Part 3 - The UML Model Report

Ports & Waterways Schema Elements

Project/Publisher: IFC Infrastructure for Ports & Waterways (IPW)
Common Schema / IFC Infra Program Office

Work Package: IPW - WP3 – Schema Extension Development
Common Schema - WP2 – Harmonization & Development

Date: 24/04/2020

Version: **V07** – FINAL, PUBLISHED

Document Information

Document ID	Title	Created By	Created
IR-CS-WP2	bSI UML Model Report - Part 3	CU/AB	2019-11-22

Revision History

Version	Status	Date	Notes
V01	DRAFT	2019-11-22	First draft
V02	DRAFT	2019-11-28	Textual additions such as introduction & methods
V03	DRAFT	2019-18-12	Zurich harmonization updates
V04	DRAFT	2020-01-13	Further harmonization updates and formatting moved to part of unified document.
V05	DRAFT	2020-01-21	model and grammar updates
V06	FINAL	2020-02-04	Submission to SCE for candidate standard
V07	PUBLISHED	2020-04-24	Corrections for publication as candidate standard

Author List

IFC Common Schema

| Jim Plume | BuildingSMART Australasia | Matthias Weise | AEC3 |
| Jon Mirtschin | GeometryGym | | |

IFC Ports & Waterways

Prof. Haijiang Li	Cardiff University	Song Liu	CCCC
Alex Bradley	Cardiff University	Honglei Qin	CCCC
Nicholas Nisbet;	AEC3 UK	Xi Wen	CCCC
Mike Ramsay	Royal Haskoning DHV	Veronica Ruby-Lewis	Waldeck Consulting
Daniel Peel	Royal Haskoning DHV	Kyle Moss;	Waldeck Consulting
Maik Weidt	WSV Germany	Michael Kluge	Planen Bauen 4.0
Julia Wissel	WSV Germany		

IFC Rail

Evandro Alfieri	Engisis	Chi Zhang	Applitec
Claude Marschal	R+P AG	Florian Hulin	SNCP Réseau
Matthiew Perin	Railenium	Thomas Liebich	AEC3
Sebastian Esser	TUM		

IFC Road

Hyounseok Moon	KICT	Karin Anderson	Swedish Transport Agency
André Borrmann	TUM	Juha Hyvärinen	
Štefan Jaud	TUM	Lars Wikström	Triona
Sergej Muhič	Siemens & AEC3	Johnny Jensen	Trimble
Antonio Marquez	Apogea	Joaquim Moya	Apogea
Jaeyoung Shin	KICT	FeiFei Zhao	CRBIM
Jisun Won	KICT		

Table of Contents

1 Package: IFC Ports and Waterways

The IFC for Ports & Waterways (IPW) conceptual model contains many concepts covering various topics within the ports & waterways domain. This work is subdivided into manageable packages based on the taxonomy of the IFC. Each package may have dependencies to other packages within the ports & waterways domain model and external sources such as common schema & other concurrent BuildingSMART projects to import and realise all necessary elements required in that topic area. In addition, all packages have a dependency on the IFC baseline schema which represents the IFC model at it's latest candidate release state of IFC 4.2. This is because all new concepts within the model derive from existing IFC concepts within IFC 4.2.

For IFC Ports & Waterways, we have defined a package structure according to FIGURE XX, below. This document follows the structure of these packages. Each package is fully described, and each concept enumerated with descriptions, relationships and property/quantity set assignments. In addition, document annexes elaborate imported packages that are not within the scope of this project and the ports & waterways domain.
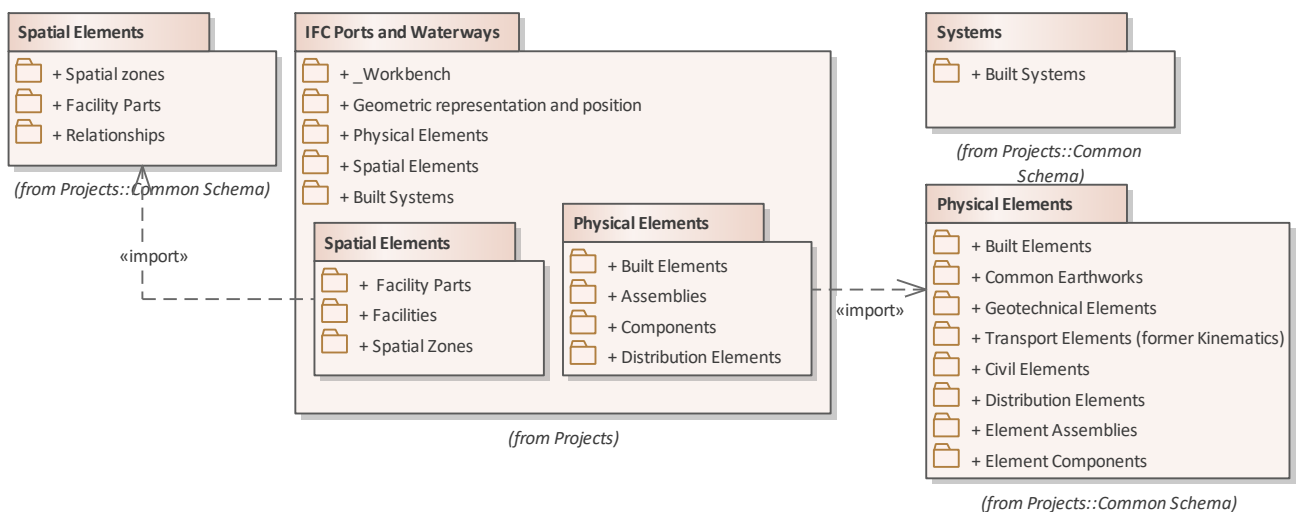
Figure 1: IFC Ports and waterways - Top level package and import structure for IFC for Ports and Waterways.

1.1 Package: Physical Elements

This package contains concepts that represent physical elements that make up constructed facilities within the ports and waterways domain. this elements are positioned and/or contained within the logical spatial structure of the project (refer to spatial elements). These elements typically have geometric shape, location, made of materials and other physical properties.

Signal
- + IfcSignal
- + IfcSignalType
- + IfcSignalTypeEnum
- + AUDIO
- + MIXED
- + VISUAL

(from Projects::Common Schema::Physical Elements:: Distribution Elements)

Physical Elements
- + Built Elements
- + Assemblies
- + Components
- + Distribution Elements

Distribution Elements
- + Flow Segments
- + Flow Terminals

Assemblies
- + ENTRANCEWORKS

(from Projects::IFC Ports and Waterways)

Built Elements
- + Mooring Elements
- + Navigation Elements
- + Vertical Elements

Components
- + Element Parts
- + Impact Protection Devices
- + Mechanical Fasteners

«import»

Built Elements
- + Access Elements
- + Course Elements
- + Members
- + Pavement Elements
- + Railing Elements
- + Slab Elements

(from Projects::Common Schema::Physical Elements)

Element Assemblies
- + MAST
- + SIGNALASSEMBLY

(from Projects::Common Schema::Physical Elements)

«import»

Common Earthworks
- + Earthworks Cut Elements
- + Earthworks Elements
- + Earthworks Systems
- + Geographic Elements

(from Projects::Common Schema:: Physical Elements)

«import»

Geotechnical Elements
- + *IfcGeotechnicalElement*
- + PEnum_ElementStatus
- + PEnum_UncertaintyBasis
- + PEnum_RiskRating
- + *Pset_Uncertainty*
- + Geotechnical stratums
- + Geotechnical Assemblies

(from Projects::Common Schema:: Physical Elements)

«import»

Element Components
- + Impact Devices
- + Sign Elements
- + Surface Features

(from Projects::Common Schema::Physical Elements)

«import»

Transport Elements (former Kinematics)
- + HAULINGGEAR
- + STRUCTURE
- + CARGO
- + ROLLINGSTOCK
- + VEHICLE
- + VEHICLEAIR
- + VEHICLEMARINE
- + VEHICLETRACKED
- + VEHICLEWHEELED
- + IfcTransportElementNonFixedTypeEnum
- + *IfcTransportElementTypeSelect*
- + *PSet_ElementKinematics*

(from Projects::Common Schema::Physical Elements)

Figure 2: Physical Elements - Overview of package structure

1.1.1 Package: Built Elements

This package addresses the modelling of ports and waterways domain elements that derive from IfcBuiltElement or IfcBuiltElementType. These comprise all elements that are primarily part of the construction of a built facility. Built elements are all physically existent and tangible things. Typical examples include walls, doors, beams or slabs.
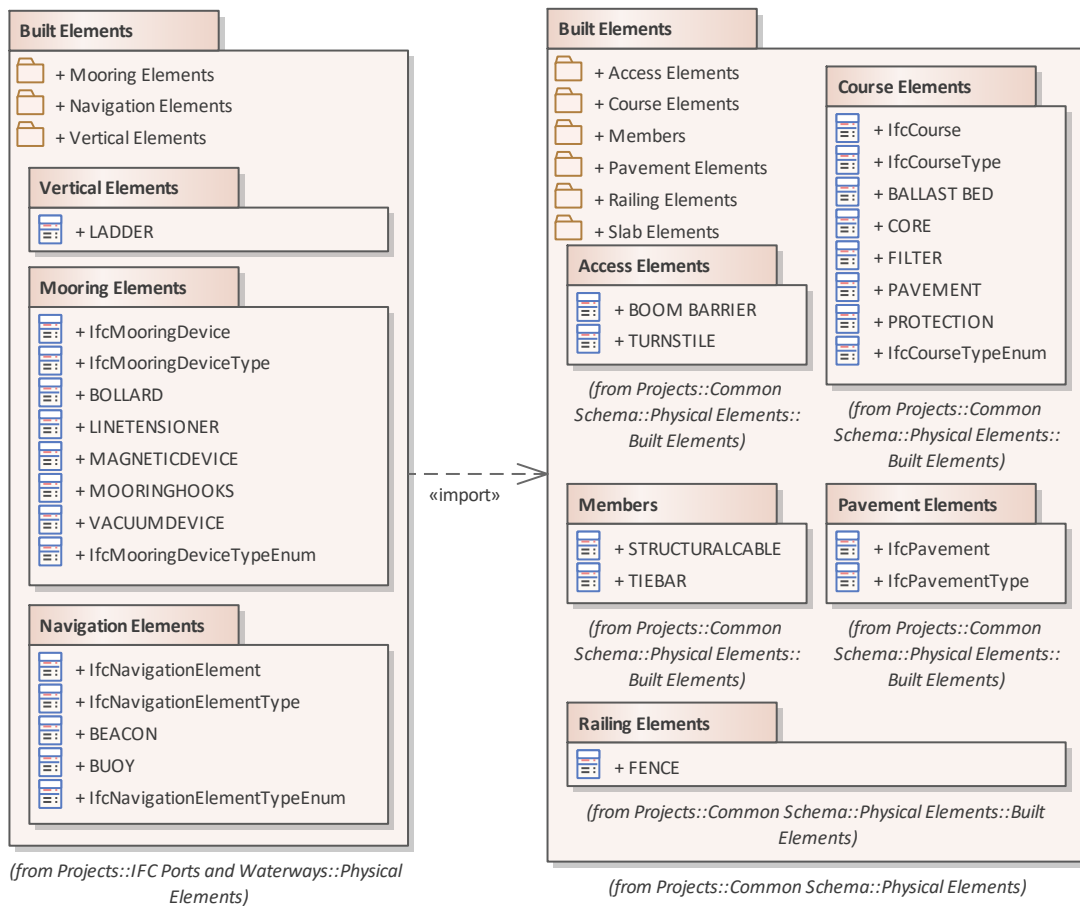
Figure 3: Built Elements - Overview of package structure.

1.1.1.1.1 Class: IfcBuiltElement

The built element comprises all elements that are primarily part of the construction of a built facility, i.e., its structural and space separating system. Built elements are all physically existent and tangible things

> NOTE Definition from ISO 6707-1: Major functional part of a building, examples are foundation, floor, roof, wall.

This IfcBuiltElement is a generalization of all elements that participate in a building system. Typical examples of IfcBuiltElement's are (among others):

- built elements within a space separation systems
- built elements within an enclosure system (such as a facade)
- built elements within a fenestration system
- built elements within a load bearing system
- built elements within a foundation system

> EXAMPLE built elements are walls, curtain wall, doors, columns, pile, and others.

REMOVE{ The _IfcBuiltElement_ is an abstract entity that cannot be instantiated. For arbitrary building elements, that cannot be expressed by a subtype of _IfcBuiltElement_, use _IfcBuiltElementProxy_.}

The IfcBuiltElement can be instantiated in the case when arbitrary built elements cannot be expressed by a subtype of IfcBuiltElement.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

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

Inheritance Statement			
Subtype Of	IfcElement		
Subtypes	EXISTING		PROPOSED
	IfcWindow	IfcMember	IfcNavigationElement
	IfcStairFlight	IfcCurtainWall	IfcMooringDevice
	IfcWall	IfcFooting	IfcEarthworksElement
	IfcStair	IfcDeepFoundation	IfcRail
	IfcSlab	IfcColumn	IfcCourse
	IfcShadingDevice	IfcChimney	IfcKerb
	IfcRampFlight	IfcCovering	IfcTrackElement
	IfcRoof	IfcBearing	IfcPavement
	IfcRamp	IfcBeam	
	IfcPlate		

1.1.1.1.2 Class: IfcBuiltElementType

The IfcBuiltElementType provides the type information for IfcBuiltElement occurrences.

> NOTE The product representations are defined as representation maps (at the level of the supertype IfcTypeProduct , which gets assigned by an element occurrence instance through the _IfcShapeRepresentation.Item[1]_ being an _IfcMappedItem_.

A built element type is used to define the common properties of a certain type of built element that are applied to all occurrences of that type. It is used to define a built element specification (i.e. the specific product information, that is common to all occurrences of that product type). Built element types (or the instantiable subtypes) may be exchanged without being already assigned to occurrences.

REMOVE{ The IfcBuildingElementType is an abstract type that cannot be instantiated. For arbitrary building element types, that cannot be expressed by a subtype of IfcBuildingElementType, use IfcBuildingElementProxyType.}

The IfcBuiltElementType can be instantiated in the case when arbitrary built element types cannot be expressed by a subtype of IfcBuiltElementType.

Occurrences of subtypes of the IfcBuildingElementType are represented by instances of the appropriate subtypes of IfcBuildingElement.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

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

Inheritance Statement			
Subtype Of	IfcElementType		
Subtypes	**EXISTING**		**PROPOSED**
	IfcBeamType	IfcRampFlightType	IfcKerbType
	IfcBearingType	IfcRampType	IfcNavigationElementType
	IfcChimneyType	IfcRoofType	IfcRailType
	IfcColumnType	IfcShadingDeviceType	IfcTrackElementType
	IfcCoveringType	IfcSlabType	IfcMooringDeviceType
	IfcCurtainWallType	IfcStairFlightType	IfcPavementType
	IfcDeepFoundationType	IfcStairType	IfcCourseType
	IfcMemberType	IfcWallType	
	IfcPlateType	IfcWindowType	
	IfcRailingType	IfcFootingType	

1.1.1.2 Package: Mooring Elements

This package addresses the definition of elements and ancillaries related to the mooring of vessels in various scenarios such as against a quayside or on a deep-water single point mooring.
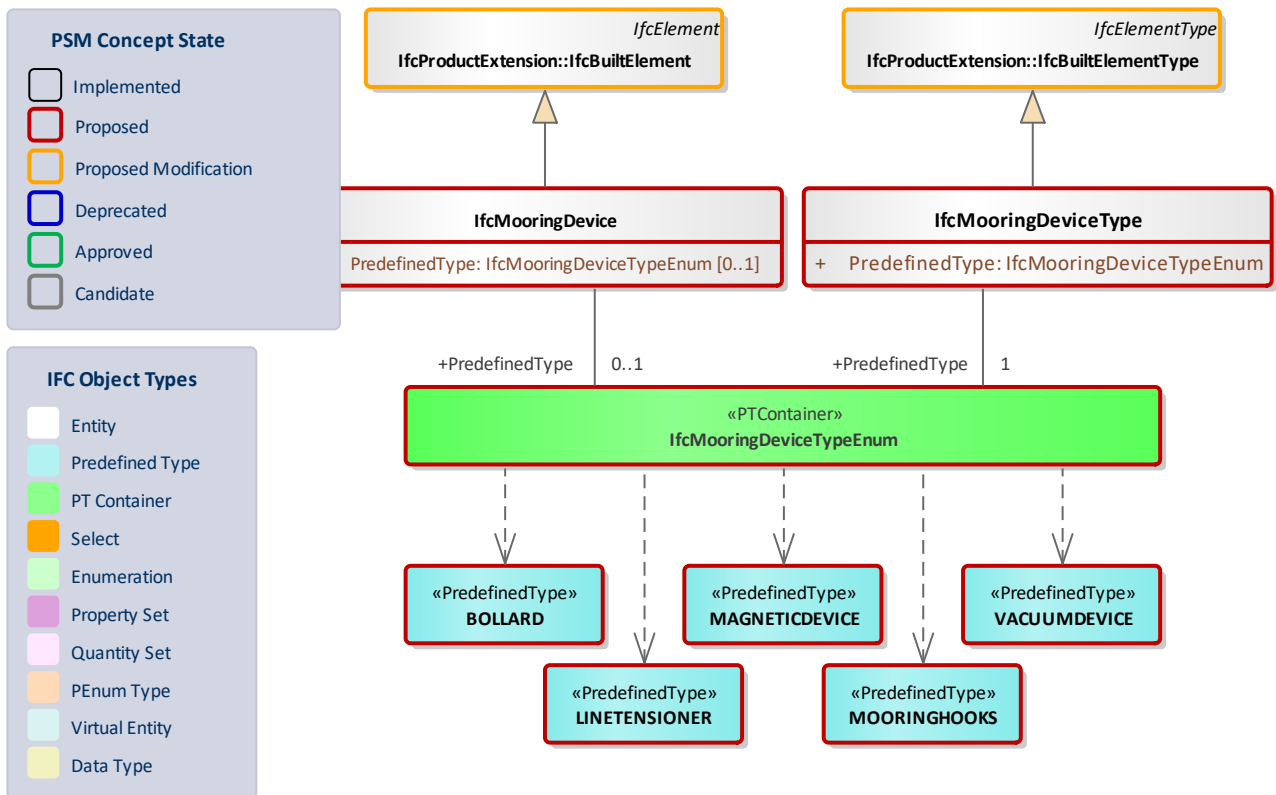
Figure 4: Mooring Elements - new extension to cover mooring elements.

1.1.1.2.1 Class: IfcMooringDevice

A mooring device is an active or passive built element who's primary function is to participate in the mooring of a vessel, this could be in the form of a bollard used as am attachment point for lines or active equipment such as quick release hooks.

Status: **Proposed**

Package: **Mooring Elements**

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

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multipl	Definition
PredefinedType	IfcMooringDeviceTypeEnum	[0..1]	Identifies the predefined type of a mooring device 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 IfcMooringDeviceType is assigned, providing its own IfcMooringDeviceType.PredefinedType.

1.1.1.2.2 Class: IfcMooringDeviceType

The IfcMooringDeviceType provides the type information for IfcMooringDevice occurrences.

A mooring device is an active or passive built element who's primary function is to participate in the mooring of a vessel, this could be in the form of a bollard used as an attachment point for lines or active equipment such as quick release hooks.

Status: **Proposed**

Package: **Mooring Elements**

Class Properties			
Status	Proposed	Is Abstract	
Property sets			

Inheritance Statement		
Subtype Of	IfcBuiltElementType	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multipl	Definition
PredefinedType	IfcMooringDeviceTypeEnum		Identifies the predefined type of a mooring device from which the type modelled, may be set.

1.1.1.2.3 PDT Container: IfcMooringDeviceTypeEnum

This container defines the different predefined types of mooring elements that can further specify an IfcMooringDevice or IfcMooringDeviceType.

Status: **Proposed**

Package: **Mooring Elements**

Container Properties				
Parent Entity	IfcMooringDeviceType IfcMooringDevice		**Stereotype**	«PTContainer»
Contains	EXISTING		PROPOSED	
			IfcMooringDeviceTypeEnum.MAGNETICDEVICE IfcMooringDeviceTypeEnum.LINETENSIONER IfcMooringDeviceTypeEnum.BOLLARD IfcMooringDeviceTypeEnum.MOORINGHOOKS IfcMooringDeviceTypeEnum.VACUUMDEVICE	

1.1.1.2.4 Predefined Type: BOLLARD

Full Identifier: **IfcMooringDeviceTypeEnum.BOLLARD**

a short, thick post on the deck of a ship or a quay side, to which ship's rope may be secured. not to be confused with traffic bollards.

Status: **Proposed**

Package: **Mooring Elements**

Predefined Type Properties			
Predefined Type Container	IfcMooringDeviceTypeEnum	**Parent Entity**	IfcMooringDeviceType IfcMooringDevice
Stereotype	«PredefinedType»		
Property sets			

1.1.1.2.5 Predefined Type: LINETENSIONER

Full Identifier: **IfcMooringDeviceTypeEnum.LINETENSIONER**

A mechanical device used to apply a tensioning load to mooring lines to improve vessel stability for port operations.

Status: **Proposed**

Predefined Type Properties			
Predefined Type Container	IfcMooringDeviceTypeEnum	**Parent Entity**	IfcMooringDeviceType
Stereotype	«PredefinedType»		IfcMooringDevice
Property sets			

1.1.1.2.6 Predefined Type: MAGNETICDEVICE

Full Identifier: **IfcMooringDeviceTypeEnum.MAGNETICDEVICE**

A Mooring devices that uses magnets as the primary method of securing the vessel.

Status: **Proposed**

Package: **Mooring Elements**

Predefined Type Properties			
Predefined Type Container	IfcMooringDeviceTypeEnum	**Parent Entity**	IfcMooringDeviceType
Stereotype	«PredefinedType»		IfcMooringDevice
Property sets			

1.1.1.2.7 Predefined Type: MOORINGHOOKS

Full Identifier: **IfcMooringDeviceTypeEnum.MOORINGHOOKS**

Quick release mooring hooks - an active device used to secure a vessel and provide automated release of vessels.

Status: **Proposed**

Package: **Mooring Elements**

Predefined Type Properties			
Predefined Type Container	IfcMooringDeviceTypeEnum	**Parent Entity**	IfcMooringDeviceType
Stereotype	«PredefinedType»		IfcMooringDevice
Property sets			

1.1.1.2.8 Predefined Type: VACUUMDEVICE

Full Identifier: **IfcMooringDeviceTypeEnum.VACUUMDEVICE**

A mooring devices that uses vacuum suction as the primary method of securing the vessel.

Status: **Proposed**

Package: **Mooring Elements**

Predefined Type Properties			
Predefined Type Container	IfcMooringDeviceTypeEnum	**Parent Entity**	IfcMooringDeviceType
Stereotype	«PredefinedType»		IfcMooringDevice
Property sets			

1.1.1.3 Package: Navigation Elements

This package addresses the definition of elements and ancillaries related to the navigation of vessels in various scenarios such around ports and terminals or navigation down managed channels or canals. these elements are usually grouped together into a navigational system.
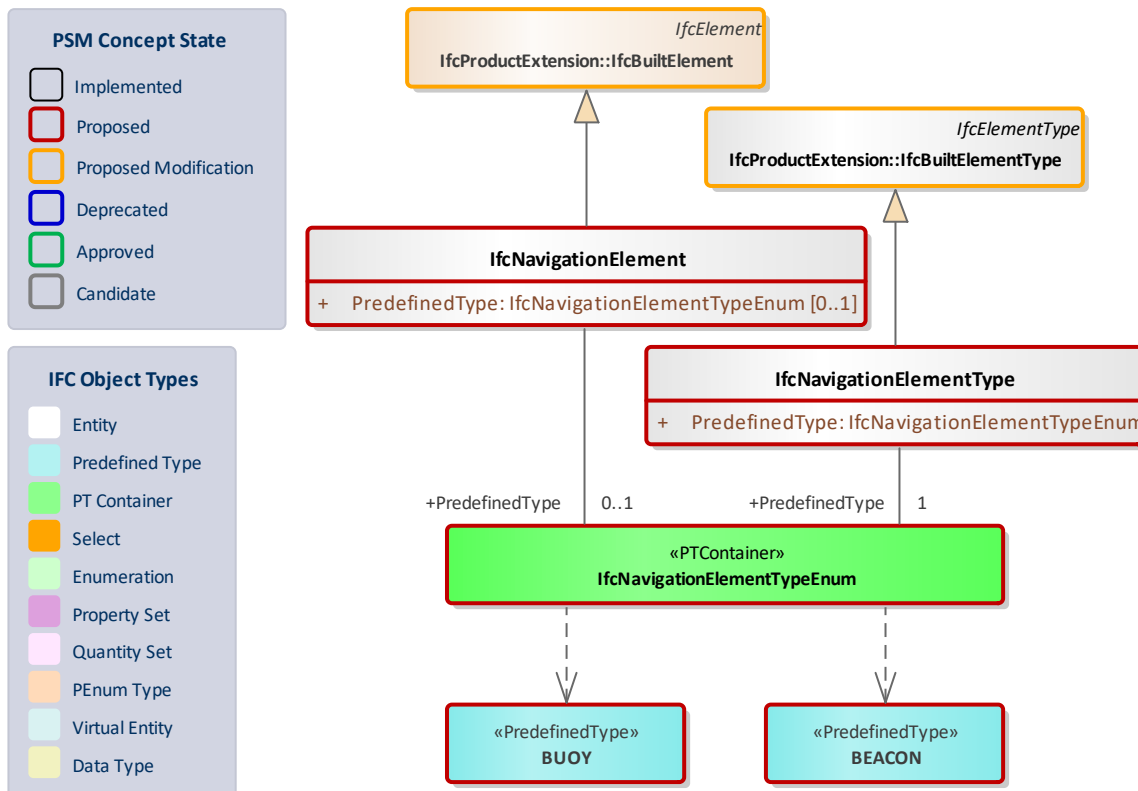

Figure 5: Navigational Elements - new extension to cover navigational elements.

1.1.1.3.1 Class: IfcNavigationElement

A navigation element is an active or passive built element who's primary function is provide navigational instructions and warnings to vessels, this could be in the form of a floating buoy, a fixed beacon.

Navigation elements can aggregate other components and elements to form the entire structure. this might include frame structure to form the body, instances of IfcSign for signage or instances of IfcSignal for supplementary lights an/or sound signals.

Status: **Proposed**

Package: **Navigation Elements**

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

Inheritance Statement		
Subtype Of	IfcBuiltElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcNavigationElement TypeEnum	[0..1]	Identifies the predefined type of a navigational element 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 IfcNavigationElementType is assigned, providing its own IfcNavigationElementType.PredefinedType.

1.1.1.3.2 Class: IfcNavigationElementType

The IfcNavigationElementType provides the type information for IfcNavigationElement occurrences.

A navigation element is an active or passive built element who's primary function is provide navigational instructions and warnings to vessels, this could be in the form of a floating buoy, a fixed beacon or sound signal.

Status: **Proposed**

Package: **Navigation Elements**

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

Inheritance Statement		
Subtype Of	[IfcBuiltElementType](#)	
Subtypes	**EXISTING**	**PROPOSED**

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcNavigationElementTypeEnum		Identifies the predefined type of a navigational element from which the type modelled, may be set.

1.1.1.3.3 PDT Container: IfcNavigationElementTypeEnum

This container defines the different predefined types of navigation elements that can further specify an [IfcNavigationElement](#) or [IfcNavigationElementType](#).

Status: **Proposed**

Package: **Navigation Elements**

Container Properties			
Parent Entity	[IfcNavigationElementType](#) [IfcNavigationElement](#)	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		[IfcNavigationElementTypeEnum.BEACON](#) [IfcNavigationElementTypeEnum.BUOY](#)	

1.1.1.3.4 Predefined Type: BEACON

Full Identifier: **IfcNavigationElementTypeEnum.BEACON**

a fixed vertical structure serving as a navigation mark, to show reefs or other hazards, or provide navigational directions.

Status: **Proposed**

Package: **Navigation Elements**

Predefined Type Properties			
Predefined Type Container	IfcNavigationElementTypeEnum	**Parent Entity**	IfcNavigationElementType
Stereotype	«PredefinedType»		IfcNavigationElement
Property sets			

1.1.1.3.5 Predefined Type: BUOY

Full Identifier: **IfcNavigationElementTypeEnum.BUOY**

an anchored floating structure serving as a navigation mark, to show reefs or other hazards, or provide navigational directions.

Status: **Proposed**

Package: **Navigation Elements**

Predefined Type Properties			
Predefined Type Container	IfcNavigationElementTypeEnum	**Parent Entity**	IfcNavigationElementType
Stereotype	«PredefinedType»		IfcNavigationElement
Property sets			

1.1.1.4 Package: Vertical Elements

This package addresses the definition of elements and ancillaries related to vertical movement of users around a ports and waterways facility.
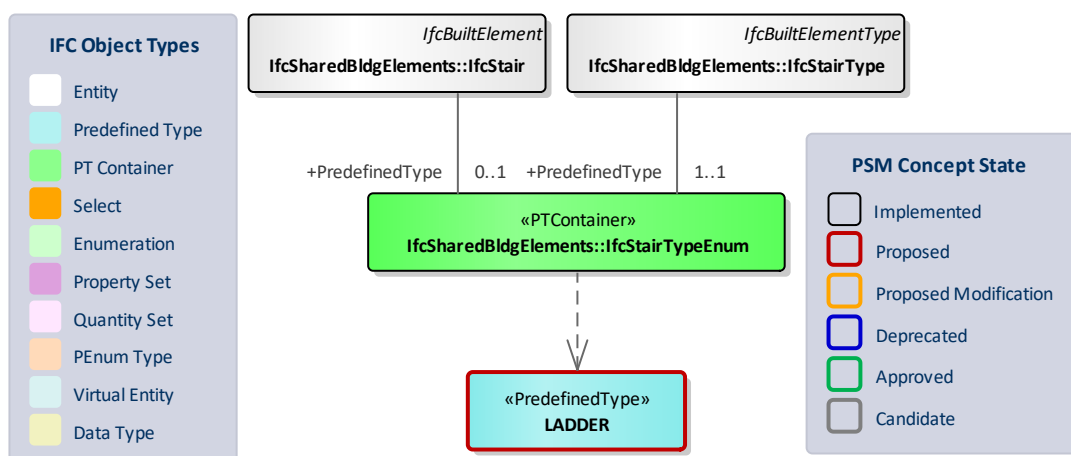
Figure 6: Vertical Elements - Modifications and extensions to vertical elements

1.1.1.4.1 Predefined Type: LADDER

Full Identifier: **IfcStairTypeEnum.LADDER**

a piece of equipment consisting of a series of bars or steps between two upright elements used for climbing up or down something

Status: **Proposed**

Package: **Vertical Elements**

Predefined Type Properties			
Predefined Type Container	IfcStairTypeEnum	**Parent Entity**	IfcStair
Stereotype	«PredefinedType»		IfcStairType
Property sets			

1.1.2 Package: Assemblies

This package addresses the conceptual elements that represent assemblies within the ports & waterways domain. Assemblies are aggregations of other elements and components to form a larger manufactured unit that can be built on site or prefabricated off-site.
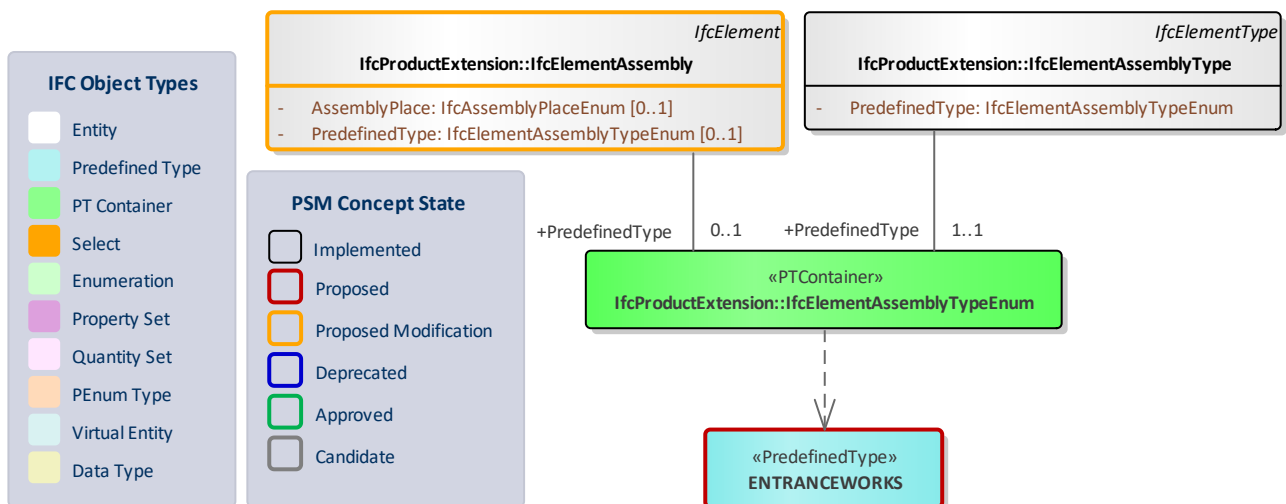
Figure 7: Element Assemblies - Modifications and extensions to element assemblies.

1.1.2.1 Class: IfcElementAssembly

The IfcElementAssembly represents complex element assemblies aggregated from several elements, such as discrete elements, building elements, or other elements.

> EXAMPLE Steel construction assemblies, such as trusses and different kinds of frames, can be represented by the IfcElementAssembly entity. Other examples include slab fields aggregated from a number of precast concrete slabs or reinforcement units made from several reinforcement bars. Also bathroom units, staircase sections and other premanufactured or precast elements are examples of the general IfcElementAssembly entity

> NOTE The IfcElementAssembly is a general purpose entity that is required to be decomposed. Also other subtypes of IfcElement can be decomposed. REMOVE {with some dedicated entities such as IfcWallElementedCase and IfcSlabElementedCase.}

The assembly structure can be nested, i.e. an IfcElementAssembly could be an aggregated part within another IfcElementAssembly.

> NOTE View definitions and/or implementer agreements may restrict the number of allowed levels of nesting.

The geometry of an IfcElementAssembly is generally formed from its components, in which case it does not need to have an explicit geometric representation. In some cases it may be useful to also expose an own explicit representation of the aggregate.

> NOTE View definitions or implementer agreements may further constrain the applicability of certain shape representations at the IfcElementAssembly in respect of the shape representations of its parts.

> HISTORY New entity in IFC2x2.

Informal Propositions:

1. The IfcElementAssembly shall have an aggregation relationship to the contained parts, i.e. the (INV) IsDecomposedBy relationship shall be utilized.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

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

Inheritance Statement		
Subtype Of	IfcElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multipl	Definition
AssemblyPlace	IfcAssemblyPlaceEnum	[0..1]	A designation of where the assembly is intended to take place defined by an Enum.
PredefinedType	IfcElementAssemblyTypeEnum	[0..1]	

1.1.2.2 Predefined Type: ENTRANCEWORKS

Full Identifier: **IfcElementAssemblyTypeEnum.ENTRANCEWORKS**

An assembly forming the support structure of a chamber (lock, dock) gate and associated elements, plus the containment of operational equipment.

Status: **Proposed**

Package: **Assemblies**

Predefined Type Properties			
Predefined Type Container	IfcElementAssemblyTypeEnum	**Parent Entity**	IfcElementAssemblyType
Stereotype	«PredefinedType»		IfcElementAssembly
Property sets			

1.1.3 Package: Components

The components package addresses the modelling of minor items included in, added to or connecting to or between elements, which usually are not of interest from the overall building structure viewpoint. However, these small parts may have vital and load carrying functions within the construction. These items do not provide any actual space boundaries. Typical examples of components include different kinds of fasteners and various accessories.

1.1.3.1 Package: Element Parts

The building element parts package addresses the modelling of major components as subordinate parts of a building element.
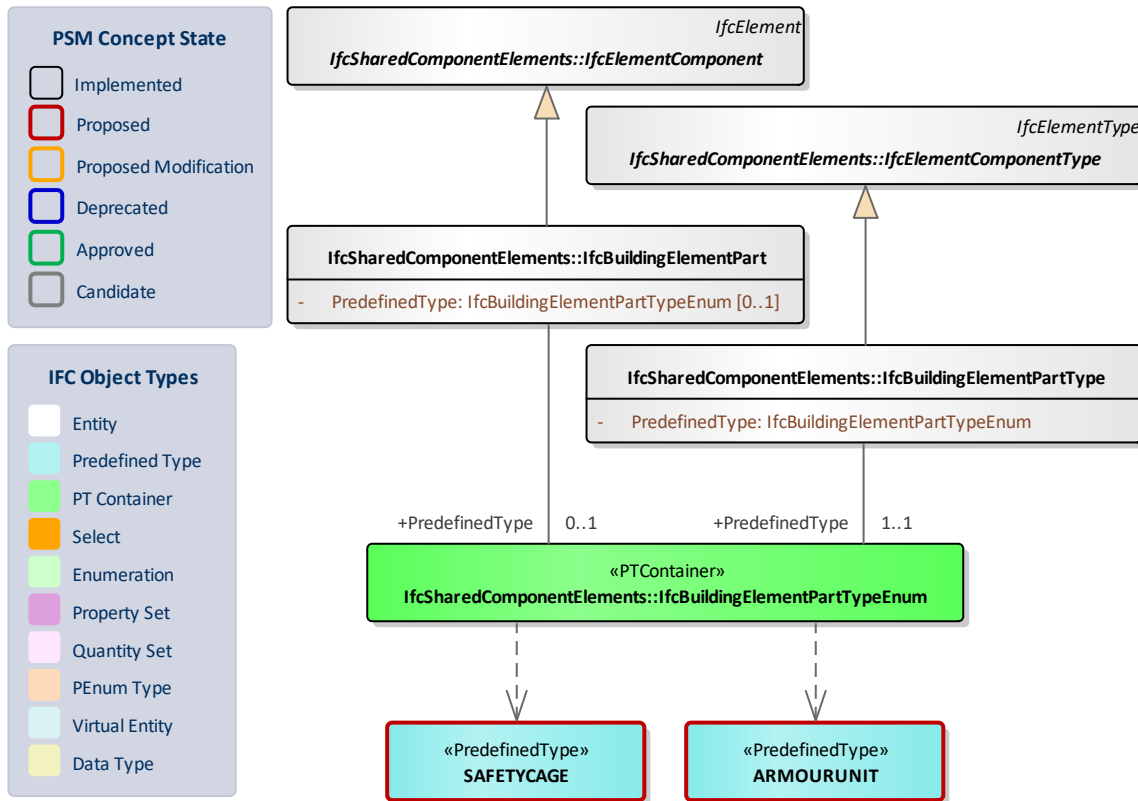
Figure 8: Building Element Parts - Modifications and extensions to building element parts

1.1.3.1.1 Predefined Type: ARMOURUNIT

Full Identifier: **IfcBuildingElementPartTypeEnum.ARMOURUNIT**

A large quarry stone or concrete shaped unit used as erosion prevention on slopes such as revetments and breakwaters. these units are grouped together into a Course layer.

NOTE definition in ISO 21650: relatively large quarry stone or concrete shaped unit that is selected to fit specified geometric characteristics and density.

Status: **Proposed**

Package: **Element Parts**

Predefined Type Properties			
Predefined Type Container	IfcBuildingElementPartTypeEnum	**Parent Entity**	IfcBuildingElementPartType
Stereotype	«PredefinedType»		IfcBuildingElementPart

1.1.3.1.2 Predefined Type: SAFETYCAGE

Full Identifier: **IfcBuildingElementPartTypeEnum.SAFETYCAGE**

Safety cages are an assembly of circular and vertical bars that are fastened to the stiles of fixed ladders and are arranged to enclose the path of a worker when climbing the ladder. Ladders so enclosed are also known as caged or hooped ladders.

Status: **Proposed**

Package: **Element Parts**

Predefined Type Properties			
Predefined Type Container	IfcBuildingElementPartTypeEnum	**Parent Entity**	IfcBuildingElementPartType
Stereotype	«PredefinedType»		IfcBuildingElementPart
Property sets			

1.1.3.2 Package: Impact Protection Devices

This package addresses the components that represent impact protection devices in the ports and waterways domain. An impact protection device functions to protect built elements from the effects of impact and vibration. this new element merges the previous elements of vibration damper and vibration isolator and adds further impact specific devices.
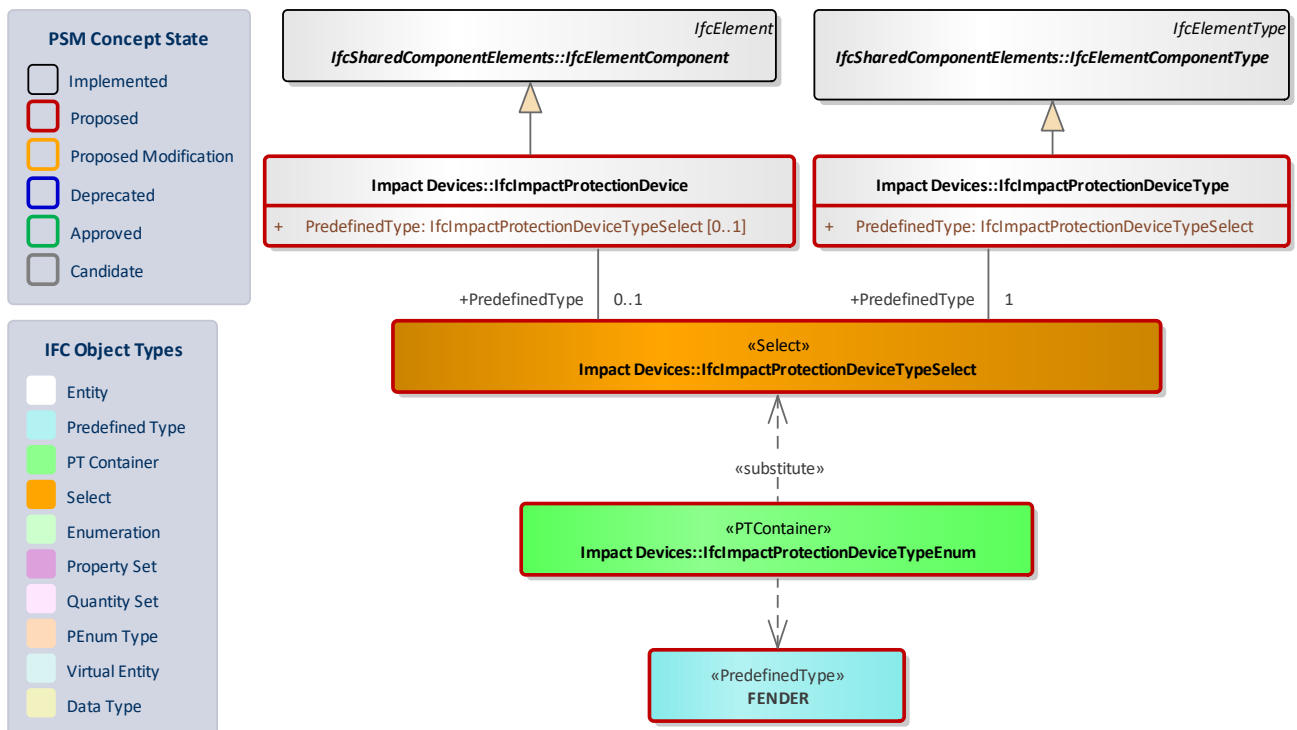
Figure 9: Impact Devices - Modifications and extensions to impact protection devices.

1.1.3.2.1 Class: IfcImpactProtectionDevice

An impact protection device is a component used to protect other built elements from kinetic damage. impact protection devices currently come in 3 different varieties:

- A vibration damper used to minimize the effects of vibration in a structure by dissipating kinetic energy. The damper may be passive (elastic, frictional, inertia) or active (in a system using sensors and actuators).
- A vibration isolator is a device used to minimize the effects of vibration transmissibility in a structure.
- Impact devices that dissipate kinetic energy from impacting elements (such as vehicles) by deformation or elastic mechanics.

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

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

Class Attributes

Name	Type	Multipl	Definition
PredefinedType	IfcImpactProtectionDeviceTypeSelect	[0..1]	Identifies the predefined type of a impact device 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 IfcImpactProtectionDeviceType is assigned, providing its own IfcImpactProtectionDeviceType.PredefinedType.

1.1.3.2.2 Class: IfcImpactProtectionDeviceType

The IfcImpactProtectionDeviceType provides the type information for IfcImpactProtectionDevice occurrences.

An impact protection device is a component used to protect other built elements from kinetic damage.

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

Inheritance Statement	
Subtype Of	IfcElementComponentType

Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multipl	Definition
PredefinedType	IfcImpactProtectionDeviceTypeSelect		Identifies the predefined type of a impact device from which the type modelled, may be set.

1.1.3.2.3 PDT Container: IfcImpactProtectionDeviceTypeEnum

This container defines the different predefined types of kinetic impact protectors that can specify an IfcImpactProtectionDevice or IfcImpactProtectionDeviceType.

Status: **Proposed**

Package: **Impact Devices**

Container Properties			
Parent Entity	IfcImpactProtectionDeviceType IfcImpactProtectionDevice	**Stereotype**	«PTContainer»
Contains	EXISTING	PROPOSED	
		IfcImpactProtectionDeviceTypeEnum.DAMPINGSYSTEM IfcImpactProtectionDeviceTypeEnum.FENDER IfcImpactProtectionDeviceTypeEnum.CRASHCUSHION IfcImpactProtectionDeviceTypeEnum.BUMPER	

1.1.3.2.4 Select: IfcImpactProtectionDeviceTypeSelect

This is a select of enumerations to provide the option of groups of predefined types for an IfcImpactProtectionDevice or IfcImpactProtectionDeviceType.

Status: **Proposed**

Package: **Impact Devices**

Select Properties	
Stereotype	«Select»
Substitutions	IfcVibrationIsolatorTypeEnum IfcImpactProtectionDeviceTypeEnum IfcVibrationDamperTypeEnum

1.1.3.2.5 Predefined Type: FENDER

Full Identifier: **IfcImpactProtectionDeviceTypeEnum.FENDER**

A passive or active device formed of a damper and impact panel that is mounted on the quayside to protect against vessel impact.

Status: **Proposed**

Package: **Impact Protection Devices**

Predefined Type Properties			
Predefined Type Container	IfcImpactProtectionDeviceTypeEnum	**Parent Entity**	IfcImpactProtectionDeviceType
Stereotype	«PredefinedType»		IfcImpactProtectionDevice
Property sets			

1.1.3.3 Package: Mechanical Fasteners

The mechanical fasteners package addresses the definition and modelling of mechanical fasteners such as bolts, nails or wire., that mechanically connect elements or parts together. A single instance of mechanical fastener may represent one or many of actual mechanical fasteners, for example an array of bolts or a row of nails.
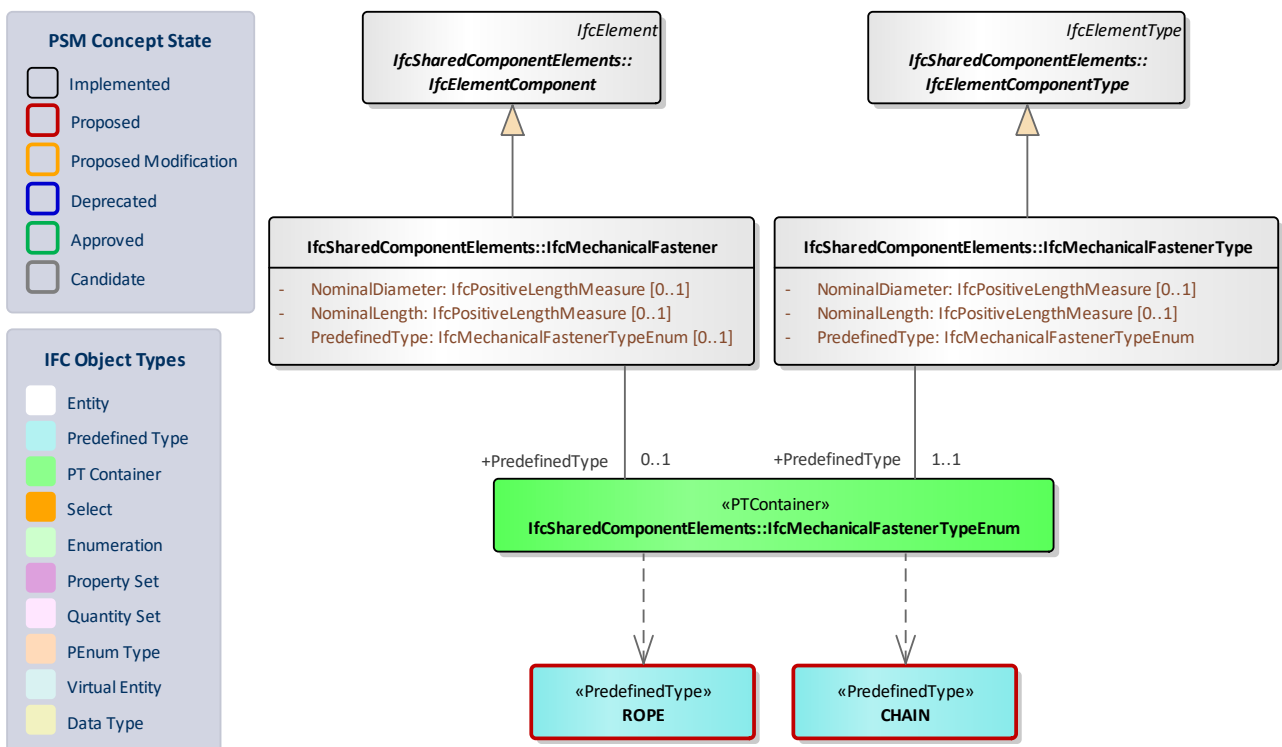
Figure 10: Mechanical Fasteners - Modifications and extensions mechanical fasteners.

1.1.3.3.1 Predefined Type: CHAIN

Full Identifier: **IfcMechanicalFastenerTypeEnum.CHAIN**

a series of linked metal rings used for fastening or securing something, or for pulling loads.

Status: **Proposed**

Package: **Mechanical Fasteners**

Predefined Type Properties			
Predefined Type Container	IfcMechanicalFastenerTypeEnum	**Parent Entity**	IfcMechanicalFastener
Stereotype	«PredefinedType»		IfcMechanicalFastenerType
Property sets			

1.1.3.3.2 Predefined Type: ROPE

Full Identifier: **IfcMechanicalFastenerTypeEnum.ROPE**

a length of thick strong cord made by twisting together strands of hemp, sisal, nylon, or similar material. used primarily for mooring vessels

Status: **Proposed**

Package: **Mechanical Fasteners**

Predefined Type Properties			
Predefined Type Container	IfcMechanicalFastenerTypeEnum	**Parent Entity**	IfcMechanicalFastener
Stereotype	«PredefinedType»		IfcMechanicalFastenerType
Property sets			

1.1.4 Package: Distribution Elements

This package contains all elements and relationships involved in distribution systems. A distribution system is a network designed to receive, store, maintain, distribute, or control the flow of a distribution media, this media could be liquid bulk, dry bulk or energy.

Objects within this package derive from IfcDistributionElement which is a generalization of all elements that participate in a distribution system. The difference between transport and distribution elements is distribution elements are continuous whereas transport elements are discontinuous.

1.1.4.1 Package: Flow Segments

Flow segments define the occurrence of a segment of a flow distribution system. Flow segments are uniform runs or edges (such as pipes, cables or ducts) that carry media between nodes (junctions or chambers). the type of media is further defined by the subtypes of IfcFlowSegment
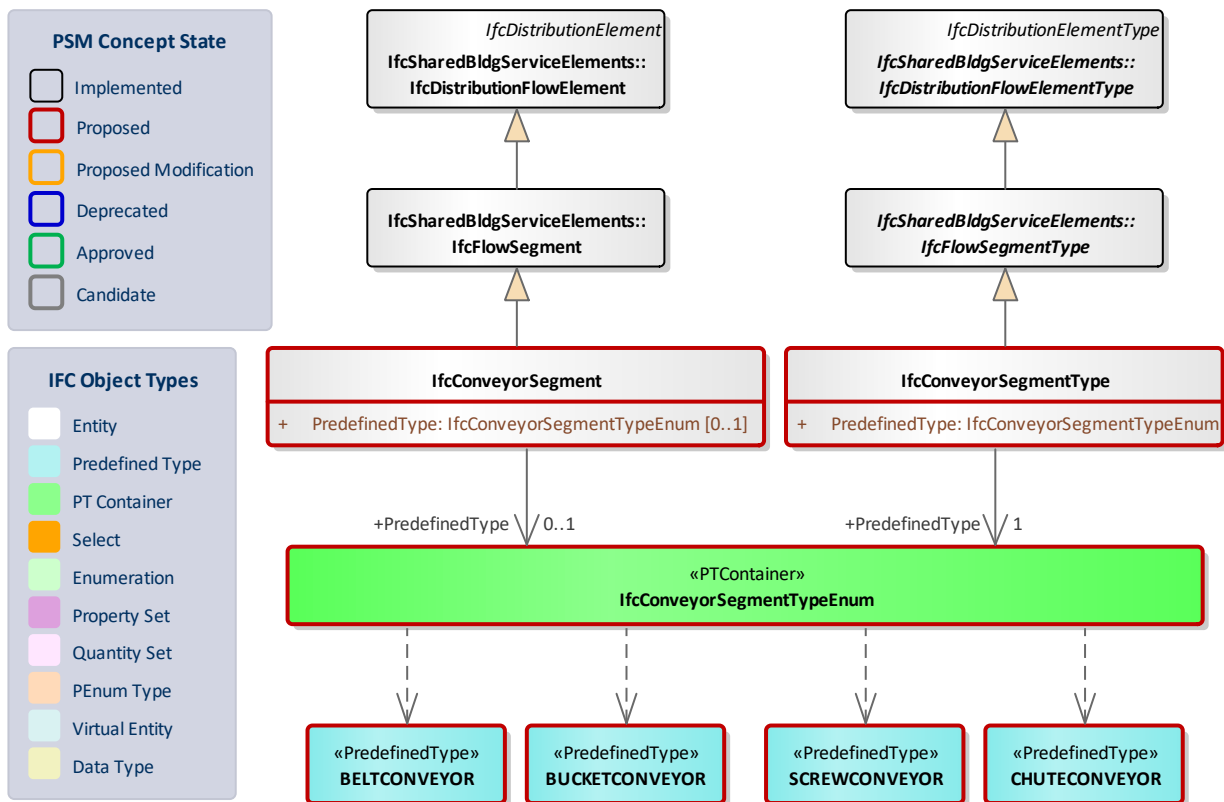
Figure 11: Flow Segments - Modifications and extensions to flow segment elements

1.1.4.1.1 Predefined Type: BELTCONVEYOR

Full Identifier: **ConveyorSegmentTypeEnum.BELTCONVEYOR**

An endless belt for carrying material without stretching.

Status: **Proposed**

Package: **Flow Segments**

Predefined Type Properties			
Predefined Type Container	IfcConveyorSegmentTypeEnum	**Parent Entity**	IfcConveyorSegmentType
Stereotype	«PredefinedType»		IfcConveyorSegment
Property sets			

1.1.4.1.2 Predefined Type: BUCKETCONVEYOR

Full Identifier: **ConveyorSegmentTypeEnum.BUCKETCONVEYOR**

A conveyor in the form of connected buckets or segments that move in a continuous loop

Status: **Proposed**

Package: **Flow Segments**

Predefined Type Properties			
Predefined Type Container	IfcConveyorSegmentTypeEnum	**Parent Entity**	IfcConveyorSegmentType
Stereotype	«PredefinedType»		IfcConveyorSegment
Property sets			

1.1.4.1.3 Predefined Type: CHUTECONVEYOR

Full Identifier: **ConveyorSegmentTypeEnum.CHUTECONVEYOR**

Gravity-operated conveyor where media descends through a trough or chute.

Status: **Proposed**

Package: **Flow Segments**

Predefined Type Properties			
Predefined Type Container	IfcConveyorSegmentTypeEnum	**Parent Entity**	IfcConveyorSegmentType
Stereotype	«PredefinedType»		IfcConveyorSegment

1.1.4.1.4 Predefined Type: SCREWCONVEYOR

Full Identifier: **ConveyorSegmentTypeEnum.SCREWCONVEYOR**

composed of a longitudinal screw in a trough or pipe that rotates to force media through the segment

Status: **Proposed**

Package: **Flow Segments**

Predefined Type Properties			
Predefined Type Container	IfcConveyorSegmentTypeEnum	**Parent Entity**	IfcConveyorSegmentType
Stereotype	«PredefinedType»		IfcConveyorSegment
Property sets			

1.1.4.1.5 Class: IfcConveyorSegment

A conveyor segment defines an occurrence of a flow segment/ continuous run within a conveyor system that joins two sections of the system. these can utilise different carrying methods such as belt, rope, chain, screw

NOTE Definition according to ISO6707-1: machine that continuously transports material or objects along a gentle slope using an endless belt, rope or chain, or rollers.

Status: **Proposed**

Package: **Flow Segments**

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

Inheritance Statement		
Subtype Of	IfcFlowSegment	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multipl	Definition
PredefinedType	IfcConveyorSegment TypeEnum	[0..1]	Identifies the predefined type of a conveyor segment 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 IfcConveyorSegmentType is assigned, providing its own IfcConveyorSegmentType.PredefinedType.

1.1.4.1.6 Class: IfcConveyorSegmentType

The ConveyorSegmentType provides the type information for ConveyorSegment occurrences.

A conveyor segment defines an occurrence of a flow segment/ continuous run within a conveyor system that joins two sections of the system. these can utilise different carrying methods such as belt, rope, chain, screw etc.

Status: **Proposed**

Package: **Flow Segments**

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

Inheritance Statement		
Subtype Of	IfcFlowSegmentType	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multipl	Definition
PredefinedType	IfcConveyorSegment TypeEnum		Identifies the predefined type of a conveyor segment from which the type modelled, may be set.

1.1.4.1.7 PDT Container: IfcConveyorSegmentTypeEnum

This container defines the different predefined types of conveyor segments that can further specify an ConveyorSegment or ConveyorSegmentType.

Status: **Proposed**

Package: **Flow Segments**

Container Properties			
Parent Entity	IfcConveyorSegmentType IfcConveyorSegment	**Stereotype**	«PTContainer»
Contains	EXISTING	PROPOSED	
		ConveyorSegmentTypeEnum.CHUTECONVEYOR ConveyorSegmentTypeEnum.SCREWCONVEYOR ConveyorSegmentTypeEnum.BUCKETCONVEYOR ConveyorSegmentTypeEnum.BELTCONVEYOR	

1.1.4.2 Package: Flow Terminals

Flow Terminals define the occurrence of a permanently attached element that acts as a terminus or beginning of a distribution system (such as an air outlet, drain, water closet, or sink). A terminal is typically a point at which a system interfaces with an external environment. Its type is defined by IfcFlowTerminalType or its subtypes.

1.1.4.2.1 Package: Fire Suppression Terminals

This package addresses the extension of the fire suppression terminal concept which has the purpose of delivering a fluid (gas or liquid) that will suppress a fire.
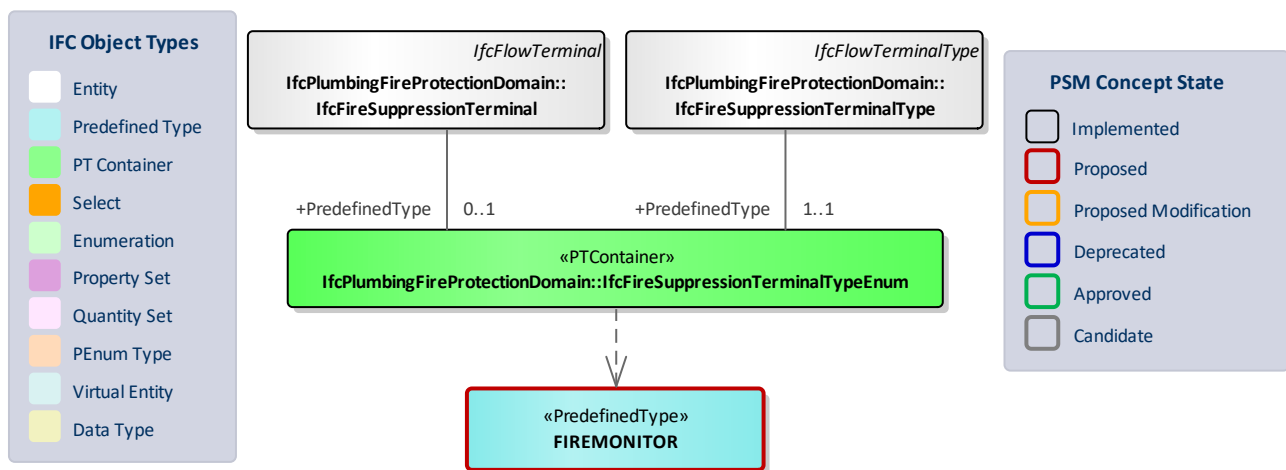
Figure 12: Fire Suppression Terminals - Modifications and extensions to fire suppression terminals

1.1.4.2.1.1 Predefined Type: FIREMONITOR

Full Identifier: **LiquidTerminalTypeEnum.FIREMONITOR**

A device to deliver large volumes of water for fire fighting in high risk locations. May be automated or manually controlled.

Status: **Proposed**

Package: **Fire Suppression Terminals**

Predefined Type Properties			
Predefined Type Container	IfcFireSuppressionTerminalTypeEnum	**Parent Entity**	IfcFireSuppressionTerminal
Stereotype	«PredefinedType»		IfcFireSuppressionTerminalType
Property sets			

1.1.4.2.2 Package: Liquid Terminals

This package addresses the proposition of the liquid terminal concept which provides a node where a liquid distribution system interacts with the external environment.
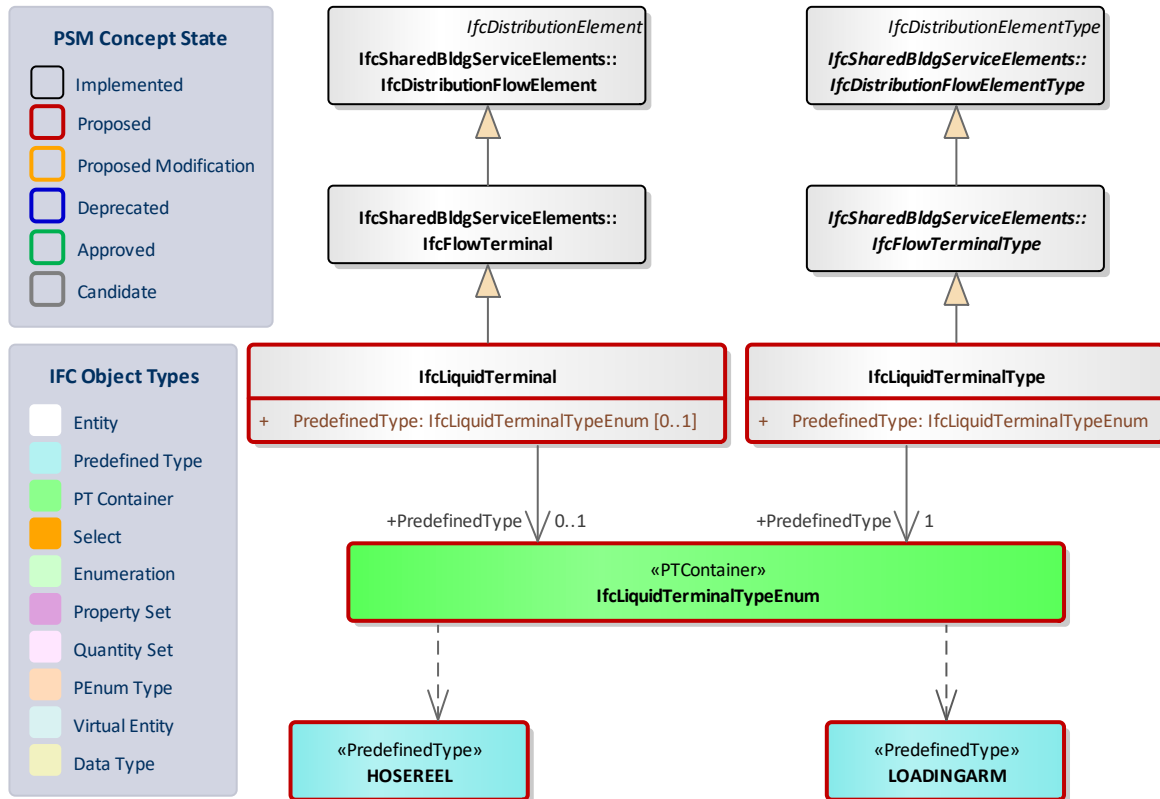
Figure 13: Liquid Terminals - new extensions to flow terminal elements (liquid terminals)

1.1.4.2.2.1 Class: IfcLiquidTerminal

A liquid terminal is a terminating or origination point for the transfer of liquid between distribution system(s). this is the point where the liquid distribution system interacts with the external environment. An example of this is a loading arm for the transfer of liquid from a docked vessel.

Status: **Proposed**

Package: **Liquid Terminals**

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

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

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcLiquidTerminal TypeEnum	[0..1]	Identifies the predefined type of a liquid terminal 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 IfcLiquidTerminalType is assigned, providing its own IfcLiquidTerminalType.PredefinedType.

1.1.4.2.2.2 Class: IfcLiquidTerminalType

The LiquidTerminalType provides the type information for LiquidTerminal occurrences.

A liquid terminal is a terminating or origination point for the transfer of liquid between distribution system(s). this is the point where the liquid distribution system interacts with the external environment. An example of this is a loading arm for the transfer of liquid from a docked vessel.

Status: **Proposed**

Package: **Liquid Terminals**

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

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

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcLiquidTerminalTypeEnum		Identifies the predefined type of a liquid terminal from which the type modelled, may be set.

1.1.4.2.2.3 PDT Container: IfcLiquidTerminalTypeEnum

This container defines the different predefined types of liquid terminals that can further specify an LiquidTerminal or LiquidTerminalType.

Status: **Proposed**

Package: **Liquid Terminals**

Container Properties			
Parent Entity	IfcLiquidTerminalType IfcLiquidTerminal	**Stereotype**	«PTContainer»
Contains	**EXISTING**	**PROPOSED**	
		LiquidTerminalTypeEnum.HOSEREEL LiquidTerminalTypeEnum.LOADINGARM	

1.1.4.2.2.4 Predefined Type: HOSEREEL

Full Identifier: **LiquidTerminalTypeEnum.HOSEREEL**

A Supporting framework on which a hose may be wound whose primary purpose is to connect and interact with the external environment.

Status: **Proposed**

Package: **Liquid Terminals**

Predefined Type Properties			
Predefined Type Container	IfcLiquidTerminalTypeEnum	**Parent Entity**	IfcLiquidTerminalType IfcLiquidTerminal
Stereotype	«PredefinedType»		
Property sets			

1.1.4.2.2.5 Predefined Type: LOADINGARM

Full Identifier: **LiquidTerminalTypeEnum.LOADINGARM**

A loading arm permits the transfer of liquid or liquefied gas from one system to another, through the use of an articulated arm that accounts for the movement of docked vessels.

Status: **Proposed**

Package: **Liquid Terminals**

Predefined Type Properties			
Predefined Type Container	IfcLiquidTerminalTypeEnum	**Parent Entity**	IfcLiquidTerminalType
Stereotype	«PredefinedType»		IfcLiquidTerminal
Property sets			

1.2 Package: Spatial Elements

This package addresses the spatial elements and relationships that might be used to define a hierarchical project structure, in terms of locations and volumes. In addition, this package addresses the definition of non-hierarchal elements such as spatial zones. The spatial structure is key to the organization of physical elements and also can act as an implicit placement structure within non-longitudinal structures. for more information please see the Spatial breakdown explanation in the previous section.
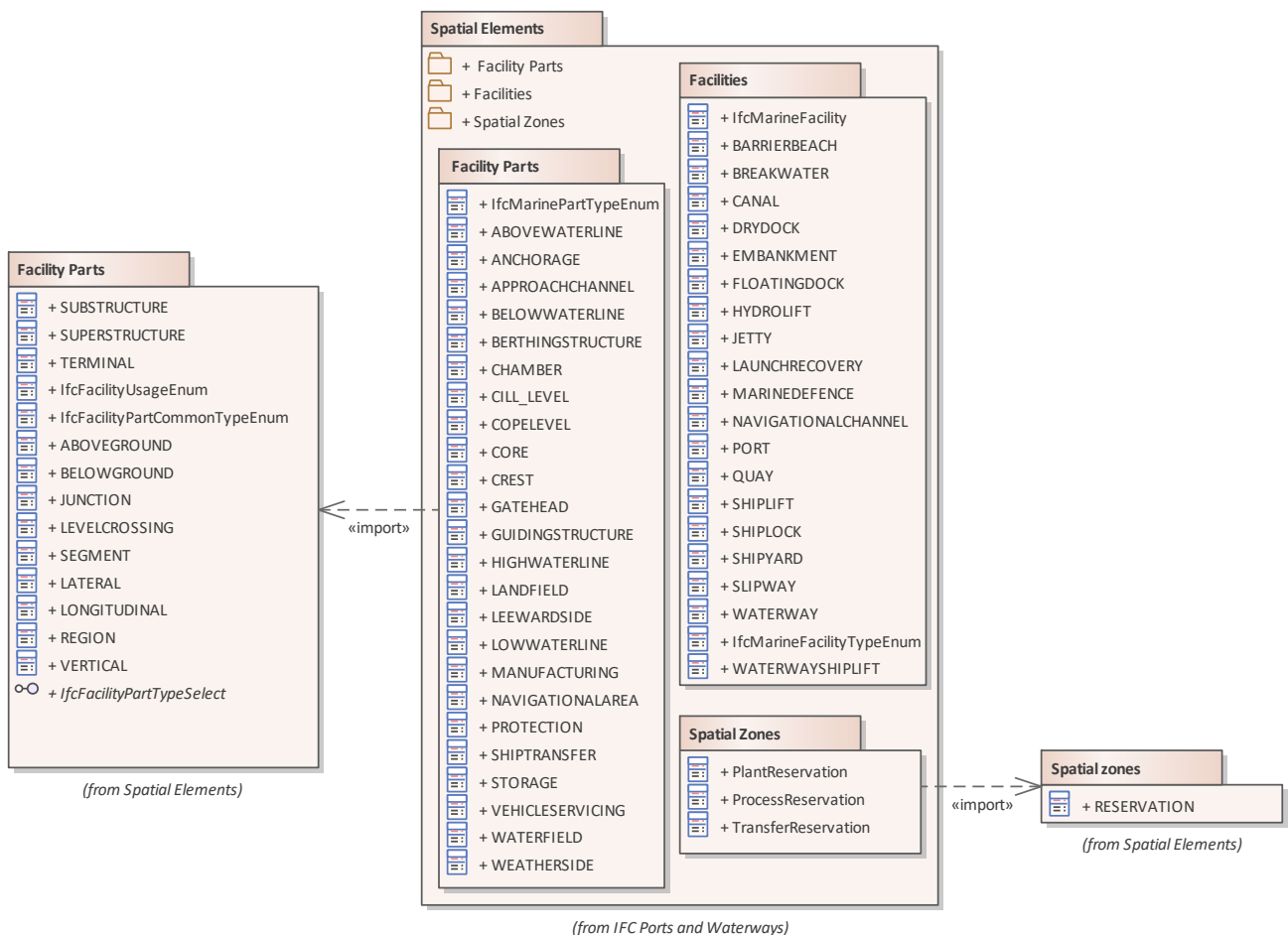
Figure 14: Spatial Elements - Overview of package structure
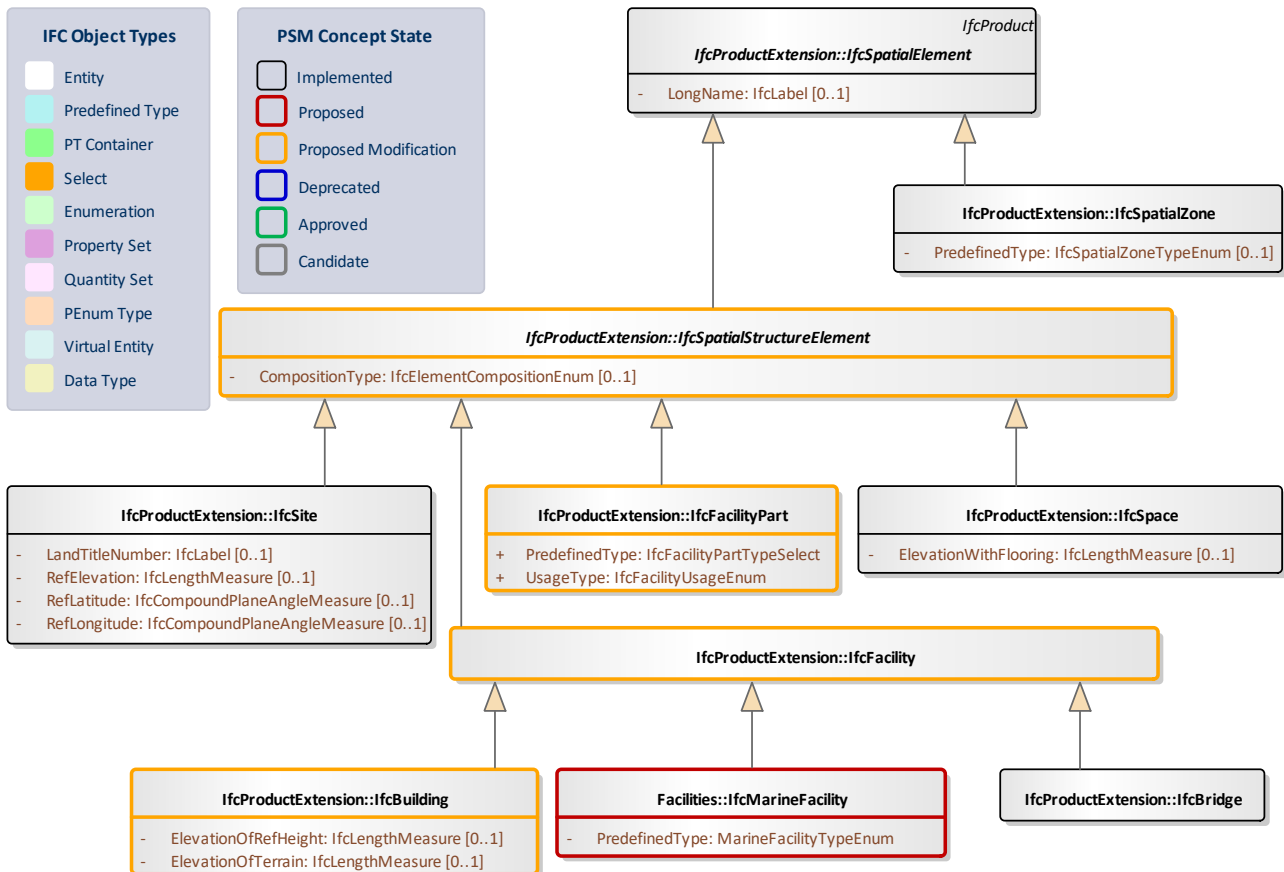
Figure 15: Spatial Elements - Inheritance for generic spatial structure elements

1.2.1 Class: IfcSpatialStructureElement

A spatial structure element is the generalization of all spatial elements that might be used to define a spatial structure. That spatial structure is often used to provide a project structure to organize a building project.

A spatial project structure might define as many levels of decomposition as necessary for the building project. Elements within the spatial project structure are:

- site as IfcSite
- facility as _IfcFacility_, or any of its specific subtypes. REMOVE {specifically building as IfcBuilding bridge as IfcBridge }
- facility part as IfcFacilityPart, REMOVE { or specifically storey as IfcBuildingStorey bridge part as IfcBridgePart }
- space as IfcSpace

or aggregations or parts thereof. The composition type declares an element to be either an element itself, or an aggregation (complex) or a decomposition (part). The interpretation of these types is given at each subtype of IfcSpatialStructureElement.

The IfcRelAggregates is defined as an 1-to-many relationship and used to establish the relationship between exactly two levels within the spatial project structure. Finally the highest level of the spatial structure is assigned to IfcProject using the IfcRelAggregates.

The subtypes of IfcSpatialStructureElement relate to other elements and systems by establishing the following relationships:

- **Containment of elements**: IfcRelContainedInSpatialStructure by inverse attribute _ContainsElements_, used to assign any element, like building elements, MEP elements, etc. to the spatial structure element in which they are primarily contained.
- **Reference of elements**: IfcRelReferencedInSpatialStructure by inverse attribute ReferencesElements, used to reference any element, like building elements, MEP elements, etc. in spatial structure elements, other then the one, where it is contained.
- **Reference of systems**: REMOVE {IfcRelServicesBuildings by inverse attribute _ServicedBySystems_, used to reference a sytem,} IfcRelReferencedInSpatialStructure by inverse attribute ReferencesElements, used to reference a system, like a building service or electrical distribution system, a zonal system, or a structural analysis system, that is assigned to this spatial structure element.

The subtypes of IfcSpatialStructureElement relate to each other by using the IfcRelAggregates relationship to build the project spatial structure. Figure 1 shows the use of IfcRelAggregates to establish a spatial structure including site, building, building section and storey. More information is provided at the level of the subtypes.
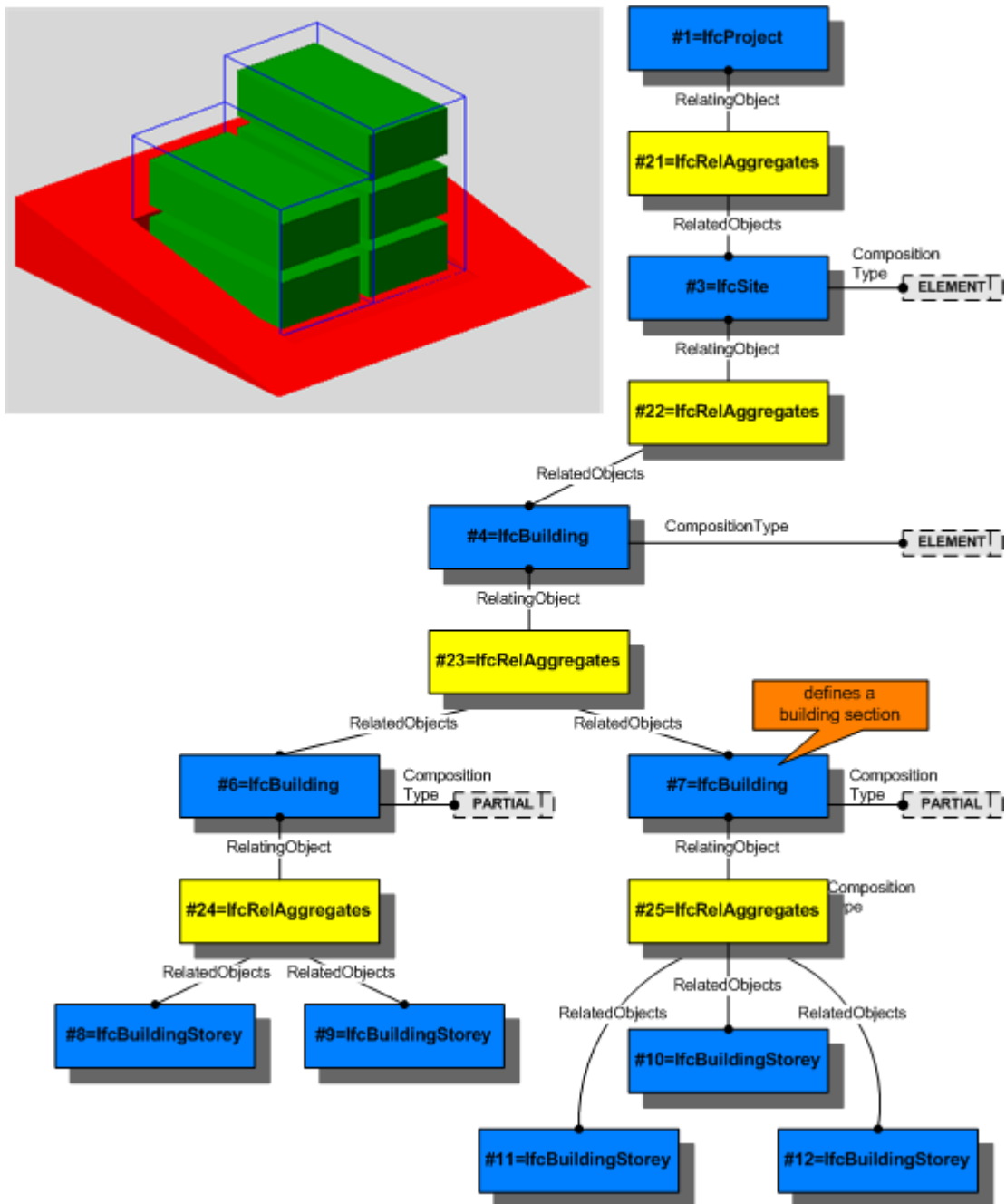
Figure — Spatial structure element composition

Informal Propositions:

1. The spatial project structure, established by the _IfcRelAggregates_, shall be acyclic.
2. A site should not be (directly or indirectly) associated to a building, storey or space.
3. A building should not be (directly or indirectly) associated to a storey or space.
4. A storey should not be (directly or indirectly) associated to a space.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

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

Inheritance Statement		
Subtype Of	IfcSpatialElement	
Subtypes	**EXISTING**	**PROPOSED**
	IfcSite	
	IfcSpace	

Class Attributes

Name	Type	Multiplicity	Definition
CompositionType	IfcElementCompositionEnum	[0..1]	Denotes, whether the predefined spatial structure element represents itself, or an aggregate (complex) or a part (part). The interpretation is given separately for each subtype of spatial structure element. If no _CompositionType_ is asserted, the default value ''ELEMENT'' applies

1.2.2 Class: IfcFacility

A Facility (derived from SpatialStructureElement) may be an IfcBuilding, an IfcBridge, an IfcRailway, an IfcRoad, an IfcMarineFacility (or any other type of built facility defined in the future, such as REMOVE{IfcRoad, IfcRailway and} IfcTunnel).

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

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

Inheritance Statement		
Subtype Of	IfcSpatialStructureElement	
Subtypes	EXISTING	PROPOSED
	IfcBridge	IfcRailway
		IfcMarineFacility
		IfcRoad

1.2.3 Class: IfcFacilityPart

IfcFacilityPart provides for spatial breakdown of built facilities. It may be further specialised according to the type of facility being broken down.

bSI Documentation

Status: **ProposedModification**

Package: **IfcProductExtension**

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

Inheritance Statement		
Subtype Of	IfcSpatialStructureElement	
Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	IfcFacilityPartTypeSelect		
UsageType	IfcFacilityUsageEnum		

1.2.4 Class: IfcMarineFacility

A marine facility represents any major structure or entity that is specific to the ports and waterways domain. examples of this include quays, jetties, shipyards, breakwaters etc.

Status: **Proposed**

Package: **Facilities**

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

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

Class Attributes

Name	Type	Multiplicity	Definition
PredefinedType	MarineFacilityTypeEnum		

1.2.5 Package: Facility Parts

Facility parts represent the further sub-division of facilities in managed and location base parts or volumes. each of these parts also have a middle level functional requirement in relation to their parent facility.
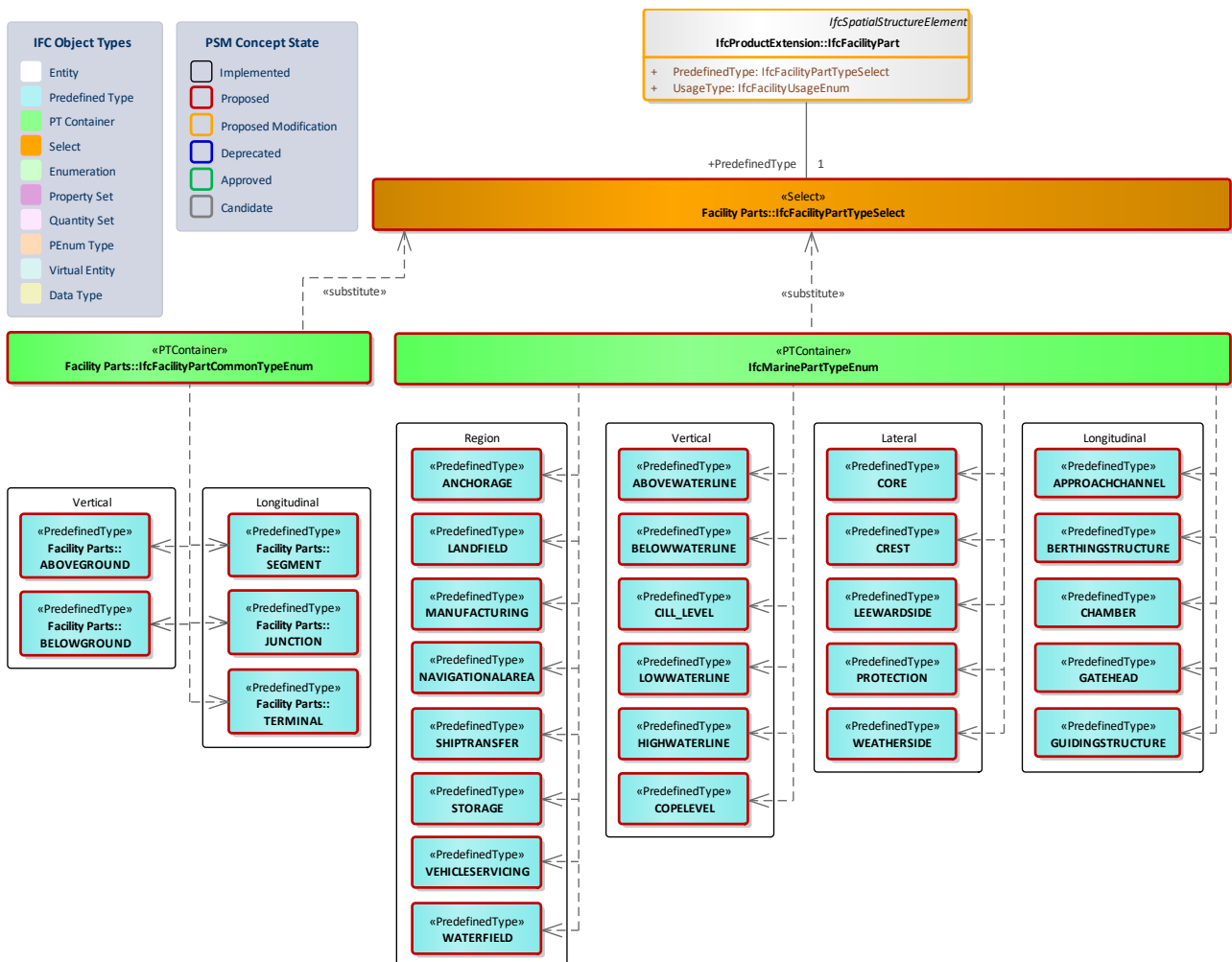
Figure 16: Facility Parts - Inheritance structure & subtyping

1.2.5.1 Predefined Type: TERMINAL

Full Identifier: **IfcFacilityPartCommonTypeEnum.TERMINAL**

A longitudinal facility part that represents a termination segment of a longitudinal facility such as the end of a breakwater, road or rail section.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.2 Select: IfcFacilityPartTypeSelect

This is a select of enumerations to provide the option of groups of predefined types for an IfcFacilityPart.

Status: **Proposed**

Package: **Facility Parts**

Select Properties	
Stereotype	«Select»
Substitutions	IfcFacilityPartCommonTypeEnum
	IfcMarinePartTypeEnum
	IfcRailwayPartTypeEnum
	IfcBridgePartTypeEnum
	IfcRoadPartTypeEnum

1.2.5.3 PDT Container: IfcFacilityPartCommonTypeEnum

Status: **Proposed**

Package: **Facility Parts**

Container Properties			
Parent Entity	IfcFacilityPart	**Stereotype**	«PTContainer»
	EXISTING	**PROPOSED**	
Contains		IfcFacilityPartCommonTypeEnum.LEVELCROSSING	
		IfcFacilityPartCommonTypeEnum.ABOVEGROUND	
		IfcFacilityPartCommonTypeEnum.TERMINAL	
	IfcBridgePartTypeEnum.SUBSTRUCTURE	IfcFacilityPartCommonTypeEnum.SUPERSTRUCTURE	
	IfcBridgePartTypeEnum.SUPERSTRUCTURE	IfcFacilityPartCommonTypeEnum.SUBSTRUCTURE	
		IfcFacilityPartCommonTypeEnum.SEGMENT	
		IfcFacilityPartCommonTypeEnum.JUNCTION	
		IfcFacilityPartCommonTypeEnum.BELOWGROUND	

1.2.5.4 PDT Container: IfcMarinePartTypeEnum

The predefined type container that collects all possible marine facility part types together into the implemented enumeration.

Status: **Proposed**

Package: **Facility Parts**

Container Properties			
Parent Entity	IfcFacilityPart	**Stereotype**	«PTContainer»
	PROPOSED		
Contains	IfcMarinePartTypeEnum.COPELEVEL	IfcMarinePartTypeEnum.STORAGE	
	IfcMarinePartTypeEnum.ANCHORAGE	IfcMarinePartTypeEnum.SHIPTRANSFER	
	IfcMarinePartTypeEnum.VEHICLESERVICING	IfcMarinePartTypeEnum.GATEHEAD	
	IfcMarinePartTypeEnum.WATERFIELD	IfcMarinePartTypeEnum.GUDINGSTRUCTURE	
	IfcMarinePartTypeEnum.APPROACHCHANNEL	IfcMarinePartTypeEnum.BELOWWATERLINE	
	IfcMarinePartTypeEnum.CREST	IfcMarinePartTypeEnum.WEATHERSIDE	
	IfcMarinePartTypeEnum.MANUFACTURING	IfcMarinePartTypeEnum.LANDFIELD	
	IfcMarinePartTypeEnum.LOWWATERLINE	IfcMarinePartTypeEnum.PROTECTION	
	IfcMarinePartTypeEnum.CORE	IfcMarinePartTypeEnum.LEEWARDSIDE	
	IfcMarinePartTypeEnum.CILL_LEVEL	IfcMarinePartTypeEnum.ABOVEWATERLINE	
	IfcMarinePartTypeEnum.BERTHINGSTRUCTURE	IfcMarinePartTypeEnum.NAVIGATIONALAREA	
	IfcMarinePartTypeEnum.CHAMBER	IfcMarinePartTypeEnum.HIGHWATERLINE	

1.2.5.5 Predefined Type: ABOVEGROUND

Full Identifier: **IfcFacilityPartCommonTypeEnum.ABOVEGROUND**

A vertical facility part for elements belonging to the space above the finished ground.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.6 Predefined Type: BELOWGROUND

Full Identifier: **IfcFacilityPartCommonTypeEnum.BELOWGROUND**

A vertical facility part for the containment of elements below the finished ground. This may include for example earthworks elements and elements in a pavement structure.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.7 Predefined Type: JUNCTION

Full Identifier: **IfcFacilityPartCommonTypeEnum.JUNCTION**

A longitudinal facility part providing an at grade junction between two or more segments of longitudinal facilities usually of the same type.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.8 Predefined Type: SEGMENT

Full Identifier: **IfcFacilityPartCommonTypeEnum.SEGMENT**

A longitudinal facility part encompassing a linear portion of the facility defined by some uniform characteristics, or a transition between segments of uniform characteristics.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcFacilityPartCommonTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.9 Predefined Type: ABOVEWATERLINE

Full Identifier: **IfcMarinePartTypeEnum.ABOVEWATERLINE**

A vertical spatial part that represents the part above the mean waterline defined within the site area.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.10 Predefined Type: ANCHORAGE

Full Identifier: **IfcMarinePartTypeEnum.ANCHORAGE**

A region spatial part that represents a managed area for the anchorage of vessels awaiting space and conditions to enter a port.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.11 Predefined Type: APPROACHCHANNEL

Full Identifier: **IfcMarinePartTypeEnum.APPROACHCHANNEL**

A longitudinal spatial part of a waterway or port facility that covers the approach of the primary facility.

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.12 Predefined Type: BELOWWATERLINE

Full Identifier: **IfcMarinePartTypeEnum.BELOWWATERLINE**

A vertical spatial part that represents the part below the mean waterline defined within the site area.

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.13 Predefined Type: BERTHINGSTRUCTURE

Full Identifier: **IfcMarinePartTypeEnum.BERTHINGSTRUCTURE**

A longitudinal spatial part of a waterway or port facility that provides facilities for the berthing of vessels while waiting for the waterway facility to become available. For example waiting for lock cycle to complete and the lock gates to open.

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.14 Predefined Type: CHAMBER

Full Identifier: **IfcMarinePartTypeEnum.CHAMBER**

A longitudinal spatial part of a waterway or port facility that forms the impounded chamber of a facility, such as a ship lock, dry dock or hydrolift

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.15 Predefined Type: CILL_LEVEL

Full Identifier: **IfcMarinePartTypeEnum.CILL_LEVEL**

A vertical spatial part that represents the elevation of the cill and floor level of an impounded facility such as a ship lock or dry lock.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.16 Predefined Type: COPELEVEL

Full Identifier: **IfcMarinePartTypeEnum.COPELEVEL**

A vertical spatial part that represents the elevation working surface of the quay for the placement of quay furniture and plant.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.17 Predefined Type: CORE

Full Identifier: **IfcMarinePartTypeEnum.CORE**

A lateral spatial part that sub divides the core structure of a facility such as a breakwater or embankment

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.18 Predefined Type: CREST

Full Identifier: **IfcMarinePartTypeEnum.CREST**

A lateral spatial part that forms the crest area of breakwater or embankment where additional structures are placed such as access items or roads.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.19 Predefined Type: GATEHEAD

Full Identifier: **IfcMarinePartTypeEnum.GATEHEAD**

A longitudinal spatial part of a waterway or port facility that forms the gate, supporting structure & plant of an impounded facility such as a ship lock, dry dock or hydrolift.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.20 Predefined Type: GUDINGSTRUCTURE

Full Identifier: **IfcMarinePartTypeEnum.GUDINGSTRUCTURE**

A longitudinal spatial part of a waterway or port facility that forms the guiding and assistive structures at the entrance to an impounded facility.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.21 Predefined Type: HIGHWATERLINE

Full Identifier: **IfcMarinePartTypeEnum.HIGHWATERLINE**

A vertical spatial part that represents the elevation of the high waterline, multiple high waterlines can be used to represent the different high tide types.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		

1.2.5.22 Predefined Type: LANDFIELD

Full Identifier: **IfcMarinePartTypeEnum.LANDFIELD**

A region or lateral facility part that covers the land field of a waterside facility such as a quay.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.23 Predefined Type: LEEWARDSIDE

Full Identifier: **IfcMarinePartTypeEnum.LEEWARDSIDE**

A lateral spatial part that covers the side of protective structures that do not experience weather or wave effects.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.24 Predefined Type: LOWWATERLINE

Full Identifier: **IfcMarinePartTypeEnum.LOWWATERLINE**

A vertical spatial part that represents the elevation of the low waterline, multiple low waterlines can be used to represent the different low tide types.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		

1.2.5.25 Predefined Type: MANUFACTURING

Full Identifier: **IfcMarinePartTypeEnum.MANUFACTURING**

A region spatial part that forms an sub division of a facility for the purpose of manufacturing activities.this covers areas that are open air and do not constitute a building or the building is only a small part of the entire area (in this case a child of type building can be used).

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.26 Predefined Type: NAVIGATIONALAREA

Full Identifier: **IfcMarinePartTypeEnum.NAVIGATIONALAREA**

A region spatial part that covers a managed navigational area that is maintained for an operational reason, this could be a dredged turning circle or waiting area.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.27 Predefined Type: PROTECTION

Full Identifier: **IfcMarinePartTypeEnum.PROTECTION**

A lateral or region spatial part that forms the area which contains protective measures for scour and erosion of a facility.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.28 Predefined Type: SHIPTRANSFER

Full Identifier: **IfcMarinePartTypeEnum.SHIPTRANSFER**

A region spatial part that represents forms a clear area used for the transfer and movement of vessels this area could include complex rail tracks and additional loading requirements.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.29 Predefined Type: STORAGE

Full Identifier: **IfcMarinePartTypeEnum.STORAGE**

A region spatial part that forms an sub division of a facility for the purpose of storing cargo. for example container stacks, dry bulk storage yards, material storage yards.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.30 Predefined Type: VEHICLESERVICING

Full Identifier: **IfcMarinePartTypeEnum.VEHICLESERVICING**

A region spatial part that represents a functional division designed for the maintenance and/or storage of vehicles used for facility operations.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.31 Predefined Type: WATERFIELD

Full Identifier: **IfcMarinePartTypeEnum.WATERFIELD**

A region or lateral facility part that covers the water field of a waterside facility such as a quay.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.5.32 Predefined Type: WEATHERSIDE

Full Identifier: **IfcMarinePartTypeEnum.WEATHERSIDE**

A lateral spatial part that covers the side of protective structures that is designed to protect and be impacted by weather or wave effects. such as the outer side of breakwaters or the riverside of flood embankments.

Status: **Proposed**

Package: **Facility Parts**

Predefined Type Properties			
Predefined Type Container	IfcMarinePartTypeEnum	**Parent Entity**	IfcFacilityPart
Stereotype	«PredefinedType»		
Property sets			

1.2.6 Package: Facilities

Facilities represent the discrete units of a ports and waterways complex/network. Facilities are also used to represent the top level complexes within ports and waterways. these facilities have a high level functional requirement within the wider context of the project.

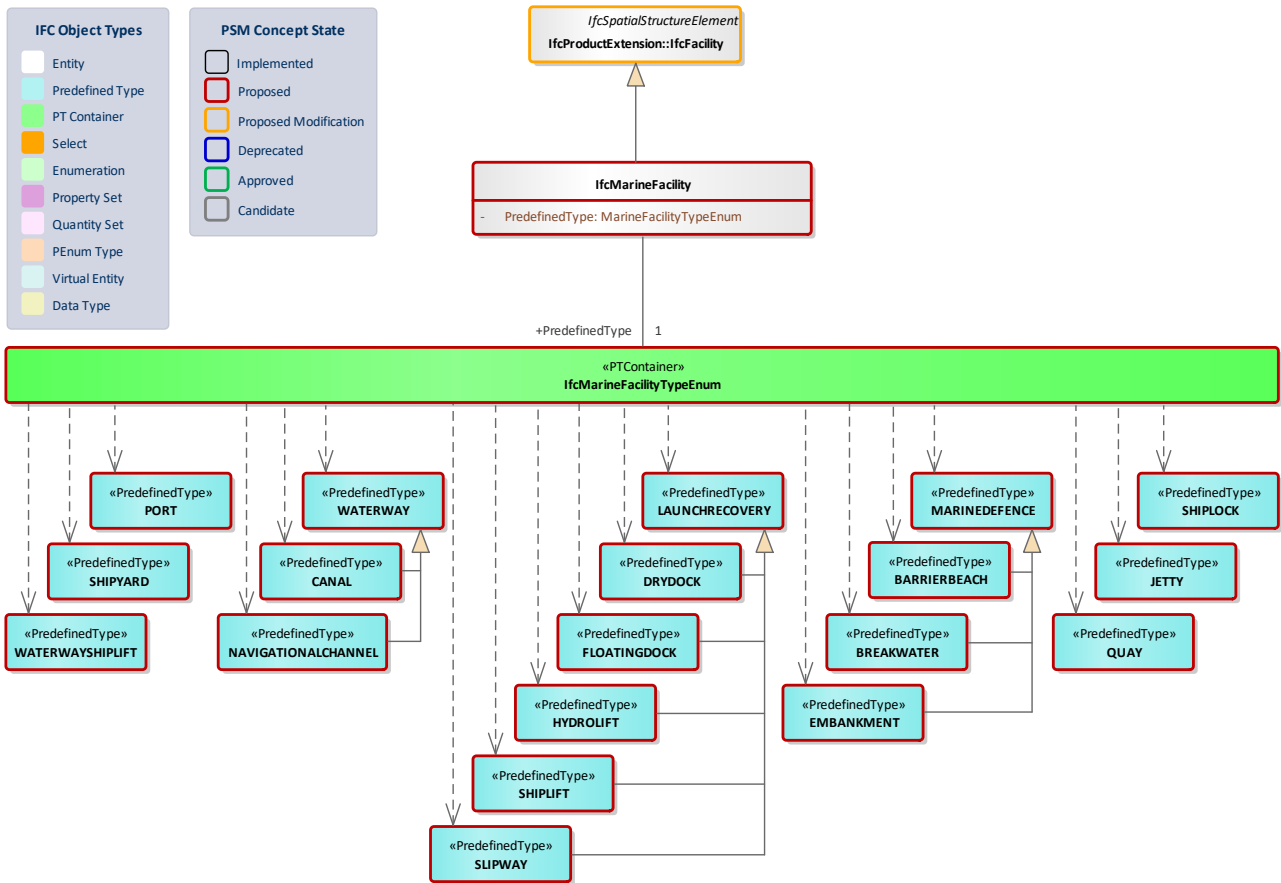Figure 17: Marine Facilities - Inheritance structure & subtyping

1.2.6.1 PDT Container: IfcMarineFacilityTypeEnum

The predefined type container that collects all possible marine facility types together into the implemented enumeration.

Status: **Proposed**

Package: **Facilities**

Container Properties			
Parent Entity	IfcMarineFacility	**Stereotype**	«PTContainer»

PROPOSED	
IfcMarineFacilityTypeEnum.QUAY IfcMarineFacilityTypeEnum.JETTY IfcMarineFacilityTypeEnum.FLOATINGDOCK IfcMarineFacilityTypeEnum.SLIPWAY IfcMarineFacilityTypeEnum.PORT IfcMarineFacilityTypeEnum.WATERWAYSHIPLIFT IfcMarineFacilityTypeEnum.SHIPLIFT IfcMarineFacilityTypeEnum.NAVIGATIONALCHANNEL IfcMarineFacilityTypeEnum.SHIPLOCK IfcMarineFacilityTypeEnum.MARINEDEFENCE	IfcMarineFacilityTypeEnum.BARRIERBEACH IfcMarineFacilityTypeEnum.BREAKWATER IfcMarineFacilityTypeEnum.EMBANKMENT IfcMarineFacilityTypeEnum.LAUNCHRECOVERY IfcMarineFacilityTypeEnum.DRYDOCK IfcMarineFacilityTypeEnum.HYDROLIFT IfcMarineFacilityTypeEnum.CANAL IfcMarineFacilityTypeEnum.WATERWAY IfcMarineFacilityTypeEnum.SHIPYARD

("Contains" is the row label in the leftmost column spanning the above.)

1.2.6.2 Predefined Type: BARRIERBEACH

Full Identifier: **IfcMarineFacilityTypeEnum.BARRIERBEACH**

a sand ridge that rises slightly above the surface of the sea and runs roughly parallel to the shore, from which it is separated by a lagoon.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.3 Predefined Type: BREAKWATER

Full Identifier: **IfcMarineFacilityTypeEnum.BREAKWATER**

A longitudinal structure that protects a shore area, harbour, basin or estuary from waves.

NOTE Definition in ISO 21650: structure protecting a shore area, harbour, anchorage and/or basin from waves

NOTE Definition in ISO 6707: long structure in a body of water designed to protect a basin or the shore from waves

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.4 Predefined Type: CANAL

Full Identifier: **IfcMarineFacilityTypeEnum.CANAL**

A man-made watercourse constructed usually, to join rivers, lakes or seas and often of a size suitable for navigation.

 NOTE definition in ISO 6707: channel constructed to carry water, usually for navigation, but which can also be used for water power, irrigation, collecting rainwater run-off , or drainage of surface water.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.5 Predefined Type: DRYDOCK

Full Identifier: **IfcMarineFacilityTypeEnum.DRYDOCK**

a Dry dock is an enclosed chamber (by gate) that allows the draining of water for the construction or repair of marine vessels.

 NOTE definition in ISO 6707: dock with gates from which water can be drained or pumped, leaving it dry to enable a vessel to be built or repaired

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.6 Predefined Type: EMBANKMENT

Full Identifier: **IfcMarineFacilityTypeEnum.EMBANKMENT**

A marine defensive structure made from earthworks activities this spatial element groups together other items connected to the earthworks element.

   NOTE definition IS 6707: section of earthworks, often formed by cut or fill, where the finished ground level is above or below original ground level and whose length usually greatly exceeds its width.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.7 Predefined Type: FLOATINGDOCK

Full Identifier: **IfcMarineFacilityTypeEnum.FLOATINGDOCK**

A spatial element that encompasses a floating dry dock and supporting quay side ancillaries.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.8 Predefined Type: HYDROLIFT

Full Identifier: **IfcMarineFacilityTypeEnum.HYDROLIFT**

A type of vessel launch & recovery facility, also known as a hydraulic lift dock, where ships are lifted vertically by water impounding systems, then floated laterally across the land to berths which subsequently become dry.

Status: **Proposed**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.9 Predefined Type: JETTY

Full Identifier: **IfcMarineFacilityTypeEnum.JETTY**

A berthing structure, that extends out into the sea usually perpendicular to the coastline, primarily for the transfer of liquid bulk materials.

   NOTE definition in ISO 21650: deck structure supported by vertical and possibly inclined piles extending into the sea, frequently in a direction normal to the coastline.

   NOTE definition in ISO 28640: facility consisting of a trestle or similar structure, berthing facilities including fendering and topside equipment to enable the transfer of LNG between ship and shore.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.10 Predefined Type: LAUNCHRECOVERY

Full Identifier: **IfcMarineFacilityTypeEnum.LAUNCHRECOVERY**

Subset of facilities for the function of launching or recovering vessels.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		

1.2.6.11 Predefined Type: MARINEDEFENCE

Full Identifier: **IfcMarineFacilityTypeEnum.MARINEDEFENCE**

A subset of facilities with the primary function of protection or defence of a coastal or flood area.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.12 Predefined Type: NAVIGATIONALCHANNEL

Full Identifier: **IfcMarineFacilityTypeEnum.NAVIGATIONALCHANNEL**

A natural navigable watercourse (such as river) that needs to be managed or have improvements applied. this also include defined navigational areas in open seas and bays.

   NOTE definition in ISO 6707: open passage for conveying or containing water

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.13 Predefined Type: PORT

Full Identifier: **IfcMarineFacilityTypeEnum.PORT**

A complex/facility for shipping and marine activities, this includes cargo, people and storage of vessels (marinas & harbours).

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties				
Predefined Type Container	IfcMarineFacilityTypeEnum		**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»			
Property sets				

1.2.6.14 Predefined Type: QUAY

Full Identifier: **IfcMarineFacilityTypeEnum.QUAY**

a facility for the mooring of vessels accompanied with the loading and unloading of cargo or passengers or the maintenance of vessels.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties				
Predefined Type Container	IfcMarineFacilityTypeEnum		**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»			
Property sets				

1.2.6.15 Predefined Type: SHIPLIFT

Full Identifier: **IfcMarineFacilityTypeEnum.SHIPLIFT**

A type of vessel launch & recovery facility, where ships are lifted vertically out of the water on platforms connected to winches, then transferred horizontally to land based berths on rail systems.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties				
Predefined Type Container	IfcMarineFacilityTypeEnum		**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»			
Property sets				

1.2.6.16 Predefined Type: SHIPLOCK

Full Identifier: **IfcMarineFacilityTypeEnum.SHIPLOCK**

A facility used for raising and lowering boats, ships and other watercraft between stretches of water of different levels on river and canal waterways or between impounded basins. This is achieved via an impounded chamber of water which is filled and emptied.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.17 Predefined Type: SHIPYARD

Full Identifier: **IfcMarineFacilityTypeEnum.SHIPYARD**

A coastal/waterside facility where ships are built and repaired.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.18 Predefined Type: SLIPWAY

Full Identifier: **IfcMarineFacilityTypeEnum.SLIPWAY**

A facility for the dynamic launch or recovery of a vessel utilizing an inclined ramp and gravitational or mechanical hauling systems.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		

1.2.6.19 Predefined Type: WATERWAY

Full Identifier: **IfcMarineFacilityTypeEnum.WATERWAY**

A subset of facilities that have the primary function of providing a navigable area of water.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.6.20 Predefined Type: WATERWAYSHIPLIFT

Full Identifier: **IfcMarineFacilityTypeEnum.WATERWAYSHIPLIFT**

A facility used for raising and lowering boats, ships and other watercraft between stretches of water of different levels on river and canal waterways or between impounded basins. This is achieved via an impounded trough of water which is mechanically lifted up and down.

Status: **Proposed**

Package: **Facilities**

Predefined Type Properties			
Predefined Type Container	IfcMarineFacilityTypeEnum	**Parent Entity**	IfcMarineFacility
Stereotype	«PredefinedType»		
Property sets			

1.2.7 Package: Spatial Zones

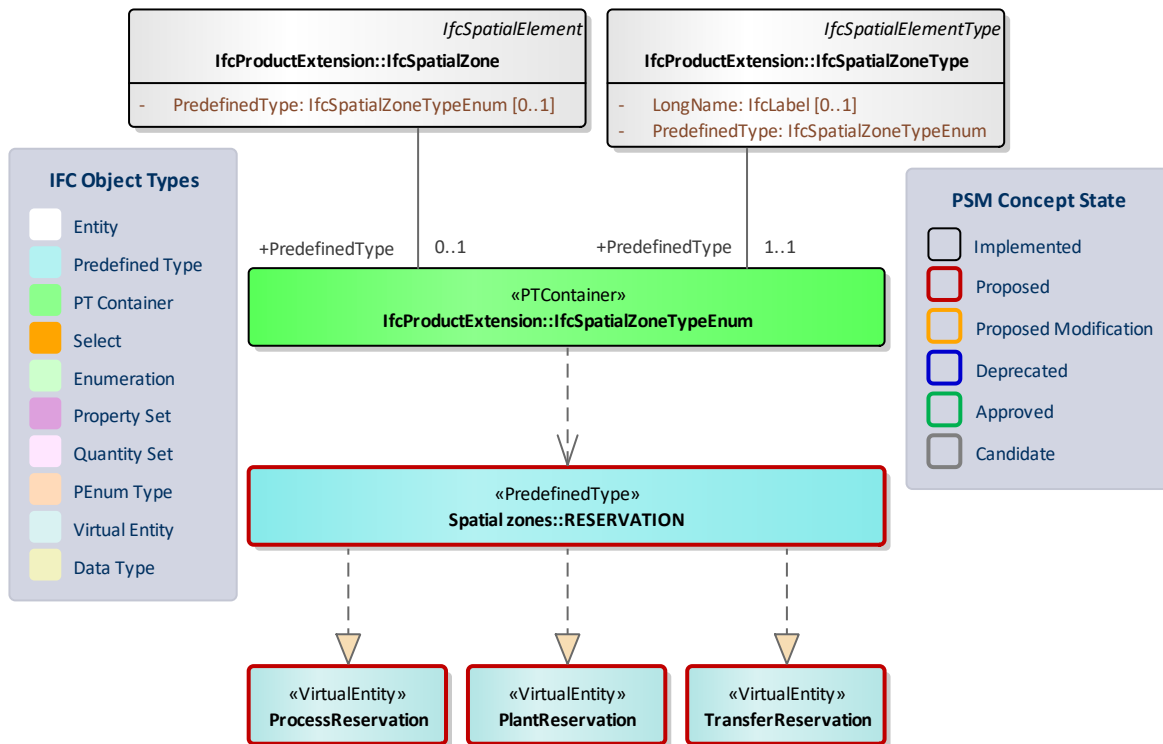this package contains concepts which represent spatial zones used to define non-hierarchal volumes within a project.

Figure 18: Spatial Zones - Inheritance structure & subtyping

1.2.7.1 Predefined Type: RESERVATION

Full Identifier: **IfcSpatialZoneTypeEnum.RESERVATION**

A spatial zone that marks some sort of reservation within the project extent.

Status: **Proposed**

Package: **Spatial zones**

Predefined Type Properties			
Predefined Type Container	IfcSpatialZoneTypeEnum	**Parent Entity**	IfcSpatialZoneType
Stereotype	«PredefinedType»		IfcSpatialZone
Property sets	Pset_RailwaySignallingReservation	Pset_RailwayReservation	
	Pset_RailwayTelecomReservation	Pset_RailwayEnergyReservation	

1.2.7.2 Virtual Entity: PlantReservation

A spatial zone reserved for the deign and installation of plant equipment.

Entity Properties	
Realizing Parent	IfcSpatialZoneTypeEnum.RESERVATION
Notes	

1.2.7.3 Virtual Entity: ProcessReservation

A spatial zone reserved for the design and installation of facility process equipment such as pipelines or conveyor systems

Entity Properties	
Realizing Parent	IfcSpatialZoneTypeEnum.RESERVATION
Notes	

1.2.7.4 Virtual Entity: TransferReservation

A spatial zone reserved for the demarcation of a transfer area between modal types. this allows the informed design and installation of elements from multiple domains and teams.

Entity Properties	
Realizing Parent	IfcSpatialZoneTypeEnum.RESERVATION
Notes	

1.3 Package: Built Systems

This package contains concepts that represent built systems within a facility or project in the ports and waterways domain. Built systems are functional groupings within the facility that form groupings such as structural systems, building/facility fabrics, finishing fabrics or restraint systems.
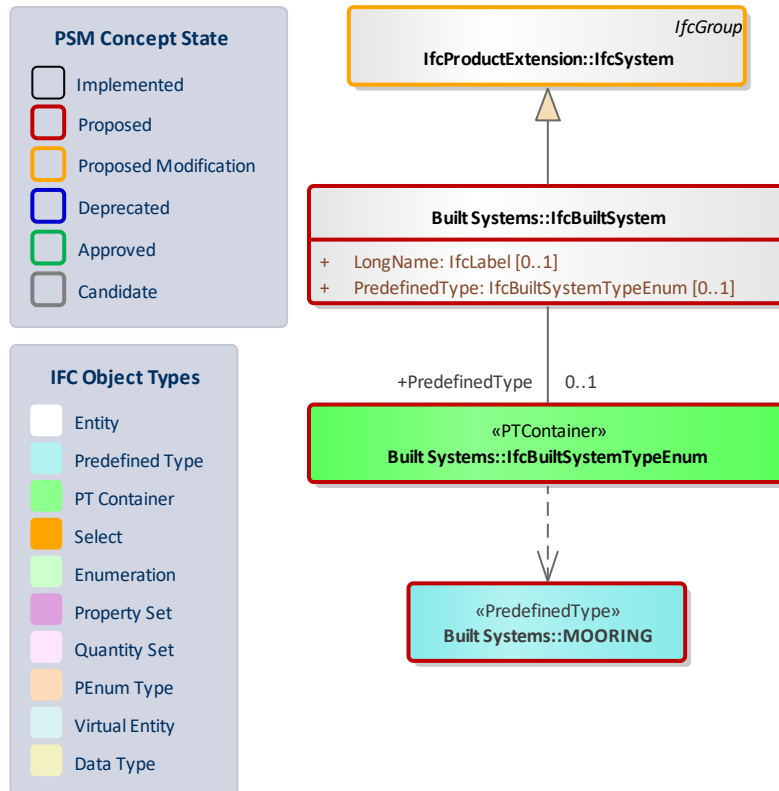

Figure 19: Built Systems - Modifications and extensions to built systems

1.3.1 Class: IfcSystem

A system is an organized combination of related parts within an AEC product, composed for a common purpose or function or to provide a service. A system is essentially a functionally related aggregation of products. The grouping relationship to one or several instances of _IfcProduct_ (the system members) is handled by IfcRelAssignsToGroup.

> NOTE The use of _IfcSystem_ often applies to the representation of building services related systems, such as the piping system, cold water system, etc. Members within such a system may or may not be connected using the connectivity related entities (through IfcDistributionPort).

> HISTORY New entity in IFC1.0

Status: **ProposedModification**

Package: **IfcProductExtension**

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

Inheritance Statement		
Subtype Of	IfcGroup	
Subtypes	**EXISTING**	**PROPOSED**
	IfcZone	IfcBuiltSystem

1.3.2 Class: IfcBuiltSystem

A built system is a group by which built elements are grouped according to a common function within the facility.

The group IfcBuiltSystem defines the occurrence of a specialized system for use within the context of a facilities physical or finishing fabric. Important functionalities for the description of a built system are derived from supertypes:

- From IfcSystem it inherits the ability to couple the built system via IfcRelReferencedInSpatialStructure to one or more IfcSpatialElement subtypes as necessary.
- From IfcGroup it inherits the inverse attribute IsGroupedBy, pointing to the relationship class IfcRelAssignsToGroup . This allows the grouping of built elements (instances of IfcBuiltElement subtypes, IfcFurnishingElement subtypes, IfcElementAssembly and IfcTransportElement).
- From IfcObjectDefinition it inherits the inverse attribute IsDecomposedBy pointing to the relationship class IfcRelAggregates. It provides the hierarchy between the separate (partial) building systems.

Status: **Proposed**

Package: **Built Systems**

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

Inheritance Statement	
Subtype Of	IfcSystem

Subtypes	EXISTING	PROPOSED

Class Attributes

Name	Type	Multipl	Definition
LongName	IfcLabel	[0..1]	Long name for a built system, used for informal purposes. It should be used, if available, in conjunction with the inherited Name attribute. NOTE In many scenarios the Name attribute refers to the short name or number of a built system, and the LongName refers to a descriptive name.
PredefinedType	IfcBuiltSystemTypeEnum	[0..1]	Predefined types of built systems.

1.3.3 PDT Container: IfcBuiltSystemTypeEnum

This enumeration identifies different types of built systems.

Status: **Proposed**

Package: **Built Systems**

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

1.3.4 Predefined Type: MOORING

Full Identifier: **IfcBuiltSystemTypeEnum.MOORING**

System of components and elements responsible for keeping or holding an element (a vessel, platform or set of catenary lines) in a desired position.

Status: **Proposed**

Package: **Built Systems**

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