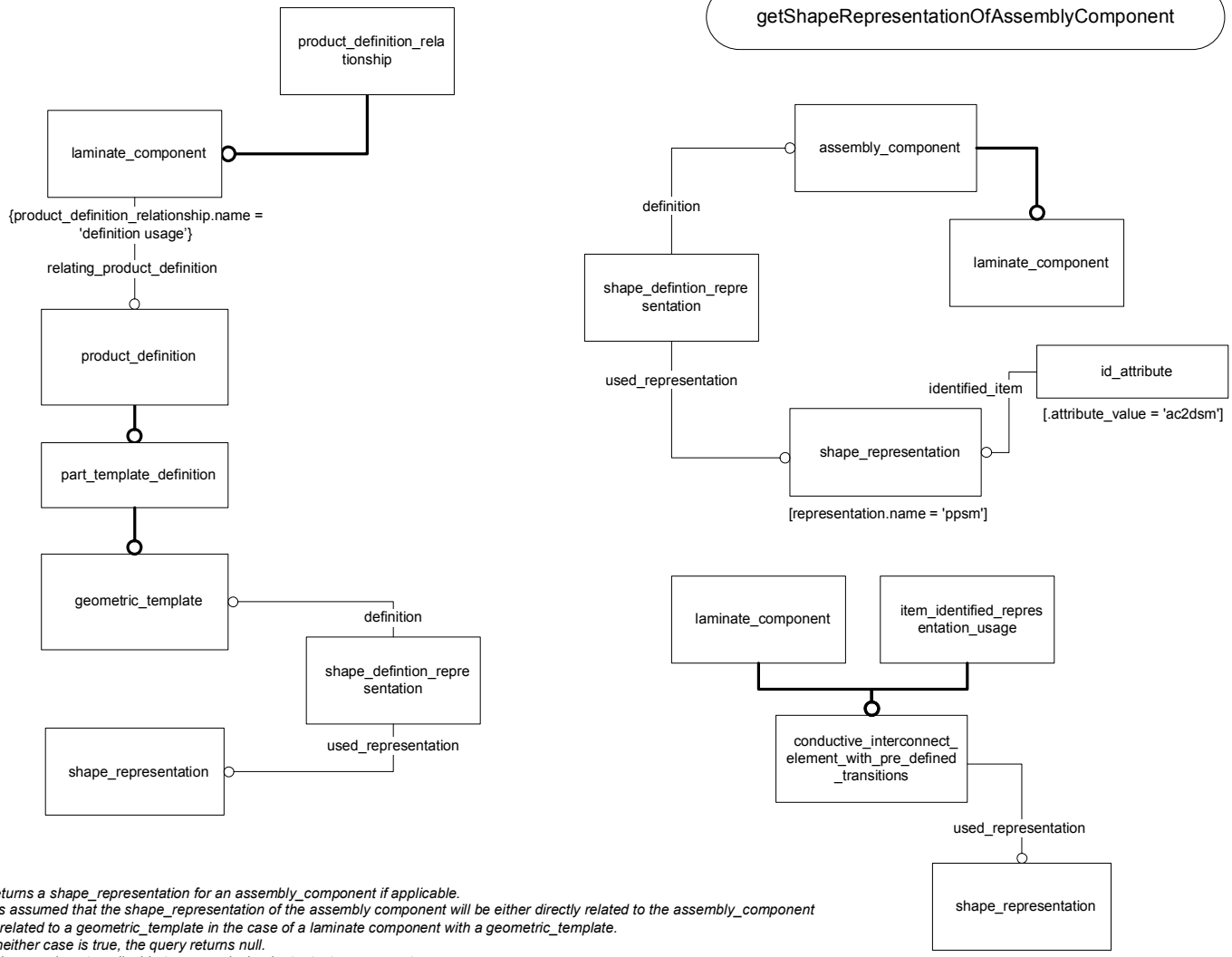
MIMqueries - LocationAndShapeOfAssemblyComponents

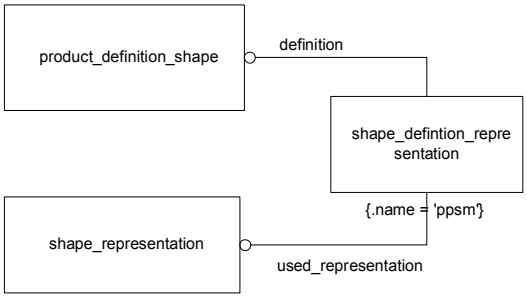
getShapeRepresentationOfAssemblyComponent	*Returns a shape_representation for an assembly_component if applicable.*
getShapeRepresentationOfProductDefinitionShape	*Returns a 'ppsm' shape_representation for a product_definition_shape directly related through a shape_definition_relationship. This method may be used to obtain the shape_representation for a structured_template, a geometric_template, an assembly_definition or an interconnect_definition. If additional global shape_representation qualification criteria are needed, they should be added to this query.*
getShapeRepresentationOfSLC	*Returns the shape_representation of a structured_layout_component.*
getShapeRepresentationOfGenericLaminateTextComponent	*Returns a shape_representation for a generic_laminate_text_component (an individual character).*
getCartesianTransformationOfNAUOR	*Returns a cartesian_transformation_operator_2d in the case that a relating component_2d_location exists for the given next_assembly_usage_occurrence_relationship.*
getTLISTTforTLIST	Returns the mapped_item corresponding to the given assembly_component_usage that is qualified by the given shape_representation The acu is the mim representation of the template_location_in_structured_template while the mapped_item is the representation of the template_location_in_structured_template_transform.
getAxisPlacementOfSLCSAR	*Returns the two Axis2_placement_2d transforms associated with the 'first location' and the 'second location' (if applicable) of the SLCSAR.*
getLocationOfLaminateComponent	*Returns between 0 and 3 transformations that must be applied sequentially to locate the shape_representation of the laminate_component with respect to the shape_representation of the interconnect_definition (pcb).*
getLocationOfAssemblyComponentInSLC	*Returns between 1 and 2 Axis2_placement_2d that must be applied sequentially to locate the shape_representation of the assembly_component with respect to the shape_representation of the structured_layout_component.*

getShapeRepresentationOfAssemblyComponent

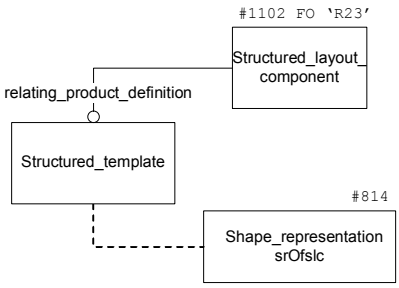


// Returns a shape_representation for an assembly_component if applicable.
// It is assumed that the shape_representation of the assembly component will be either directly related to the assembly_component
// or related to a geometric_template in the case of a laminate component with a geometric_template.
// If neither case is true, the query returns null.
// This query is not applicable to a generic_laminate_text_component.

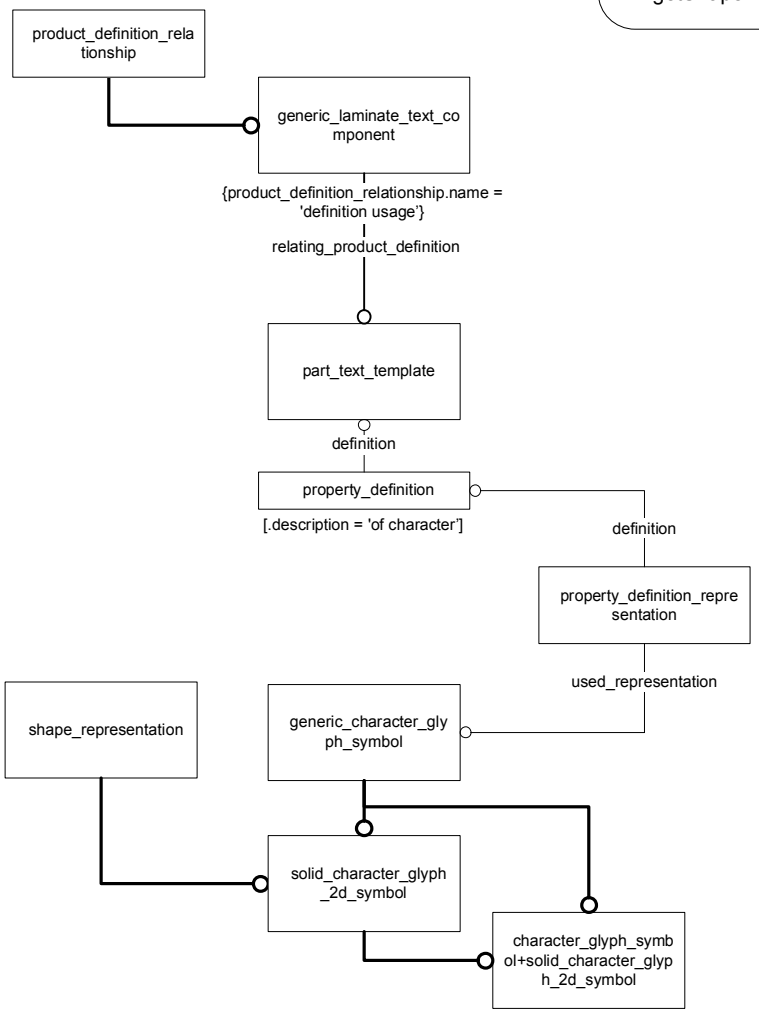
```
shape_representation getShapeRepresentationOfAssemblyComponent(assembly_component ac)
{
    shape_representation sr = relatedEntityOp(ac)
        where    {shape_definition_representation sdr}
                 {ac <- sdr.definition}
                 {sdr.used_representation -> sr}

    if (sr != null)
    {
        id_attribute ia = referencingEntityOp(sr)
            where {sr <- ia.identified_item}
                  {ia.attribute_value = 'ac2dsm'}

        if (ia != null)
            return sr
    }

    If (ac InstanceOf laminate_component)
    {
        product_definition e_pd = ac.relating_product_definition

        if (e_pd instanceOf geometric_template)
        {
            gt = (geometric_template) e_pd
            shape_representation sr2 = relatedEntityOp(gt)
                where    {shape_definition_representation sdr}
                         {gt <- sdr.definition}
                         {sdr.used_representation -> sr2}
            return sr2
        }
    }

    if (ac instanceOf Item_identified_representation_usage)
        {
            item_identified_representation_usage e_iiru = ac
            representation e_rep = e_iiru.used_representation
            if (e_rep instanceOf shape_representation)
                return e_rep
        }
    return null
}
```



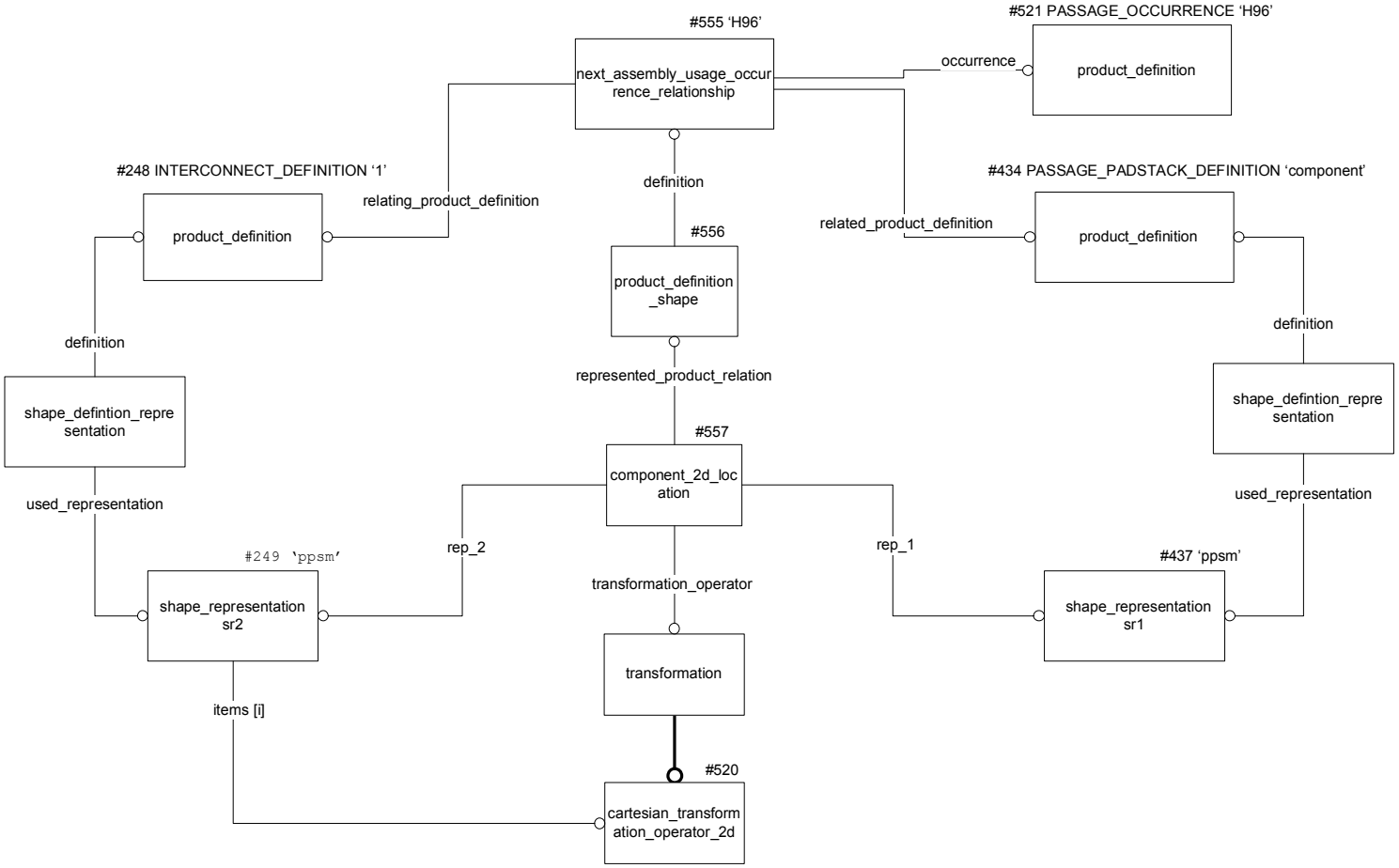

```
// Returns a 'ppsm' shape_representation for a product_definition_shape directly related through a shape_definition_relationship.
// This method may be used to obtain the shape_representation for a structured_template, a geometric_template,
// an assembly_definition or an interconnect_definition.
// If additional global shape_representation qualification criteria are needed, they should be added to this query.

shape_representation getShapeRepresentationOfProductDefinitionShape(product_definition_shape pds)
{
    shape_representation sr = relatedEntityOp(pds)
        where    {shape_definition_representation sdr}
                 {pds <- sdr.definition}
                 {sdr.used_representation -> sr}
                 {sdr.name = 'ppsm'}
    return sr
}
```



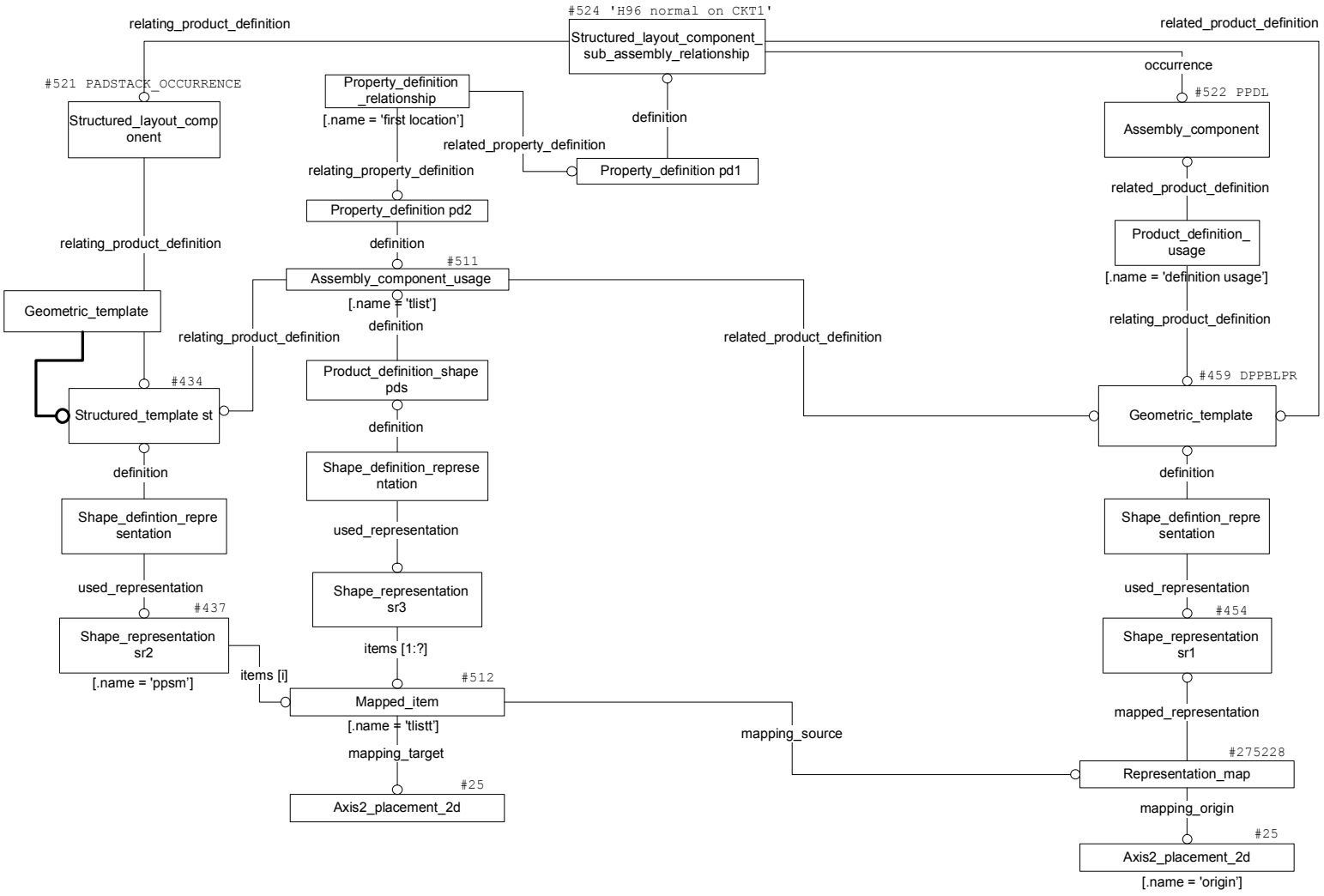

```
// Returns the shape_representation of a structured_layout_component.

shape_representation getShapeRepresentationOfSLC(structured_layout_component slc)
{
    structured_template st = referencedEntityOp(slc)
        where   {slc.relating_product_definition -> st}

    shape_representation srOfslc = getShapeRepresentationOfProductDefinitionShape(st)
    return srOfslc
}
```



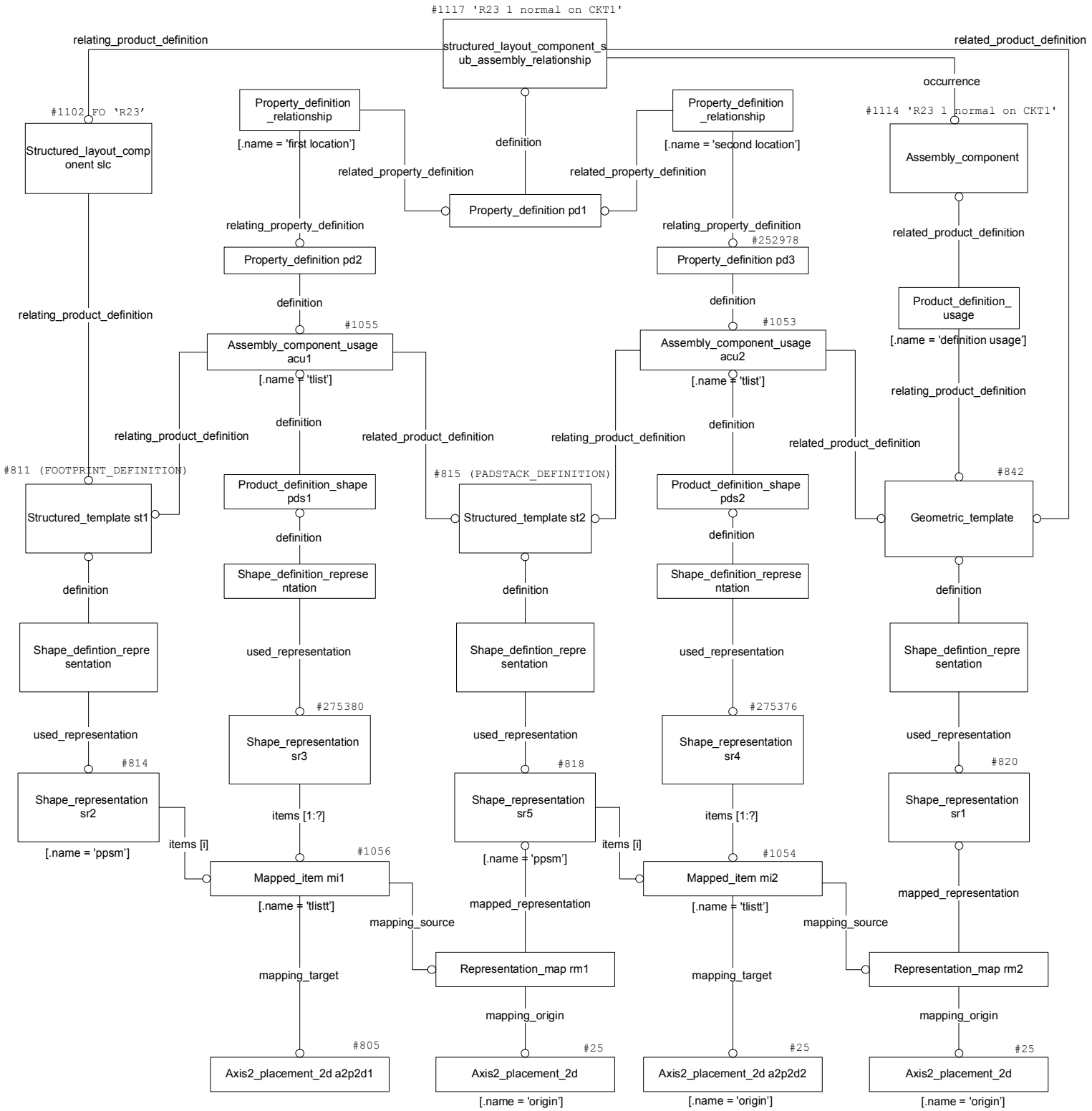

```
// Returns a shape_representation for a generic_laminate_text_component (an individual character)
// If the geometry is not explicity represented in a solid_character_glyph_2d_symbol, returns null.

shape_representation getShapeRepresentationOfGenericLaminateTextComponent(generic_laminate_text_component gltc)
{
    part_text_template ptt = gltc.relating_product_definition

    If (ptt == null)
        return null

    property_definition pd = referencingEntityOp(ptt)
        where   {pd.definition -> ptt}
                {pd.description = 'of character'}

    If (pd == null)
        return null

    solid_character_glyph_2d_symbol scg2ds = relatedEntityOp(pd)
            where   {property_definition_representation pdr}
                    {pd <- pdr.definition}
                    {pdr.used_representation -> scg2ds}

    return scg2ds
}
```



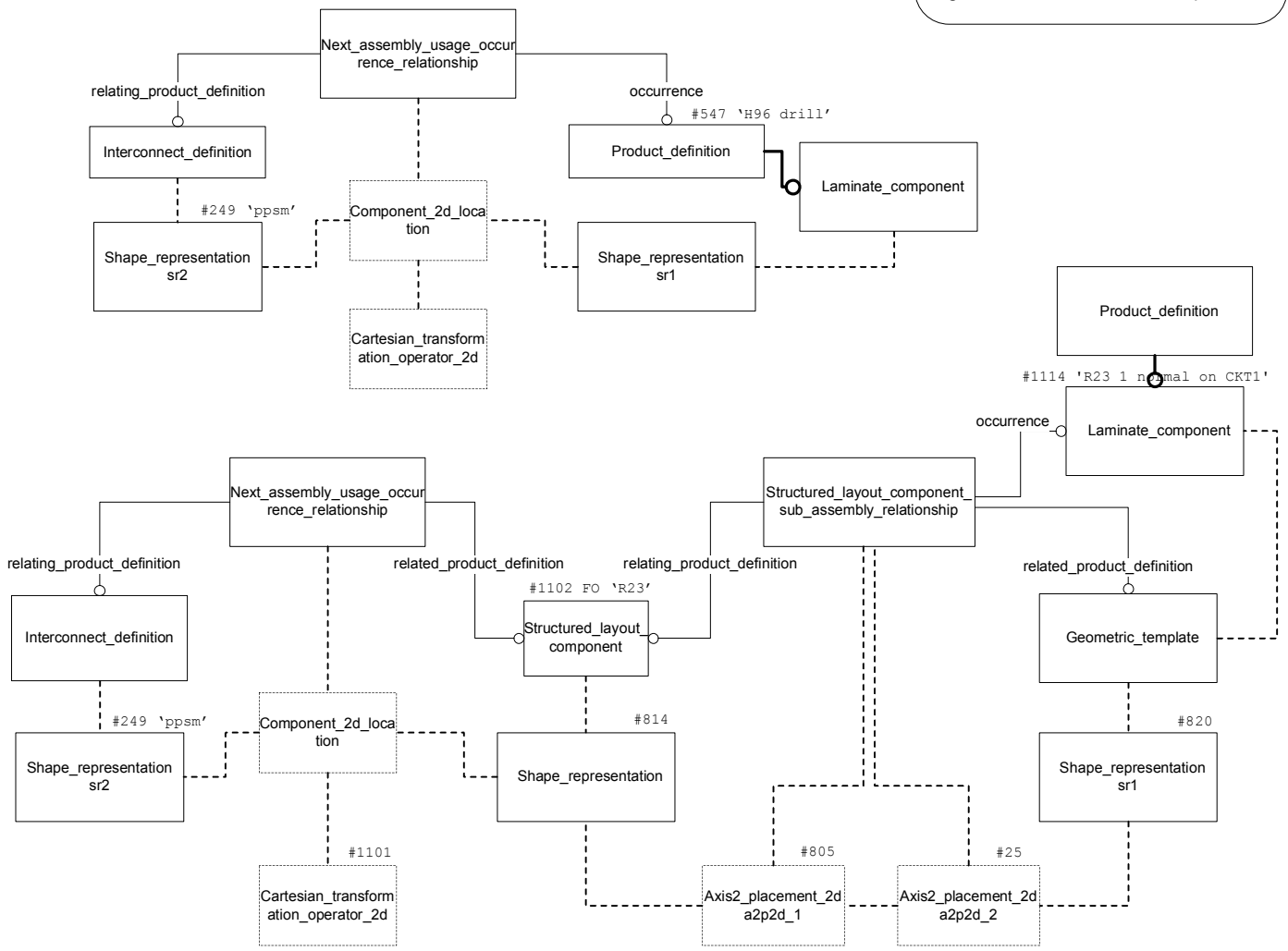

```
// Returns a cartesian_transformation_operator_2d in the case that a relating component_2d_location exists
// for the given next_assembly_usage_occurrence_relationship. The c2dl is qualified by the two given shape_representations.
// If no such transformation exists, the query returns null.

cartesian_transformation_operator_2d getCartesianTransformationOfNAUOR(
    next_assembly_usage_occurrence_relationship nauor,
    shape_representation sr1,
    shape_representation sr2)
{
    product_definition_shape pds = referencingEntityOp(nauor)
        where   {pds.definition -> nauor}

    Aggregate<component_2d_location> a_c2dl = referencingEntitiesOp(pds)
        where   {component_2d_location c2dl}
                {c2dl.represented_product_relation->pds}

    component_2d_location c2dl = referencingFilterOp(a_c2dl)
        where   {c2dl.rep_1 -> sr1}
                {c2dl.rep_2 -> sr2}

    if (c2ld != null)
    {
        cartesian_transformation_operator_2d cto2d = referencedEntityOp(c2dl)
            where   {c2dl.transformation -> cto2d}
        return cto2d
    }
    return null
}
```




```
// Returns the mapped_item corresponding to the given assembly_component_usage that is
// qualified by the given shape_representation The acu is the mim representation of the
// template_location_in_structured_template while the mapped_item is the representation of the
// template_location_in_structured_template_transform.

mapped_item getTLISTTforTLIST(assembly_component_usage e_acu,
                              shape_representation sr2)
{
    Aggregate <product_definition_shape> a_pds = referencingEntitiesOp(e_acu)
        where   {product_definition_shape pds}
                {pds.definition->acu}

    For each product_definition_shape pds in a_pds
    {
        Aggregate<shape_representation> a_sr = relatedEntitiesOp(pds)
            where   {shape_representation sr}
                    {shape_definition_representation sdr}
                    {pds<-sdr.definition}
                    {sdr.used_representation-> sr}

        For each shape_representation sr in a_sr
        {
            Aggregate<mapped_item> a_mi = referencedEntitiesOp(sr)
                where   {mapped_item mi}
                        {sr.items Contains mi}
                        {mi.name = 'tlistt'}

            mapped_item mi = referencedFilterOp(a_mi)
                where   {mapped_item mi}
                        {sr2.items Contains mi}

            if (mi != null)
                return mi
        }
    }
    return null
}
```

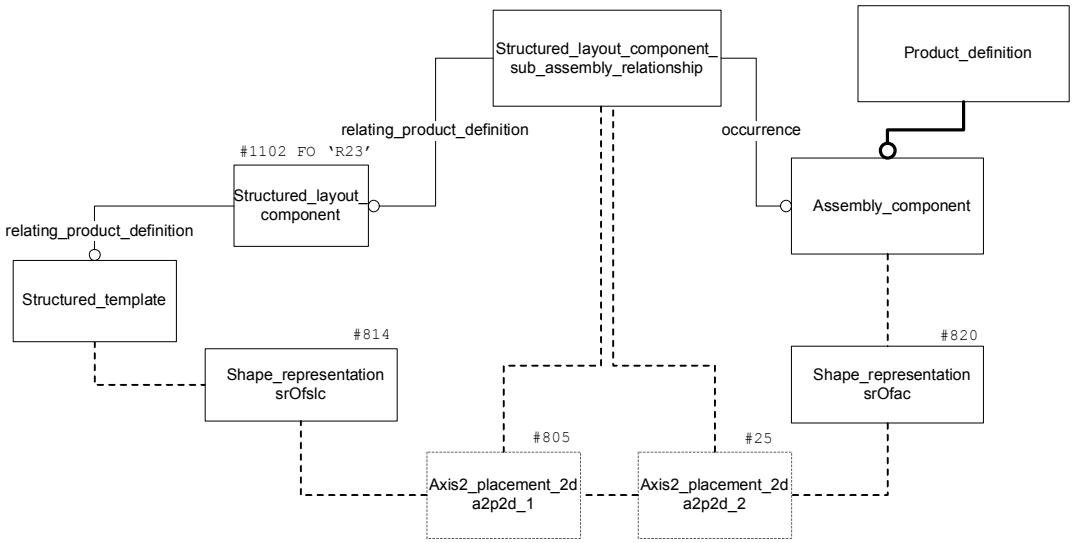

#1117 'R23 1 normal on CKT1'
structured_layout_component_sub_assembly_relationship
relating_product_definition
related_product_definition
occurrence
#1102 FO 'R23'
Structured_layout_component slc
Property_definition_relationship
[.name = 'first location']
Property_definition_relationship
[.name = 'second location']
#1114 'R23 1 normal on CKT1'
Assembly_component
definition
related_property_definition
related_property_definition
Property_definition pd1
relating_property_definition
relating_property_definition
#252978
Property_definition pd2
Property_definition pd3
related_product_definition
definition
definition
Product_definition_usage
[.name = 'definition usage']
relating_product_definition
#1055
#1053
Assembly_component_usage acu1
[.name = 'tlist']
Assembly_component_usage acu2
[.name = 'tlist']
relating_product_definition
definition
definition
relating_product_definition
related_product_definition
relating_product_definition
related_product_definition
#811 (FOOTPRINT_DEFINITION)
#815 (PADSTACK_DEFINITION)
#842
Structured_template st1
Product_definition_shape pds1
Structured_template st2
Product_definition_shape pds2
Geometric_template
definition
definition
definition
Shape_definition_representation
Shape_definition_representation
definition
definition
definition
Shape_defintion_representation
Shape_defintion_representation
Shape_defintion_representation
used_representation
used_representation
used_representation
#275380
#275376
Shape_representation sr3
Shape_representation sr4
used_representation
used_representation
used_representation
#814
#818
#820
Shape_representation sr2
Shape_representation sr5
Shape_representation sr1
[.name = 'ppsm']
items [1:?]
items [1:?]
[.name = 'ppsm']
items [i]
items [i]
#1056
#1054
Mapped_item mi1
Mapped_item mi2
[.name = 'tlistt']
[.name = 'tlistt']
mapped_representation
mapped_representation
mapping_source
mapping_source
Representation_map rm1
Representation_map rm2
mapping_target
mapping_target
mapping_origin
mapping_origin
#805
#25
#25
#25
Axis2_placement_2d a2p2d1
Axis2_placement_2d
[.name = 'origin']
Axis2_placement_2d a2p2d2
[.name = 'origin']
Axis2_placement_2d
[.name = 'origin']

```
// Returns one or two Axis2_placement_2d transforms associated with the 'first location'
// and the 'second location' (if applicable) of the SLCSAR.

[axis2_placement_2d;  axis2_placement_2d] getAxisPlacementOfSLCSAR(
      structured_layout_component_sub_assembly_relationship slcsar,
      shape_representation sr1,
      shape_representation sr2)
{
      axis2_placement_2d a2p2d1 = null;
      axis2_placement_2d a2p2d2 = null;

      structured_layout_component slc = referencedEntityOp(slcsar)
            where {slcsar.relating_product_definition->slc }

      structured_template st1 = referencedEntityOp(slc)
            where {slc.relating_product_definition->st }

      property_definition pd1 = referencingEntityOp(slcsar)
            where       {pd1.definition -> slcsar}

      property_definition pd2 = relatedEntityOp(pd1)
                  where       {property_definition_relationship pdr}
                              {pd1<-pdr.related_property_definition}
                              {pdr.relating_property_definition->pd2}
                              {pdr.name = 'first location'}

      assembly_component_usage acu1 = referencedEntityOp(pd2)
            where       {pd2.definition->acu1}
                        {acu1.name = 'tlist'}

      mapped_item mi1 = getTLISTTforTLIST(acu1, sr2);

      representation_map rm1 = referencedEntityOp(mi1)
            where       {mi1.mapping_source->rm1}

      shape_representation sr5 = referencedEntityOp(rm1)
            where       {rm1.mapped_representation->sr5}

      axis2_placement_2d a2p2d1 = referencedEntityOp(mi1)
            where       {mi1.transform -> a2p2d1 }

      property_definition pd3 = relatedEntityOp(pd1)
            where       {property_definition_relationship pdr}
                        {pd1<-pdr.related_property_definition}
                        {pdr.relating_property_definition->pd2}
                        {pdr.name = 'second location'}

      if (pd3 !=null)
      {
            Assembly_component_usage acu2 = referencedEntityOp(pd3)
                  where       {pd3.definition->acu2}
                              {acu2.name = 'tlist'}

            mapped_item mi2 = getTLISTTforTLIST(acu2, sr5);

            axis2_placement_2d a2p2d2 = referencedEntityOp(mi2)
                  where       {mi2.transform -> a2p2d2 }
      }
      return [a2p2d1; a2p2d2]
}
```



// Returns between 0 and 3 transformations that must be applied sequentially to locate the shape_representation of the laminate_component with respect to the shape_representation
// of the interconnect_definition (pcb). Query may be applied to either a Laminate_component that is part of a Structured_layout_component or a Laminate_component located directly on the Pcb.

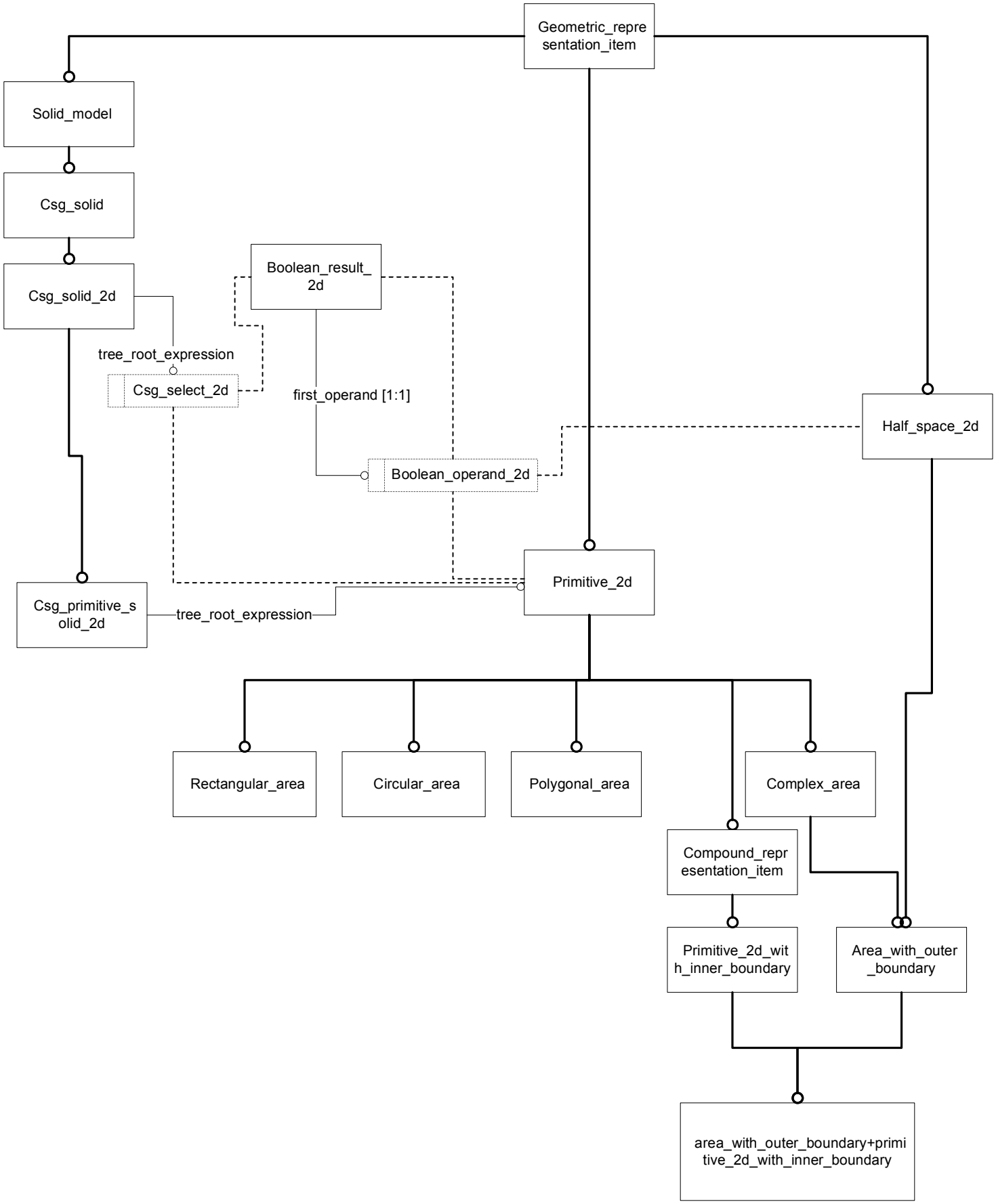
```
[Cartesian_transformation_operator_2d; Axis2_placement_2d;  Axis2_placement_2d] getLocationOfLaminateComponent(
        Interconnect_definition id, Laminate_component lc, Shape_representation sr1, Shape_representation sr2)
{
        Structured_layout_component_sub_assembly_relationship slcsar = referencingEntityOp(lc)
                where {slcsar.related_product_definition->lc }

        If (slcsar !=null)
        {
                structured_layout_component slc = referencedEntityOp(slcsar)
                        where       {slcsar.relating_product_definition -> slc }

                structured_template st = referencedEntityOp(slc)
                        where       {slc.relating_product_definition -> st}

                shape_representation srOfslc = getShapeRepresentationOfProductDefinitionShape(st);

                [a2p2d1; a2p2d2] = getAxisPlacementOfSLCSAR(slcsar, sr1, srOfslc);

                next_assembly_occurrence_usage_relationship naour = referencingEntityOp(slc)
                        where {naour.related_product_definition->slc }

                cartesian_transformation_operator_2d cto2d = getCartesianTransformationOfNAUOR(naour, srOfslc, sr2)

                return [cto2d; a2p2d1; a2p2d2]
        }
        else // Laminate_component is not part of a Structured_layout_component
        {
                next_assembly_occurrence_usage_relationship naour = referencingEntityOp(lc)
                        where       {naour.related_product_definition ->lc }
                                    {naour.relating_product_definition ->id }

                cartesian_transformation_operator_2d cto2d = getCartesianTransformationOfNAUOR(naour, sr1, sr2)

                return [cto2d; null; null]]
        }
}
```



// Returns between 1 and 2 Axis2_placement_2d that must be applied sequentially to locate the shape_representation of the assembly_component
// with respect to the shape_representation of the structured_layout_component.
// It is possible for the assembly_component to be a (nested) structured_layout_component.

[Axis2_placement_2d; Axis2_placement_2d] getLocationOfAssemblyComponentInSLC(
Assembly_component e_ac,
Structured_layout_component_sub_assembly_relationship slcsar,
Structured_layout_component slc,
Shape_representation srOfac)
{
structured_template st = referencedEntityOp(slc)
where {slc.relating_product_definition -> st}

shape_representation srOfslc = getShapeRepresentationOfProductDefinitionShape(st)
[a2p2d1; a2p2d2] = getAxisPlacementOfSLCSAR(slcsar, srOfac, srOfslc)
return [a2p2d1; a2p2d2]
}


Geometric_representation_item
Solid_model
Csg_solid
Csg_solid_2d
Boolean_result_2d
tree_root_expression
Csg_select_2d
first_operand [1:1]
Half_space_2d
Boolean_operand_2d
Primitive_2d
Csg_primitive_solid_2d
tree_root_expression
Rectangular_area
Circular_area
Polygonal_area
Complex_area
Compound_representation_item
Primitive_2d_with_inner_boundary
Area_with_outer_boundary
area_with_outer_boundary+primitive_2d_with_inner_boundary


property_definition
_relationship
relating_property_definition
related_property_definition
{.name = 'reference package'}
shape_aspect
of_shape
package
footprint_definition
definition
definition
package_terminal
shape_definition
_representation
shape_definition_
representation
used_representation
used_representation
geometric_representation_
context
context_of_items
definition
mapped_item
used_representation
shape_representation
shape_representation
items [i]
rep_1
usage_concept_usage
_relationship
representation
_relationship
rep_2
mapping_target
mapping_source
axis2_placement_2d
representation_map
mapping_origin
axis2_placement_2d
geometric_representation_context
context_of_items
mapped_representation
shape_representation
items [i]
axis2_placement_2d