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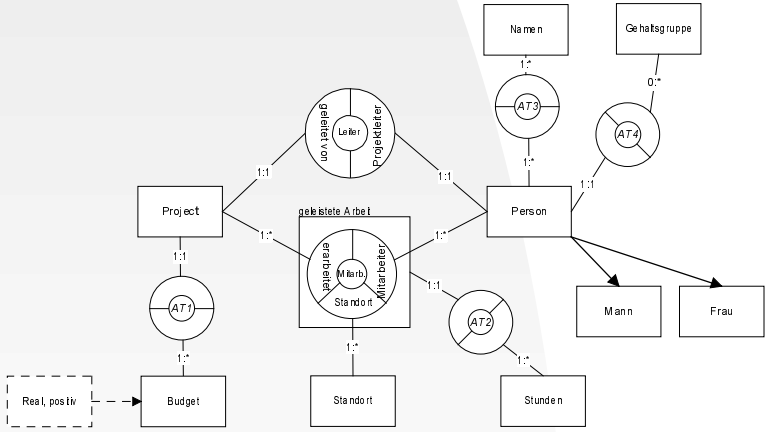
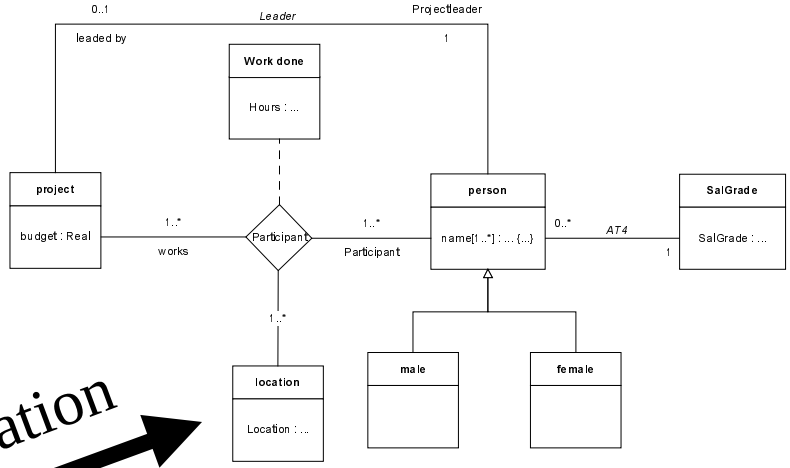
Form A Semantically Irreducible Formulated Conceptual Schema To An UML-Model

From A Conceptual Schema (CS) To An UML Class Diagram

Result of the Information Analysis (IA):
Semantically irreducible formulated CS



Transformation



Description of the information structure of the application

- Classes
- Attributes
- Operations
- Associations, Dependencies
- Stereotypes, Constraints
- Consistency Checks (OCL)

Why CS, And Not UML From The Very Beginning?

- CS contains all the relevant information, especially rules
- Iterativeley improvable based on the universe of discourse

- IA-description is oriented on the natural language
- IA integrates established modeling methods
  (like ER, EER, NIAM, ORM)

- from CS ⇒
  - Class structure diagram and
  - consistency guarantee dynamic constructs

  ... derivable through algorithm

Concepts Of The Information Analysis

semantically irreducible formulation of the conceptual schema

(oriented on the natural language)

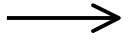
Structural Concepts,
basic elements of infomation:

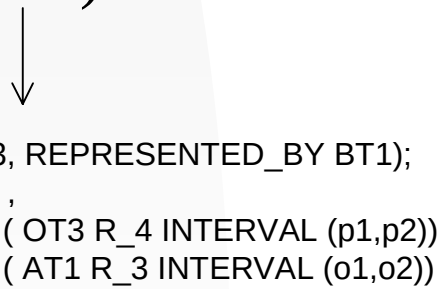
- objecttyp (OT)
- associationtypes (AT)
- dependencetypes

graphically visualized

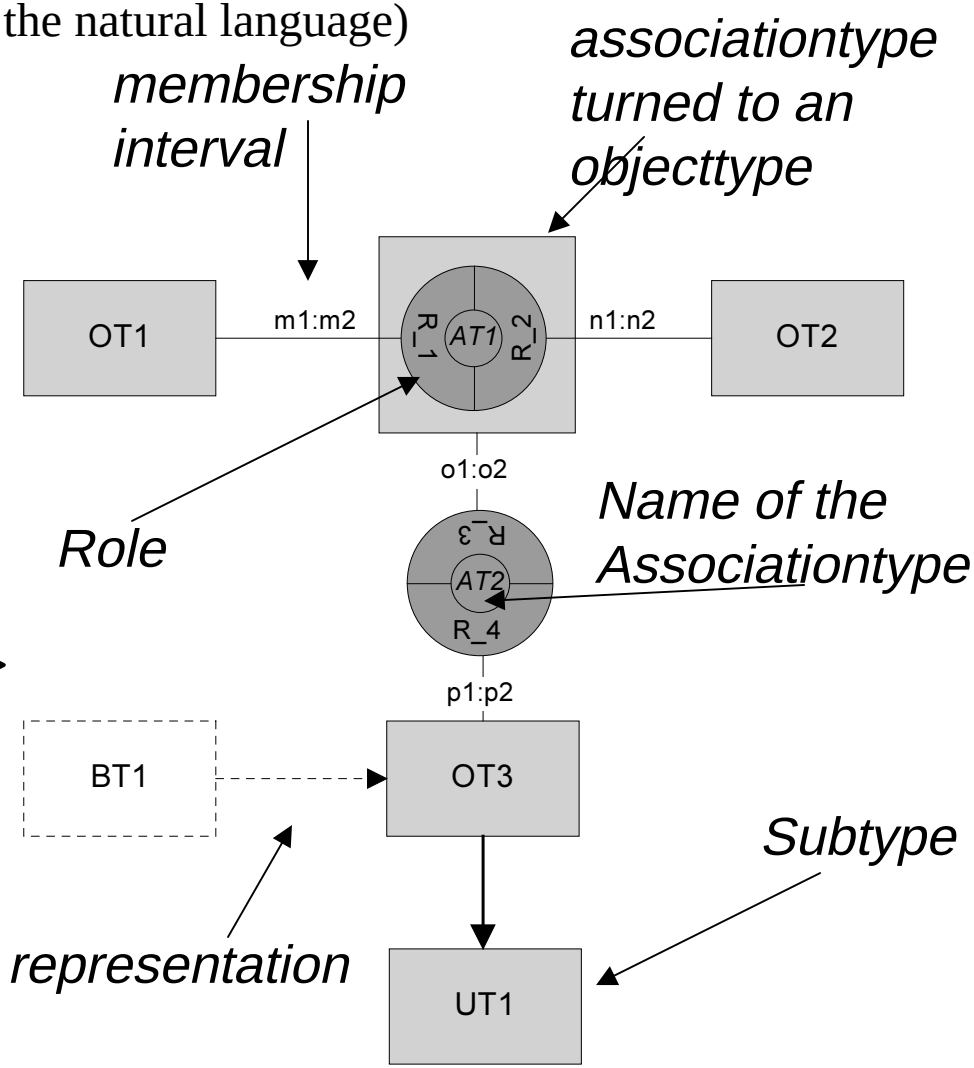
and

language (ISDL):





```
OBJECT (TYPE OT3, REPRESENTED_BY BT1);
ASSOC ( TYPE AT2 ,
            COMP ( OT3 R_4 INTERVAL (p1,p2)),
            COMP ( AT1 R_3 INTERVAL (o1,o2)) );
```



Information Structure Description Language (ISDL)

schema header

object-type

object-type

assoc.-type

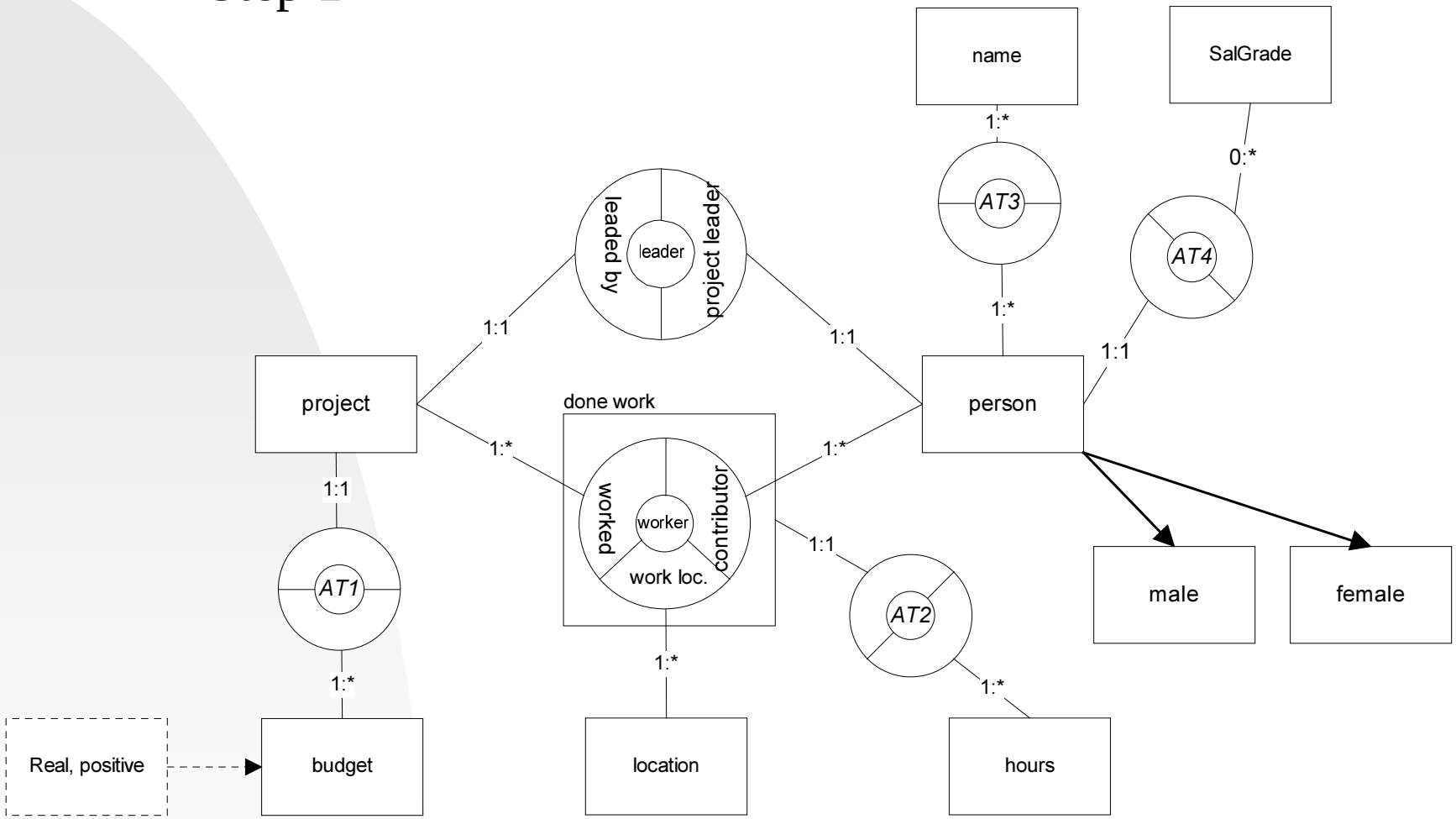
```
CONCEPTUAL_SCHEMA ( Company / Alt_Company, 0.0 );
#doc
   Description
   ============
doc#
OBJECT ( TYPE Person , REPRESENTED_BY String );
#doc
   *** standard description object ***
doc#

OBJECT ( TYPE SalGrade, REPRESENTED BY REAL(5,2));
#doc
   *** standard description object ***
doc#

ASSOC ( TYPE  payment,
              COMP ( SalGrade  INTERVAL (0,*)),
              COMP ( Person INTERVAL (1,1)) );
#doc
   *** standard description assozciation ***
doc#
END_SCHEMA ;
```

The Conceptual Schema

Step 1

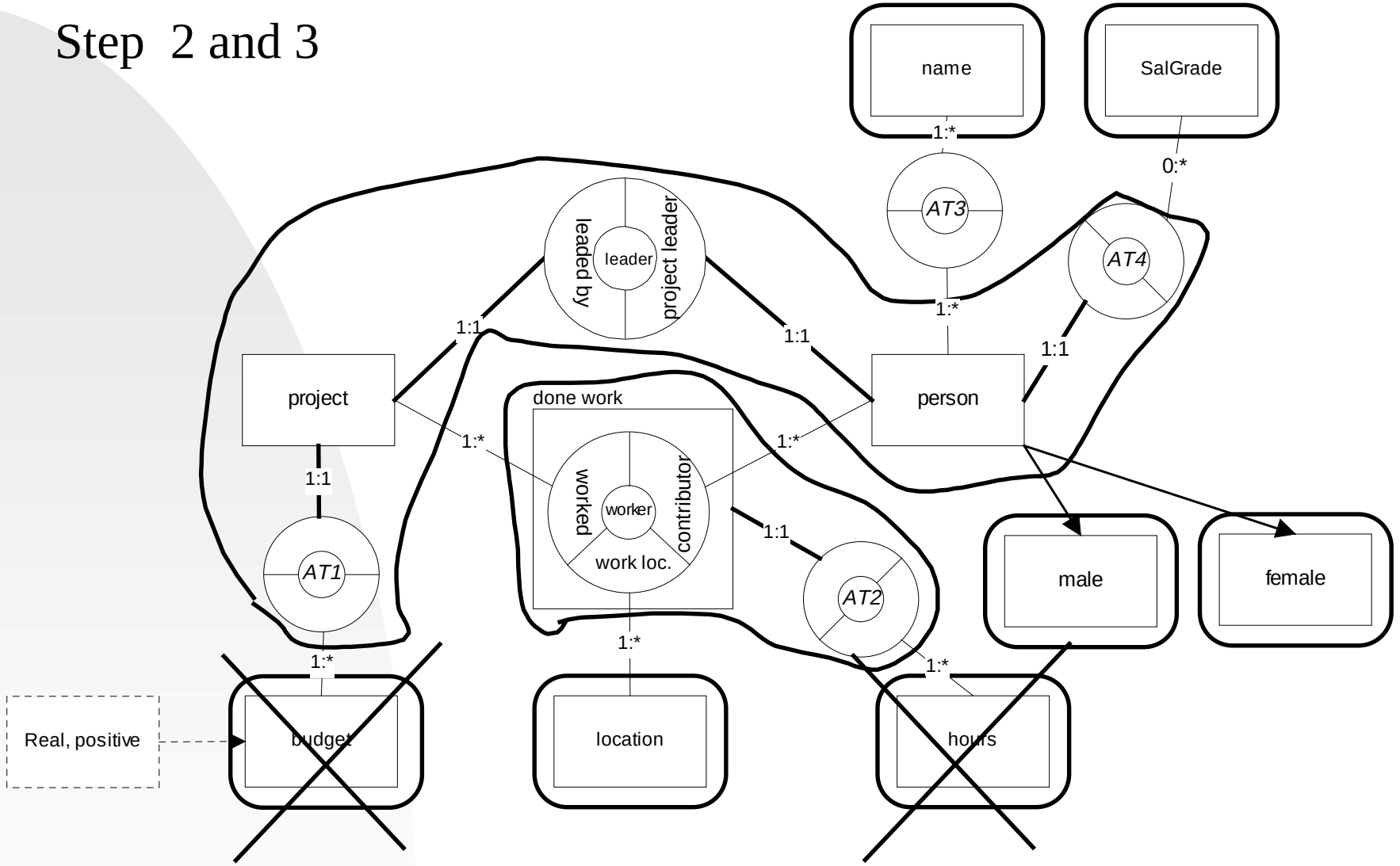


Why The Semantically Irreducible Formulation?

- Supports completeness and contradiction freeness
- lightens modeling of complex context
- is stable against schema evolution
- necessary for the derivation of relational DB structures
- makes the algorithmic derivation of optimized object oriented structures possible

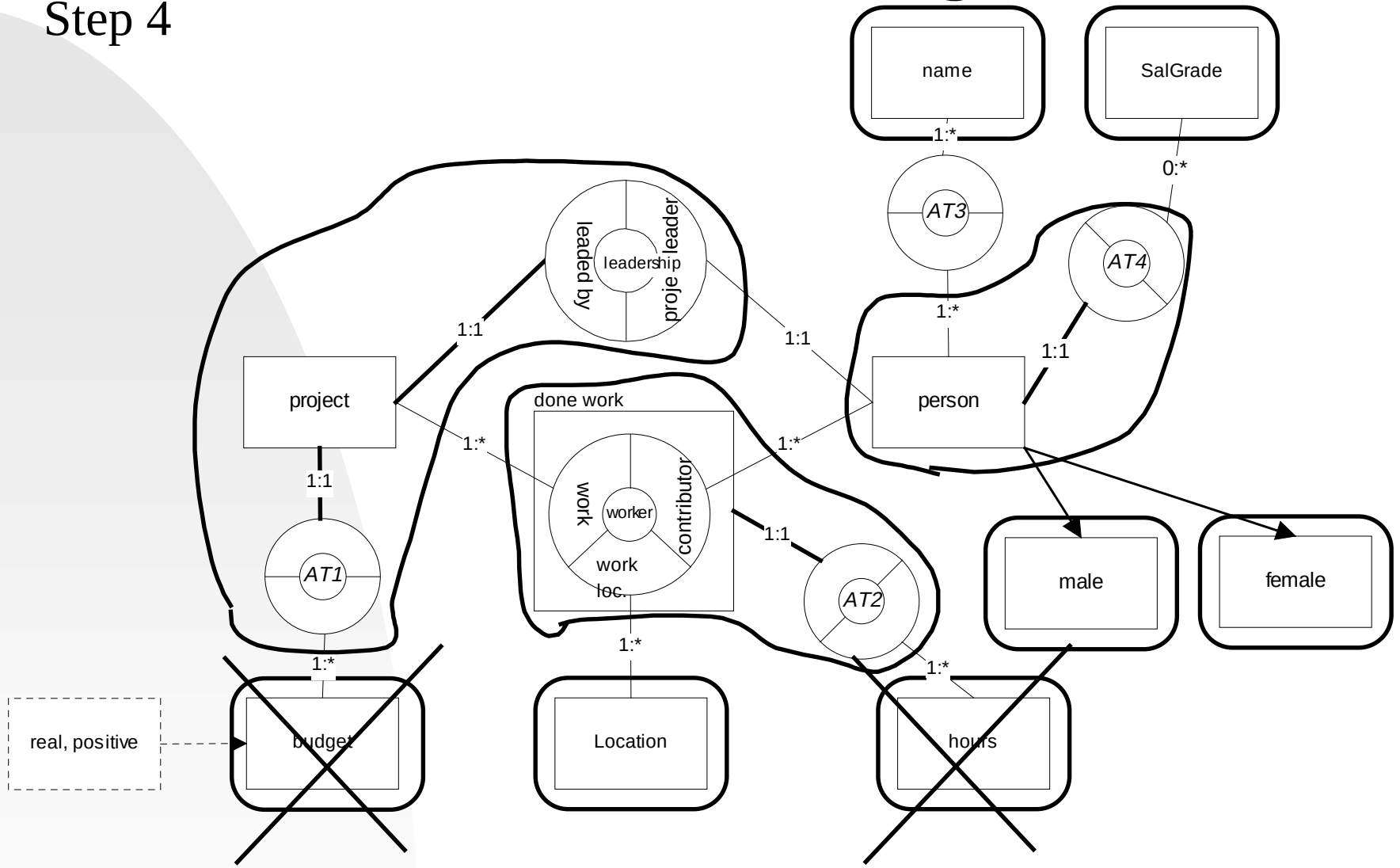
The Transformation Algorithm

Step 2 and 3



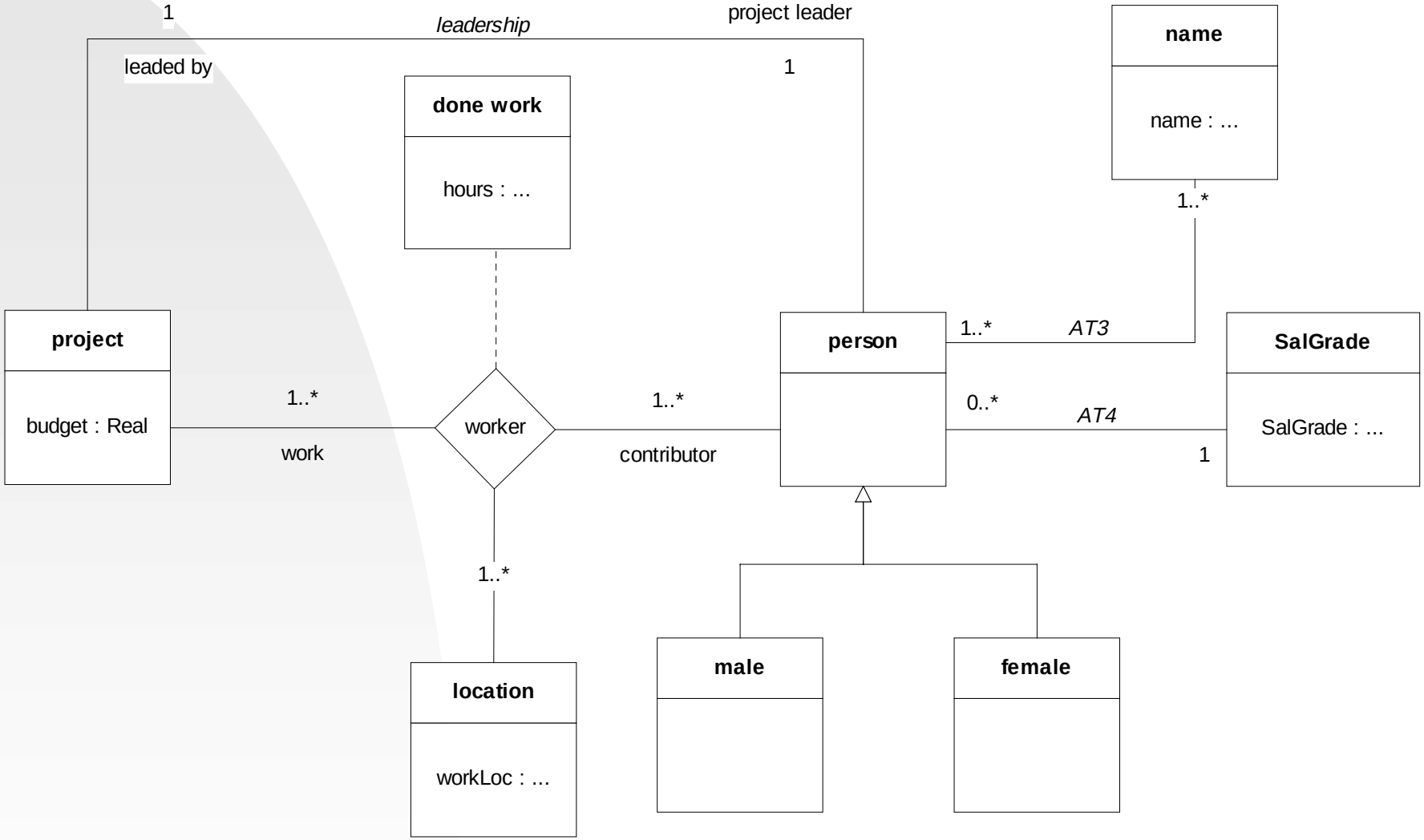
The Transformation Algorithm

Step 4



The Transformation Algorithm

Step 5, 6 and 7



Semantically Irreducible Formulation

- Supports completeness and contradiction freeness
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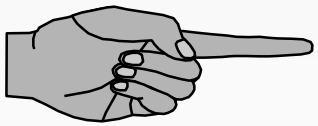
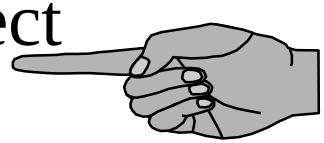
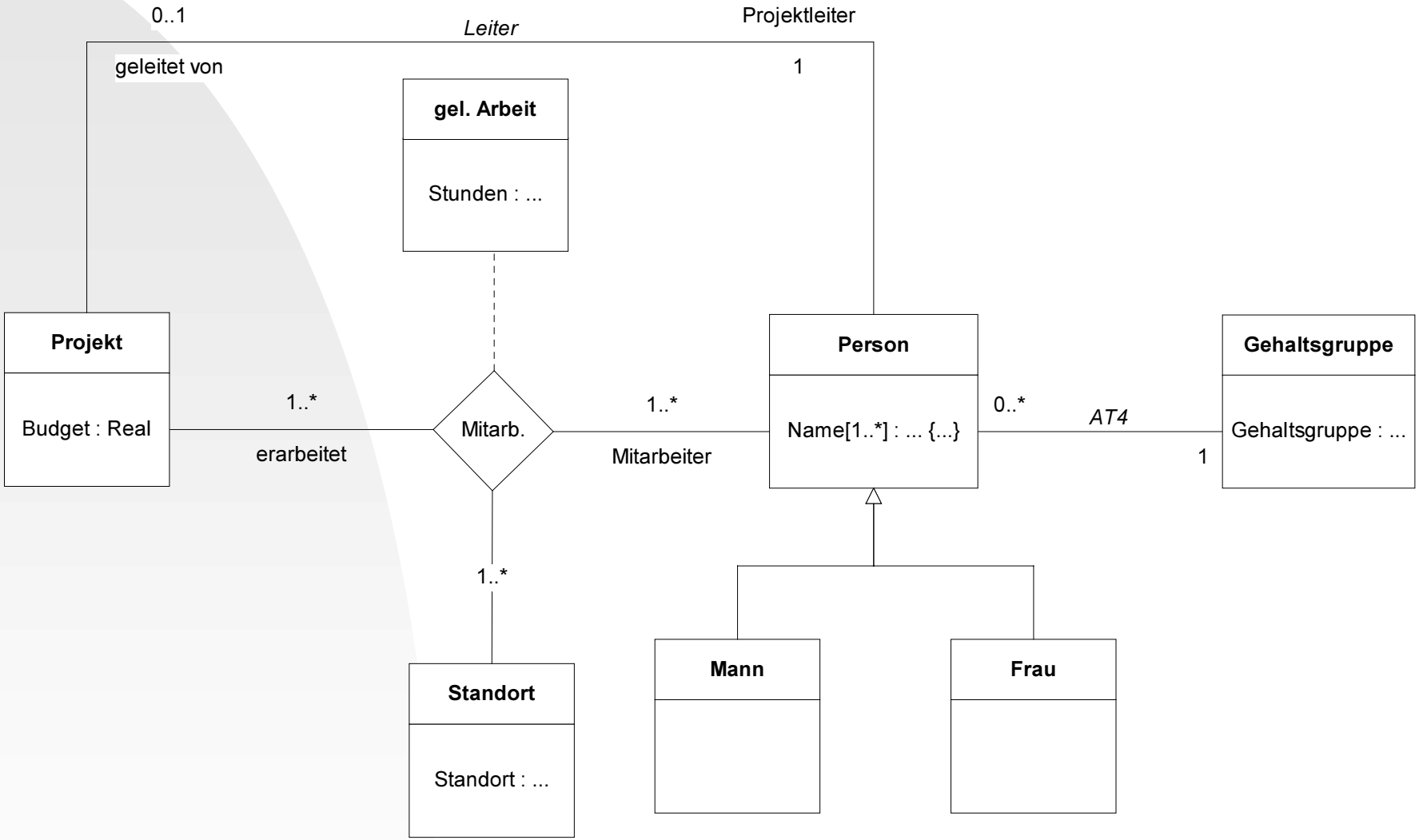


- Allows the late application of object specific application views



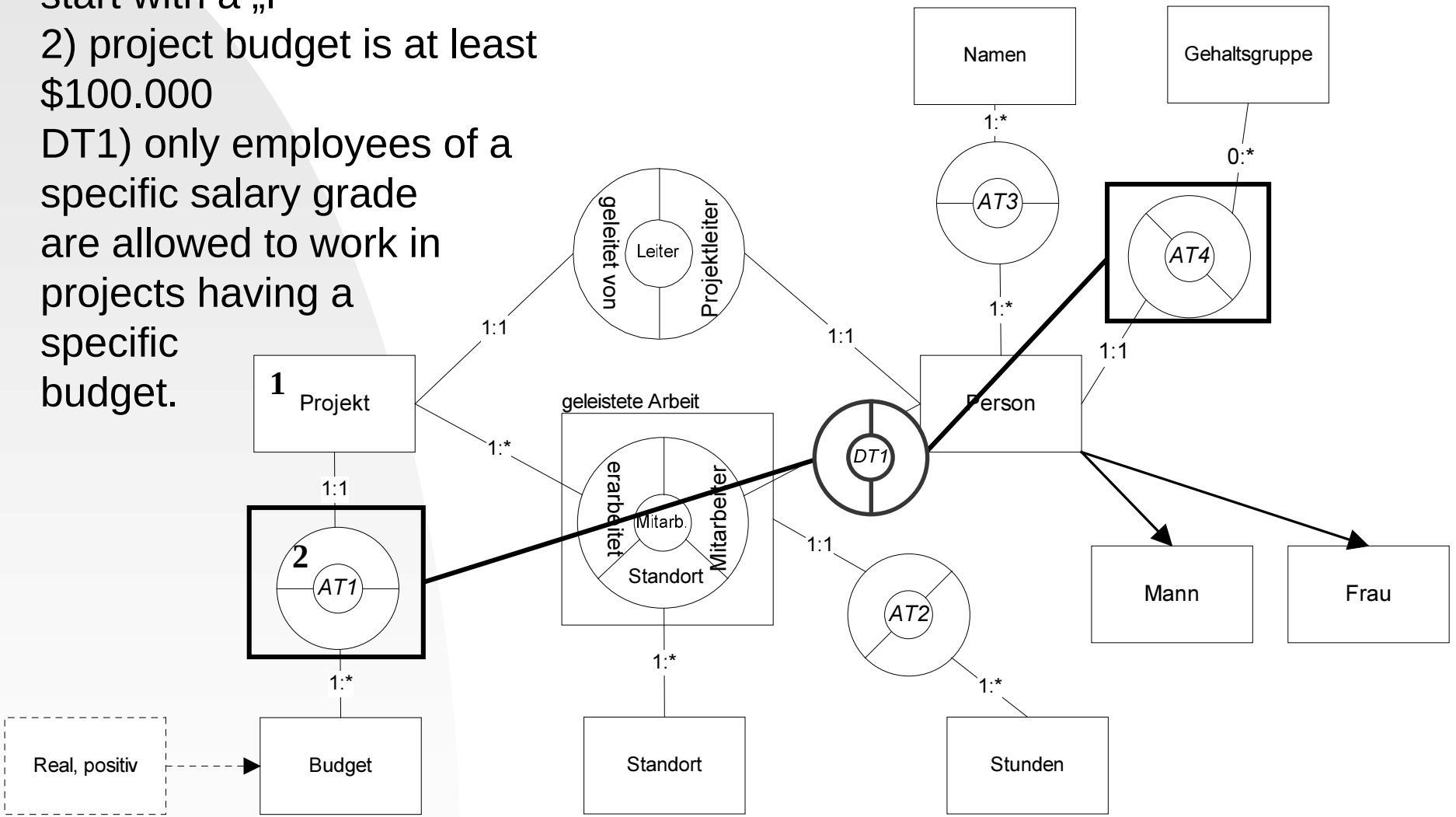
The Transformation Algorithm

Step 8: Applying a application centric view

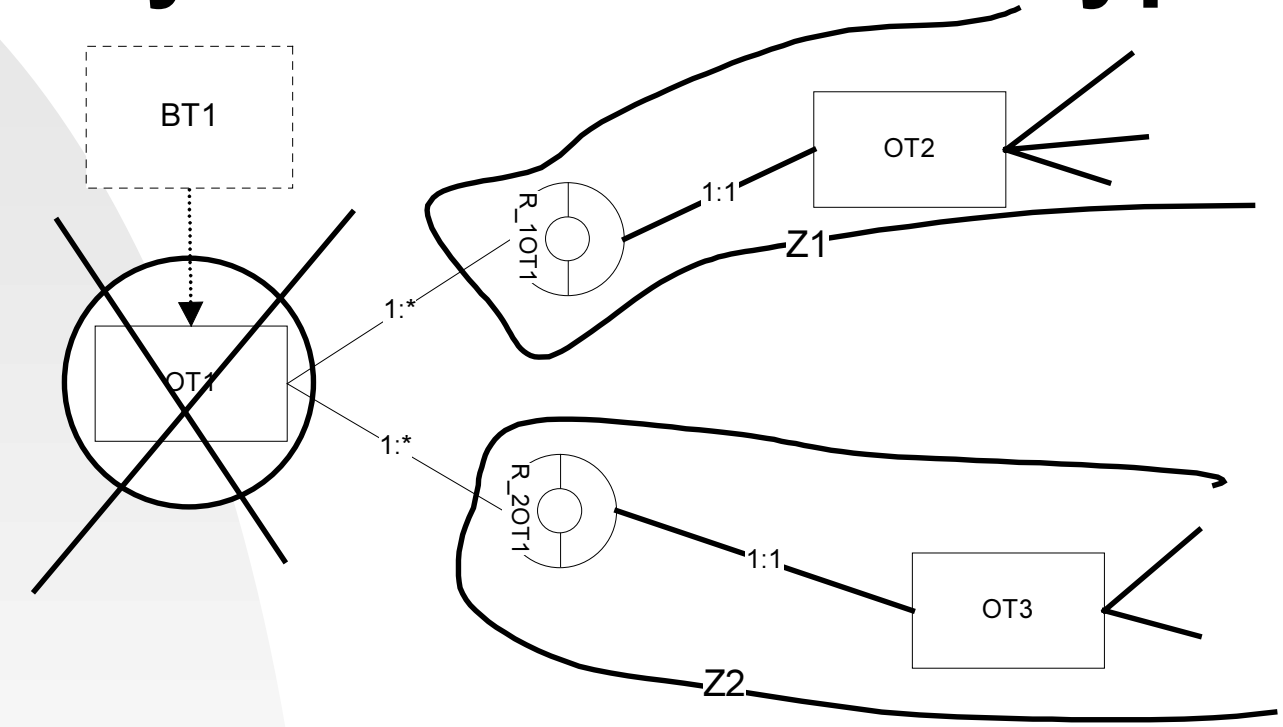


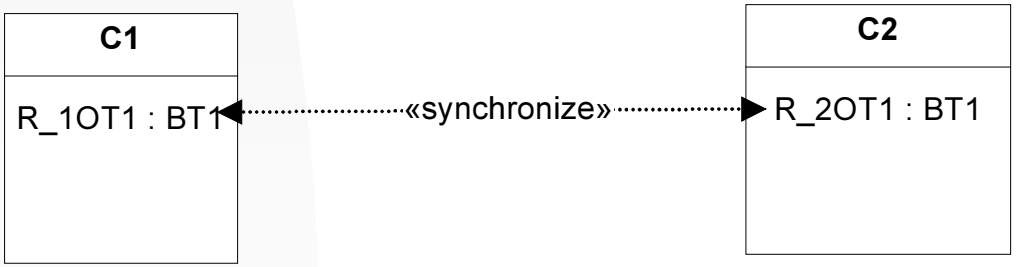
Constraints (expl.) - Depencency Types

1) project names have to start with a „F“
2) project budget is at least $100.000
DT1) only employees of a specific salary grade are allowed to work in projects having a specific budget.

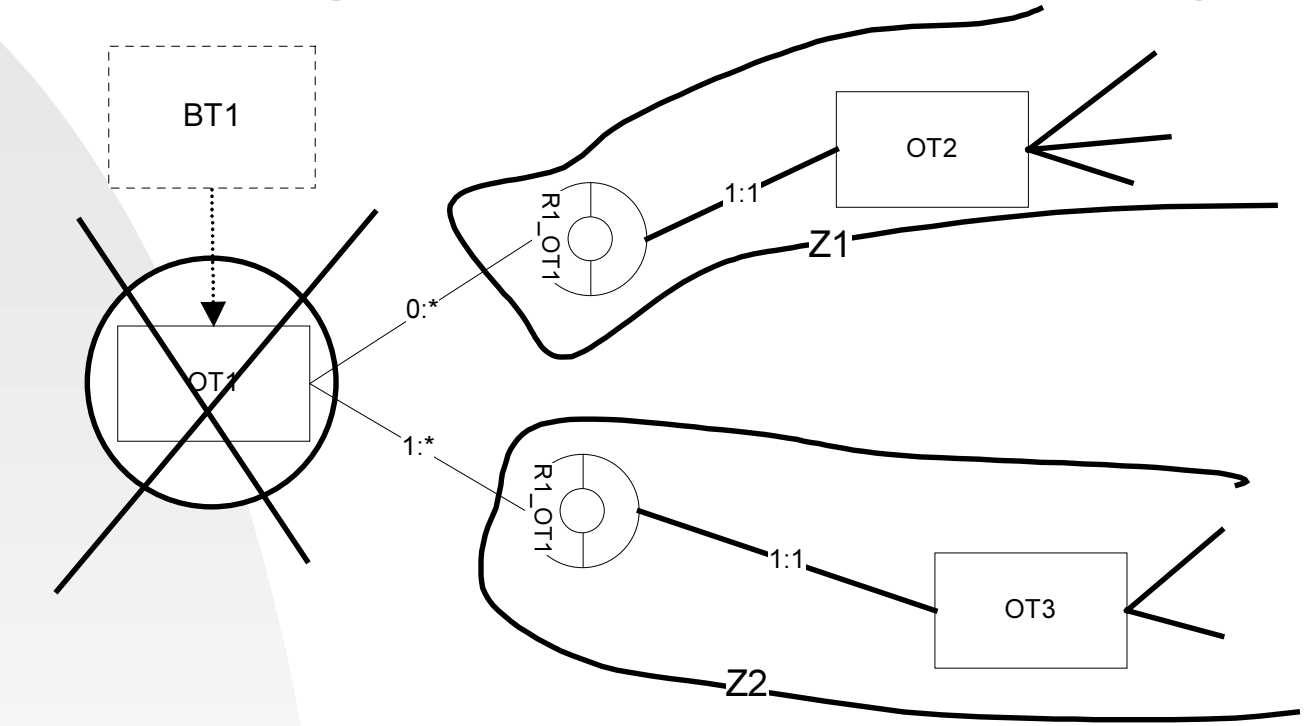


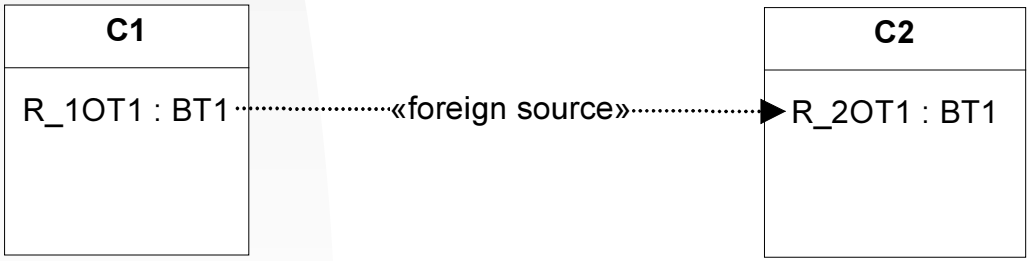
Constraints (implicit I) synchronize stereotype



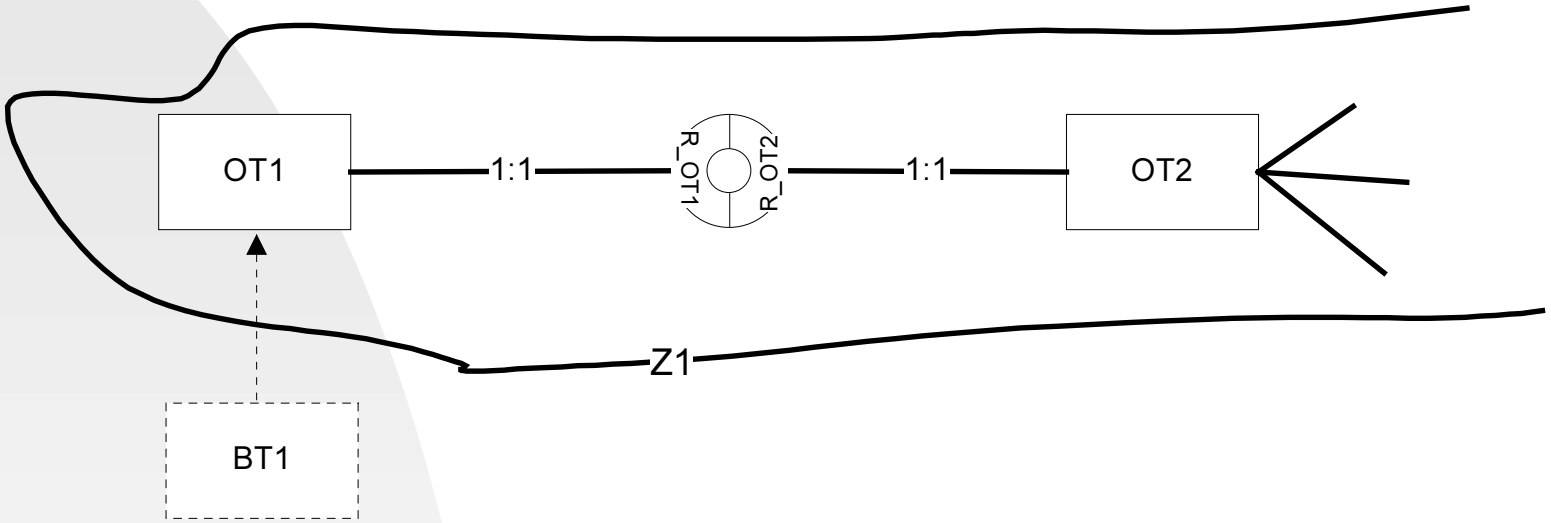


Constraints (implicit II) foreign source stereotyp





Constraints (implicit III) unique attribute



C1
R_OT1 : BT1 {unique}

Derived OCL consistency rulee:

C1

self.allInstances->forAll(c1, c2|c1<>c2 implies c1.R_OT1<>c2.R_OT1);