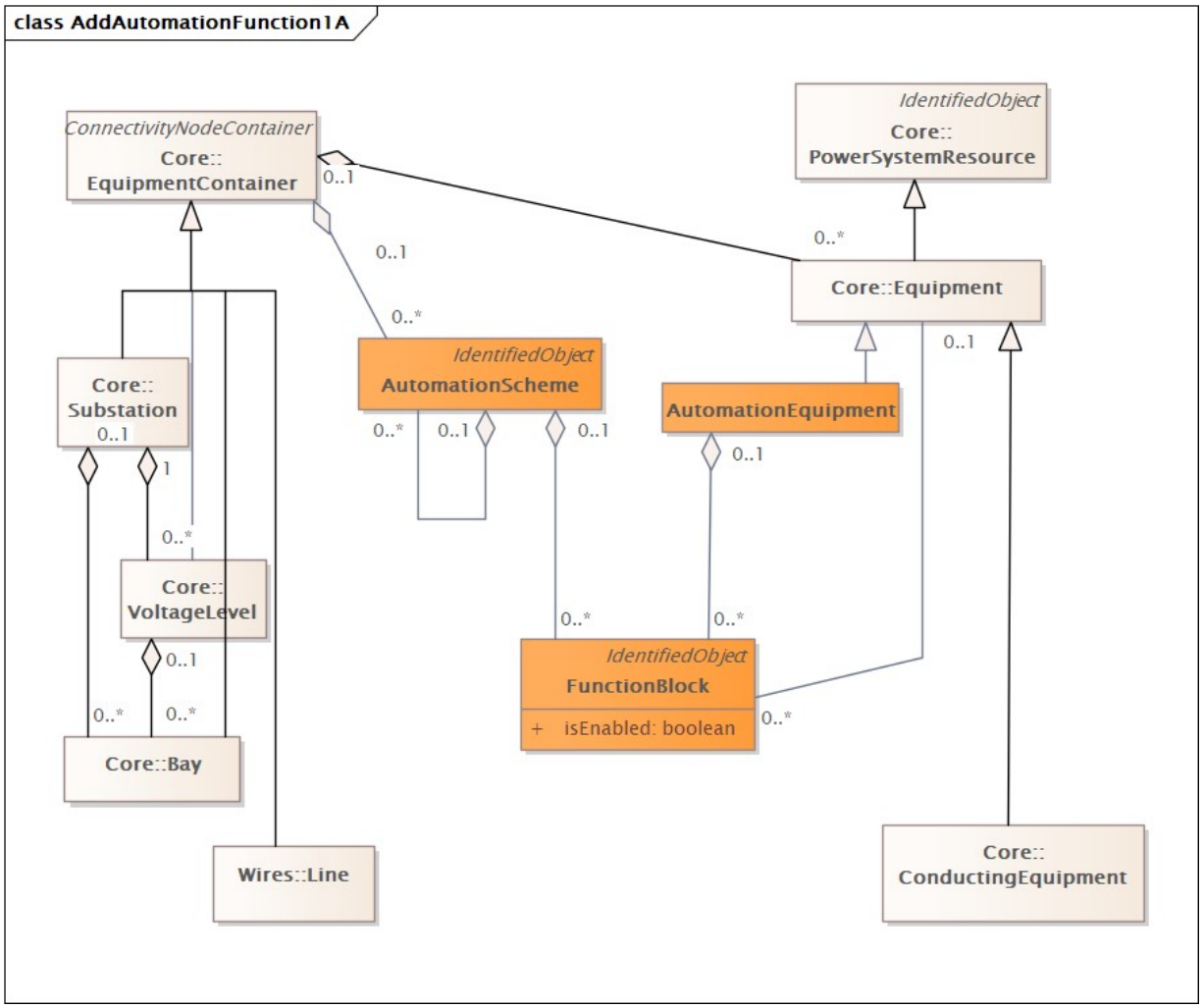

Figure 16 – Automation functions