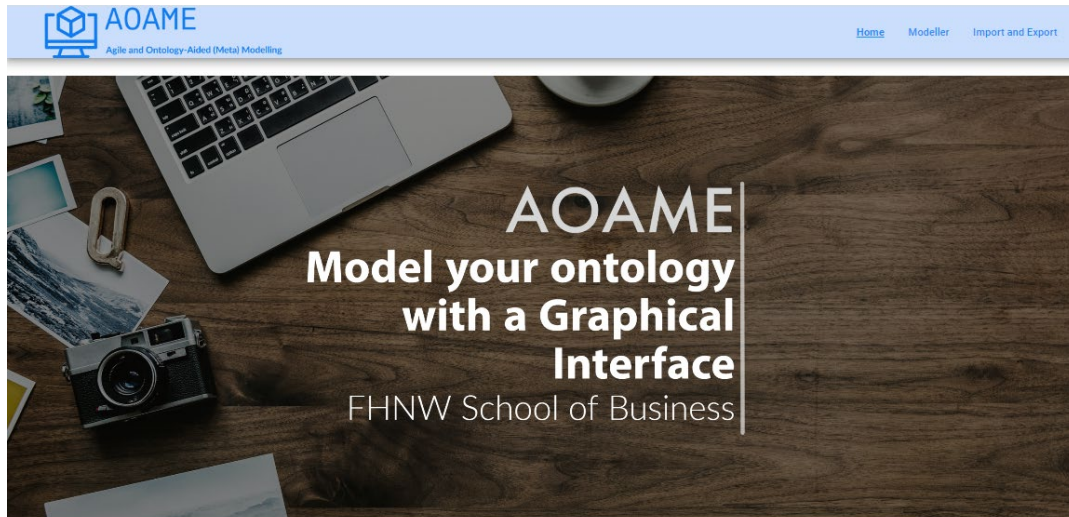


# Walkthrough on ontology-based modelling in AOAME

## 1 Start AOAME

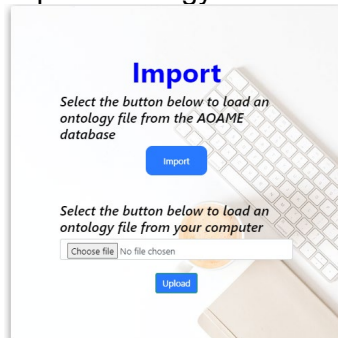
URL: <https://aoame.herokuapp.com>



### How to model with AOAME



### Import Ontology files from the AOAME database

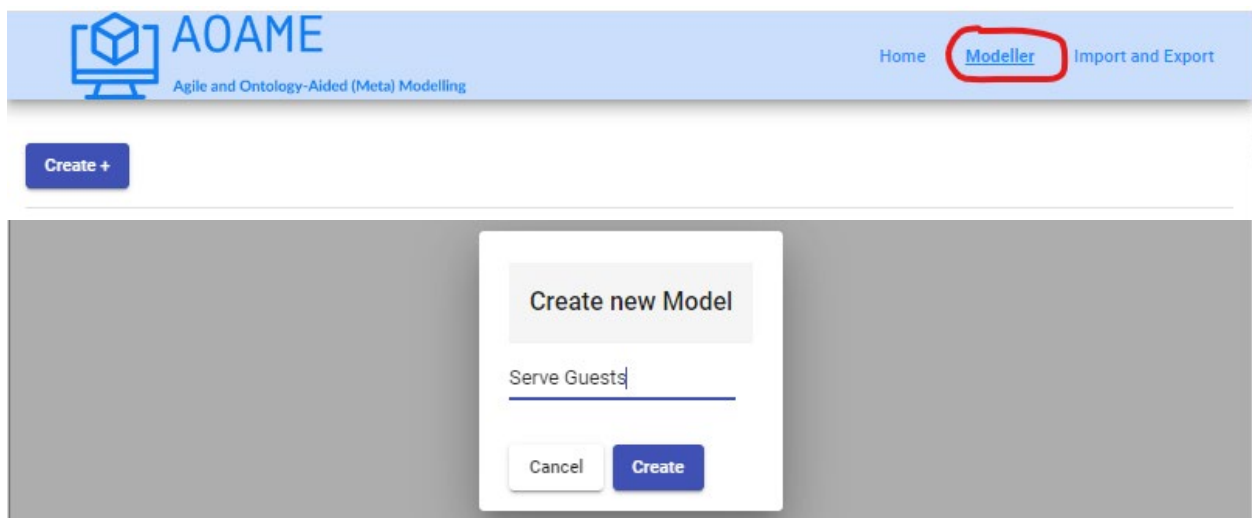


You can import individual files or all languages at once:



## 2 Create a Model

Create a new process model called "Serve Guests"



After creating the model, show that the model "Serve Guests" can be retrieved from the Triple-store:

- o <https://aoame-fuseki.herokuapp.com/>

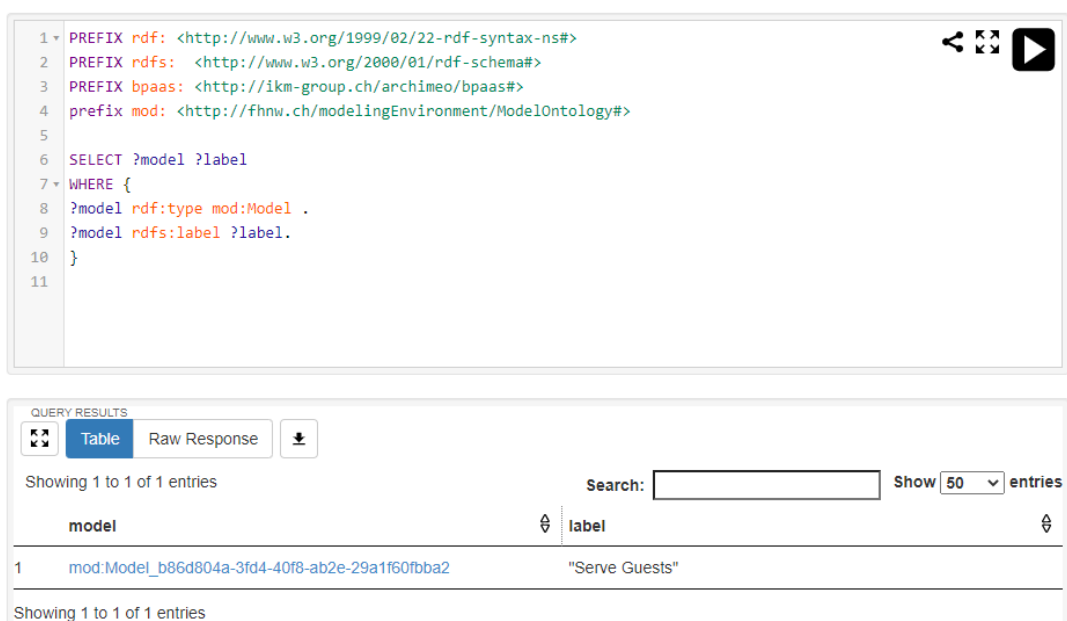
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>

PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>

```
SELECT ?model ?label
WHERE {
  ?model rdf:type mod:Model .
  ?model rdfs:label ?label.
}
```



```
1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
3 PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
4 prefix mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
5
6 SELECT ?model ?label
7 WHERE {
8   ?model rdf:type mod:Model .
9   ?model rdfs:label ?label.
10 }
11
```

QUERY RESULTS

Table Raw Response

Showing 1 to 1 of 1 entries

Search:  Show 50 entries

model	label
mod:Model_b86d804a-3fd4-40f8-ab2e-29a1f60fba2	"Serve Guests"

Showing 1 to 1 of 1 entries

Let's retrieve all the triples associated to the model "Order processing" -> at the moment it retrieves that the model is an instance of model.

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>

PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>

```
SELECT *  
WHERE {  
  ?subject ?relation ?object .  
  ?subject rdfs:label "Serve Guests".  
}
```

```
1 PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>  
2 PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>  
3 PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>  
4 prefix mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>  
5  
6 SELECT *  
7 WHERE {  
8   ?subject ?relation ?object .  
9   ?subject rdfs:label "Serve Guests".  
10  }  
11  
12
```

QUERY RESULTS

Table Raw Response

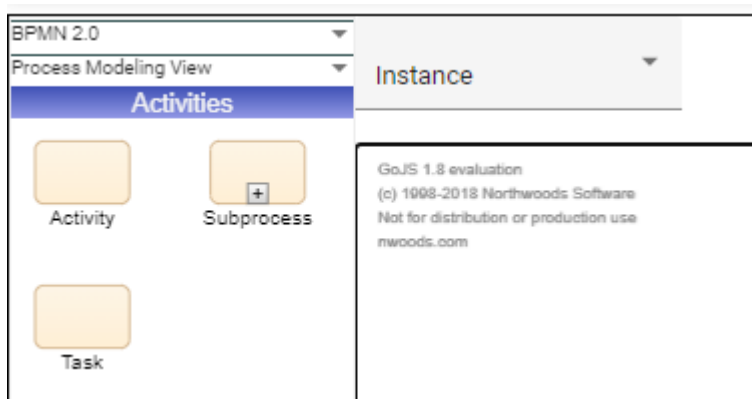
Showing 1 to 2 of 2 entries

Search:  Show 50 entries

	subject	relation	object
1	mod:Model_b86d804a-3fd4-40f8-ab2e-29a1f60fba2	rdf:type	mod:Model
2	mod:Model_b86d804a-3fd4-40f8-ab2e-29a1f60fba2	rdfs:label	"Serve Guests"

Showing 1 to 2 of 2 entries

To start modelling, select the model language “BPMN 2.0” and the “Process Modeling View”



Create a BPMN Task called “Serve beverages”

Run the same query as above and now we see that also the task has been entered ID of the model and the ID of the Task are connected with a relation *hasShape*.

The term “Shape” is the name of a class, which visualizes a conceptual element. That’s because several graphical notations might refer to the same conceptual elements. For example, we might have 2 BPMN Pools, which refer to the FHNW Organization.

	subject	relation	object
1	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	rdf:type	mod:Model
2	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	mod:modelHasShape	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab
3	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	rdfs:label	"Serve Guests"

Showing 1 to 3 of 3 entries

Create a duplicate of the Task “Serve beverages”.



Running the same query we see that there are two shapes

	subject	relation	object
1	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	rdf:type	mod:Model
2	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	mod:modelHasShape	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab
3	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	mod:modelHasShape	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba
4	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	rdfs:label	"Serve Guests"

Let's run the below query to show all the properties of the two tasks, including the two shapes for the conceptual model Task:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
```

```
SELECT *
WHERE {
?subject ?relation ?object .
?subject rdfs:label "Serve beverages".
}
```

The first 8 rows are properties of the first task, whereas from row 9 to row 16 we have the second task.

- There are the X and Y coordinates of the two tasks in the canvas, their height and width
- The two different shapes point to the same conceptual element Task (see rows 4 and 12).
- Both graphical elements are instances of the class shape.
- The shape instantiates the instance *Task* from the Palette (this allows to inherit the property of the graphical notation Task).
- The labels for both tasks are "Serve beverages"

	subject	relation	object
1	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	mod:shapePositionsOnCoordinateY	"227"^^xsd:integer
2	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	mod:shapePositionsOnCoordinateX	"241"^^xsd:integer
3	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	mod:shapeHasWidth	"100"^^xsd:integer
4	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	mod:shapeVisualisesConceptualElement	mod:Task_e27352cf-fca6-4c4f-b2a7-fdfe2e34f674
5	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	rdf:type	mod:Shape
6	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	mod:shapeHasHeight	"70"^^xsd:integer
7	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	mod:shapeInstantiatesPaletteConstruct	<http://fhnw.ch/modelingEnvironment/PaletteOntology#Task>
8	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	rdfs:label	"Serve beverages"
9	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba	mod:shapePositionsOnCoordinateY	"228"^^xsd:integer
10	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba	mod:shapePositionsOnCoordinateX	"408"^^xsd:integer
11	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba	mod:shapeHasWidth	"100"^^xsd:integer
12	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba	mod:shapeVisualisesConceptualElement	mod:Task_0c511e4c-8b67-4b7d-bdcd-6a6e666f70d7
13	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba	rdf:type	mod:Shape
14	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba	mod:shapeHasHeight	"70"^^xsd:integer
15	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba	mod:shapeInstantiatesPaletteConstruct	<http://fhnw.ch/modelingEnvironment/PaletteOntology#Task>
16	mod:Task_Shape_49a33c41-5223-b8ea-aae6-ce42b734e0ba	rdfs:label	"Serve beverages"

Delete one Task and run the query again: Only the triples for one task are shown. In line 4 you see the ID of the conceptual model element for the task.

4	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab	mod:shapeVisualisesConceptualElement	mod:Task_e27352cf-fca6-4c4f-b2a7-fdfe2e34f674
---	---	--------------------------------------	---

Now, let's have a look at the properties of this conceptual element Task. We run the next query (the condition of the query has the ID of the conceptual model element for the task):

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
```

```
SELECT *
WHERE {
mod:Task_e27352cf-fca6-4c4f-b2a7-fdf2e34f674 ?relation ?object.
}
```

- The result shows that the conceptual element is instance of two classes: the conceptual model and the modelling construct of BPMN Task. The latter indicates the relation of the conceptual model with the ontology-based meta-model of BPMN.

	relation	object
1	<a href="#">rdf:type</a>	<a href="#">&lt;http://ikm-group.ch/archiMEO/BPMN#Task&gt;</a>
2	<a href="#">rdf:type</a>	<a href="#">mod:ConceptualElement</a>

Let's have a look at the class Task in the ontology-based meta-model by running the following query:

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
prefix mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
```

```
SELECT *
WHERE {
<http://ikm-group.ch/archiMEO/BPMN#Task|> ?relation ?object.
}
```

We can see that the class BPMN Task has three properties:

- o the relation `rdfs:subClassOf` formally declares that the language construct Task specializes the class Activity. This relation `subClassOf` indicates a taxonomy. It has the benefit of adding semantics, as the properties specified in the super-class are inherited by the subclass, but not viceversa.
- o The relation declares that Task is a class
- o The third relation show that a label is specified for that class

	relation	object
1	<a href="#">rdfs:subClassOf</a>	<a href="#">&lt;http://ikm-group.ch/archiMEO/BPMN#Activity&gt;</a>
2	<a href="#">rdf:type</a>	<a href="#">&lt;http://www.w3.org/2002/07/owl#Class&gt;</a>
3	<a href="#">rdfs:label</a>	"Task"

Let's add a start event to the process.



We run the below query and show that "start event" has been added.

```
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
```

```
SELECT *
WHERE {
?subject ?relation ?object .
?subject rdfs:label "Serve Guests".
}
```

	subject	relation	object
1	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	rdf:type	mod:Model
2	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	mod:modelHasShape	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab
3	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	mod:modelHasShape	mod:StartEvent_Shape_3d7e96df-55ca-d25b-c8b8-740a05daf61c
4	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	rdfs:label	"Serve Guests"

We now add a sequence flow connecting the start event and the activity.



Running the same query again shows that the sequence flow is added to the ontology

	subject	relation	object
1	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	rdf:type	mod:Model
2	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	mod:modelHasShape	mod:SequenceFlow_BPMN_Shape_613f6388-3478-a889-abc5-095071b60ceb
3	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	mod:modelHasShape	mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab
4	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	mod:modelHasShape	mod:StartEvent_Shape_3d7e96df-55ca-d25b-c8b8-740a05daf61c
5	mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183	rdfs:label	"Serve Guests"



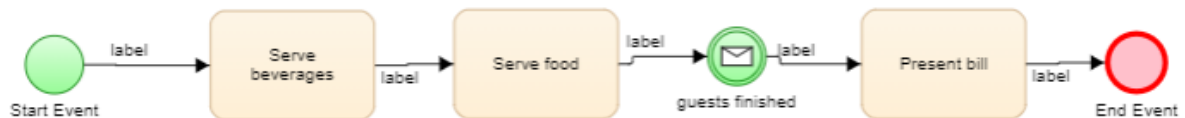
The task should be connected to the sequence flow. Let's test it with the following query:

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
PREFIX bpmn: <http://ikm-group.ch/archiMEO/BPMN#>
PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
```

```
SELECT ?sequenceflow ?TargetOfSequence
WHERE {
    ?sequenceflow rdf:type bpmn:SequenceFlow.
    ?sequenceflow lo:modelingRelationHasTargetModelingElement ?TargetOfSequence.
}
```

sequenceflow	elementTargetOfSequence
1 <a href="#">mod:SequenceFlow_1a42e3c6-f154-4177-8035-daca567de50a</a>	<a href="#">mod:Task_94e28235-5c9f-4a12-a6c5-ddf77428152e</a>

We now finish modelling the process:



Running the above query again, we get all the sequence flows and their targets

sequenceflow	TargetOfSequence
1 <a href="#">mod:SequenceFlow_1a42e3c6-f154-4177-8035-daca567de50a</a>	<a href="#">mod:Task_94e28235-5c9f-4a12-a6c5-ddf77428152e</a>
2 <a href="#">mod:SequenceFlow_79381919-4176-4320-a4d2-de173cb77b81</a>	<a href="#">mod:MessageIntermediateEvent_ce7dc4b3-2c52-40e9-8dde-5e658eb8ebfa</a>
3 <a href="#">mod:SequenceFlow_b3970ba1-1c3d-4381-987e-7c87fde69321</a>	<a href="#">mod:EndEvent_acf50fee-d263-409c-8bcd-de476e52f0fa</a>
4 <a href="#">mod:SequenceFlow_c99b0610-3cb8-4417-bf0b-5b457ace1009</a>	<a href="#">mod:Task_c57517bc-95d7-4a2b-9070-5d38d3c02821</a>
5 <a href="#">mod:SequenceFlow_459883b8-4203-464c-9758-d31ec2359cab</a>	<a href="#">mod:Task_a20e1f12-434b-4ce5-b1a6-fe6dfad68c07</a>

Similarly, the following query finds starts of all sequence flow relations:

```

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
PREFIX bpmn: <http://ikm-group.ch/archiMEO/BPMN#>
PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>

```

```

SELECT ?sequenceflow ?SourceOfSequence
WHERE {
    ?sequenceflow rdf:type bpmn:SequenceFlow.
    ?sequenceflow lo:modelingRelationHasSourceModelingElement ?SourceOfSequence.
}

```

	sequenceflow	SourceOfSequence
1	<a href="#">mod:SequenceFlow_1a42e3c6-f154-4177-8035-daca567de50a</a>	<a href="#">mod:Event_b6d9edfe-b852-44ed-b435-361b3ba91df6</a>
2	<a href="#">mod:SequenceFlow_79381919-4176-4320-a4d2-de173cb77b81</a>	<a href="#">mod:Task_c57517bc-95d7-4a2b-9070-5d38d3c02821</a>
3	<a href="#">mod:SequenceFlow_b3970ba1-1c3d-4381-987e-7c87fde69321</a>	<a href="#">mod:Task_a20e1f12-434b-4ce5-b1a6-fe6dfad68c07</a>
4	<a href="#">mod:SequenceFlow_c99b0610-3cb8-4417-bf0b-5b457ace1009</a>	<a href="#">mod:Task_94e28235-5c9f-4a12-a6c5-ddf77428152e</a>
5	<a href="#">mod:SequenceFlow_459883b8-4203-464c-9758-d31ec2359cab</a>	<a href="#">mod:MessageIntermediateEvent_ce7dc4b3-2c52-40e9-8dde-5e658eb8ebfa</a>

And here all the sequence flow connections:

```

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
PREFIX bpmn: <http://ikm-group.ch/archiMEO/BPMN#>
PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>

```

```

SELECT ?SourceOfSequence ?TargetOfSequence
WHERE {
    ?sequenceflow rdf:type bpmn:SequenceFlow.
    ?sequenceflow lo:modelingRelationHasTargetModelingElement ?TargetOfSequence.
    ?sequenceflow lo:modelingRelationHasSourceModelingElement ?SourceOfSequence.
}

```

	SourceOfSequence	TargetOfSequence
1	<a href="#">mod:Event_b6d9edfe-b852-44ed-b435-361b3ba91df6</a>	<a href="#">mod:Task_94e28235-5c9f-4a12-a6c5-ddf77428152e</a>
2	<a href="#">mod:Task_c57517bc-95d7-4a2b-9070-5d38d3c02821</a>	<a href="#">mod:MessageIntermediateEvent_ce7dc4b3-2c52-40e9-8dde-5e658eb8ebfa</a>
3	<a href="#">mod:Task_a20e1f12-434b-4ce5-b1a6-fe6dfad68c07</a>	<a href="#">mod:EndEvent_acf50fee-d263-409c-8bcd-de476e52f0fa</a>
4	<a href="#">mod:Task_94e28235-5c9f-4a12-a6c5-ddf77428152e</a>	<a href="#">mod:Task_c57517bc-95d7-4a2b-9070-5d38d3c02821</a>
5	<a href="#">mod:MessageIntermediateEvent_ce7dc4b3-2c52-40e9-8dde-5e658eb8ebfa</a>	<a href="#">mod:Task_a20e1f12-434b-4ce5-b1a6-fe6dfad68c07</a>

To see labels of all the tasks in a model, we can run the following query:

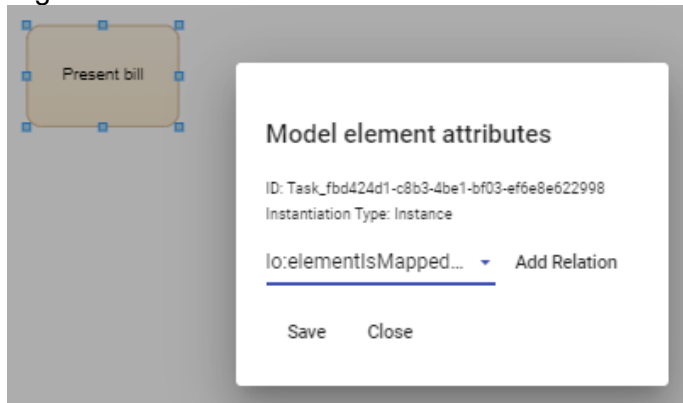
```
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
PREFIX po: <http://fhnw.ch/modelingEnvironment/PaletteOntology#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX bpmn: <http://ikm-group.ch/archiMEO/BPMN#>
```

```
SELECT ?model ?shape ?task ?label
WHERE {
  ?model rdfs:label "Serve Guests".
  ?model mod:modelHasShape ?shape.
  ?shape mod:shapeVisualisesConceptualElement ?task.
  ?task rdf:type bpmn:Task .
  ?shape rdfs:label ?label.
}
```

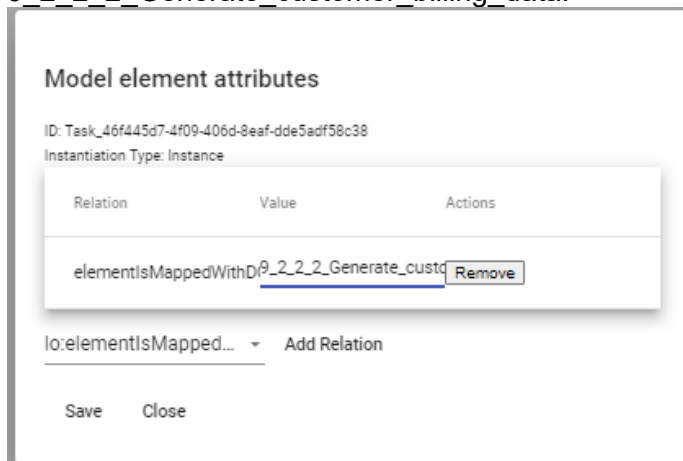
	model	shape	task	label
1	<a href="#">mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183</a>	<a href="#">mod:Task_Shape_385fda05-8bd5-5e6c-cd6a-e2aba2a828ab</a>	<a href="#">mod:Task_e27352cf-fca6-4c4f-b2a7-fdfe2e34f674</a>	"Serve beverages"
2	<a href="#">mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183</a>	<a href="#">mod:Task_Shape_1f4c3daf-1285-1333-2067-5321bd467b2f</a>	<a href="#">mod:Task_6c8a85f0-7834-4b10-9a1b-7408f67e636e</a>	"Serve food"
3	<a href="#">mod:Model_264d7442-4d7c-4e61-a081-3fe8bd7d9183</a>	<a href="#">mod:Task_Shape_81ab7b94-518c-09c6-6aa6-4171daa0deba</a>	<a href="#">mod:Task_9e426161-f887-497d-8584-abcd9e0669a1</a>	"Present bill"

### 3 Connecting to Domain Knowledge

Right click on “Present bill” and add a relation `lo:elementsMappedWithDOConcept`:



Then select a value from the ontology. In this case we select the APQC category `9_2_2_2_Generate_customer_billing_data`.



The following query retrieves the relationships between modelling elements and elements of the domain ontology:

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX bpaas: <http://ikm-group.ch/archimeo/bpaas#>
PREFIX bpmn: <http://ikm-group.ch/archiMEO/BPMN#>
PREFIX mod: <http://fhnw.ch/modelingEnvironment/ModelOntology#>
PREFIX lo: <http://fhnw.ch/modelingEnvironment/LanguageOntology#>
```

```
SELECT ?element ?domainobject
WHERE {
  ?element lo:elementsMappedWithDOConcept ?domainobject.
}
```

element

domainobject

mod:Task\_fbd424d1-c8b3-4be1-bf03-ef0e8e622998

<http://ikm-group.ch/archimeo/apqc/9\_2\_2\_2\_Generate\_customer\_billing\_data\_10795>