bSI UML Model Report

UML Model Report for Systems taxonomy and IFC mapping

Project/Publisher: IFC Tunnel Project

Work Package: IFC Tunnel – WP3 – Schema Extension

Date: 20/10/2022

Version: **V11** – FINAL

Document Information

Document ID	Title	Created By	Created
IR-TUN-WP3-SYS	bSI UML Model Report – IFC Tunnel – SYS	LW	2022-10-20

Revision History

Version	Status	Date	Notes
V01	DRAFT	2021-12-20	First draft
V02	DRAFT	2022-02-28	Second draft - model updates
V10	FINAL	2022-06-28	Final version (Pset and Qto definitions excluded)
V11	FINAL	2022-10-20	Final version including changes after work with the IFC specification

Author List

IFC Tunnel

Contents

1 Introduction

The IFC Tunnel project extends the IFC data model into the domain of tunnels by describing the semantics and geometry for tunnels. The conceptual model documentation for IFC Tunnel is divided in these parts:

- IR-TUN_ConceptualModelReport - Excavation, support and lining_v1.1. Describes the domain taxonomy concepts specified within the excavation, support and lining domain and their mapping to existing, modified or proposed entities, predefined types or property sets in the IFC specification
- IR-TUN_ConceptualModelReport - Geotechnics_v1.1. Describes the domain taxonomy concepts in the geological and geotechnical domain and their mapping to existing, modified or proposed entities, predefined types or property sets in the IFC specification
- **IR-TUN_ConceptualModelReport - Systems_v1.1 (this document)**. Describes the domain taxonomy concepts in the systems domain and their mapping to existing, modified or proposed entities, predefined types or property sets in the IFC specification
- IR-TUN_ConceptualModelReport – IFC Extension_v1.1. Describes the proposed extensions to the IFC schema based on the requirements from the three above documents.
- IR-TUN_ConceptualModelReport – Annex I – Reading guide_v1.0. Describes the UML notation used in the above documents.

The IFC Tunnel project has based the definition of tunnel concepts in taxonomies specified by the three domain expert teams and on the previously distributed requirements analysis report (IR-TUN_Requirement-Analysis-Report_v1.0).

2 Package: Systems

A package containing the systems taxonomy concepts and their mappings towards existing or new IFC elements.

All classes stereotyped <<VirtualEntity>> represent the domain taxonomy concepts. The mappings towards IFC is made through UML Realization relationships. The IFC Entities are represented by classes with no stereotype. Property sets and Predefined types are represented by UML classes stereotyped as <<PropertySet>> and <<PredefinedType>>.

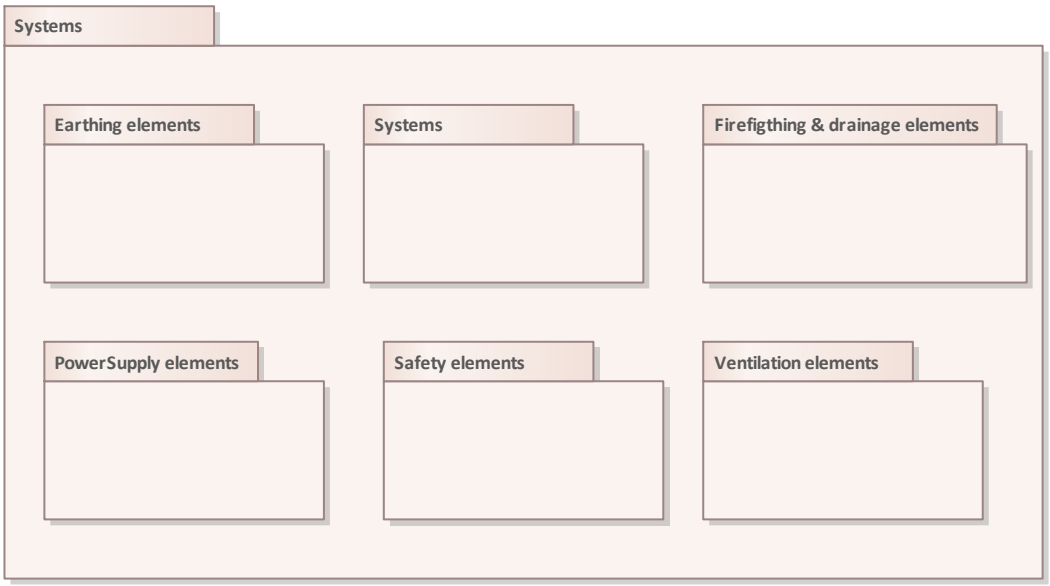

Figure 1: Systems -

2.1 Package: Ventilation elements

Package containing taxonomy and IFC mappings for elements related to ventilation.

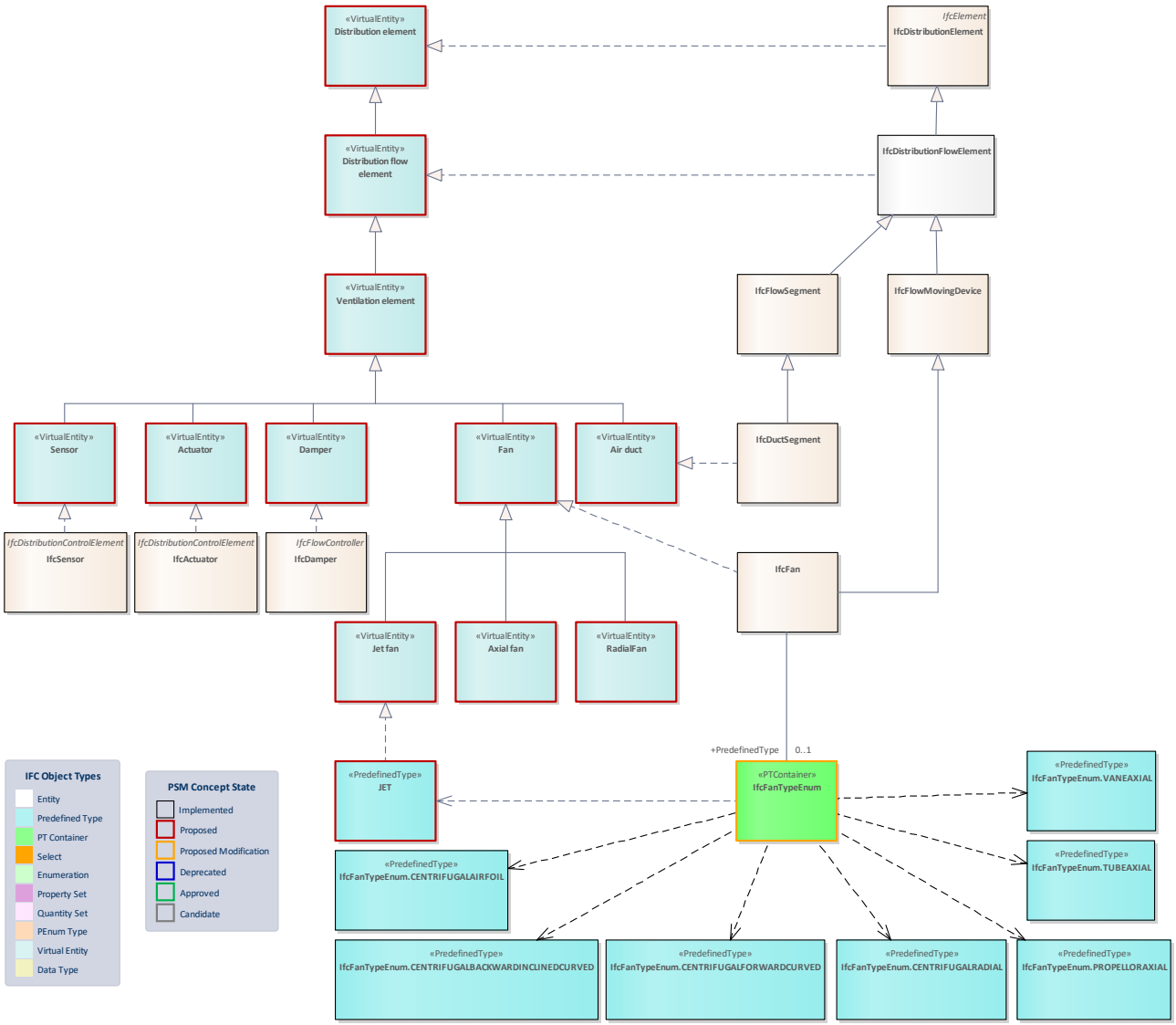

Figure 2: Ventilation elements overview -

2.1.1 PDT Container: IfcFanTypeEnum

Enumeration defining the typical types of fans.

> HISTORY New enumeration in IFC2x2.

bSI Documentation

Status: **ProposedModification**

Package: **IfcHvacDomain**

Container Properties			
Parent Entity	IfcFanType IfcFan	**Stereotype**	«PTContainer»
Contains	**EXISTING** IfcFanTypeEnum.PROPELLORAXIAL IfcFanTypeEnum.CENTRIFUGALBACKWARDINCLINEDCURVED IfcFanTypeEnum.CENTRIFUGALRADIAL IfcFanTypeEnum.VANEAXIAL IfcFanTypeEnum.CENTRIFUGALFORWARDCURVED IfcFanTypeEnum.CENTRIFUGALAIRFOIL IfcFanTypeEnum.TUBEAXIAL	**PROPOSED** IfcFanTypeEnum.JET	

2.1.2 Predefined Type: JET

Full Identifier: **IfcFanTypeEnum.JET**

A fan used for producing a high-velocity flow of air in a space. The typical function is to add momentum to the air within a tunnel. Inlets and outlets are not ducted.

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcFanTypeEnum	**Parent Entity**	IfcFanType IfcFan
Stereotype	«PredefinedType»		
Property sets			

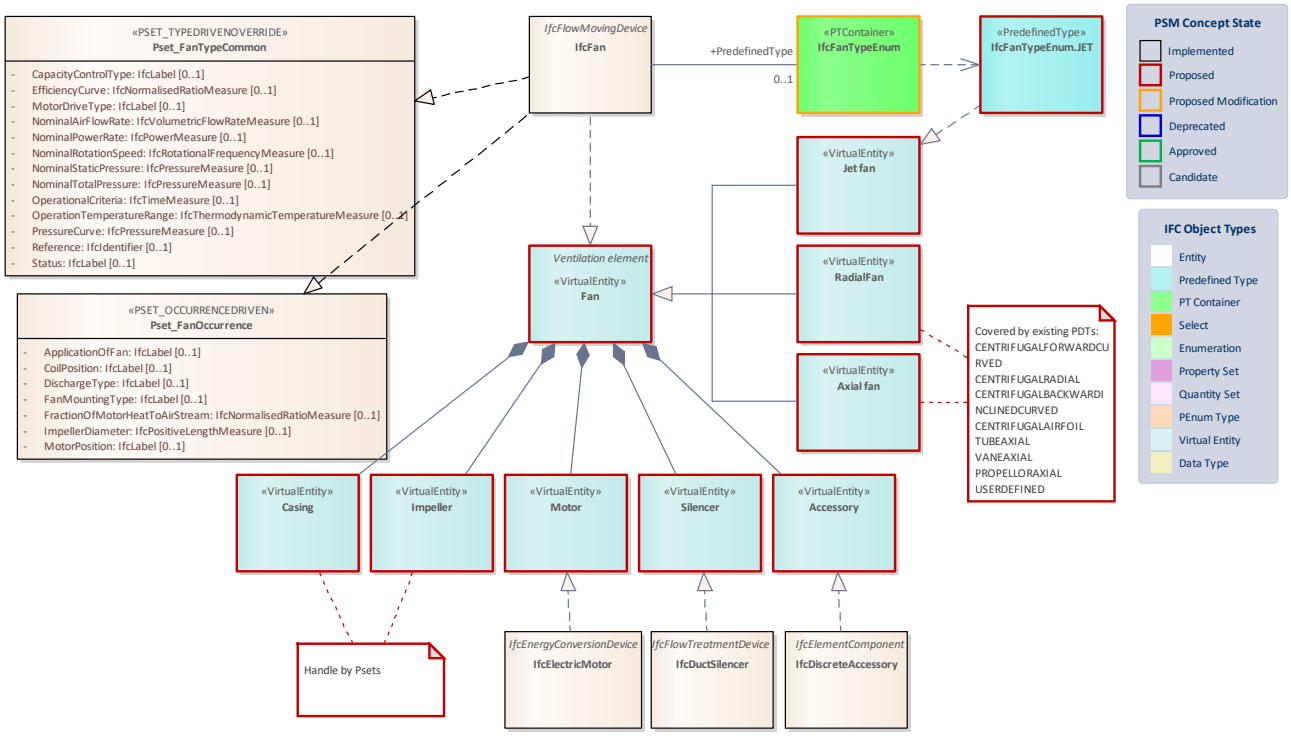

Figure 3: Fan -

2.1.3 PDT Container: IfcFanTypeEnum

Enumeration defining the typical types of fans.

> HISTORY New enumeration in IFC2x2.

bSI Documentation

Status: **ProposedModification**

Package: **IfcHvacDomain**

Container Properties			
Parent Entity	IfcFanType IfcFan	**Stereotype**	«PTContainer»
Contains	**EXISTING** IfcFanTypeEnum.PROPELLORAXIAL IfcFanTypeEnum.CENTRIFUGALBACKWARDINCLINEDCURVED	**PROPOSED** IfcFanTypeEnum.JET	

	IfcFanTypeEnum.CENTRIFUGALRADIAL IfcFanTypeEnum.VANEAXIAL IfcFanTypeEnum.CENTRIFUGALFORWARDCURVED IfcFanTypeEnum.CENTRIFUGALAIRFOIL IfcFanTypeEnum.TUBEAXIAL	

2.1.4 Predefined Type: JET

Full Identifier: **IfcFanTypeEnum.JET**

A fan used for producing a high-velocity flow of air in a space. The typical function is to add momentum to the air within a tunnel. Inlets and outlets are not ducted.

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcFanTypeEnum	**Parent Entity**	IfcFanType IfcFan
Stereotype	«PredefinedType»		
Property sets			

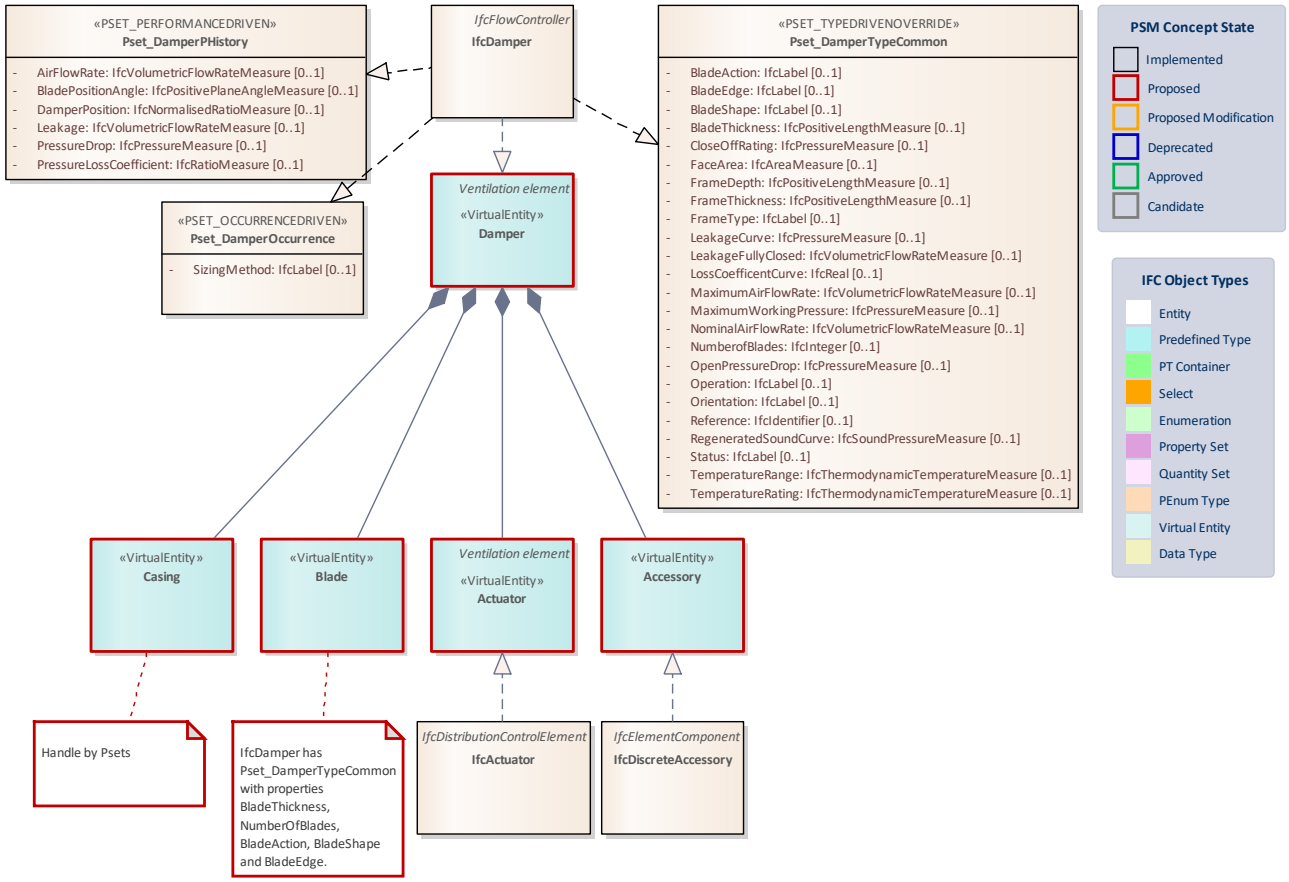

Figure 4: Damper -

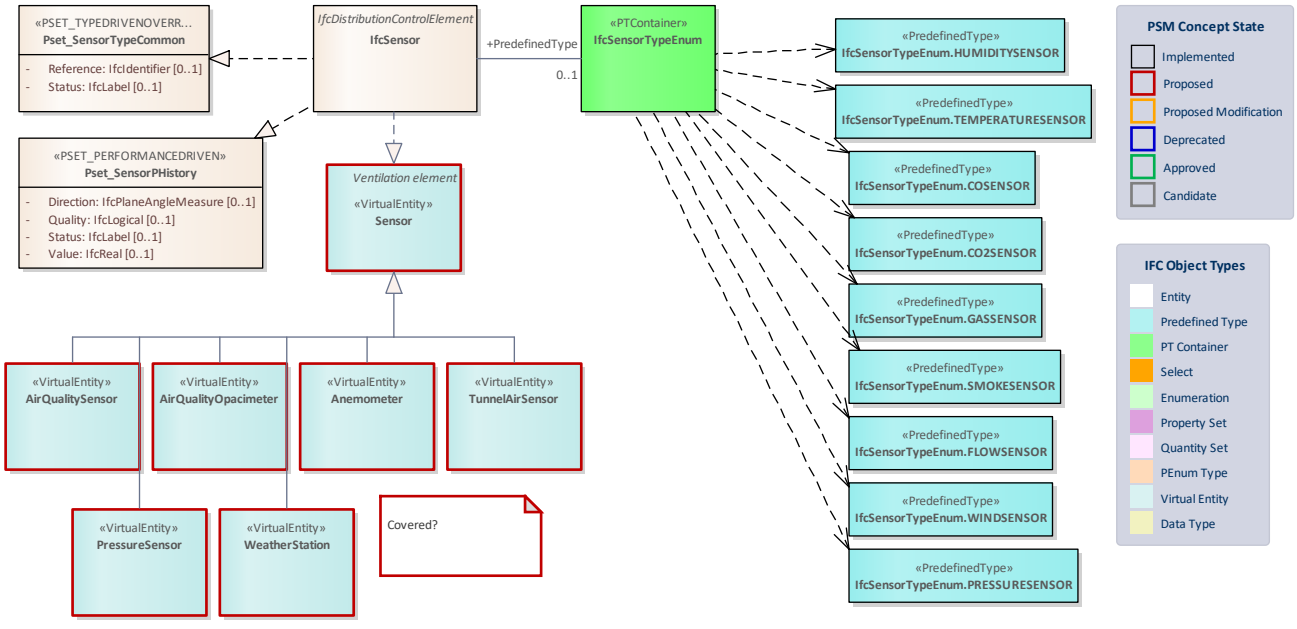

Figure 5: Sensor -

2.1.5 Virtual Entity: WeatherStation

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	

2.1.6 Virtual Entity: Ventilation element

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	

2.1.7 Virtual Entity: TunnelAirSensor

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	

2.1.8 Virtual Entity: Silencer

Device for reducing the sound emission.

Entity Properties	
Realizing Parent	IfcDuctSilencer
Notes	

2.1.9 Virtual Entity: Sensor

A sensor is a technical component that can record certain physical or chemical properties and/or the material composition of its environment qualitatively or quantitatively as a measured variable. These variables are recorded by means of physical, chemical or biological effects and converted into a processable electrical signal.

Entity Properties	
Realizing Parent	IfcSensor
Notes	

2.1.10 Virtual Entity: RadialFan

A radial fan is a fan in which the air is drawn in from the direction of the impeller's axis of rotation and the air is discharged radially.

Entity Properties	
Realizing Parent	
Notes	Covered by existing PDTs: CENTRIFUGALFORWARDCURVED CENTRIFUGALRADIAL CENTRIFUGALBACKWARDINCLINEDCURVED CENTRIFUGALAIRFOIL TUBEAXIAL VANEAXIAL PROPELLORAXIAL USERDEFINED

2.1.11 Virtual Entity: PressureSensor

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	

2.1.12 Virtual Entity: Motor

Machine that generates power for propulsion by converting energy.

Entity Properties

Realizing Parent	IfcElectricMotor
Notes	

2.1.13 Virtual Entity: Jet fan

A jet fan essentially consists of an elongated tube with an electrically driven fan operating in the center. The ejected air stream entrains the surrounding air, thus causing the entire air column to move. The inlet and outlet tubes are usually equipped with a silencer.

Entity Properties	
Realizing Parent	IfcFanTypeEnum.JET
Notes	

2.1.14 Virtual Entity: Impeller

The rotating part of a fan designed to move a gaseous medium by rotation.

Entity Properties	
Realizing Parent	
Notes	Handle by Psets

2.1.15 Virtual Entity: Fan

A fan is an externally driven turbomachine that conveys a gaseous medium. For this purpose, the fan has an impeller through which the flow passes axially or radially and which usually rotates in a housing.

Entity Properties	
Realizing Parent	IfcFan
Notes	

2.1.16 Virtual Entity: Distribution flow element

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcDistributionFlowElement
Notes	

2.1.17 Virtual Entity: Distribution element

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcDistributionElement
Notes	

2.1.18 Virtual Entity: Damper

A damper is a movable device for closing an opening.

Entity Properties	
Realizing Parent	IfcDamper
Notes	

2.1.19 Virtual Entity: Casing

Fluidically shaped outer shell of a fan in which the fan impeller can perform flow work.

Entity Properties	
Realizing Parent	
Notes	Handle by Psets Handle by Psets

2.1.20 Virtual Entity: Blade

Damper blades are structures of thin plates that are used to stop or regulate airflow.

Entity Properties	
Realizing Parent	
Notes	IfcDamper has Pset_DamperTypeCommon with properties BladeThickness, NumberOfBlades, BladeAction, BladeShape and BladeEdge.

2.1.21 Virtual Entity: Axial fan

An axial fan is a fan in which the axis of rotation of the impeller corresponds to the axis of air flow.

Entity Properties	
Realizing Parent	
Notes	Covered by existing PDTs: CENTRIFUGALFORWARDCURVED CENTRIFUGALRADIAL CENTRIFUGALBACKWARDINCLINEDCURVED CENTRIFUGALAIRFOIL TUBEAXIAL VANEAXIAL PROPELLORAXIAL USERDEFINED

2.1.22 Virtual Entity: Anemometer

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	

2.1.23 Virtual Entity: AirQualitySensor

<<ToDo: definition>>

Entity Properties	
Realizing Parent	

Notes	

2.1.24 Virtual Entity: AirQualityOpacimeter

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	

2.1.25 Virtual Entity: Air duct

Air ducts are an essential part of ventilation systems and are used to guide air.

Entity Properties	
Realizing Parent	IfcDuctSegment
Notes	

2.1.26 Virtual Entity: Actuator

Machine that generates power for propulsion by converting energy.

Entity Properties	
Realizing Parent	IfcActuator
Notes	

2.1.27 Virtual Entity: Accessory

A thing which can be added to something else in order to make it more useful.

Entity Properties	
Realizing Parent	IfcDiscreteAccessory
Notes	

2.2 Package: Systems

This package contains the classes that represent the actual system entities rather than the elements groped into these systems.

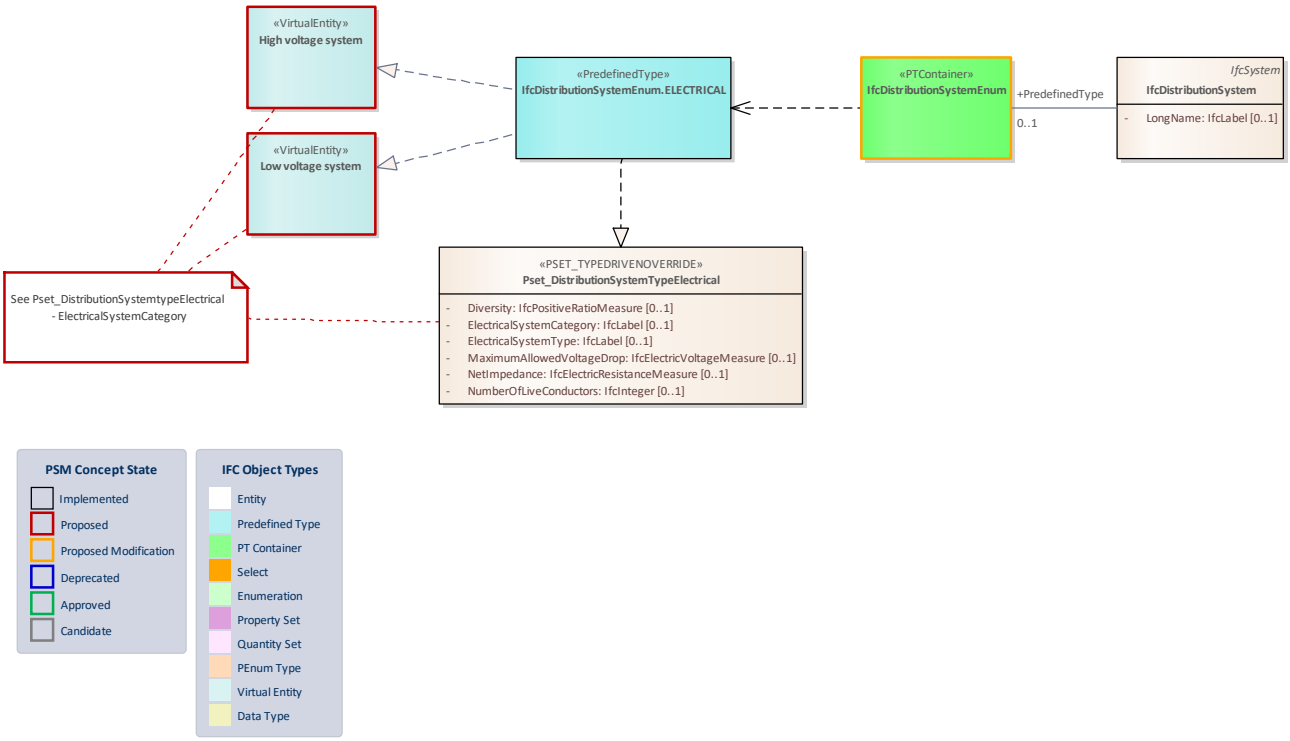

Figure 6: High vs low voltage -

2.2.1 PDT Container: IfcDistributionSystemEnum

This enumeration identifies different types of distribution systems. It is used to designate systems by their function as well as ports of devices within such systems to restrict connectivity to compatible connections.

> HISTORY New enumeration in IFC4.

Ports for cable carriers may be connected using _IfcCableCarrierSegment_ and _IfcCableCarrierFitting_. Type objects for cable carrier segments and fittings (_IfcCableCarrierSegmentType_ and _IfcCableCarrierFittingType_ that are not specific to a particular system type may have ports with _PredefinedType_ of NOTDEFINED which indicates that occurrences of such objects may connect to ports of any other cable-carrier based port. Valid enumerations for cable carriers are the same as that for cables, and may be asserted if ports of the contained cables are all of the same type.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Container Properties			
Parent Entity	IfcDistributionSystem IfcDistributionPort	**Stereotype**	«PTContainer»
Contains	**EXISTING** IfcDistributionSystemEnum.MONITORINGSYSTEM IfcDistributionSystemEnum.COMPRESSEDAIR IfcDistributionSystemEnum.EARTHING IfcDistributionSystemEnum.VENTILATION IfcDistributionSystemEnum.TELEPHONE IfcDistributionSystemEnum.HEATING IfcDistributionSystemEnum.DISPOSAL IfcDistributionSystemEnum.TV IfcDistributionSystemEnum.HAZARDOUS IfcDistributionSystemEnum.CONVEYING IfcDistributionSystemEnum.OIL IfcDistributionSystemEnum.EXHAUST IfcDistributionSystemEnum.REFRIGERATION IfcDistributionSystemEnum.LIGHTNINGPROTECTION IfcDistributionSystemEnum.DATA IfcDistributionSystemEnum.CHEMICAL IfcDistributionSystemEnum.DRAINAGE IfcDistributionSystemEnum.SEWAGE IfcDistributionSystemEnum.AIRCONDITIONING IfcDistributionSystemEnum.FIREPROTECTION IfcDistributionSystemEnum.OPERATIONAL IfcDistributionSystemEnum.CONDENSERWATER IfcDistributionSystemEnum.CONTROL IfcDistributionSystemEnum.SECURITY IfcDistributionSystemEnum.DOMESTICCOLDWATER IfcDistributionSystemEnum.DOMESTICHOTWATER IfcDistributionSystemEnum.VENT IfcDistributionSystemEnum.WASTEWATER IfcDistributionSystemEnum.ELECTRICAL	**PROPOSED** IfcDistributionSystemEnum.SAFETY IfcDistributionSystemEnum.CATENARY_SYSTEM IfcDistributionSystemEnum.OVERHEAD_CONTACTLINE_SYSTEM IfcDistributionSystemEnum.RETURN_CIRCUIT

	IfcDistributionSystemEnum.LIGHTING IfcDistributionSystemEnum.FUEL IfcDistributionSystemEnum.AUDIOVISUAL IfcDistributionSystemEnum.VACUUM IfcDistributionSystemEnum.STORMWATER IfcDistributionSystemEnum.RAINWATER IfcDistributionSystemEnum.CHILLEDWATER IfcDistributionSystemEnum.COMMUNICATION IfcDistributionSystemEnum.ELECTROACOUSTIC IfcDistributionSystemEnum.WATERSUPPLY IfcDistributionSystemEnum.GAS IfcDistributionSystemEnum.SIGNAL IfcDistributionSystemEnum.POWERGENERATION IfcDistributionSystemEnum.MUNICIPALSOLIDWASTE	

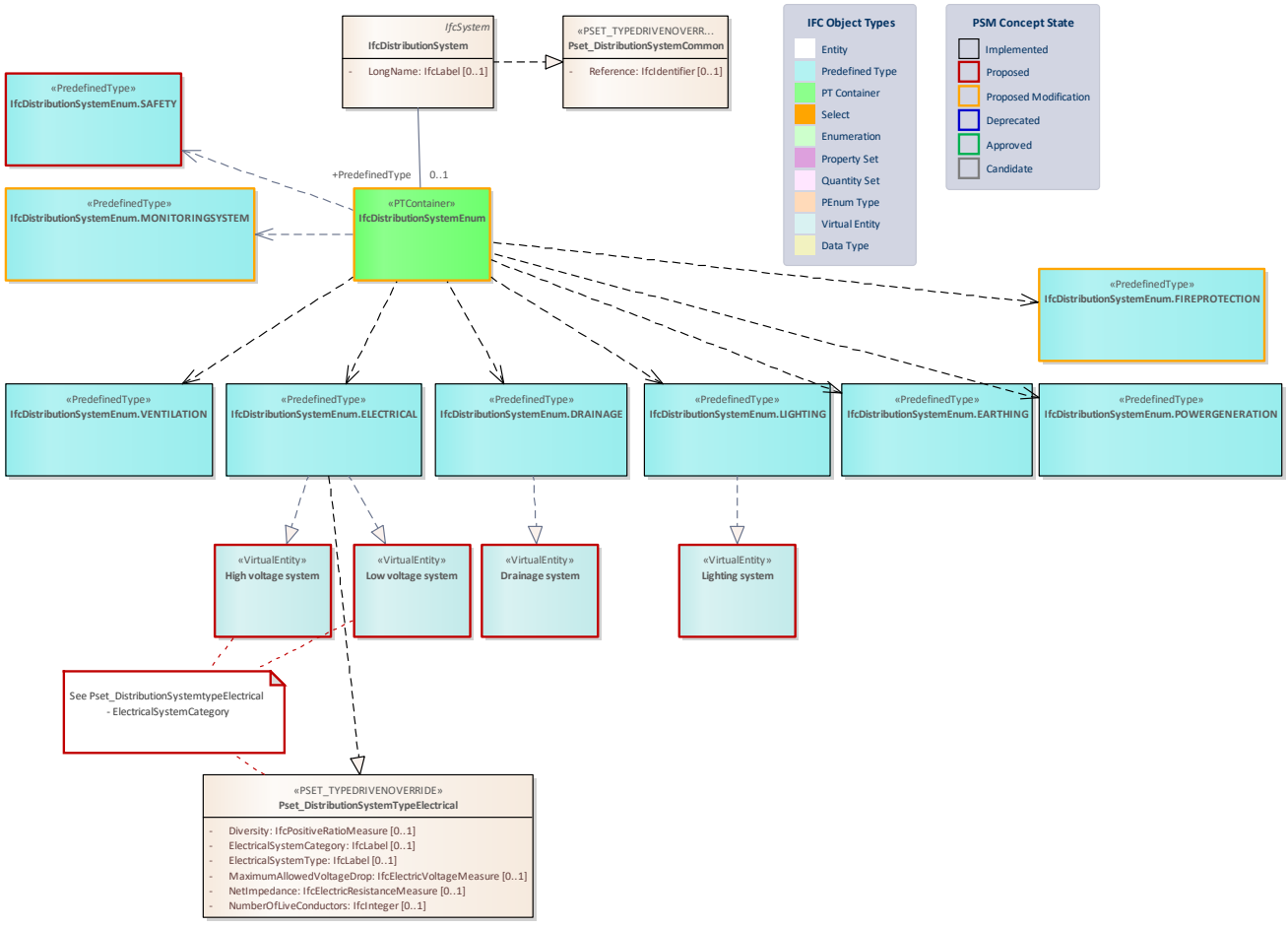

Figure 7: Systems overview -

2.2.2 PDT Container: IfcDistributionSystemEnum

This enumeration identifies different types of distribution systems. It is used to designate systems by their function as well as ports of devices within such systems to restrict connectivity to compatible connections.

> HISTORY New enumeration in IFC4.

Ports for cable carriers may be connected using _IfcCableCarrierSegment_ and _IfcCableCarrierFitting_. Type objects for cable carrier segments and fittings (_IfcCableCarrierSegmentType_ and _IfcCableCarrierFittingType_ that are not specific to a particular system type may have ports with _PredefinedType_ of NOTDEFINED which indicates that occurrences of such objects may connect to ports of any other cable-carrier based port. Valid enumerations for cable carriers are the same as that for cables, and may be asserted if ports of the contained cables are all of the same type.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Container Properties			
Parent Entity	IfcDistributionSystem IfcDistributionPort	**Stereotype**	«PTContainer»
Contains	**EXISTING** IfcDistributionSystemEnum.MONITORINGSYSTEM IfcDistributionSystemEnum.COMPRESSEDAIR IfcDistributionSystemEnum.EARTHING IfcDistributionSystemEnum.VENTILATION IfcDistributionSystemEnum.TELEPHONE IfcDistributionSystemEnum.HEATING IfcDistributionSystemEnum.DISPOSAL IfcDistributionSystemEnum.TV IfcDistributionSystemEnum.HAZARDOUS IfcDistributionSystemEnum.CONVEYING IfcDistributionSystemEnum.OIL IfcDistributionSystemEnum.EXHAUST	**PROPOSED** IfcDistributionSystemEnum.SAFETY IfcDistributionSystemEnum.CATENARY_SYSTEM IfcDistributionSystemEnum.OVERHEAD_CONTACTLINE_SYSTEM IfcDistributionSystemEnum.RETURN_CIRCUIT	

	IfcDistributionSystemEnum.REFRIGERATION IfcDistributionSystemEnum.LIGHTNINGPROTECTION IfcDistributionSystemEnum.DATA IfcDistributionSystemEnum.CHEMICAL IfcDistributionSystemEnum.DRAINAGE IfcDistributionSystemEnum.SEWAGE IfcDistributionSystemEnum.AIRCONDITIONING IfcDistributionSystemEnum.FIREPROTECTION IfcDistributionSystemEnum.OPERATIONAL IfcDistributionSystemEnum.CONDENSERWATER IfcDistributionSystemEnum.CONTROL IfcDistributionSystemEnum.SECURITY IfcDistributionSystemEnum.DOMESTICCOLDWATER IfcDistributionSystemEnum.DOMESTICHOTWATER IfcDistributionSystemEnum.VENT IfcDistributionSystemEnum.WASTEWATER IfcDistributionSystemEnum.ELECTRICAL IfcDistributionSystemEnum.LIGHTING IfcDistributionSystemEnum.FUEL IfcDistributionSystemEnum.AUDIOVISUAL IfcDistributionSystemEnum.VACUUM IfcDistributionSystemEnum.STORMWATER IfcDistributionSystemEnum.RAINWATER IfcDistributionSystemEnum.CHILLEDWATER IfcDistributionSystemEnum.COMMUNICATION IfcDistributionSystemEnum.ELECTROACOUSTIC IfcDistributionSystemEnum.WATERSUPPLY IfcDistributionSystemEnum.GAS IfcDistributionSystemEnum.SIGNAL IfcDistributionSystemEnum.POWERGENERATION IfcDistributionSystemEnum.MUNICIPALSOLIDWASTE	

2.2.3 Predefined Type:

Full Identifier: **IfcDistributionSystemEnum.FIREPROTECTION**

Fire protection sprinkler system.

Proposed new definition: Measures for active fire protection including detecting, stopping and escaping fire

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Predefined Type Properties			
Predefined Type Container	IfcDistributionSystemEnum	**Parent Entity**	IfcDistributionSystem IfcDistributionPort
Stereotype	«PredefinedType»		
Property sets			

2.2.4 Predefined Type: MONITORINGSYSTEM

Full Identifier: **IfcDistributionSystemEnum.MONITORINGSYSTEM**

Sensor-based system for building and infastructure environmental monitoring and control.

Proposed widening of definition (remove environmental): Sensor-based system for building and infastructure monitoring and control..

Status: **ProposedModification**

Package: **Systems**

Predefined Type Properties			
Predefined Type Container	IfcDistributionSystemEnum	**Parent Entity**	IfcDistributionSystem IfcDistributionPort
Stereotype	«PredefinedType»		
Property sets			

2.2.5 Predefined Type: SAFETY

Full Identifier: **IfcDistributionSystemEnum.SAFETY**

A system aimed for protecting the safety of people, vehicles and other equipment from unwanted events.

Status: **Proposed**

Package: **Systems**

Predefined Type Properties			
Predefined Type Container	IfcDistributionSystemEnum	**Parent Entity**	IfcDistributionSystem IfcDistributionPort
Stereotype	«PredefinedType»		
Property sets			

2.2.6 Virtual Entity: Drainage system

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcDistributionSystemEnum.DRAINAGE
Notes	

2.2.7 Virtual Entity: High voltage system

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcDistributionSystemEnum.ELECTRICAL
Notes	See Pset_DistributionSystemtypeElectrical - ElectricalSystemCategory

2.2.8 Virtual Entity: Lighting system

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcDistributionSystemEnum.LIGHTING
Notes	

2.2.9 Virtual Entity: Low voltage system

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcDistributionSystemEnum.ELECTRICAL
Notes	See Pset_DistributionSystemtypeElectrical - ElectricalSystemCategory

2.2.10 Virtual Entity: Network system

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	

2.3 Package: Safety elements

Package containing taxonomy and IFC mappings for safety related elements.

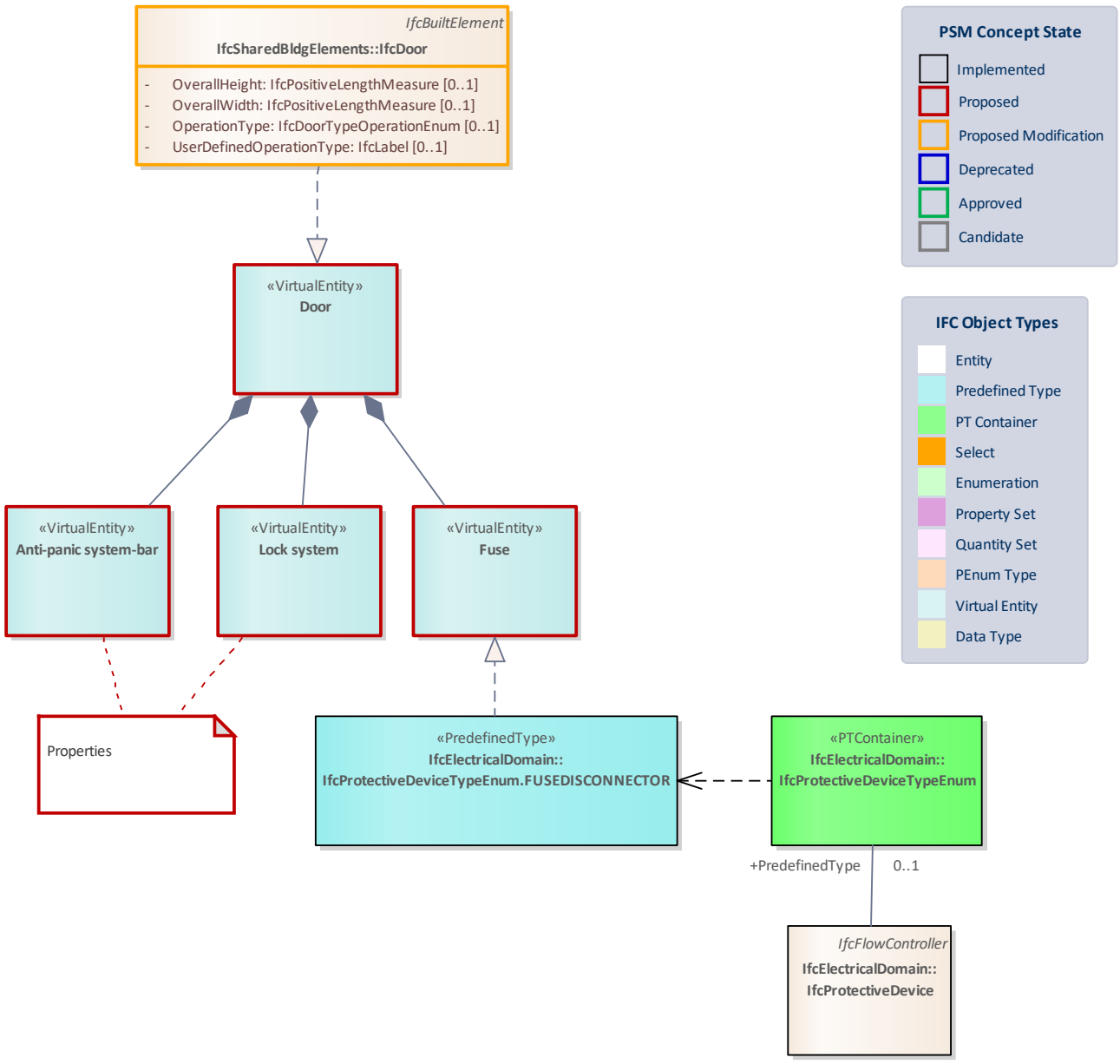

Figure 8: Door -

2.3.1 Class: IfcDoor

The door is a built element that is predominately used to provide controlled access for people, goods, animals and vehicles. It includes constructions with hinged, pivoted, sliding, and additionally revolving and folding operations. REMOVE: A door consists of a lining and one or several panels.

NOTE Definition according to ISO 6707-1: construction for closing an opening, intended primarily for access with hinged, pivoted or sliding operation.

The _IfcDoor_ defines a particular occurrence of a door inserted in the spatial context of a project. A door can:

- be inserted as a filler in an opening using the _IfcRelFillsElement_ relationship, then the _IfcDoor_ has an inverse attribute _FillsVoids_ provided;
  NOTE View definitions or implementer agreements may restrict the relationship to only include one door into one opening

- be part of an element assembly, in general an _IfcCurtainWall_, using the _IfcRelAggregates_ relationship, then the _IfcDoor_ has an inverse attribute _Decomposes_ is provided;

- be a "free standing" door, then the _IfcDoor_ has no inverse attributes _FillsVoids_ or _Decomposes_ provided.

This specification provides two entities for door occurrences:

- _IfcDoorStandardCase_ used for all occurrences of doors, that have a ''Profile'' shape representation defined to which a set of shape parameters for lining and framing properties apply. Additionally it requires the provision of an _IfcDoorType_ that references one _IfcDoorLiningProperties_ and on to many _IfcDoorPanelProperties_;
  NOTE see _IfcDoorStandardCase_ for all specific constraints imposed by this subtype.

- _IfcDoor_ used for all other occurrences of doors, particularly for doors having only ''Brep'', or ''SurfaceModel'' geometry without applying shape parameters.

The actual parameters of the door and/or its shape are defined by the _IfcDoor_ as the occurrence definition (or project instance), or by the _IfcDoorType_ as the specific definition (or project type). The following parameters are given:

at the _IfcDoor_ or _IfcDoorStandardCase_ for occurrence specific parameters. The _IfcDoor_ specifies:

- the door width and height

- the door opening direction (by the y-axis of the _ObjectPlacement_)* at the _IfcDoorType_, to which the _IfcDoor_ is related by the inverse relationship _IsTypedBy_ pointing to _IfcRelDefinesByType_, for type parameters common to all occurrences of the same type.

at the IfcDoorType, to which the IfcDoor is related by the inverse relationship IsTypedBy pointing to IfcRelDefinesByType, for type parameters common to all occurrences of the same type.

- the operation type (single swing, double swing, revolving, etc.)

- the door hinge side (by using two different styles for right and left opening doors)

- the construction material type

- the particular attributes for the lining by the _IfcDoorLiningProperties_

- the particular attributes for the panels by the _IfcDoorPanelProperties_

The geometric representation of _IfcDoor_ is given by the _IfcProductDefinitionShape_, allowing multiple geometric representations. The _IfcDoor_ may get its parameter and shape from the _IfcDoorType_. If an _IfcRepresentationMap_ (a block definition) is defined for the _IfcDoorType_, then the _IfcDoor_ inserts it through the _IfcMappedItem_.

The geometric representation of _IfcDoor_ is defined using the following (potentially multiple) _IfcShapeRepresentation_''s for its _IfcProductDefinitionShape_:

- **'Profile'**: A''Curve3D'' consisting of a single losed curve defining the outer boundary of the door (lining). The door parametric representation uses this profile in order to apply the door lining and panel parameter. If not provided, the profile of the _IfcOpeningElement_ is taken.
- '**FootPrint**': A ''GeometricCurveSet'', or ''Annotation2D'' representation defining the 2D shape of the door
- '**Body**': A ''SweptSolid'', ''SurfaceModel'', or ''Brep'' representation defining the 3D shape of the door.

In addition the parametric representation of a (limited) door shape is available by applying the parameters from _IfcDoorType_ referencing _IfcDoorLiningProperties_ and _IfcDoorPanelProperties_. The purpose of the parameter is described at those entities and below (door opening operation by door type).

The overall size of the _IfcDoor_ to be used to apply the lining or panel parameter provided by the _IfcDoorType_ is determined by the IfcShapeRepresentation with the RepresentationIdentifier = ''Profile''.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgElements**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	**EXISTING**	**PROPOSED**
	IfcDoorStandardCase	

Class Attributes

Name	Type	Multiplicity	Definition

OverallHeight	IfcPositiveLengthMeasure	[0..1]	Overall measure of the height, it reflects the Z Dimension of a bounding box, enclosing the body of the door opening. If omitted, the _OverallHeight_ should be taken from the geometric representation of the _IfcOpening_ in which the door is inserted. NOTE The body of the door might be taller then the door opening (e.g. in cases where the door lining includes a casing). In these cases the _OverallHeight_ shall still be given as the door opening height, and not as the total height of the door lining.
OverallWidth	IfcPositiveLengthMeasure	[0..1]	Overall measure of the width, it reflects the X Dimension of a bounding box, enclosing the body of theE door opening. If omitted, the _OverallWidth_ should be taken from the geometric representation of the _IfcOpening_ in which the door is inserted. NOTE The body of the door might be wider then the door opening (e.g. in cases where the door lining includes a casing). In these cases the _OverallWidth_ shall still be given as the door opening width, and not as the total width of the door lining.
OperationType	IfcDoorTypeOperationEnum	[0..1]	Type defining the general layout and operation of the door type in terms of the partitioning of panels and panel operations. NOTE The _OperationType_ shall only be used, if no type object _IfcDoorType_ is assigned, providing its own _IfcDoorType.OperationType_.
UserDefinedOperationType	IfcLabel	[0..1]	Designator for the user defined operation type, shall only be provided, if the value of _OperationType_ is set to USERDEFINED.

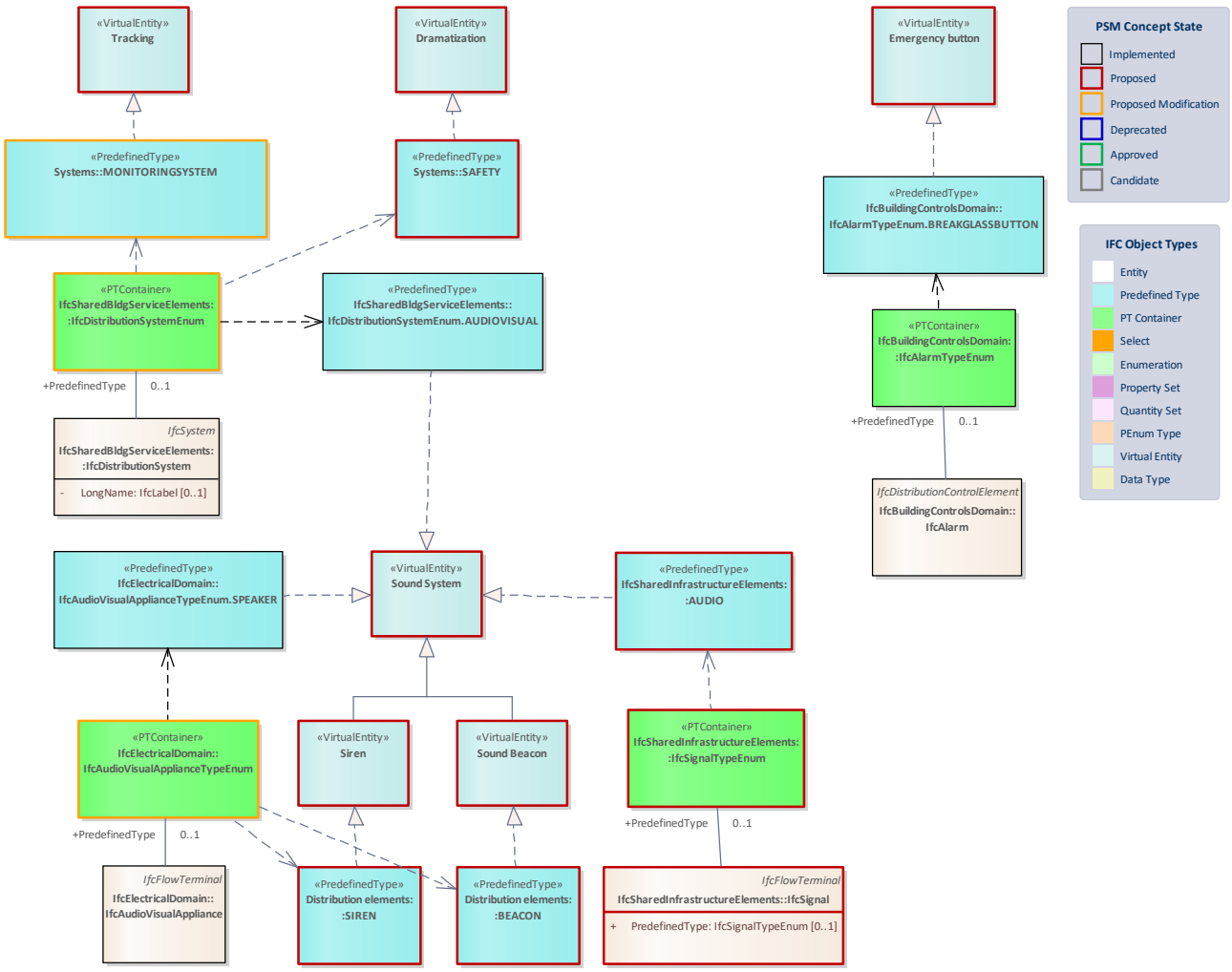

Figure 9: Dramatization, Tracking & Sound -

2.3.2 PDT Container: IfcAudioVisualApplianceTypeEnum

Defines the range of different types of audio-video devices that can be specified.

> HISTORY New enumeration in IFC4.

bSI Documentation

Status: **ProposedModification**

Package: **IfcElectricalDomain**

Container Properties

Parent Entity	IfcAudioVisualApplianceType IfcAudioVisualAppliance	**Stereotype**	«PTContainer»
Contains	**EXISTING** IfcAudioVisualApplianceTypeEnum.PLAYER IfcAudioVisualApplianceTypeEnum.SWITCHER IfcAudioVisualApplianceTypeEnum.MICROPHONE IfcAudioVisualApplianceTypeEnum.RECEIVER IfcAudioVisualApplianceTypeEnum.TUNER IfcAudioVisualApplianceTypeEnum.PROJECTOR IfcAudioVisualApplianceTypeEnum.CAMERA IfcAudioVisualApplianceTypeEnum.AMPLIFIER IfcAudioVisualApplianceTypeEnum.TELEPHONE IfcAudioVisualApplianceTypeEnum.DISPLAY IfcAudioVisualApplianceTypeEnum.SPEAKER	**PROPOSED** IfcAudioVisualApplianceTypeEnum.BEACON IfcAudioVisualApplianceTypeEnum.SIREN IfcAudioVisualApplianceTypeEnum.RAILWAY_COMMUNICATION_TERMINAL	

2.3.3 PDT Container: IfcDistributionSystemEnum

This enumeration identifies different types of distribution systems. It is used to designate systems by their function as well as ports of devices within such systems to restrict connectivity to compatible connections.

> HISTORY New enumeration in IFC4.

Ports for cable carriers may be connected using _IfcCableCarrierSegment_ and _IfcCableCarrierFitting_. Type objects for cable carrier segments and fittings (_IfcCableCarrierSegmentType_ and _IfcCableCarrierFittingType_ that are not specific to a particular system type may have ports with _PredefinedType_ of NOTDEFINED which indicates that occurrences of such objects may connect to ports of any other cable-carrier based port. Valid enumerations for cable carriers are the same as that for cables, and may be asserted if ports of the contained cables are all of the same type.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Container Properties

Parent Entity	IfcDistributionSystem IfcDistributionPort	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
	IfcDistributionSystemEnum.MONITORINGSYSTEM IfcDistributionSystemEnum.COMPRESSEDAIR IfcDistributionSystemEnum.EARTHING IfcDistributionSystemEnum.VENTILATION IfcDistributionSystemEnum.TELEPHONE IfcDistributionSystemEnum.HEATING IfcDistributionSystemEnum.DISPOSAL IfcDistributionSystemEnum.TV IfcDistributionSystemEnum.HAZARDOUS IfcDistributionSystemEnum.CONVEYING IfcDistributionSystemEnum.OIL IfcDistributionSystemEnum.EXHAUST IfcDistributionSystemEnum.REFRIGERATION IfcDistributionSystemEnum.LIGHTNINGPROTECTION IfcDistributionSystemEnum.DATA IfcDistributionSystemEnum.CHEMICAL IfcDistributionSystemEnum.DRAINAGE IfcDistributionSystemEnum.SEWAGE IfcDistributionSystemEnum.AIRCONDITIONING IfcDistributionSystemEnum.FIREPROTECTION IfcDistributionSystemEnum.OPERATIONAL IfcDistributionSystemEnum.CONDENSERWATER IfcDistributionSystemEnum.CONTROL IfcDistributionSystemEnum.SECURITY IfcDistributionSystemEnum.DOMESTICCOLDWATER IfcDistributionSystemEnum.DOMESTICHOTWATER IfcDistributionSystemEnum.VENT IfcDistributionSystemEnum.WASTEWATER IfcDistributionSystemEnum.ELECTRICAL IfcDistributionSystemEnum.LIGHTING IfcDistributionSystemEnum.FUEL IfcDistributionSystemEnum.AUDIOVISUAL IfcDistributionSystemEnum.VACUUM IfcDistributionSystemEnum.STORMWATER IfcDistributionSystemEnum.RAINWATER	IfcDistributionSystemEnum.SAFETY IfcDistributionSystemEnum.CATENARY_SYSTEM IfcDistributionSystemEnum.OVERHEAD_CONTACTLINE_SYSTEM IfcDistributionSystemEnum.RETURN_CIRCUIT	

	IfcDistributionSystemEnum.CHILLEDWATER IfcDistributionSystemEnum.COMMUNICATION IfcDistributionSystemEnum.ELECTROACOUSTIC IfcDistributionSystemEnum.WATERSUPPLY IfcDistributionSystemEnum.GAS IfcDistributionSystemEnum.SIGNAL IfcDistributionSystemEnum.POWERGENERATION IfcDistributionSystemEnum.MUNICIPALSOLIDWASTE	

2.3.4 Class: IfcSignal

A signal is an active device that conveys information or instructions to users, by means of an audio, visual signal or a combination of both.

The primary distinction from an IfcSign is that a signal is active and therefore a subtype of IfcFlowTerminal usually requiring power and data connections for its operation.

An instance of IfcSignal represents a singular signalling device in a larger assembled unit or connected system, such as an individual frame within a railway signal, a single light unit in a traffic light system or an audio signal or light mounted on a navigational buoy.

Signals can be physically aggregated together into an assembly which can include multiple signal instances (and also sign instances) and the associated supporting structural elements such as a simple pole or a rigid frame gantry (see Signal Assembly for examples).

Signals can be logically (functionally) grouped together into a signalling system (a type of distribution system) to represent a connected group of signals for example a group of traffic lights controlling an road intersection.

Status: **Proposed**

Package: **IfcSharedInfrastructureElements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets	Pset_RailwaySignalGeneral		

Inheritance Statement	
Subtype Of	IfcFlowTerminal

Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcSignalTypeEnum	[0..1]	Identifies the predefined type of a signal from which the type modelled, may be set. This type may associate additional specific property sets. NOTE The PredefinedType shall only be used, if no IfcSignalType is assigned, providing its own IfcSignType .PredefinedType.

2.3.5 PDT Container: IfcSignalTypeEnum

This container defines the different predefined types of signals that can specify an IfcSignal or IfcSignalType.

Status: **Proposed**

Package: **IfcSharedInfrastructureElements**

Container Properties			
Parent Entity	IfcSignalType IfcSignal	**Stereotype**	«PTContainer»
Contains	EXISTING	PROPOSED	
		IfcSignalTypeEnum.MIXED IfcSignalTypeEnum.AUDIO IfcSignalTypeEnum.VISUAL	

2.3.6 Predefined Type: AUDIO

Full Identifier: **IfcSignalTypeEnum.AUDIO**

A signal type formed of an active device conveying information by emitting an audio signal such as a beep, ring, horn or explosive sound.

Status: **Proposed**

Package: **IfcSharedInfrastructureElements**

Predefined Type Properties			
Predefined Type Container	IfcSignalTypeEnum	**Parent Entity**	IfcSignalType IfcSignal
Stereotype	«PredefinedType»		
Property sets			

2.3.7 Predefined Type: BEACON

Full Identifier: **IfcAudioVisualApplianceTypeEnum.BEACON**

A light or other visible object serving as a signal, warning, or guide

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcAudioVisualApplianceTypeEnum	**Parent Entity**	IfcAudioVisualApplianceType IfcAudioVisualAppliance
Stereotype	«PredefinedType»		
Property sets			

2.3.8 Predefined Type: SIREN

Full Identifier: **IfcAudioVisualApplianceTypeEnum.SIREN**

A device that makes a loud prolonged signal or warning sound

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcAudioVisualApplianceTypeEnum	**Parent Entity**	IfcAudioVisualApplianceType IfcAudioVisualAppliance
Stereotype	«PredefinedType»		

Property sets	

2.3.9 Predefined Type: MONITORINGSYSTEM

Full Identifier: **IfcDistributionSystemEnum.MONITORINGSYSTEM**

Sensor-based system for building and infastructure environmental monitoring and control.

Proposed widening of definition (remove environmental): Sensor-based system for building and infastructure monitoring and control..

Status: **ProposedModification**

Package: **Systems**

Predefined Type Properties			
Predefined Type Container	IfcDistributionSystemEnum	**Parent Entity**	IfcDistributionSystem IfcDistributionPort
Stereotype	«PredefinedType»		
Property sets			

2.3.10 Predefined Type: SAFETY

Full Identifier: **IfcDistributionSystemEnum.SAFETY**

A system aimed for protecting the safety of people, vehicles and other equipment from unwanted events.

Status: **Proposed**

Package: **Systems**

Predefined Type Properties			
Predefined Type Container	IfcDistributionSystemEnum	**Parent Entity**	IfcDistributionSystem IfcDistributionPort
Stereotype	«PredefinedType»		
Property sets			

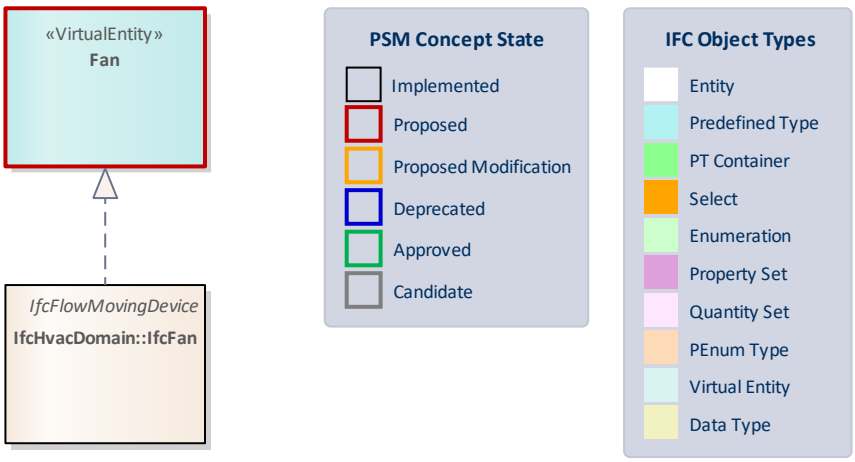

Figure 10: Fan -

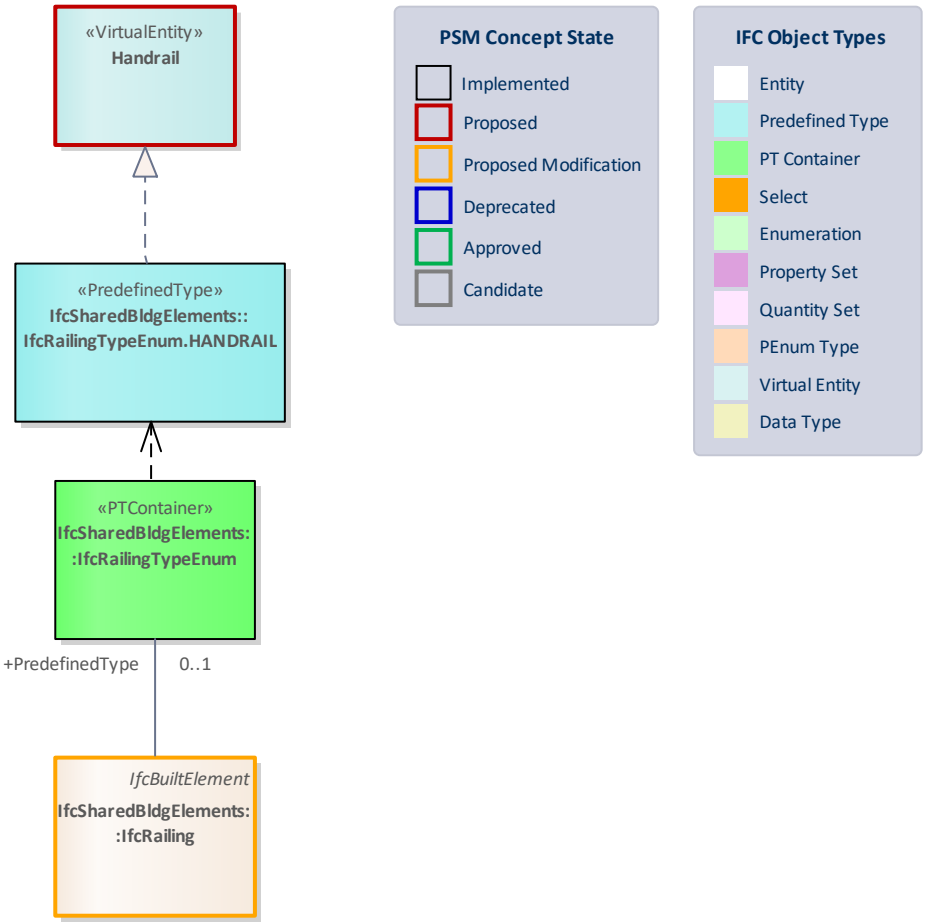

Figure 11: Handrail -

2.3.11 Class: IfcRailing

The railing is a frame assembly adjacent to human or vehicle circulation spaces and at some space boundaries where it is used in lieu of walls or to complement walls. REMOVE{ Designed to aid humans, either as an optional physical support, or to prevent injury or damage, either by falling or collision.} Designed as an optional physical support, or to prevent injury or damage, either by falling or collision.

> HISTORY New entity in IFC2.0

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgElements**

Class Properties			
Status	ProposedModification	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	**EXISTING**	**PROPOSED**

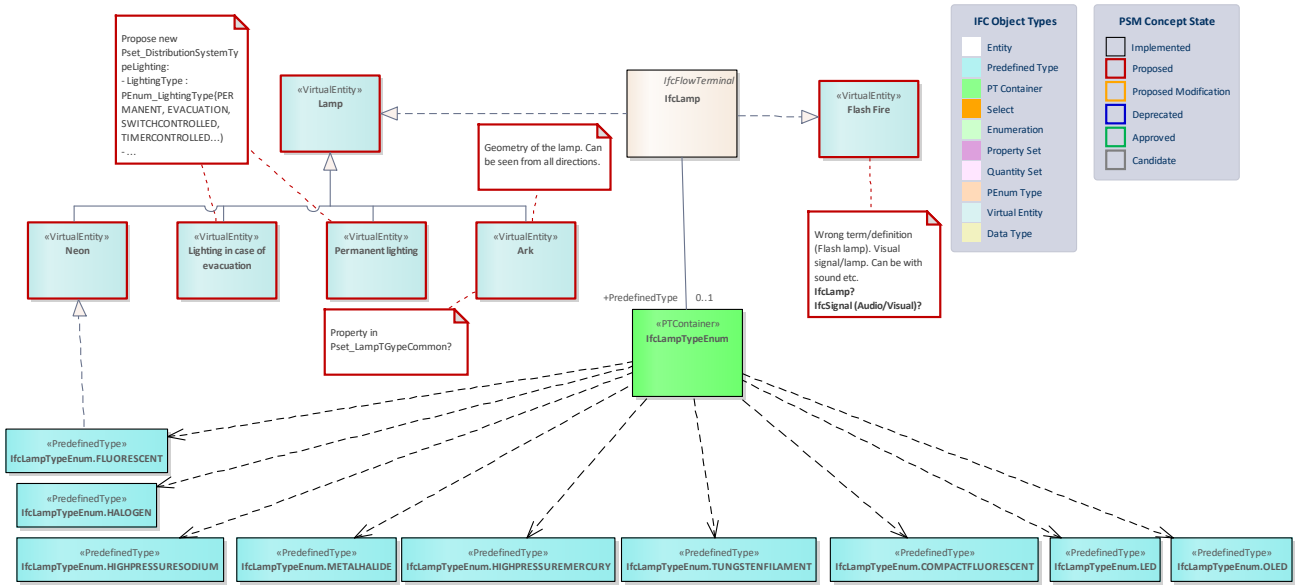

Figure 12: Lamp -

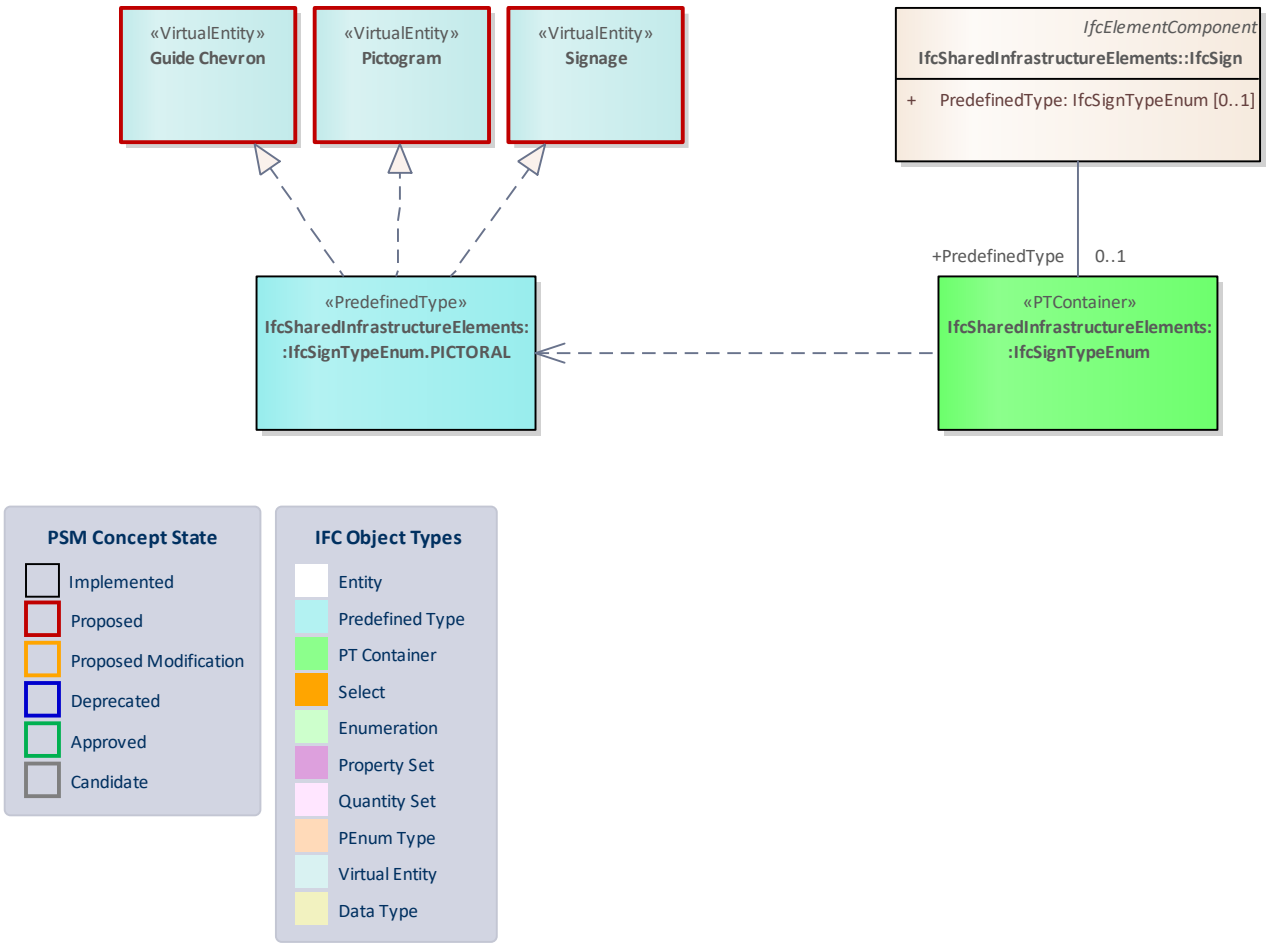

Figure 13: Signage -

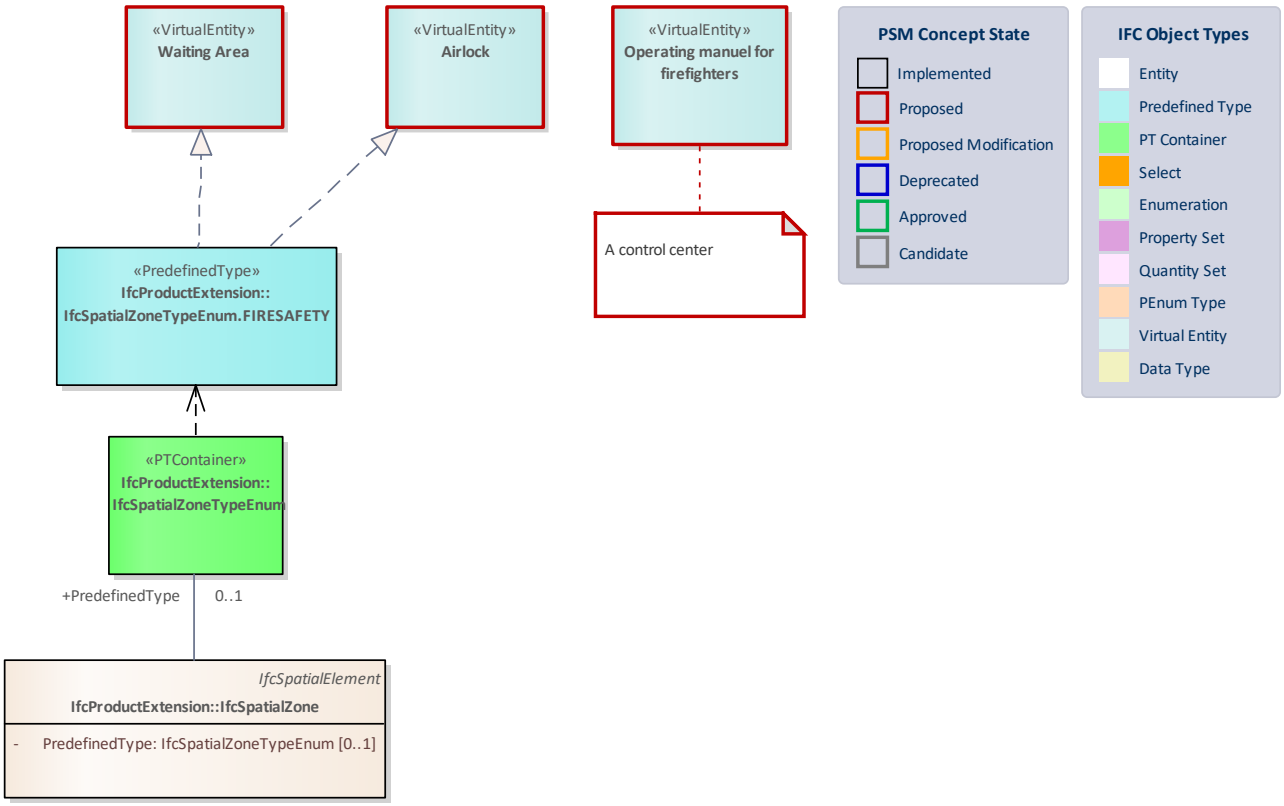

Figure 14: Spatial -

2.3.12 Virtual Entity: Airlock

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcSpatialZoneTypeEnum.FIRESAFETY
Notes	

2.3.13 Virtual Entity: Anti-panic system-bar

Bar to open a door

Entity Properties	
Realizing Parent	
Notes	Properties

2.3.14 Virtual Entity: Ark

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	Property in Pset_LampTGypeCommon? Geometry of the lamp. Can be seen from all directions.

2.3.15 Virtual Entity: Door

Tunnel doors are doors in tunnels that have to withstand special demands in terms of durability, fire resistance, pressure tightness, load changes due to pressure shocks and aggressive environments (salt and humidity). They serve as access doors and also as escape and rescue doors.

Entity Properties	
Realizing Parent	IfcDoor
Notes	

2.3.16 Virtual Entity: Dramatization

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcDistributionSystemEnum.SAFETY
Notes	

2.3.17 Virtual Entity: Emergency button

A panic alarm is an electronic device designed to assist in alerting somebody in emergency situations where a threat to persons or property exists.

Entity Properties

Realizing Parent	IfcAlarmTypeEnum.BREAKGLASSBUTTON
Notes	

2.3.18 Virtual Entity: Fan

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcFan
Notes	

2.3.19 Virtual Entity: Flash Fire

A flash fire is a sudden, intense fire caused by ignition of a mixture of air and a dispersed flammable substance such as a solid (including dust), flammable or combustible liquid (such as an aerosol or fine mist), or a flammable gas. It is characterized by high temperature, short duration, and a rapidly moving flame front.

Entity Properties	
Realizing Parent	IfcLamp
Notes	Wrong term/definition (Flash lamp). Visual signal/lamp. Can be with sound etc. IfcLamp? IfcSignal (Audio/Visual)?

2.3.20 Virtual Entity: Fuse

Entity Properties	
Realizing Parent	IfcProtectiveDeviceTypeEnum.FUSEDISCONNECTOR
Notes	

2.3.21 Virtual Entity: Guide Chevron

Directional arrows to the emergency exit

Entity Properties	
Realizing Parent	IfcSignTypeEnum.PICTORAL
Notes	

2.3.22 Virtual Entity: Handrail

Self-rescue is the ability to free oneself from dangerous situations. As a preventive measure, it also includes the knowledge of how to prevent dangerous situations. The technical term self-rescue means: people rescue themselves from the danger zone under their own power.

Entity Properties	
Realizing Parent	IfcRailingTypeEnum.HANDRAIL
Notes	

2.3.23 Virtual Entity: Lamp

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcLamp
Notes	

2.3.24 Virtual Entity: Lighting in case of evacuation

<<ToDo: definition>>

Entity Properties	
Realizing Parent	

Notes	Propose new Pset_DistributionSystemTypeLighting: - LightingType : PEnum_LightingType{PERMANENT, EVACUATION, SWITCHCONTROLLED, TIMERCONTROLLED...) - ...

2.3.25 Virtual Entity: Lock system

Entity Properties	
Realizing Parent	
Notes	Properties

2.3.26 Virtual Entity: Neon

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcLampTypeEnum.FLUORESCENT
Notes	

2.3.27 Virtual Entity: Operating manuel for firefighters

A control center

Entity Properties	
Realizing Parent	
Notes	A control center

2.3.28 Virtual Entity: Permanent lighting

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	Propose new Pset_DistributionSystemTypeLighting: - LightingType : PEnum_LightingType{PERMANENT, EVACUATION, SWITCHCONTROLLED, TIMERCONTROLLED...) - ...

2.3.29 Virtual Entity: Pictogram

A pictogram, also called a pictogramme, pictograph, or simply picto,[1] and in computer usage an icon, is a graphic symbol that conveys its meaning through its pictorial resemblance to a physical object. Pictographs are often used in writing and graphic systems in which the characters are to a considerable extent pictorial in appearance. A pictogram may also be used in subjects such as leisure, tourism, geography or signalisaton.

Entity Properties	
Realizing Parent	IfcSignTypeEnum.PICTORAL
Notes	

2.3.30 Virtual Entity: Signage

A pictogram, also called a pictogramme, pictograph, or simply picto,[1] and in computer usage an icon, is a graphic symbol that conveys its meaning through its pictorial resemblance to a physical object. Pictographs are often used in writing and graphic systems in which the characters are to a considerable extent pictorial in appearance. A pictogram may also be used in subjects such as leisure, tourism, geography or signalisaton.

Entity Properties	
Realizing Parent	IfcSignTypeEnum.PICTORAL
Notes	

2.3.31 Virtual Entity: Siren

<<ToDo: definition>>

Entity Properties

Realizing Parent	IfcAudioVisualApplianceTypeEnum.SIREN
Notes	

2.3.32 Virtual Entity: Sound Beacon

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcAudioVisualApplianceTypeEnum.BEACON
Notes	

2.3.33 Virtual Entity: Sound System

An efficient alarm and escape guidance system is essential for buildings with large numbers of people. The name of the Evacom acoustic escape guidance system is composed of the terms evacuation, verification, alerting and communication. It enables voice communication in both directions, i.e. from the alarm location to the security control centre and vice versa, in real time.

Entity Properties	
Realizing Parent	IfcDistributionSystemEnum.AUDIOVISUAL IfcSignalTypeEnum.AUDIO IfcAudioVisualApplianceTypeEnum.SPEAKER
Notes	

2.3.34 Virtual Entity: Tracking

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcDistributionSystemEnum.MONITORINGSYSTEM
Notes	

2.3.35 Virtual Entity: Waiting Area

Waiting zone, area outside the traffic zone where fugitives can wait safely and smoke-free for evacuation. These are usually ventilated with positive pressure (ventilation).

Entity Properties	
Realizing Parent	IfcSpatialZoneTypeEnum.FIRESAFETY
Notes	

2.4 Package: PowerSupply elements

Package containing taxonomy and IFC mappings for elements related to power supply.

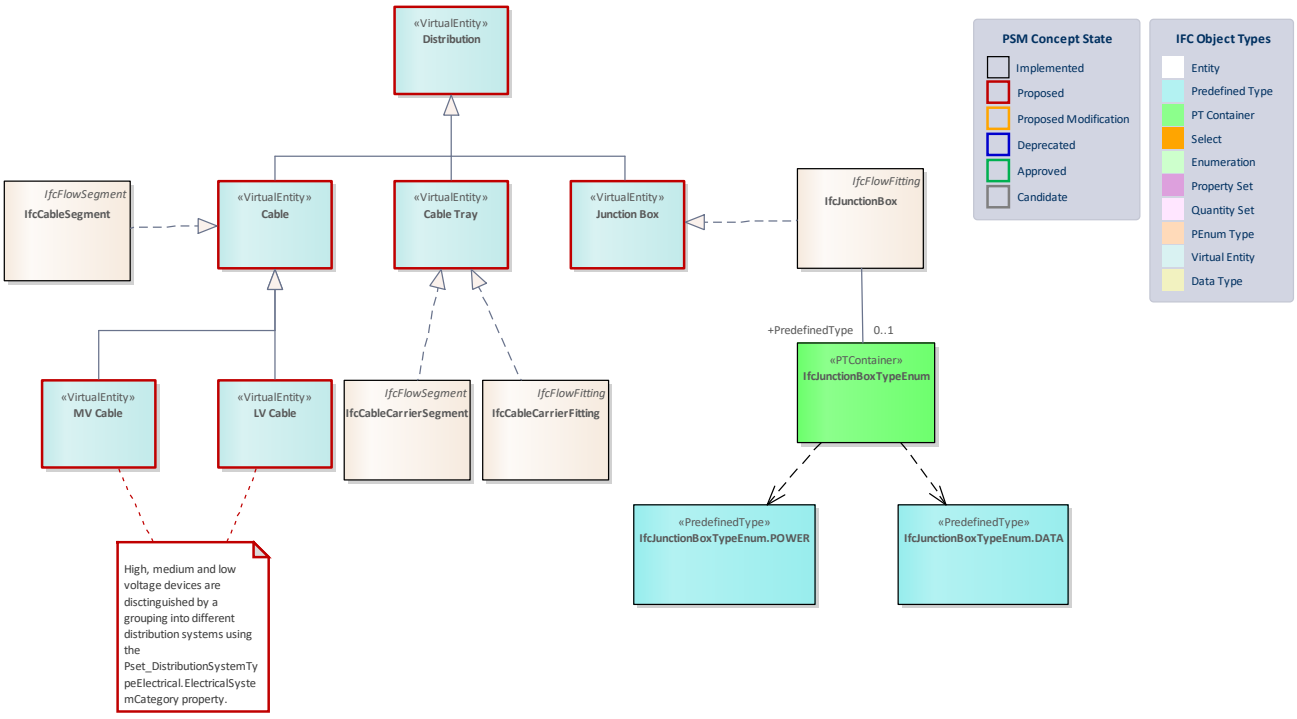

Figure 15: Distribution devices -

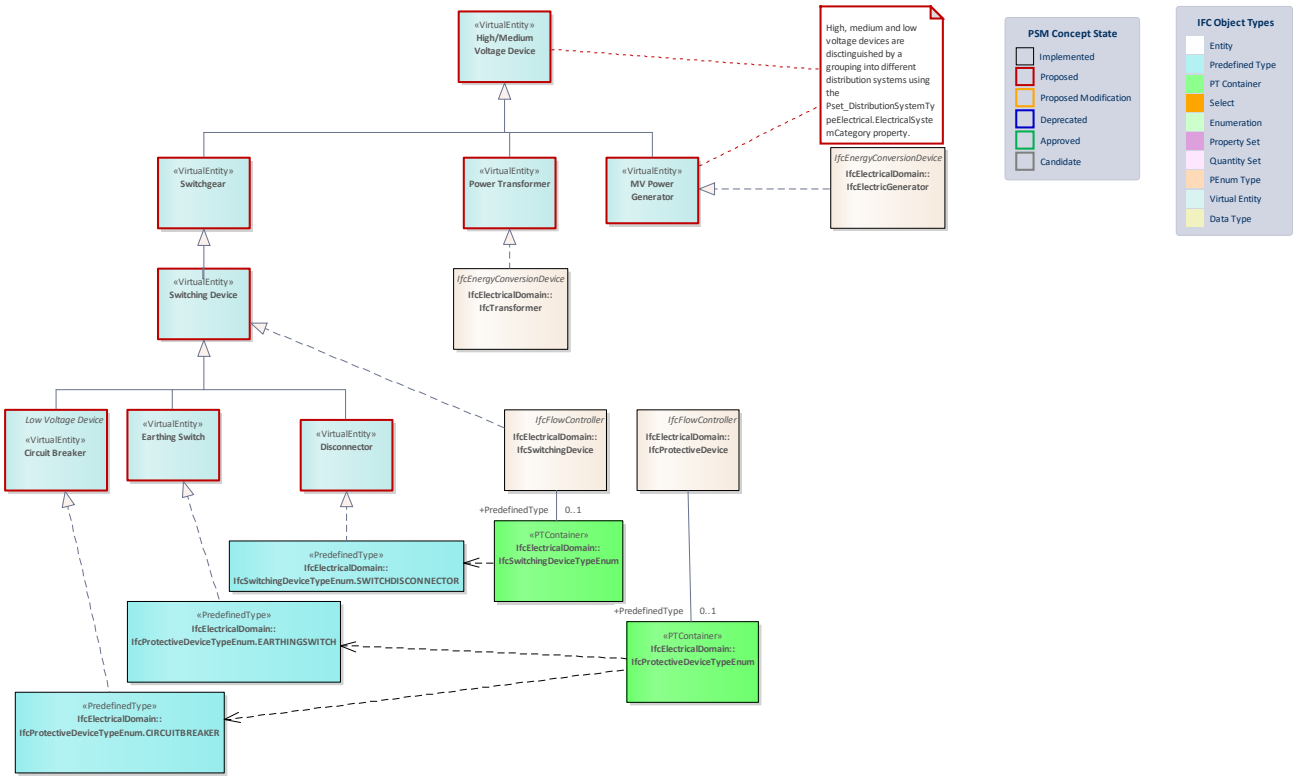

Figure 16: High/medium voltage devices -

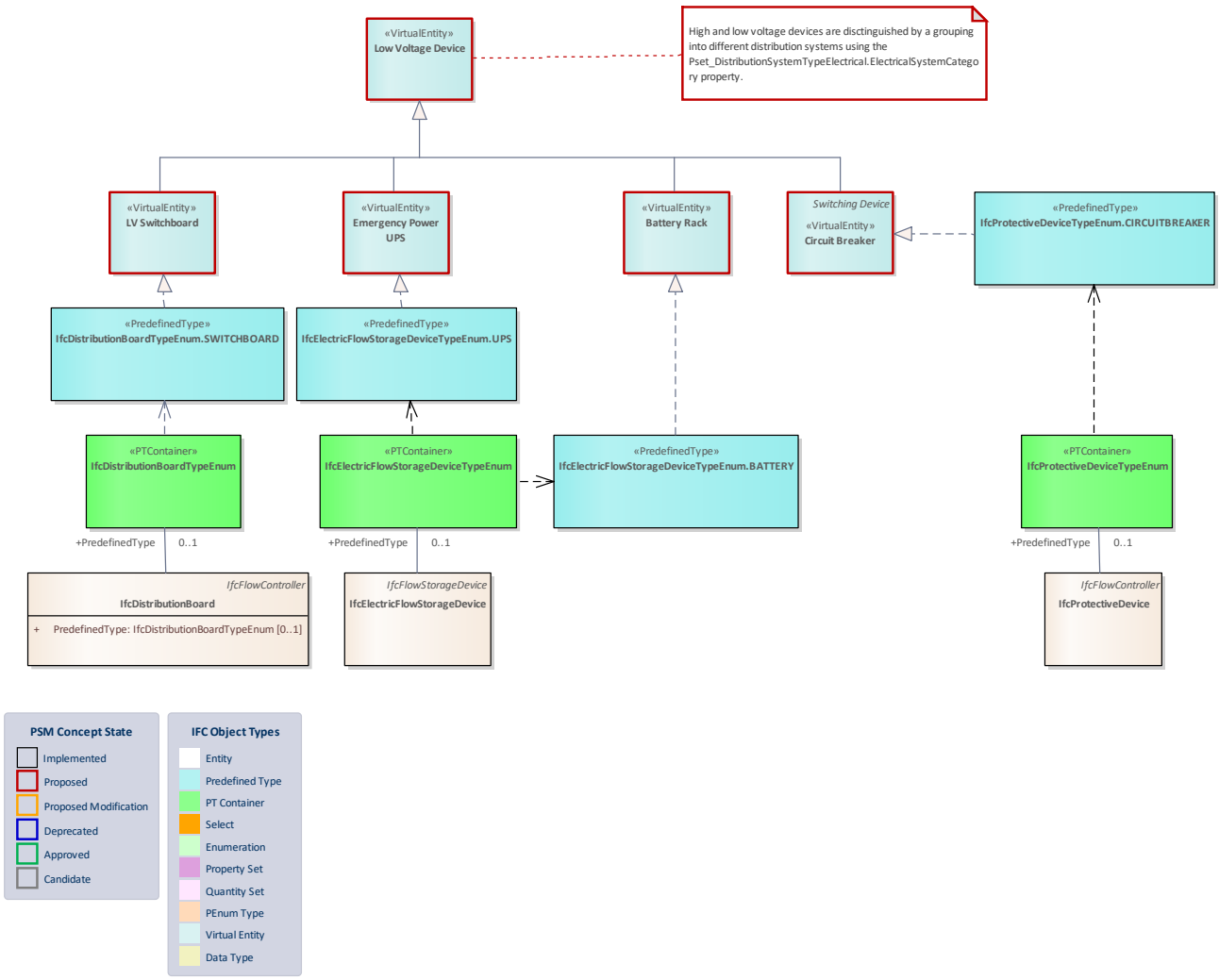

Figure 17: Low voltage devices -

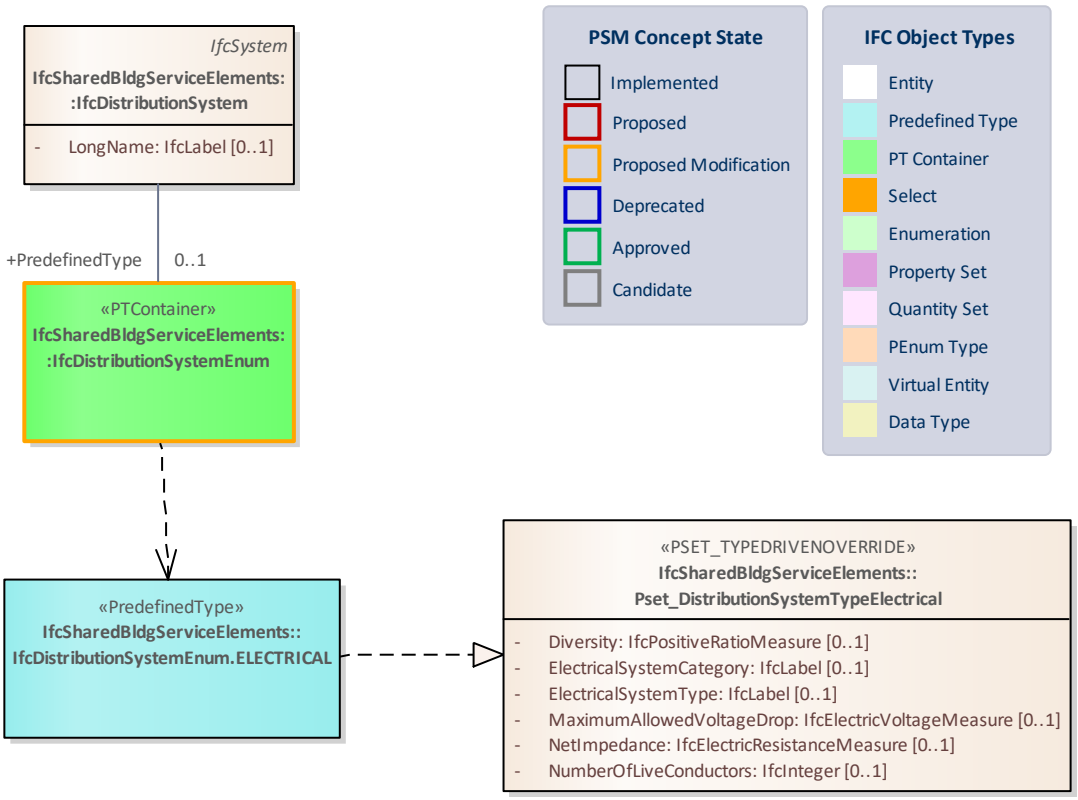

Figure 18: System elements -

2.4.1 PDT Container: IfcDistributionSystemEnum

This enumeration identifies different types of distribution systems. It is used to designate systems by their function as well as ports of devices within such systems to restrict connectivity to compatible connections.

> HISTORY New enumeration in IFC4.

Ports for cable carriers may be connected using _IfcCableCarrierSegment_ and _IfcCableCarrierFitting_. Type objects for cable carrier segments and fittings (_IfcCableCarrierSegmentType_ and _IfcCableCarrierFittingType_ that are not specific to a particular system type may have ports with _PredefinedType_ of NOTDEFINED which indicates that occurrences of such objects may connect to ports of any other cable-carrier based port. Valid enumerations for cable carriers are the same as that for cables, and may be asserted if ports of the contained cables are all of the same type.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Container Properties			
Parent Entity	IfcDistributionSystem IfcDistributionPort	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
	IfcDistributionSystemEnum.MONITORINGSYSTEM IfcDistributionSystemEnum.COMPRESSEDAIR IfcDistributionSystemEnum.EARTHING IfcDistributionSystemEnum.VENTILATION IfcDistributionSystemEnum.TELEPHONE IfcDistributionSystemEnum.HEATING IfcDistributionSystemEnum.DISPOSAL IfcDistributionSystemEnum.TV IfcDistributionSystemEnum.HAZARDOUS IfcDistributionSystemEnum.CONVEYING IfcDistributionSystemEnum.OIL IfcDistributionSystemEnum.EXHAUST IfcDistributionSystemEnum.REFRIGERATION IfcDistributionSystemEnum.LIGHTNINGPROTECTION IfcDistributionSystemEnum.DATA IfcDistributionSystemEnum.CHEMICAL IfcDistributionSystemEnum.DRAINAGE IfcDistributionSystemEnum.SEWAGE IfcDistributionSystemEnum.AIRCONDITIONING IfcDistributionSystemEnum.FIREPROTECTION IfcDistributionSystemEnum.OPERATIONAL IfcDistributionSystemEnum.CONDENSERWATER IfcDistributionSystemEnum.CONTROL IfcDistributionSystemEnum.SECURITY IfcDistributionSystemEnum.DOMESTICCOLDWATER IfcDistributionSystemEnum.DOMESTICHOTWATER IfcDistributionSystemEnum.VENT IfcDistributionSystemEnum.WASTEWATER IfcDistributionSystemEnum.ELECTRICAL IfcDistributionSystemEnum.LIGHTING IfcDistributionSystemEnum.FUEL IfcDistributionSystemEnum.AUDIOVISUAL	IfcDistributionSystemEnum.SAFETY IfcDistributionSystemEnum.CATENARY_SYSTEM IfcDistributionSystemEnum.OVERHEAD_CONTACTLINE_SYSTEM IfcDistributionSystemEnum.RETURN_CIRCUIT	

	IfcDistributionSystemEnum.VACUUM IfcDistributionSystemEnum.STORMWATER IfcDistributionSystemEnum.RAINWATER IfcDistributionSystemEnum.CHILLEDWATER IfcDistributionSystemEnum.COMMUNICATION IfcDistributionSystemEnum.ELECTROACOUSTIC IfcDistributionSystemEnum.WATERSUPPLY IfcDistributionSystemEnum.GAS IfcDistributionSystemEnum.SIGNAL IfcDistributionSystemEnum.POWERGENERATION IfcDistributionSystemEnum.MUNICIPALSOLIDWASTE	

2.4.2 Virtual Entity: Battery Rack

IEC 60050-482

Support, stand or grating with one or more levels or tiers for the installation of cells or monoblock cointainers in a stationary battery.

Entity Properties	
Realizing Parent	IfcElectricFlowStorageDeviceTypeEnum.BATTERY
Notes	

2.4.3 Virtual Entity: Cable

IEC 60050-461

Assembly consisting of one or more coductor cores, their individual coverings, common assembly protection, and protective coverings. Dedicated to the flow of electricity.

Entity Properties	
Realizing Parent	IfcCableSegment
Notes	

2.4.4 Virtual Entity: Cable Tray

IEC 61537

System component used for cable support consisting of a base with integratedside members or a base connected to side members.

Entity Properties	
Realizing Parent	IfcCableCarrierSegment IfcCableCarrierFitting
Notes	

2.4.5 Virtual Entity: Circuit Breaker

IEC 60050-441-14

Mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified duration and reaking currents under apecified abnormal conditions such as those of short cicuit.

Entity Properties	
Realizing Parent	IfcProtectiveDeviceTypeEnum.CIRCUITBREAKER
Notes	

2.4.6 Virtual Entity: Disconnector

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcSwitchingDeviceTypeEnum.SWITCHDISCONNECTOR
Notes	

2.4.7 Virtual Entity: Distribution

<<ToDo: definition>>

Entity Properties

Realizing Parent	
Notes	

2.4.8 Virtual Entity: Earthing Switch

2.4.9

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcProtectiveDeviceTypeEnum.EARTHINGSWITCH
Notes	

2.4.10 Virtual Entity: Emergency Power UPS

IEC 62040-1

Combination of convertors, switches, and energy storage devices (for example, batteries), constituting a power system for maintaining continuity of load power in case of input power failure.

Entity Properties	
Realizing Parent	IfcElectricFlowStorageDeviceTypeEnum.UPS
Notes	

2.4.11 Virtual Entity: High/Medium Voltage Device

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	High, medium and low voltage devices are disctinguished by a grouping into different distribution systems using the Pset_DistributionSystemTypeElectrical.ElectricalSystemCategory property.

2.4.12 Virtual Entity: Junction Box

IEC 60050-412

Closed or protected connecting device allowing making of one or several junctions, including an insulating base and possibly a cover.

Entity Properties	
Realizing Parent	IfcJunctionBox
Notes	

2.4.13 Virtual Entity: Low Voltage Device

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	High and low voltage devices are disctinguished by a grouping into different distribution systems using the Pset_DistributionSystemTypeElectrical.ElectricalSystemCategory property.

2.4.14 Virtual Entity: LV Cable

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	High, medium and low voltage devices are disctinguished by a grouping into different distribution systems using the Pset_DistributionSystemTypeElectrical.ElectricalSystemCategory property.

2.4.15 Virtual Entity: LV Switchboard

IEC 60439-1

A combination of one or more low-voltage swtiching devices togheter with asssociated control, measuring, signaling, protective equipment, etc. Completely assembled with all the internal electrical and mechanical interconnections and structural parts.

Entity Properties	
Realizing Parent	IfcDistributionBoardTypeEnum.SWITCHBOARD
Notes	

2.4.16 Virtual Entity: MV Cable

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	High, medium and low voltage devices are disctinguished by a grouping into different distribution systems using the Pset_DistributionSystemTypeElectrical.ElectricalSystemCategory property.

2.4.17 Virtual Entity: MV Power Generator

IEC 60050-602

A group of rotating machines transforming mechanical or thermal energy into electricity, in an internal combustion set the prime mover consists of an internal combustion engine.

Entity Properties	
Realizing Parent	IfcElectricGenerator
Notes	High, medium and low voltage devices are disctinguished by a grouping into different distribution systems using the Pset_DistributionSystemTypeElectrical.ElectricalSystemCategory property.

2.4.18 Virtual Entity: Power Transformer

IEC 60050-421-01

A static piece of apparatus with two or more windings which, transforms a system of alternating voltage and current into another system of voltage and current usually of different values and at the same frequency for the purpose of transmitting electrical power.

Entity Properties	
Realizing Parent	IfcTransformer
Notes	

2.4.19 Virtual Entity: Switchgear

IEC 60050-441

General term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures.

Entity Properties	
Realizing Parent	
Notes	

2.4.20 Virtual Entity: Switching Device

IEC 60050-441-11

A device designed to make or break the current flow in one or more electric circuits.

Entity Properties	
Realizing Parent	IfcSwitchingDevice
Notes	

2.5 Package: Firefigthing & drainage elements

Package containing taxonomy and IFC mappings for elements related to fire fighting.

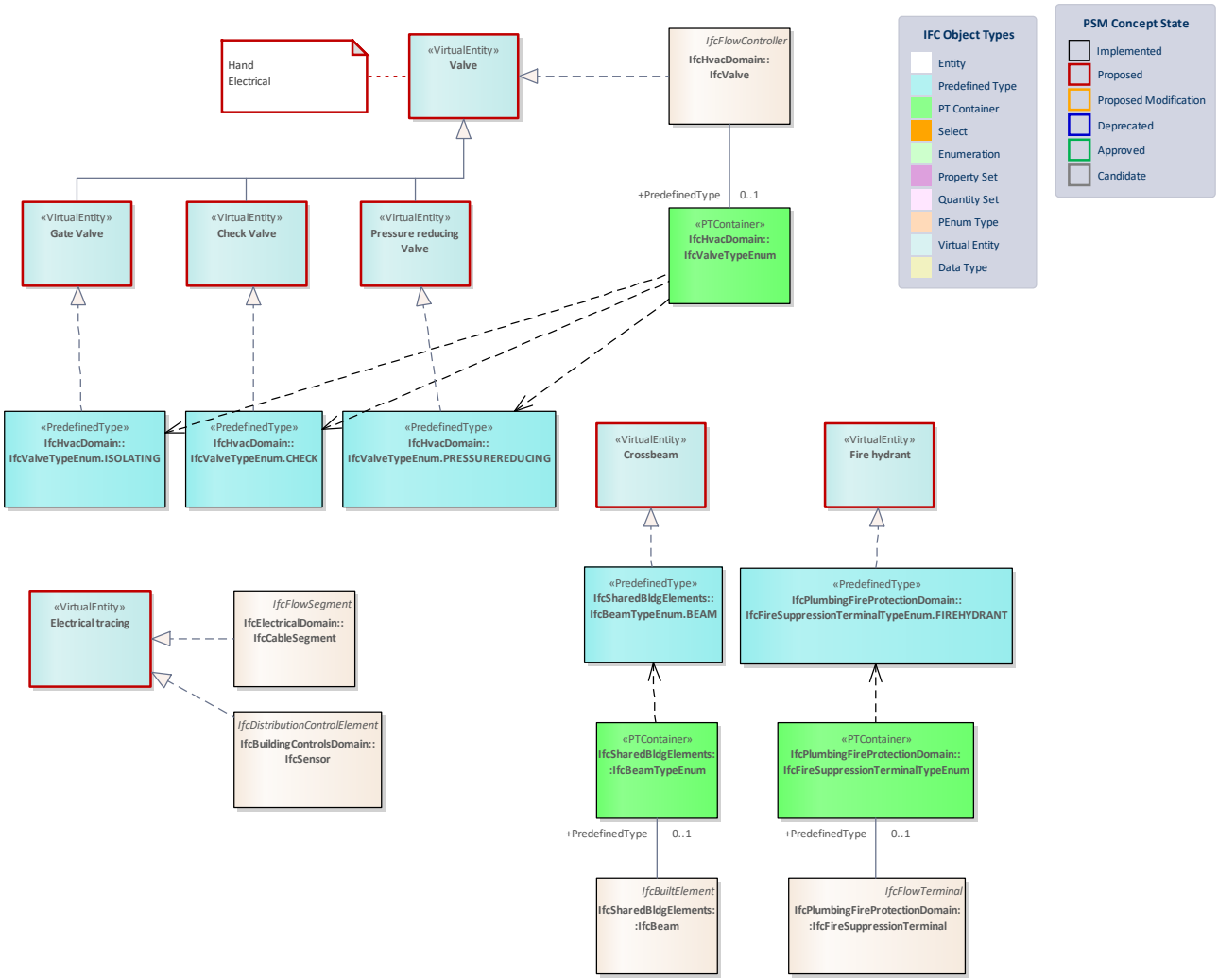

Figure 19: Firefigthing elements 1 -

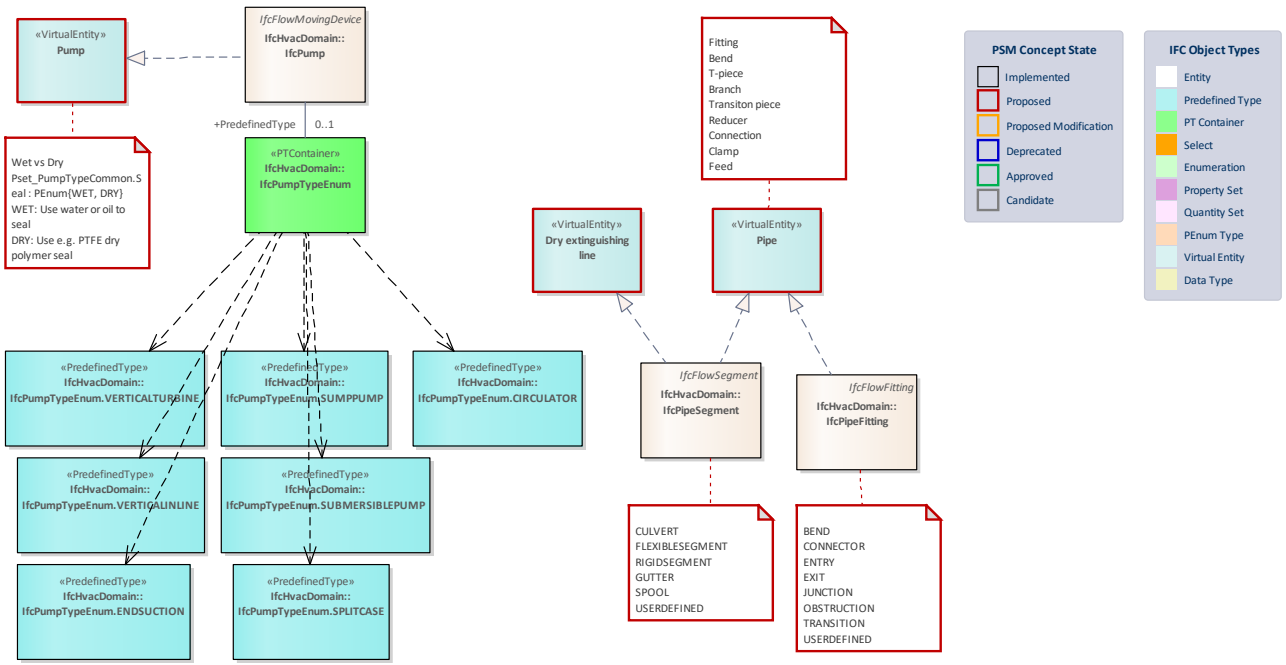

Figure 20: Firefighting elements 2 -

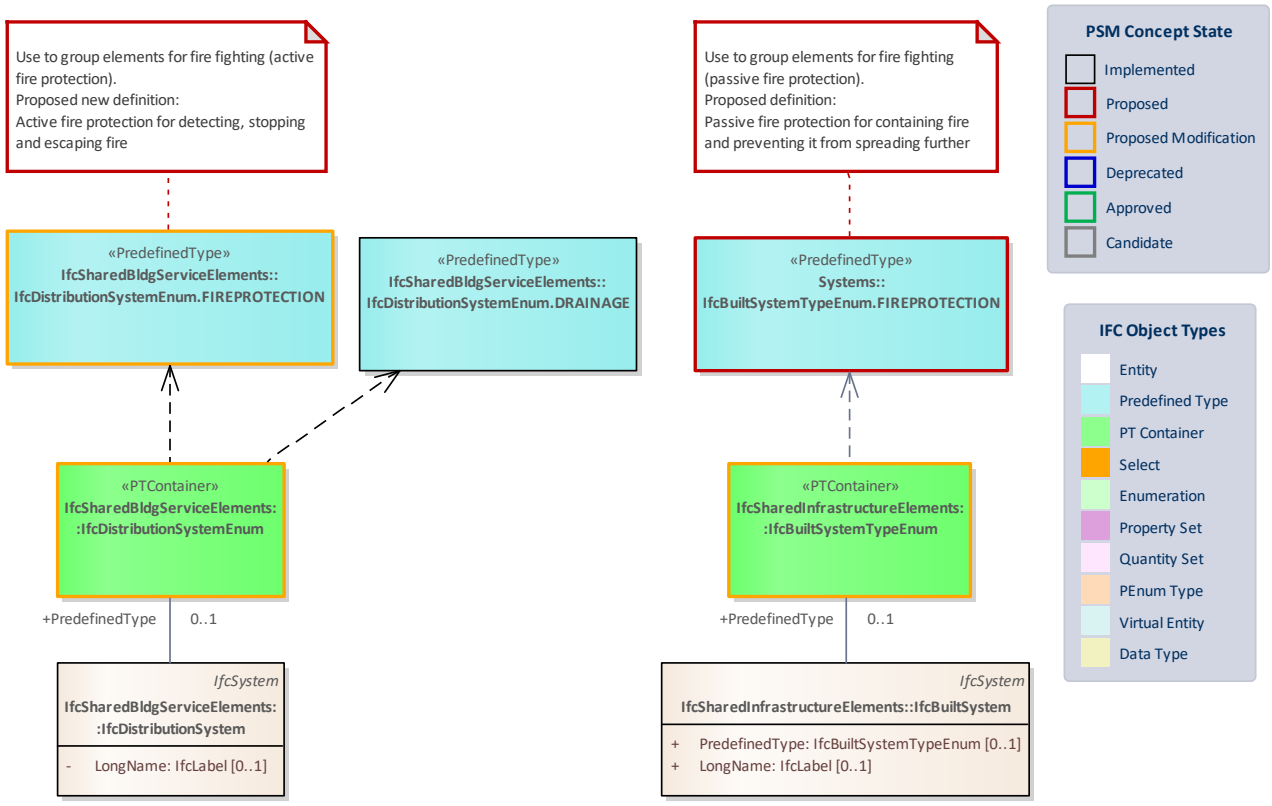

Figure 21: Firefigthing systems -

2.5.1 PDT Container: IfcDistributionSystemEnum

This enumeration identifies different types of distribution systems. It is used to designate systems by their function as well as ports of devices within such systems to restrict connectivity to compatible connections.

> HISTORY New enumeration in IFC4.

Ports for cable carriers may be connected using _IfcCableCarrierSegment_ and _IfcCableCarrierFitting_. Type objects for cable carrier segments and fittings (_IfcCableCarrierSegmentType_ and _IfcCableCarrierFittingType_ that are not specific to a particular system type may have ports with _PredefinedType_ of NOTDEFINED which indicates that occurrences of such objects may connect to ports of any other cable-carrier based port. Valid enumerations for cable carriers are the same as that for cables, and may be asserted if ports of the contained cables are all of the same type.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Container Properties			
Parent Entity	IfcDistributionSystem IfcDistributionPort	**Stereotype**	«PTContainer»
Contains	**EXISTING** IfcDistributionSystemEnum.MONITORINGSYSTEM IfcDistributionSystemEnum.COMPRESSEDAIR IfcDistributionSystemEnum.EARTHING IfcDistributionSystemEnum.VENTILATION IfcDistributionSystemEnum.TELEPHONE IfcDistributionSystemEnum.HEATING IfcDistributionSystemEnum.DISPOSAL IfcDistributionSystemEnum.TV IfcDistributionSystemEnum.HAZARDOUS IfcDistributionSystemEnum.CONVEYING IfcDistributionSystemEnum.OIL IfcDistributionSystemEnum.EXHAUST IfcDistributionSystemEnum.REFRIGERATION IfcDistributionSystemEnum.LIGHTNINGPROTECTION IfcDistributionSystemEnum.DATA	**PROPOSED** IfcDistributionSystemEnum.SAFETY IfcDistributionSystemEnum.CATENARY_SYSTEM IfcDistributionSystemEnum.OVERHEAD_CONTACTLINE_SYSTEM IfcDistributionSystemEnum.RETURN_CIRCUIT	

	IfcDistributionSystemEnum.CHEMICAL IfcDistributionSystemEnum.DRAINAGE IfcDistributionSystemEnum.SEWAGE IfcDistributionSystemEnum.AIRCONDITIONING IfcDistributionSystemEnum.FIREPROTECTION IfcDistributionSystemEnum.OPERATIONAL IfcDistributionSystemEnum.CONDENSERWATER IfcDistributionSystemEnum.CONTROL IfcDistributionSystemEnum.SECURITY IfcDistributionSystemEnum.DOMESTICCOLDWATER IfcDistributionSystemEnum.DOMESTICHOTWATER IfcDistributionSystemEnum.VENT IfcDistributionSystemEnum.WASTEWATER IfcDistributionSystemEnum.ELECTRICAL IfcDistributionSystemEnum.LIGHTING IfcDistributionSystemEnum.FUEL IfcDistributionSystemEnum.AUDIOVISUAL IfcDistributionSystemEnum.VACUUM IfcDistributionSystemEnum.STORMWATER IfcDistributionSystemEnum.RAINWATER IfcDistributionSystemEnum.CHILLEDWATER IfcDistributionSystemEnum.COMMUNICATION IfcDistributionSystemEnum.ELECTROACOUSTIC IfcDistributionSystemEnum.WATERSUPPLY IfcDistributionSystemEnum.GAS IfcDistributionSystemEnum.SIGNAL IfcDistributionSystemEnum.POWERGENERATION IfcDistributionSystemEnum.MUNICIPALSOLIDWASTE	

2.5.2 Predefined Type:

Full Identifier: **IfcDistributionSystemEnum.FIREPROTECTION**

Fire protection sprinkler system.

Proposed new definition: Measures for active fire protection including detecting, stopping and escaping fire

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Predefined Type Properties			
Predefined Type Container	IfcDistributionSystemEnum	**Parent Entity**	IfcDistributionSystem IfcDistributionPort
Stereotype	«PredefinedType»		
Property sets			

2.5.3 PDT Container: IfcBuiltSystemTypeEnum

This enumeration identifies different types of built systems.

Status: **ProposedModification**

Package: **IfcSharedInfrastructureElements**

Container Properties			
Parent Entity	IfcBuiltSystem	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		IfcBuiltSystemTypeEnum.FIREPROTECTION IfcBuiltSystemTypeEnum.SHADING IfcBuiltSystemTypeEnum.MOORINGSYSTEM IfcBuiltSystemTypeEnum.OUTERSHELL IfcBuiltSystemTypeEnum.TUNNEL_PRESUPPORT IfcBuiltSystemTypeEnum.TRANSPORT IfcBuiltSystemTypeEnum.FOUNDATION IfcBuiltSystemTypeEnum.TUNNEL_SUPPORT IfcBuiltSystemTypeEnum.PRESTRESSING IfcBuiltSystemTypeEnum.LOADBEARING IfcBuiltSystemTypeEnum.TUNNEL_LINING IfcBuiltSystemTypeEnum.REINFORCING IfcBuiltSystemTypeEnum.EROSIONPREVENTION IfcBuiltSystemTypeEnum.TRACKCIRCUIT IfcBuiltSystemTypeEnum.WATERPROOFING IfcBuiltSystemTypeEnum.MOORING IfcBuiltSystemTypeEnum.FENESTRATION	

2.5.4 Predefined Type: FIREPROTECTION

Full Identifier: **IfcBuiltSystemTypeEnum.FIREPROTECTION**

Measures for passive fire protection including containing fire and preventing it from spreading further.

Status: **Proposed**

Package: **Systems**

Predefined Type Properties			
Predefined Type Container	IfcBuiltSystemTypeEnum	**Parent Entity**	IfcBuiltSystem
Stereotype	«PredefinedType»		
Property sets			

2.5.5 Virtual Entity: Check Valve

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcValveTypeEnum.CHECK
Notes	

2.5.6 Virtual Entity: Crossbeam

A crossbeam is a long, thick bar of wood, metal, or concrete that is placed between two walls or other structures, especially in order to support the roof of a building.

Entity Properties	
Realizing Parent	IfcBeamTypeEnum.BEAM
Notes	

2.5.7 Virtual Entity: Dry extinguishing line

<<ToDo: definition>>

Entity Properties

Realizing Parent	IfcPipeSegment
Notes	

2.5.8 Virtual Entity: Electrical tracing

Normal cabling

Entity Properties	
Realizing Parent	IfcCableSegment IfcSensor
Notes	

2.5.9 Virtual Entity: Fire hydrant

A fire hydrant or firecock is a connection point by which firefighters can tap into a water supply. It is a component of active fire protection. Underground fire hydrants have been used in Europe and Asia since at least the 18th century. Above-ground pillar-type hydrants are a 19th-century invention.

Entity Properties	
Realizing Parent	IfcFireSuppressionTerminalTypeEnum.FIREHYDRANT
Notes	

2.5.10 Virtual Entity: Gate Valve

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcValveTypeEnum.ISOLATING
Notes	

2.5.11 Virtual Entity: Pipe

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcPipeSegment IfcPipeFitting
Notes	

2.5.12 Virtual Entity: Pressure reducing Valve

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcValveTypeEnum.PRESSUREREDUCING
Notes	

2.5.13 Virtual Entity: Pump

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcPump
Notes	Wet vs Dry Pset_PumpTypeCommon.Seal : PEnum{WET, DRY} WET: Use water or oil to seal DRY: Use e.g. PTFE dry polymer seal

2.5.14 Virtual Entity: Valve

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcValve
Notes	

2.6 Package: Earthing elements

Package containing taxonomy and IFC mappings for elements related to earthing.

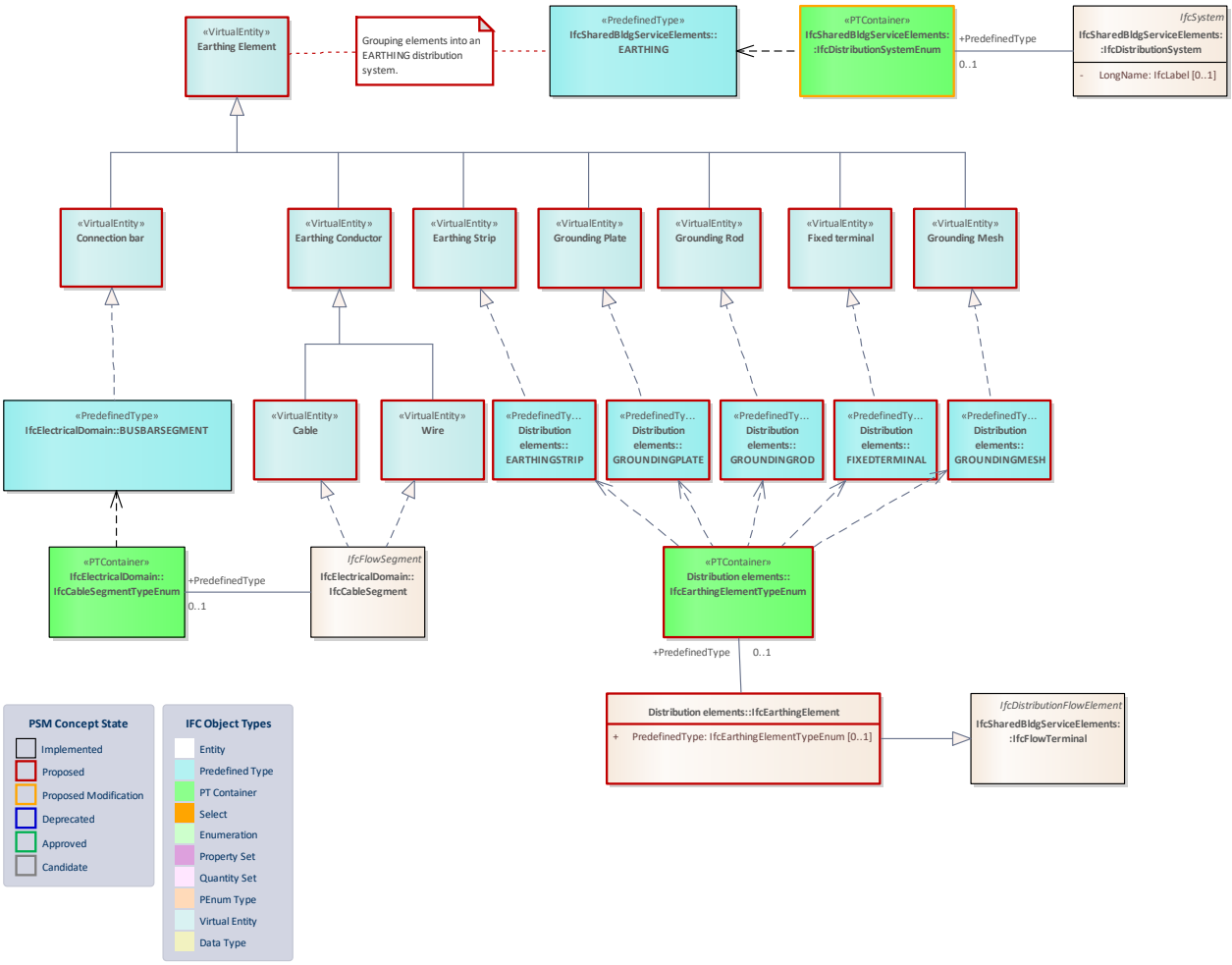

Figure 22: Earthing overview -

2.6.1 PDT Container: IfcDistributionSystemEnum

This enumeration identifies different types of distribution systems. It is used to designate systems by their function as well as ports of devices within such systems to restrict connectivity to compatible connections.

> HISTORY New enumeration in IFC4.

Ports for cable carriers may be connected using _IfcCableCarrierSegment_ and _IfcCableCarrierFitting_. Type objects for cable carrier segments and fittings (_IfcCableCarrierSegmentType_ and _IfcCableCarrierFittingType_ that are not specific to a particular system type may have ports with _PredefinedType_ of NOTDEFINED which indicates that occurrences of such objects may connect to ports of any other cable-carrier based port. Valid enumerations for cable carriers are the same as that for cables, and may be asserted if ports of the contained cables are all of the same type.

bSI Documentation

Status: **ProposedModification**

Package: **IfcSharedBldgServiceElements**

Container Properties			
Parent Entity	IfcDistributionSystem IfcDistributionPort	**Stereotype**	«PTContainer»
Contains	**EXISTING** IfcDistributionSystemEnum.MONITORINGSYSTEM IfcDistributionSystemEnum.COMPRESSEDAIR IfcDistributionSystemEnum.EARTHING IfcDistributionSystemEnum.VENTILATION IfcDistributionSystemEnum.TELEPHONE IfcDistributionSystemEnum.HEATING IfcDistributionSystemEnum.DISPOSAL IfcDistributionSystemEnum.TV IfcDistributionSystemEnum.HAZARDOUS IfcDistributionSystemEnum.CONVEYING IfcDistributionSystemEnum.OIL IfcDistributionSystemEnum.EXHAUST IfcDistributionSystemEnum.REFRIGERATION IfcDistributionSystemEnum.LIGHTNINGPROTECTION IfcDistributionSystemEnum.DATA IfcDistributionSystemEnum.CHEMICAL IfcDistributionSystemEnum.DRAINAGE IfcDistributionSystemEnum.SEWAGE IfcDistributionSystemEnum.AIRCONDITIONING IfcDistributionSystemEnum.FIREPROTECTION IfcDistributionSystemEnum.OPERATIONAL IfcDistributionSystemEnum.CONDENSERWATER IfcDistributionSystemEnum.CONTROL	**PROPOSED** IfcDistributionSystemEnum.SAFETY IfcDistributionSystemEnum.CATENARY_SYSTEM IfcDistributionSystemEnum.OVERHEAD_CONTACTLINE_SYSTEM IfcDistributionSystemEnum.RETURN_CIRCUIT	

	IfcDistributionSystemEnum.SECURITY IfcDistributionSystemEnum.DOMESTICCOLDWATER IfcDistributionSystemEnum.DOMESTICHOTWATER IfcDistributionSystemEnum.VENT IfcDistributionSystemEnum.WASTEWATER IfcDistributionSystemEnum.ELECTRICAL IfcDistributionSystemEnum.LIGHTING IfcDistributionSystemEnum.FUEL IfcDistributionSystemEnum.AUDIOVISUAL IfcDistributionSystemEnum.VACUUM IfcDistributionSystemEnum.STORMWATER IfcDistributionSystemEnum.RAINWATER IfcDistributionSystemEnum.CHILLEDWATER IfcDistributionSystemEnum.COMMUNICATION IfcDistributionSystemEnum.ELECTROACOUSTIC IfcDistributionSystemEnum.WATERSUPPLY IfcDistributionSystemEnum.GAS IfcDistributionSystemEnum.SIGNAL IfcDistributionSystemEnum.POWERGENERATION IfcDistributionSystemEnum.MUNICIPALSOLIDWASTE	

2.6.2 Class: IfcEarthingElement

A terminal or busbar which is part of the earthing arrangement of an installation and which enables the electric connection of a number of conductors for earthing purposes.

Status: **Proposed**

Package: **Distribution elements**

Class Properties			
Status	Proposed	**Is Abstract**	
Property sets			

Inheritance Statement		
Subtype Of	IfcFlowTerminal	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcEarthingElementTypeEnum	[0..1]	

2.6.3 PDT Container: IfcEarthingElementTypeEnum

Status: **Proposed**

Package: **Distribution elements**

Container Properties			
Parent Entity	IfcEarthingElement	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		IfcEarthingElementTypeEnum.EARTHINGSTRIP IfcEarthingElementTypeEnum.GROUNDINGPLATE IfcEarthingElementTypeEnum.GROUNDINGROD IfcEarthingElementTypeEnum.FIXEDTERMINAL IfcEarthingElementTypeEnum.GROUNDINGMESH	

2.6.4 Predefined Type: EARTHINGSTRIP

Full Identifier: **IfcEarthingElementTypeEnum.EARTHINGSTRIP**

According to EN 62561-2, for use in earth-termination and lightning protection systems as well as for ring equipotential bonding.

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthingElementTypeEnum	**Parent Entity**	IfcEarthingElement

Stereotype	«PredefinedType»		
Property sets			

2.6.5 Predefined Type: FIXEDTERMINAL

Full Identifier: **IfcEarthingElementTypeEnum.FIXEDTERMINAL**

According to EN 62561-2, for installation in concrete as a corrosion-free connection to the earth-termination system for protective equipotential bonding and / or functional equipotential bonding of the down conductor

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthingElementTypeEnum	**Parent Entity**	IfcEarthingElement
Stereotype	«PredefinedType»		
Property sets			

2.6.6 Predefined Type: GROUNDINGMESH

Full Identifier: **IfcEarthingElementTypeEnum.GROUNDINGMESH**

IEC 60050-531

An electrode in the form of a mesh, and designed to establish an equipotential plan.

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthingElementTypeEnum	**Parent Entity**	IfcEarthingElement
Stereotype	«PredefinedType»		
Property sets			

2.6.7 Predefined Type: GROUNDINGPLATE

Full Identifier: **IfcEarthingElementTypeEnum.GROUNDINGPLATE**

IEC 62561-2

Earth electrode consisting of a metal plate buried in the ground

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthingElementTypeEnum	**Parent Entity**	IfcEarthingElement
Stereotype	«PredefinedType»		
Property sets			

2.6.8 Predefined Type: GROUNDINGROD

Full Identifier: **IfcEarthingElementTypeEnum.GROUNDINGROD**

IEC 62561-2

Earth electrode consisting of a metal rod driven into the ground

Status: **Proposed**

Package: **Distribution elements**

Predefined Type Properties			
Predefined Type Container	IfcEarthingElementTypeEnum	**Parent Entity**	IfcEarthingElement
Stereotype	«PredefinedType»		
Property sets			

2.6.9 Virtual Entity: Cable

<<ToDo: definition>>

Entity Properties

Realizing Parent	IfcCableSegment
Notes	

2.6.10 Virtual Entity: Connection bar

IEC 60050-826

Busbar which is part of an equipotential bonding system and enables the electric connection of anumber of conductors for equipotential bonding purposes.

Entity Properties	
Realizing Parent	IfcCableSegmentTypeEnum.BUSBARSEGMENT
Notes	

2.6.11 Virtual Entity: Earthing Conductor

IEC 60050-195

Conductor which provides a conductive path, or part of the conductive path, between a given point in a system or in an installation or in equipment and an earth electrode

Entity Properties	
Realizing Parent	
Notes	

2.6.12 Virtual Entity: Earthing Element

<<ToDo: definition>>

Entity Properties	
Realizing Parent	
Notes	

2.6.13 Virtual Entity: Earthing Strip

According to EN 62561-2, for use in earth-termination and lightning protection systems as well as for ring equipotential bonding.

Entity Properties	
Realizing Parent	IfcEarthingElementTypeEnum.EARTHINGSTRIP
Notes	

2.6.14 Virtual Entity: Fixed terminal

According to EN 62561-2, for installation in concrete as a corrosion-free connection to the earth-termination system for protective equipotential bonding and / or functional equipotential bonding of the down conductor

Entity Properties	
Realizing Parent	IfcEarthingElementTypeEnum.FIXEDTERMINAL
Notes	

2.6.15 Virtual Entity: Grounding Mesh

IEC 60050-531

An electrode in the form of a mesh, and designed to establish an equipotential plan.

Entity Properties	
Realizing Parent	IfcEarthingElementTypeEnum.GROUNDINGMESH
Notes	

2.6.16 Virtual Entity: Grounding Plate

IEC 62561-2

Earth electrode consisting of a metal plate buried in the ground

Entity Properties	
Realizing Parent	IfcEarthingElementTypeEnum.GROUNDINGPLATE
Notes	

2.6.17 Virtual Entity: Grounding Rod

IEC 62561-2

Earth electrode consisting of a metal rod driven into the ground

Entity Properties	
Realizing Parent	IfcEarthingElementTypeEnum.GROUNDINGROD
Notes	

2.6.18 Virtual Entity: Wire

<<ToDo: definition>>

Entity Properties	
Realizing Parent	IfcCableSegment
Notes	