Intelligent Systems

CompGuide – Ontology for Clinical Practice Guidelines

Intelligent Systems Lab

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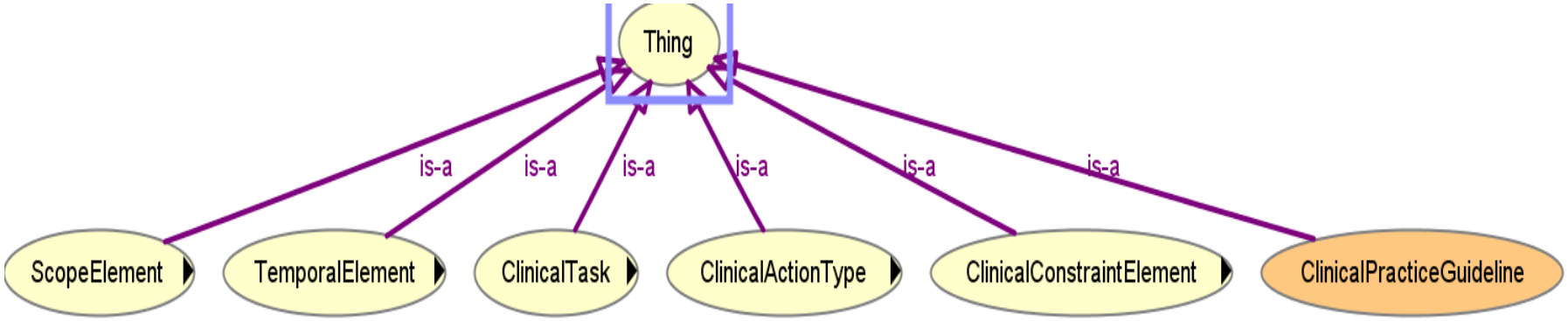
Summary

- **CompGuide**
  - Introduction
  - Representation of Administrative Information
  - Construction of Workflow Procedures
  - Definition of Temporal Constraints
  - Definition of Clinical Constraints
  - Practical Assignment

CompGuide

- Introduction
  - Model obtained from consulting domain experts and observing different clinical guidelines;
  - A guideline is represented as a linked list of individuals belonging do different classes of tasks.



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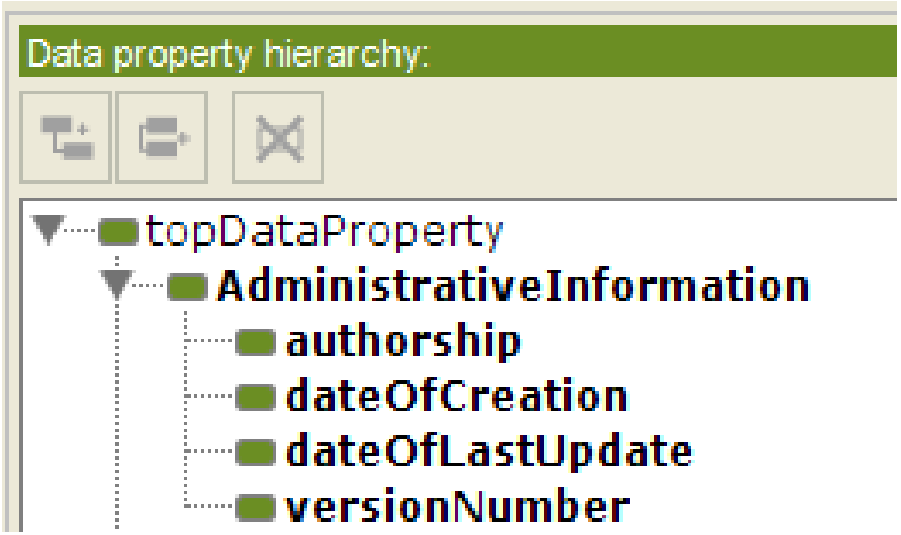
- Representation of Administrative Information
  - A CPG is represented as an instance of the *ClinicalPracticeGuideline Class;*
  - OWL has built-in data types that allow the expression of simple text, numeric values and dates.



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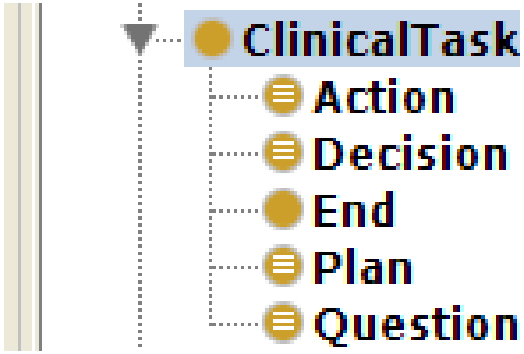
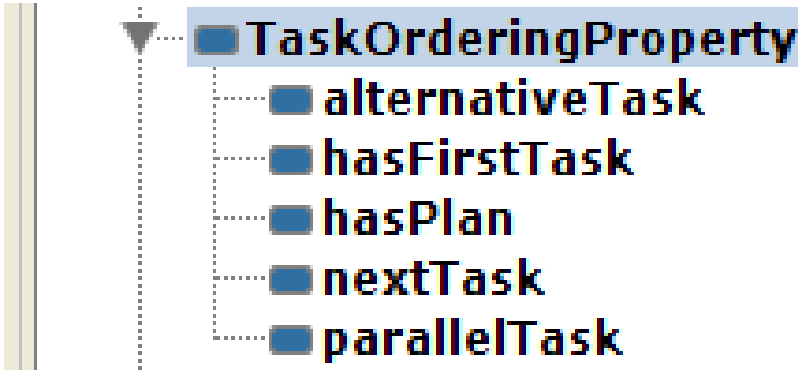
- Construction of Workflow Procedures
  - Three main primitive classes under *ClinicalTask*;
  - The tasks of an individual from *ClinicalPracticeGuideline* are all contained in an individual from *Plan*, to which it is linked through the *hasPlan* object property;
  - A *Plan* contains any number of instances of the other tasks, including other *Plans*, and it is connected to its first task through the *hasFirstTask* property;
  - The sequence of tasks is established by the *nextTask* property.





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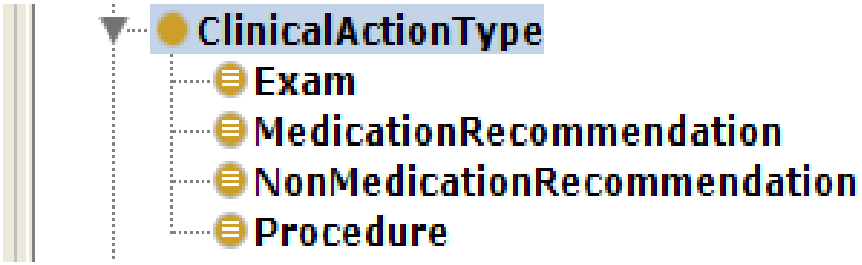
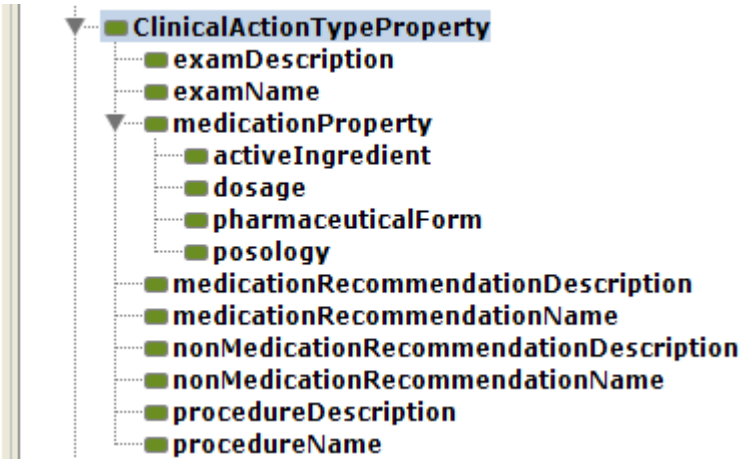
- Construction of Workflow Procedures
  - The *Action* class represents a step performed by a healthcare professional that includes clinical procedures, clinical exams, medication recommendations and non-medication recommendations;
  - The different types of actions are defined under *ClinicalActionType* and linked to the *Action* through the *hasClinicalActionType*;





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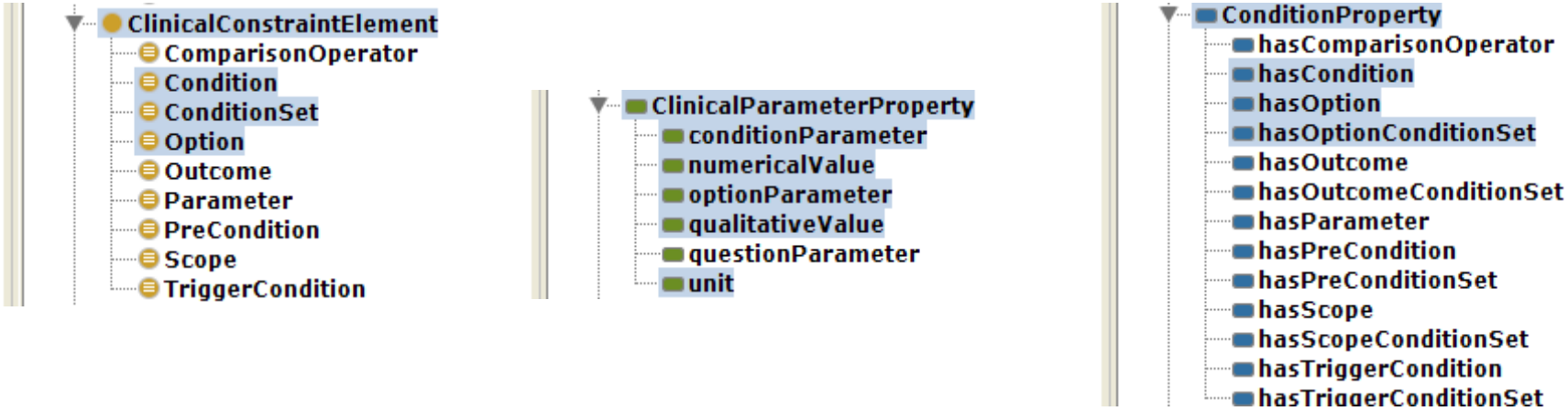
- Construction of Workflow Procedures
  - To express decision moments in the workflow, there is a *Decision* class;
  - The association of a *Decision* with options and rules is done through object properties that connect them to instances from the *ClinicalConstraintElement* subclasses.



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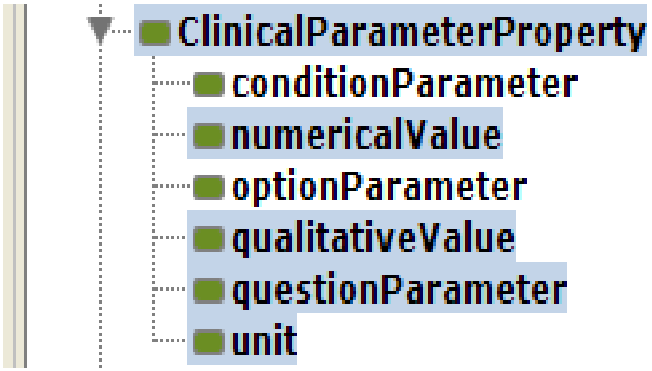
- Construction of Workflow Procedures
  - The *Question* class is used to obtain information about a patient's health condition, more specifically about the clinical parameters necessary to follow the guideline;
  - There are data properties created to specify the name of the parameter to be obtained and the units in which it should be expressed. Such properties are *string* data types named *questionParameter* and *unit*, respectively.



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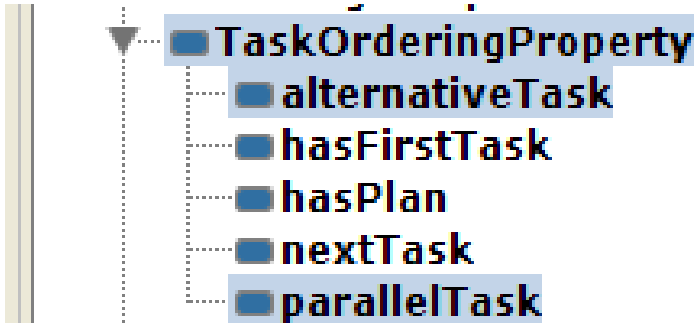
- Construction of Workflow Procedures
  - The *End* class is used to signal the termination of the execution thread that is being followed and to indicate that the guideline reached its finishing point;
  - The executions of parallel and alternative tasks are modelled by the *alternativeTask* and *parallelTask* properties.



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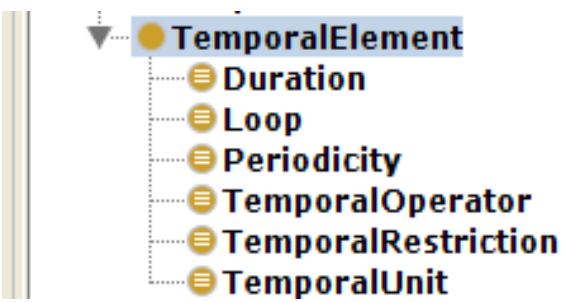
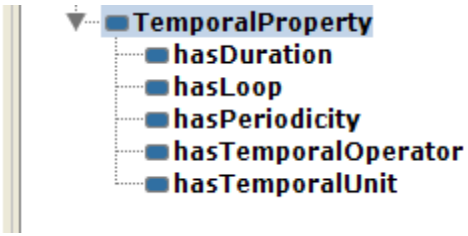
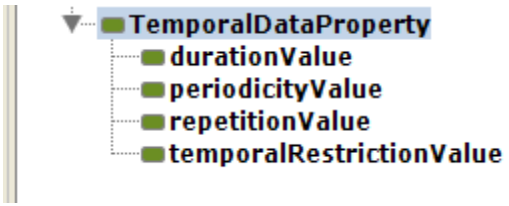
- Definition of Temporal Constraints
  - The classes for the definition of temporal constraints are under the *TemporalElement* class;
  - The *Duration* class specifies how long a task should last and is defined exclusively for *Plans* and *Actions*;
  - The *TemporalUnit* class contains individuals that represent the different time units in which the *Duration* can be expressed, namely *second*, *minute*, *hour*, *day*, *week*, *month* and *year;*
  - In the *Loop* class it is possible to define cycles for the executions of certain tasks (*Plans* and *Actions*). Each instance of *Loop* has a data property called *RepetitionValue* which is an integer that expresses the number of repetitions that a group of tasks is subjected to.







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- Definition of Temporal Constraints
  - Moreover, each instance also has a *hasPeriodicity* object property that connects it to individuals from the *Periodicity* class (another subclass of *TemporalElement)* which has the appropriate constructs, namely the *hasTemporalUnit* object property and the *periodicityValue* data property, to define the regular intervals at which the task is repeated;
  - Another feature of the temporal properties is the possibility to define temporal restrictions in clinical constraints. For this purpose one associates a *TemporalRestriction* and a *TemporalOperator* to clinical conditions that must be met for a task to be executed:
    - *Somewhere in the past*: the condition manifested itself at some point in the past;
    - *Always in the past*: the condition manifested itself continuously during a time interval in the past; and
    - *Currently*: the condition is manifesting itself during the medical observations.

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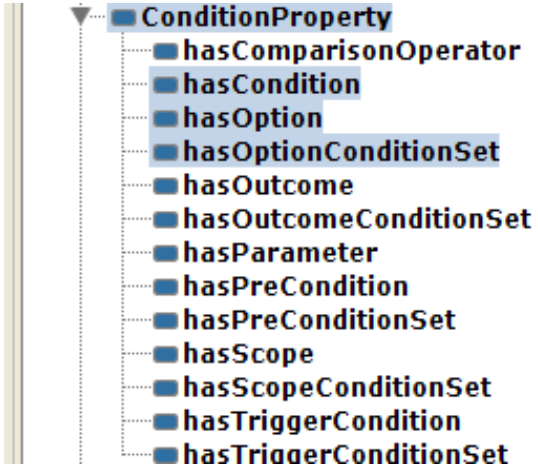
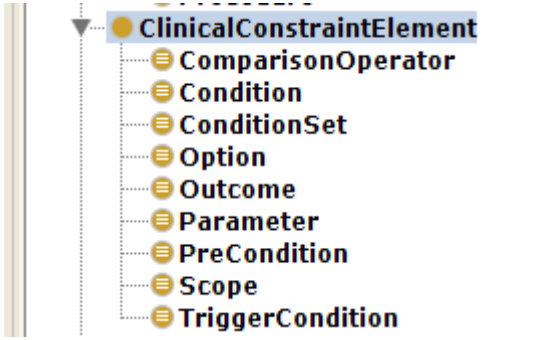
- Definition of Clinical Constraints
  - The association of individuals from *Option* to *Decision* is done by the *hasOption* property;
  - The number of times this property is used in a *Decision* is equal to the number of options the task presents;
  - Each *Option* has a *optionParameter* data property and a *NumericalValue* or *QualitativeValue* data properties;
  - The rules that dictate the option selection are provided by the *hasConditionSet* property, linking the individuals from this task to *ConditionSet;*
  - Each *ConditionSet* is linked to one or more individuals from *Condition* through the *hasCondition* property;
  - The *hasComparisonOperator* property connects individuals from *Condition* to *ComparisonOperator*. There, the following individuals were created: *equal to*, *greater than*, *greater or equal than*, *less than*, *less or equal than* and *different from*.





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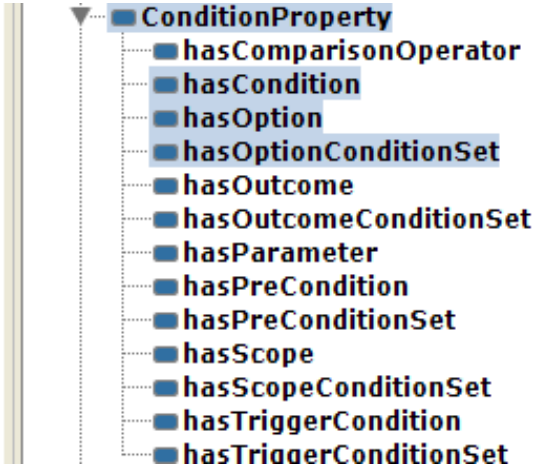
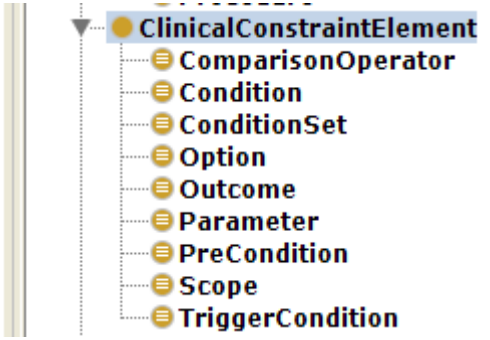
- Definition of Clinical Constraints
  - *PreCondition:* is used for all types of tasks to express the requirements of the patient state hat must be met before the execution of a task. For instance, when administering some pharmacological agent it should be known that the patient is not allergic to it;
  - *TriggerCondition:* reference in the tasks that are up for selection (connected by the *alternativeTask* property) to the heath condition of the patient;
  - *Outcome:* class puts a restriction to *Plans* and *Actions* that are oriented by therapy goals.





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