Approach of adapting the metamodels in the 1st/2nd iterations

We did the following kinds of adaptations in the 1st/2nd adaptations:

* Adding values to the namespace URI or prefix, if these were missing. These values are required to generate the EMF model code.
* Adding root container elements, if these were missing. Every instantiable EMF meta-model requires a root container element. The reason is that only elements directly or transitively contained by this root element can later be instantiated in a generated model.

In some specific constellations, Xtext does not generate rule calls, even if the meta-model has a root container element, namely, when this element is not abstract but has subtypes. Also in these cases, we added an additional root container element containing the original root container.

* Removing bidirectional references, if present.

Xtext cannot cope with bidirectional references (and they are also considered an EMF antipattern (See, e.g., the discussion in <https://www.eclipse.org/forums/index.php/t/1105161/>).

* Switching to EMF-native primitive datatypes, if other ones are used:

Some meta-models introduce their own primitive datatypes (e.g., *Boolean*, *String*, etc.) instead of using EMF's defaults.

However, Xtext utilizes these EMF-native primitive datatypes and has specific rules on how to treat them.

For example, an attribute of the type *EBoolean* in the meta-model will be translated into a grammar that allows the user to define the value of that attribute via the presence (=true) or absence (=false) of an optional keyword. For example, an ATL user might specify that a **lazy rule** is unique by adding the keyword **unique** in front of the **lazy rule**.

Thus, we switched from custom primitive datatypes to the EMF-native ones in the EMF meta-models.

* Boolean values with lower bound 1 were changed to 0 since Xtext would otherwise generate a grammar that enforces the value ``*true''* for that attribute.
* Mandatory attributes are changed to be optional if they were not required in the original grammar. For example, the attribute mapsTo in class *InPatternElement* is mandatory in the ATL meta-model, but there is no corresponding element in the original grammar.
* Adding missing concepts. We constructed the original grammar of BibTeX following the specification in <https://www.bibtex.com/g/bibtex-format/> as described above. The original grammar contains the concepts entry type `*unpublished'* and standard field type `*annote'*, which are missing in the meta-model. We manually added two classes to the meta-model to correspond to these concepts.

For specific details on the modifications, please see: <https://docs.google.com/spreadsheets/d/15vzQXDJkoVRbTG-u7SGBuzKjCWbVQJ4xWHT9IfzKY6c/edit#gid=0> .