



Foto: Thomas Josek

# Meta-modelling as a context system

# Definitions

modelling = (modeller+, model (mediaProduct+), target+)

- A meta-model is a model where the target of the model is one or more models.
- Meta-modelling is the creation and manipulation of meta-models.

# Two aspects of meta-models

- A top-down meta-model is a blueprint for models.
  - This is the grammar function of a meta-model, where it works as a rule system for models.
  - XML as a meta-model for XML document types such as TEI and LIDO.
- A bottom-up meta-model is based on other models
  - Expressing aggregated information from them.
  - The Text Wheel (Sahle 2013)
  - ontology matching (Quix, Kensche, and Li 2007)

# UML meta-modelling

- M0: user data, an instance of a model.
- M1: User model, an instance of a meta-model, a language to describe an information domain.
- M2: Meta-model, an instance of a meta-meta-model, the language for specifying a model. UML is an M2 meta-model.
- M3: Meta-Meta-model, meta-modelling architecture infrastructure, a language for specifying meta-models.

# Example 1: CIDOC-CRM

- Model

- Chains of triplets adopted in the semantic web organisation of data and associated notation

subject → predicate → object/subject → predicate — object/subject → predicate → ...

- Meta-model

- Classes and properties are disconnected from each other
  - Separate hierarchies of directed graphs.
- A relationship between two classes is an inheritance relationship
  - Object-oriented modelling
  - The members of a subclass class form a subset of the members of a superclass.

## Example 2: TEI

```
<!ELEMENT poem (lg | l)+>
```

```
<!ELEMENT lg (l+)>
```

```
<!ELEMENT l (#PCDATA)>
```

```
<poem>
```

```
  <lg>
```

```
    <l>As water falls</l>
```

```
    <l>we fall</l>
```

```
  </lg>
```

```
  <lg>
```

```
    <l>As we fall</l>
```

```
    <l>standards fall</l>
```

```
  </lg>
```

```
</poem>
```

- The form of the meta-model (the DTD) is more similar to the form of the model (the XML fragment).

- They are both trees

- Main difference:

- Repetition

# Three types of relationship differences

1. The relationship between an element in a model and an element in a meta-model is between something more particular and something more universal.
  - The meta-model can in itself be linked to a higher level meta-model in which what was the universal now acts as the particular
2. The context of each element in the model is different from the context of each element in the meta-model.
  - Different meaning
  - Meta-modelling is a process of adding and removing meaning
    - as all modelling is
3. The meta-model includes scope notes establishing a link between formal semantics and a semantics which is meaningful to humans.
  - Not only the formal rules, also the semantic rules expressing the link to the human life world have to be fulfilled for the standard to be used correctly
    - also when the methods for and even the possibilities of establishing clear rules are different

# Meta-modelling as modelling

- The role of meta-modelling in the establishment of meaning
  - context
  - in the use of models as well as in the creation of them
- The cyclical aspects
  - the creation and use of meta-models always have both top-down and bottom-up aspects
  - the importance of both and how they are implemented in specific use cases can vary significantly

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