



EUROPEAN CENTRAL BANK

EUROSYSTEM

**Silvia Giacinti**

Principal Economist-Statistician

DG-S

**Dominik Lin**

Economist-Statistician

DG-S

# BIRD methodology – Transformations

# Introduction



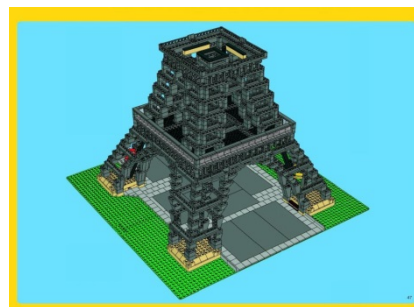
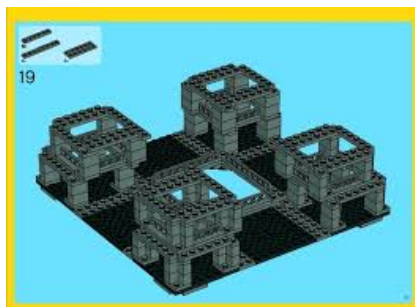
Validation and Transformation Language  
(VTL)

Terminology

VTL univocal representation in BIRD

## Validation and Transformation Language (VTL)

- **Dataset based** language
- Provided / documented by the **SDMX community**
- Allows us to **describe transformations** from datasets into other datasets (e.g. *input layer* → *output layer*)
- Enables an **univocal representation** of transformations in the BIRD database (i.e. BIRD interpretation of **SDMX information model for transformations**)



## Validation and Transformation Language (VTL) – terminology

*SDMX information model for transformations*

Transformation scheme

```
CNTRPRTS_ATNMS := CNTRPRTS [filter (ENTRPRS_SZ_CHC =  
"0" and TYP_ENTRPRS in ("1", "2")), keep  
(CNTRPRTY_ID, NMBR_EMPLYIS, BLNC_SHT_TTL, ANNL_TRNVR,  
TYP_ENTRPRS, CNTRL_PBLC_15, EXCPTN_MRG_ACQSTN)];
```

```
CNTRPRTS_PRVS := [left CNTRPRTS as "A",  
ENTRPRS_SZ_PRVS_PRD as "B" A.CNTRPRTY_ID =  
B.CNTRPRTY_ID] {keep (A.CNTRPRTY_ID,  
B.ENTRPRS_SZ_CLCLTD, B.ENTRPRS_SZ_PRLMNR)};
```

...

Transformation(s)

Each element of a **Transformation** is a **Transformation node**. Each Transformation is decomposed into its **Transformation nodes** and related “tree structure”.

## VTL univocal representation in BIRD

```
...  
CRDT_CRD_DBT_E := CRDT_CRD_DBT_E [calc "51" as  
"TYP_INSTRMNT" ] ;
```

Eight Transformation of the Transformation scheme P\_IMPLCT\_CRDT\_CRD\_DBT

```
:= [ := ] {7_0}  
  CRDT_CRD_DBT_E [DatasetID] {7_0_0}  
  calc [calc] {7_0_1}  
    CRDT_CRD_DBT_E [DatasetID] {7_0_1_0}  
    as [as] {7_0_1_1}  
      "51" [StringC] {7_0_1_1_0}  
      "TYP_INSTRMNT" [StringC] {7_0_1_1_1}
```

Associated tree structure

## VTL univocal representation in BIRD

```
LNS_E := union(CRDT_CRD_DBT_E, FCTRNG_E, FNNCL_LSS_E,  
OTHR_DPSTS_E, OTHR_LNS_E, OTHR_TRD_RCVBLS_E,  
RVRS_RPRCHS_LNS_E, CRRNT_ACCNT_ASSTS_E);  
...
```

First Transformation of the Transformation scheme P\_LNS\_E

```
:= [:=] {0_0}  
  LNS_E [DatasetID] {0_0_0}  
  union [union] {0_0_1}  
    Parameters [Parameters] {0_0_1_0}  
      CRDT_CRD_DBT_E [DatasetID] {0_0_1_0_0}  
      FCTRNG_E [DatasetID] {0_0_1_0_1}  
      FNNCL_LSS_E [DatasetID] {0_0_1_0_2}  
      OTHR_DPSTS_E [DatasetID] {0_0_1_0_3}  
      OTHR_LNS_E [DatasetID] {0_0_1_0_4}  
      OTHR_TRD_RCVBLS_E [DatasetID] {0_0_1_0_5}  
      RVRS_RPRCHS_LNS_E [DatasetID] {0_0_1_0_6}  
      CRRNT_ACCNT_ASSTS_E [DatasetID] {0_0_1_0_7}
```

Associated tree structure

## VTL univocal representation in BIRD

```
:= [:=] {7_0}
  CRDT_CRD_DBT_E [DatasetID] {7_0_0}
  calc [calc] {7_0_1}
    CRDT_CRD_DBT_E [DatasetID] {7_0_1_0}
    as [as] {7_0_1_1}
      "51" [MEMBER_ID] {7_0_1_1_0}
      "TYP_INSTRMNT" [VARIABLE_ID] {7_0_1_1_1}
```

Associated tree structure to the 8<sup>th</sup> Transformation of P\_IMPLCT\_CRDT\_CRD\_DBT

```
:= [:=] {0_0}
  LNS_E [DatasetID] {0_0_0}
  union [union] {0_0_1}
    Parameters [Parameters] {0_0_1_0}
      CRDT_CRD_DBT_E [DatasetID] {0_0_1_0_0}
      FCTRNG_E [DatasetID] {0_0_1_0_1}
      FNNCL_LSS_E [DatasetID] {0_0_1_0_2}
      OTHR_DPSTS_E [DatasetID] {0_0_1_0_3}
      OTHR_LNS_E [DatasetID] {0_0_1_0_4}
      OTHR_TRD_RCVBLS_E [DatasetID] {0_0_1_0_5}
      RVRS_RPRCHS_LNS_E [DatasetID] {0_0_1_0_6}
      CRRNT_ACCNT_ASSTS_E [DatasetID] {0_0_1_0_7}
```

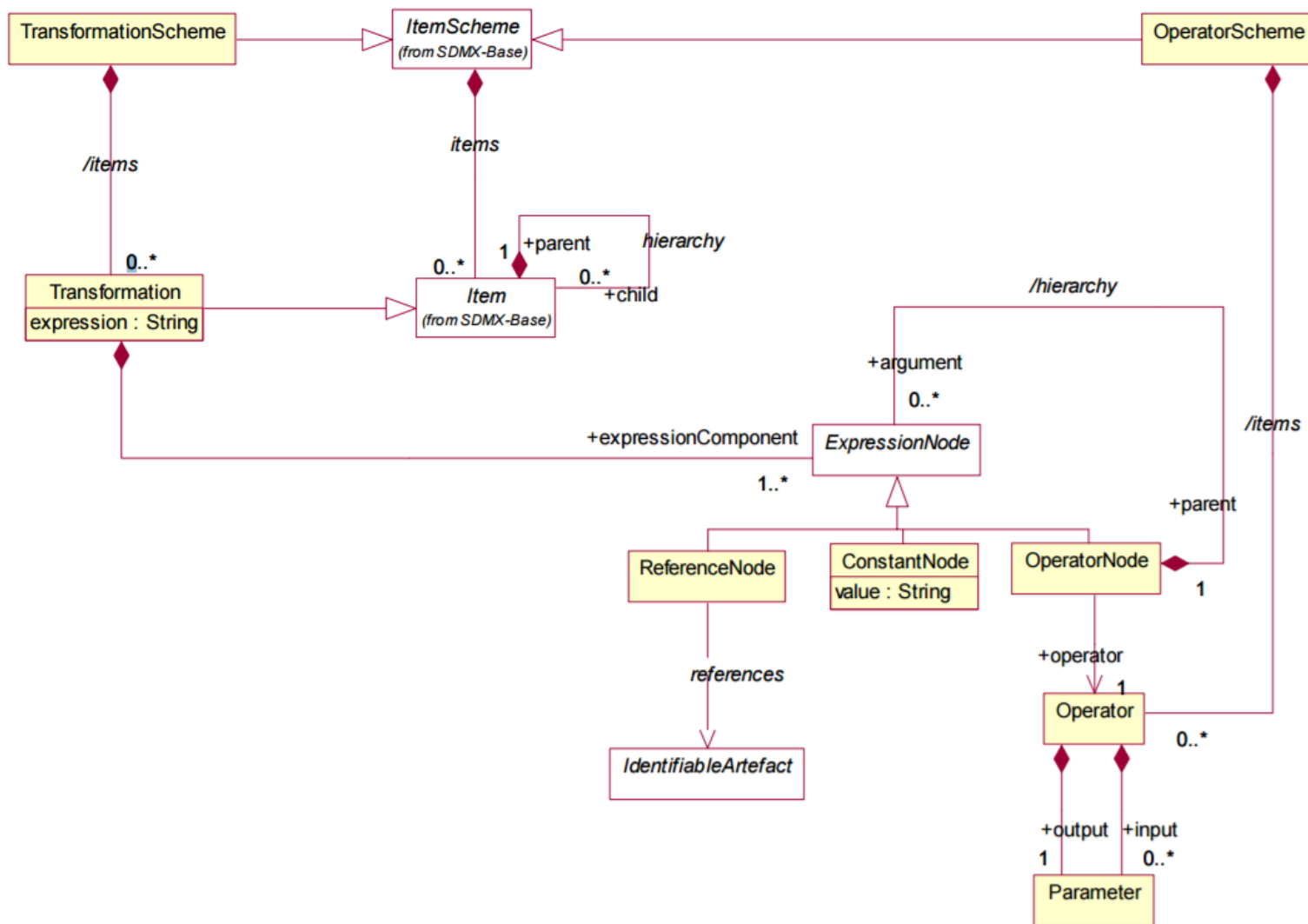
Associated tree structure to the first Transformation of P\_LNS\_E

## VTL univocal representation in BIRD

- Full decomposition of each **Transformation** into its **Transformation nodes**
- **Identification of associated dictionary objects** (e.g. cubes, variables, members,...), see `TYPE_OF_NODE` in `TRANSFORMATION_NODE` table
- Table **NODE\_CONNECTIONS** comprises the relationships between **Transformations** on the **Transformation node** level



## SDMX information model for transformations



See **SDMX Technical Specifications, Section 2 – Information model, 13.2.1 Class Diagram** (<https://sdmx.org/>)