IFC Bridge Conceptual Model

bSI Summit, Paris

Juha Hyvärinen

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Background and workflow

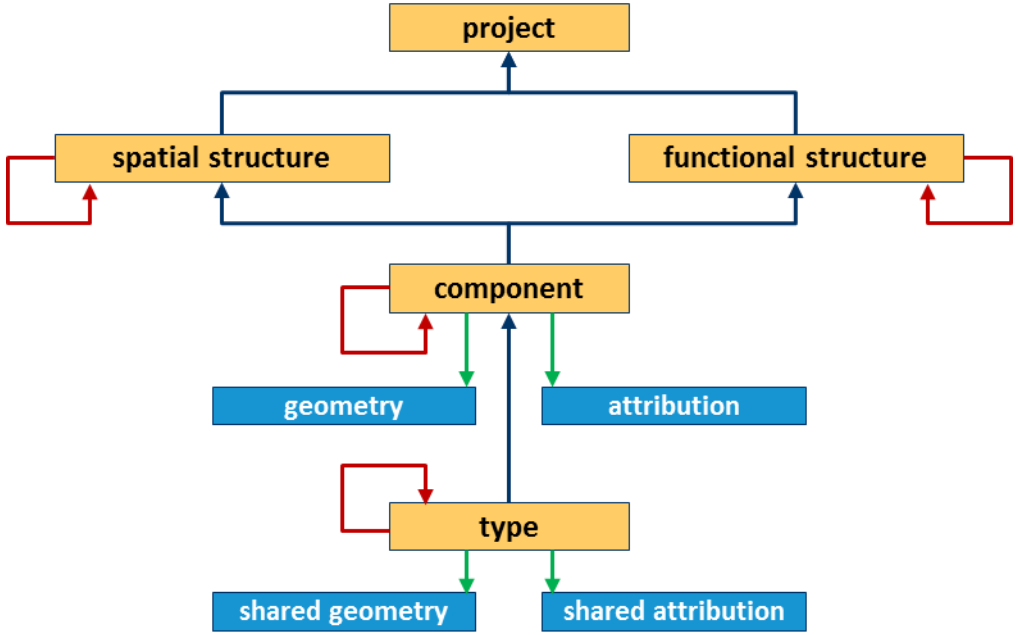
- Previous IFC-Bridge work, and national IFC Bridge related developments:
  - France MINnD
  - USA FHWA
  - China CRBIM IFC Rail
  - Korea KICT IFC Road
- IFC Bridge WP1 Report: Requirements analysis
  - Bridge types in scope
  - Use cases
  - Asset management requirements
- IFC Specification constraints
  - IFC 4.1 specification
  - Infra Overall architecture guidelines
- Workflow
  - Bridge taxonomy - Properties
  - **Conceptual model**
  - IFC Extension and MVDs

"It is of major importance for any IFC extension project to limit the introduction of new IFC types (entities) to a reasonable extent as handling new entities puts an extra burden to developers and may hinder the fast adoption of the developed IFC extensions by software vendors."

IFC model breakdown principles

Main bridge (project) breakdown hierarchy, e.g.:

Site
- Bridge
  - Substructure (*FacilityPart*)
    - Abutment (*FacilityPart*)
    - Pier (*FacilityPart*)
    - Abutment (*FacilityPart*)
  - Superstructure (*FacilityPart*)
  - ….



Physical components used to build up the bridge, and their decomposition, e.g.:

Abutment (*ElementAssembly*)
- Wing wall (*Wall*)
- Head wall (*Wall*)
- Wing wall (*Wall*)

Functional grouping of components into systems or asset groups such as:

Drainage
Lighting
Signage
Condition monitoring
Reinforcing/pre-stressing
….

IFC Bridge Conceptual –draft 23.3.2018

Report: IR-Bridge-WP2_ConceptualModelReport.pdf

Class diagrams: IfcBridge_UML.pdf

- Concepts from IFC4.1 used as is
- Concepts from IFC4.1 with updated semantic definition / usage
- Concepts from IFC4.1 with new predefined types (15)
- New concepts (6)

New Spatial Concepts

- Facility

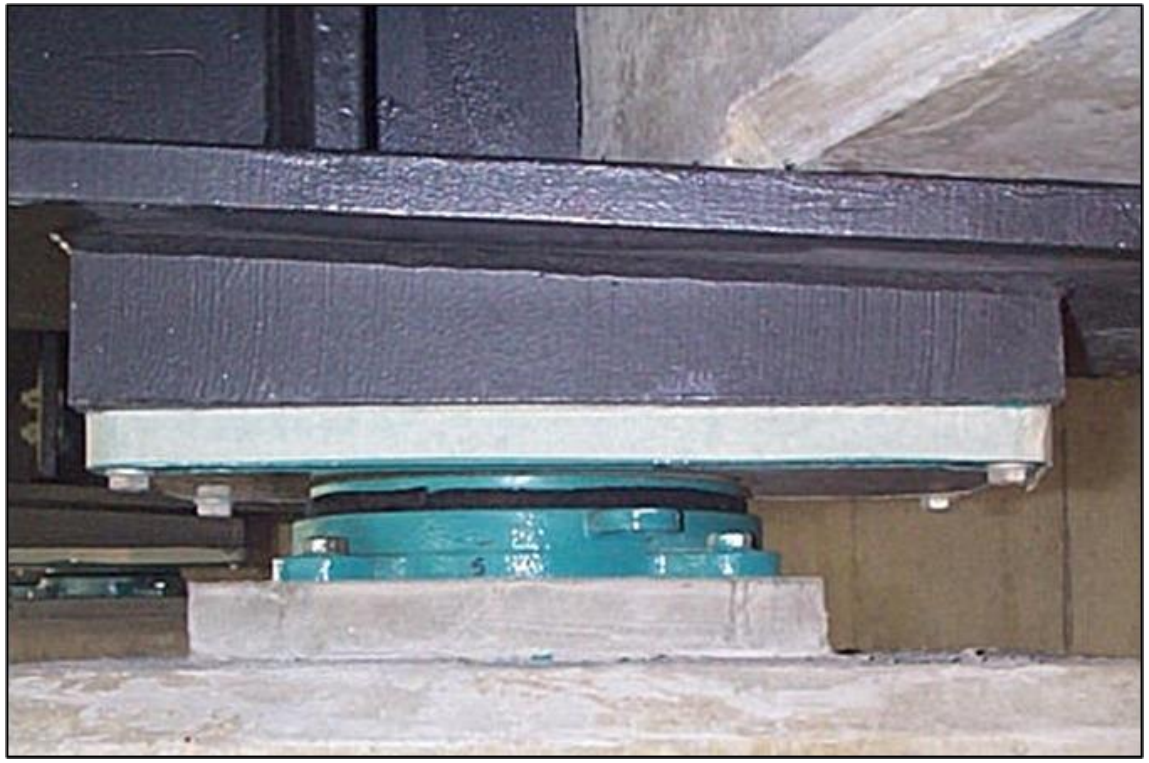
  Common abstract supertype of all built facilities (Building, Bridge, Road, Railway…)

- Bridge
  - BOXGIRDERBRIDGE,
  - ARCHEDBRIDGE,
  - SUSPENSIONBRIDGE,
  - CABLE-STAYEDBRIDGE,
  - CULVERTBRIDGE,
  - GIRDERBRIDGE,
  - SLABBRIDGE,
  - CANTILIVERSLABBRIDGE,
  - BOWSTRINGBRIDGE,
  - LADDERBRIDGE,
  - FRAMEWORKBRIDGE,
  - PORTALBRIDGE

- FacilityPart
  - BRIDGE_PART
    - ABUTMENT
    - DECK
    - DECK_SEGMENT
    - FOUNDATION
    - PIER
    - PIER_SEGMENT
    - PYLON
    - SUBSTRUCTURE
    - SUPERSTRUCTURE
    - SURFACESTRUCTURE

New Physical Concepts (1)

- Bearing
  - CYLINDRICAL_PTFE
  - ELASTOMERIC
  - GUIDE
  - POT
  - RESTRAINT
  - ROCKER
  - ROLLER
  - SLIDING
  - SPHERICAL_PTFE



https://www.steelconstruction.info/Bridge_articulation_and_bearing_specification

New Physical Concepts (2)

- TendonConduit
  - TENDON_SLEEVE
  - COUPLING
  - GROUT_VENT
  - GROUT_INLET
  - TRUMPET

http://en.vsl.cz/post-tensioning/

New Physical Concepts (3)

- VibrationDamper
  - BENDING_YIELD
  - SHEAR_YIELD
  - AXIAL_YIELD
  - FRICTION
  - VISCOUS
  - RUBBER

http://img.archiexpo.com/images_ae/photo-g/126411-6507243.jpg

Beam: • GIRDER_SEGMENT • PIERCAP • HATSTONE • CORNICE • EDGEBEAM	Column: • PIERSTEM • PIERSTEM_SEGMENT • STANDCOLUMN	Covering: • COPING • PAVING
Member: • STIFFENING_RIB • ARCH_SEGMENT • SUSPENSION_CABLE • SUSPENDER • STAY_CABLE	Plate: • FLANGE_PLATE • WEB_PLATE • STIFFENER_PLATE • GUSSET_PLATE	Slab: • APPROACH_SLAB
Wall: • RETAININGWALL	ElementAssembly: • ABUTMENT • PIER • PYLON • CROSS_BRACING • DECK	VibrationIsolator: • BASE
BuildingElementPart: • APRON • DEVIATOR • BLISTER	DiscreteAccessory: • EXPANSION_JOINT_DEVICE	MechanicalFastener: • COUPLER
ReinforcingBar: • SPACEBAR	SurfaceFeature: • DEFECT	GeographicElement: • SOIL_BORING_POINT

Existing Physical Concepts with new Predefined Types

Bridge Conceptual Model
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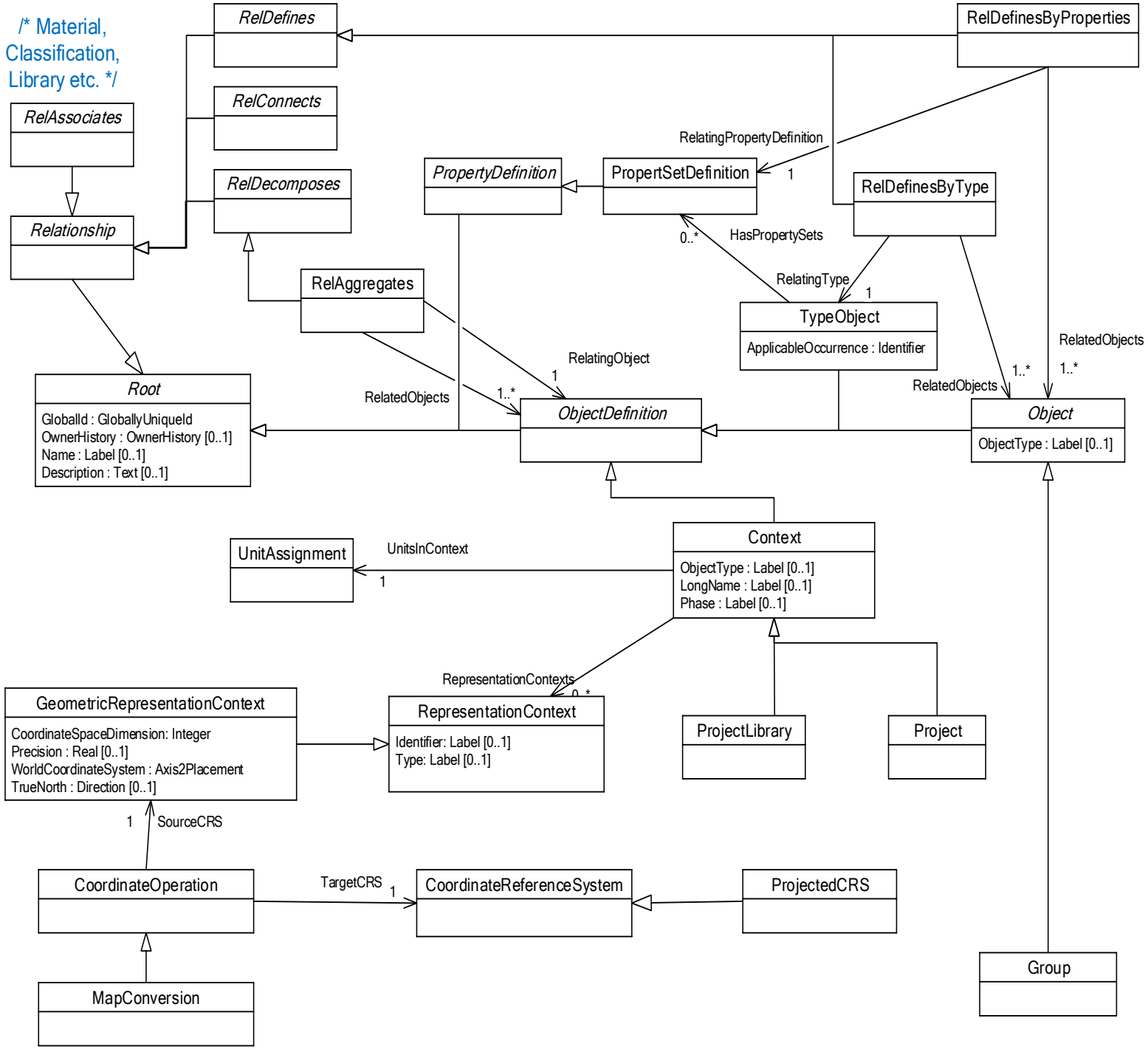
UML Class Diagrams

General Concepts



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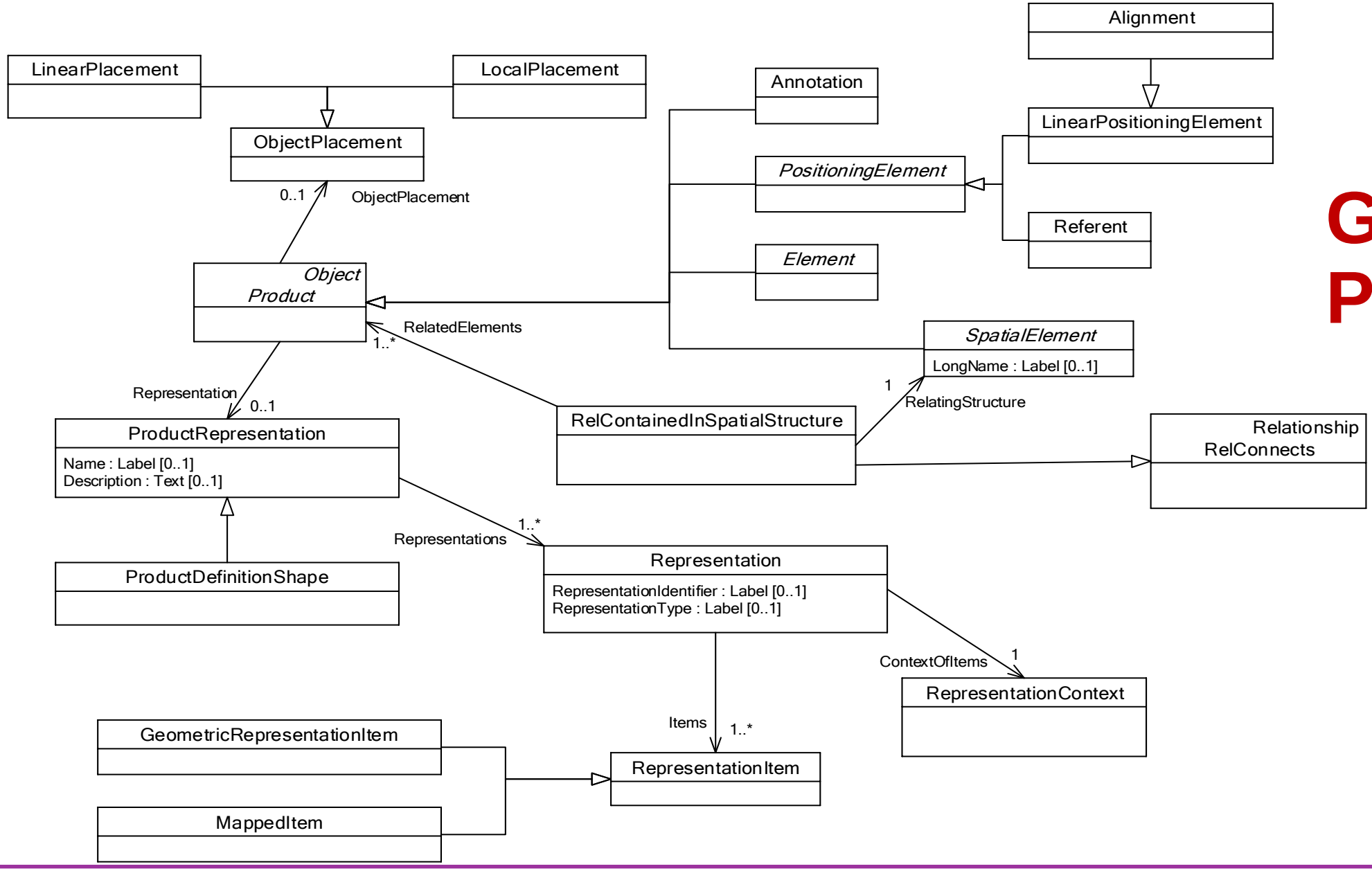
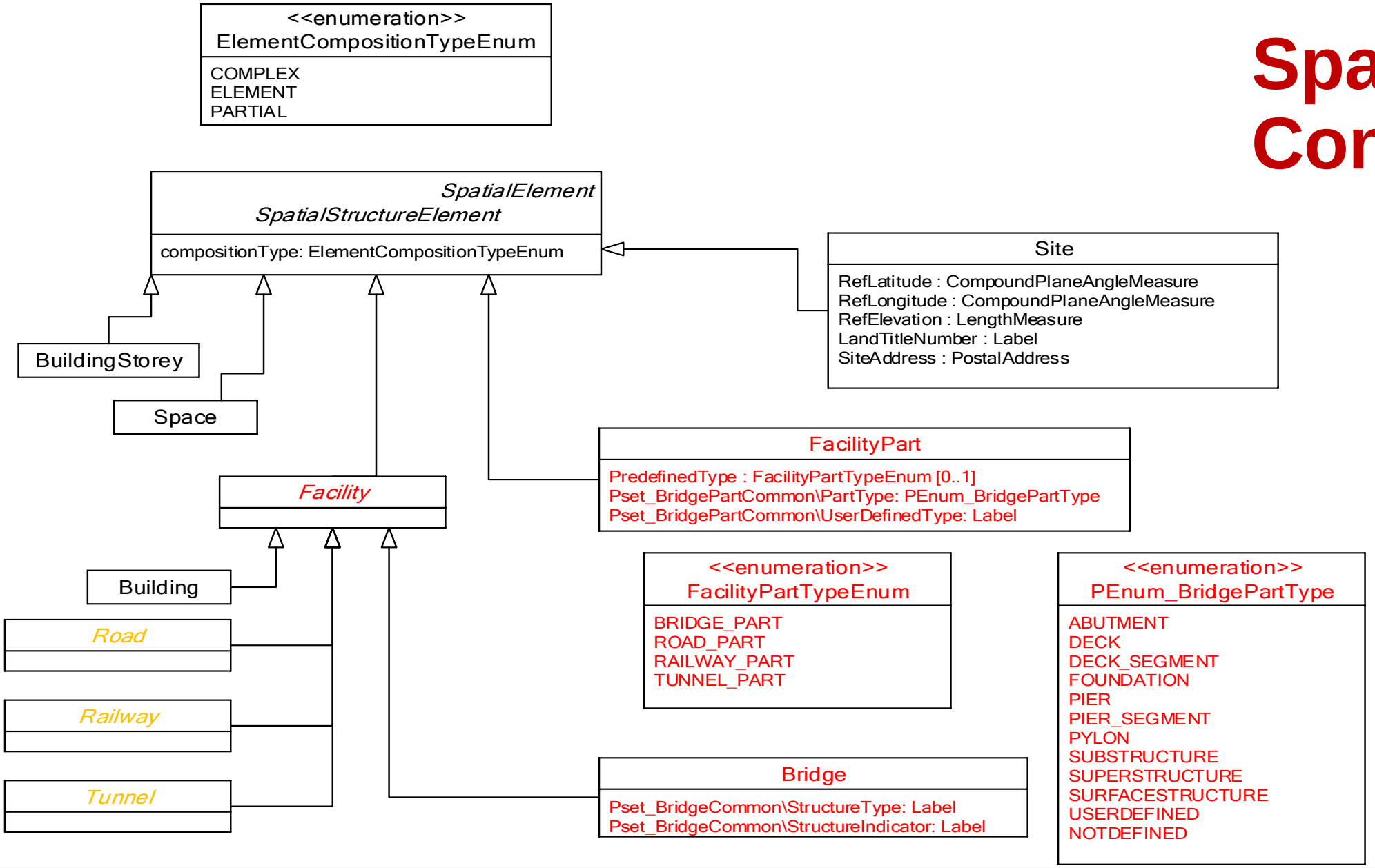
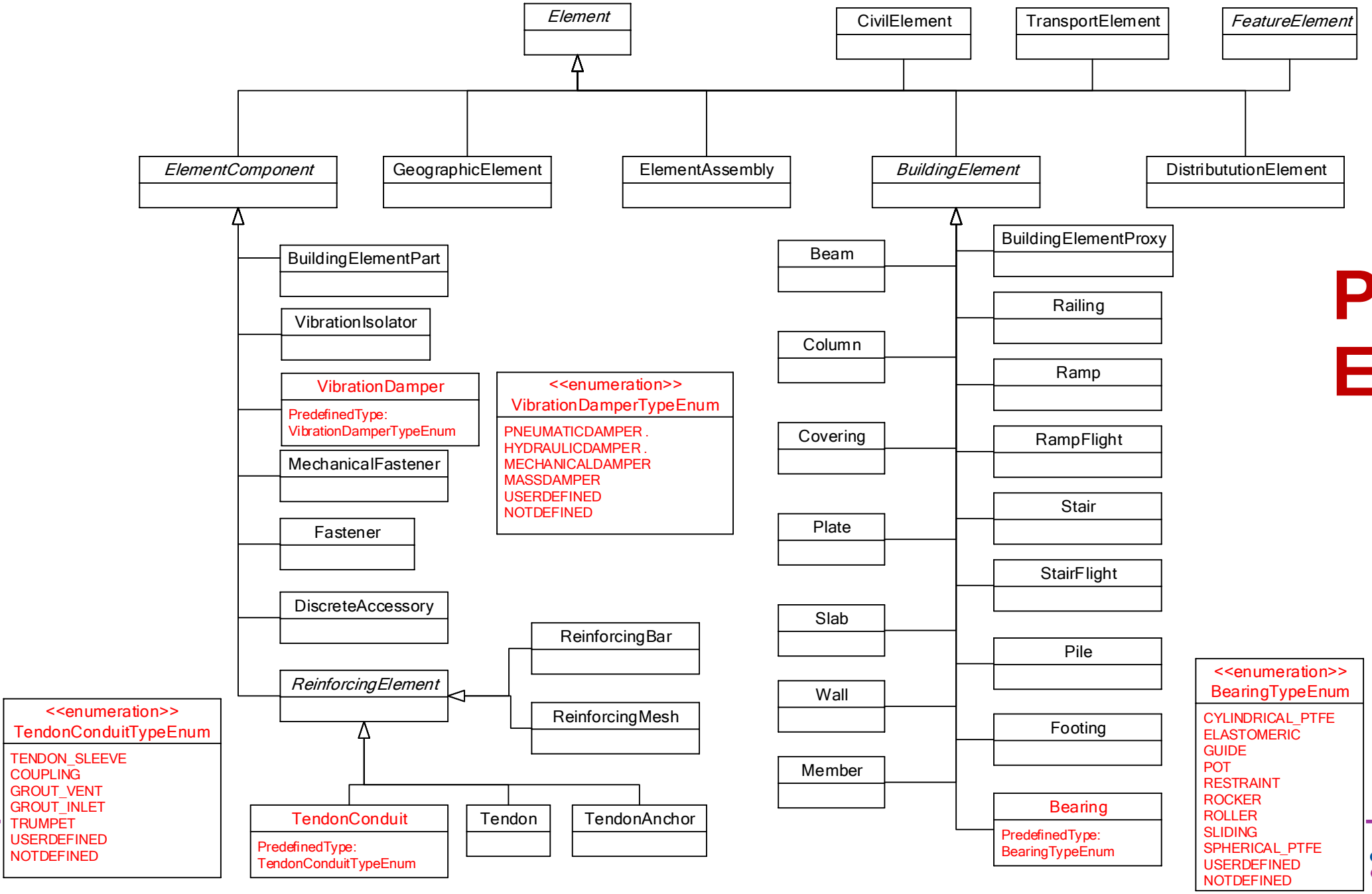
Geometry & Placement



Spatial Concepts





Physical Elements

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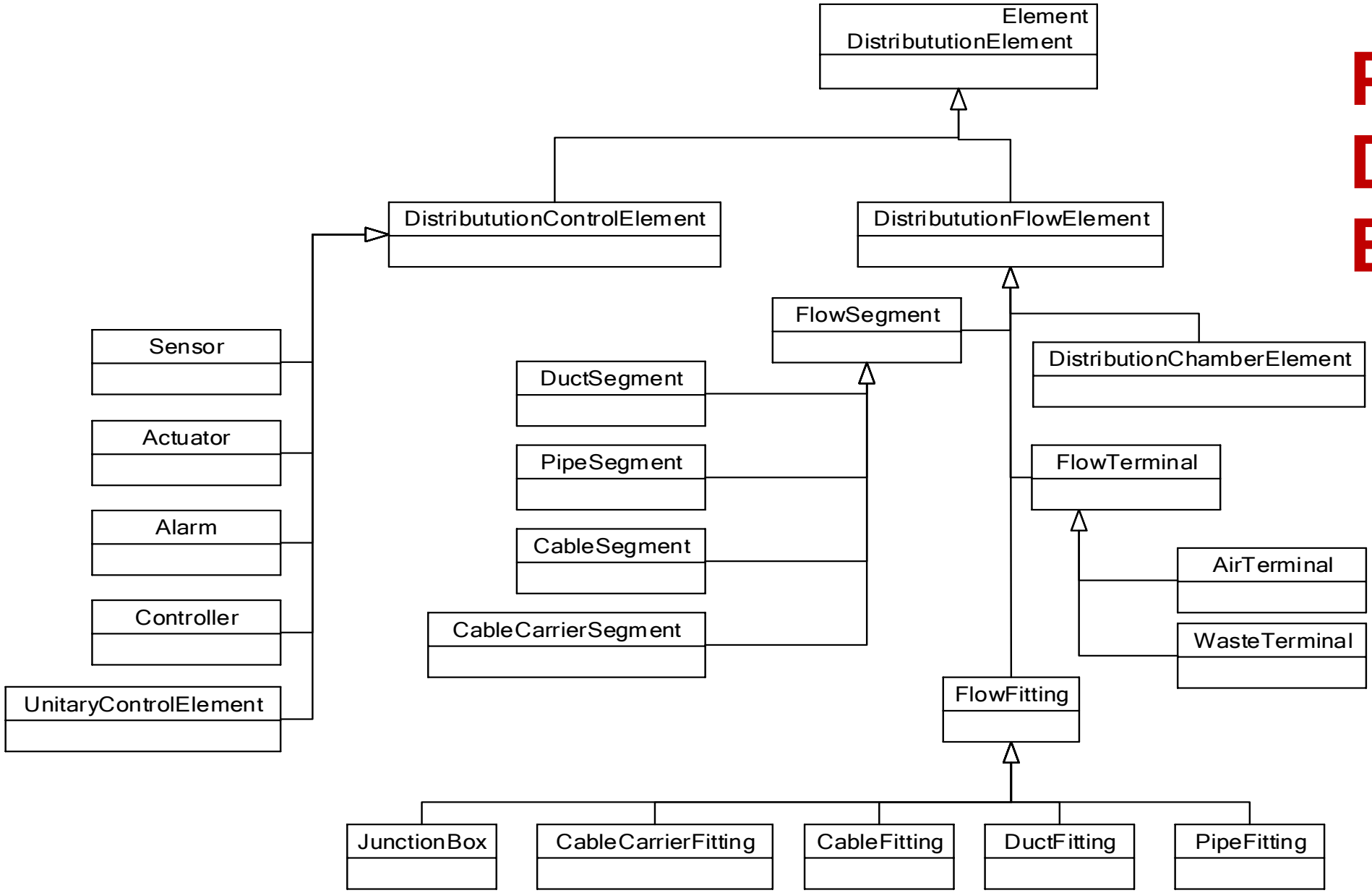
Physical Distribution Elements



Thank you

Thank you for your time and feedback.

Please feel free to provide additional feedback on the Conceptual Model report or on this presentation by sending your feedback to:

Juha.Hyvarinen@vtt.fi
IFC Bridge Project Team member

CC:

l.mol@gobar.nl
InfraRoom Project Coordinator and administrator