

# MoKi: a Wiki-Based Conceptual Modeling Tool

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**Abstract.** The success of wikis for collaborative knowledge construction is triggering the development of a number of tools for collaborative conceptual modeling based on them. In this paper we present a completely revised version of MoKi, a tool for modelling ontologies and business process models in an integrated way.

## 1 Introduction

MoKi <sup>1</sup> is a collaborative MediaWiki-based<sup>2</sup> tool for modeling ontological and procedural knowledge in an integrated manner. The main idea behind MoKi is to associate a wiki page, containing both unstructured and structured information, to each entity of the ontology and process model. In this section we present a completely revised version of MoKi, which extends the first release of the tool (see [1]). The main changes w.r.t. [1] are (i) the redesign of the content organisation of the MoKi page, which now comprises an unstructured part and a structured part (this extends and replaces the simple representational languages used in [1]); and (ii) the multi-mode access to the page content, to support easy usage both by domain experts and knowledge engineers, thus facilitating them to play an equally central role in the modelling activities (this extends and replaces the single template-based access mode provided in [1]).

### 1.1 The MoKi page

Being a tool supporting the description of ontological and procedural knowledge according to the OWL Web Ontology Language and the Business Processes Modelling Notation (BPMN), the basic element for MoKi are *concepts*, *properties*, and *individuals* in the ontology, and *processes* in the process model. Each instance of these elements is therefore associated to a MoKi page, composed of an unstructured part and a structured part.

*The unstructured part* This part contains text written following the standard MediaWiki markup format: in particular, it can contain plain text, possibly enriched by formatting information, links to other MoKi pages or to external resources, uploaded images, and so on. The format of this part of the page is the same for all the different elements of the models.

*The structured part* This part, which is delimited by specific tags to separate it from the unstructured text, contains knowledge stored according to the modelling language adopted. In the current implementation, the structured part of a page describing an ontology element contains a RDF/XML serialisation of a set of OWL statements formalising the element, while, similarly, the structured part of a page describing a BPMN process contains an XML serialisation of the process diagram.

<sup>1</sup> See <http://moki.fbk.eu>.

<sup>2</sup> See <http://www.mediawiki.org>.

**Lightly-structured: Mountain**

is a

Every Mountain is a Landform

has part

Properties

Subject	Property	Object
Mountain	hasLocation	GeographicalPlace

Verbalized

- Every Mountain is something that is not a Hill and that is not a Plain.
- Everything that is MadeOf by a Mountain is something that is an Earth or that is a Rock.

**Fully-structured: Mountain**

Axioms

Mountain \cisa \not Hill \and \not Plain

Mountain \cisa Landform

Mountain \cisa \forall\text{orall MadeOf}.(Earth \cor Rock)

Mountain \cisa \forall\text{orall hasLocation}.(GeographicalPlace)

Fig. 1. Lightly-structured access mode and Fully-structured access mode for ontology concepts.

## 1.2 Supporting multi-mode access in MoKi

Users can access the ontological and procedural knowledge contained in MoKi using three different access modes: one mode, the *unstructured access mode*, to access the unstructured part of a MoKi page, and two different modes, the *fully-structured access mode* and the *lightly-structured access mode*, to access the structured part.

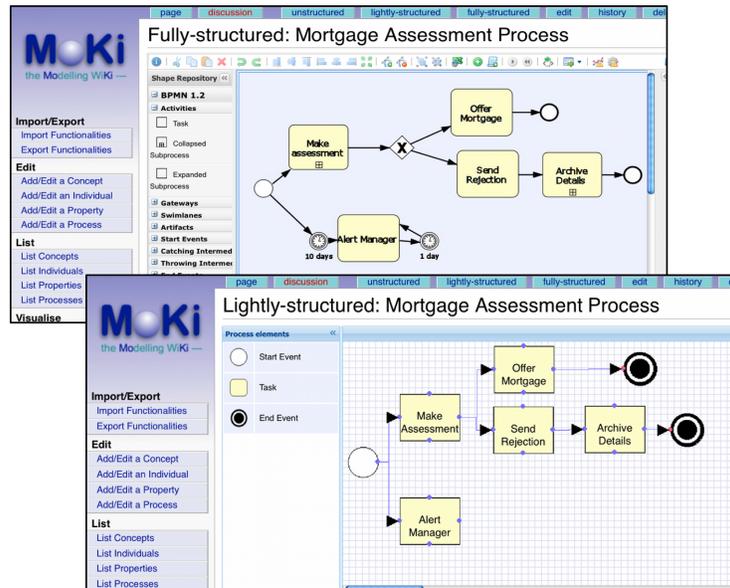
*The unstructured access mode* This access mode allows the user to edit/view the content of the unstructured part of the MoKi page of a model element. The editing/viewing of this part occurs in the standard MediaWiki way.

*The fully-structured access mode* This access mode allows the user to edit/view the content of the structured part of a MoKi page using the full expressivity of the modelling language adopted. For ontological knowledge the fully-structured access mode allows the user to view/edit formal statements (axioms) describing the element associated to the page. Axioms are written according to the *latex2owl* syntax<sup>3</sup>, an intuitive latex-style format for writing ontologies using a text-editor, format which can be automatically translated into (an RDF/XML serialisation of) OWL. The user can easily edit the list of axioms in a form based interface, as shown in Figure 1 (right). For procedural knowledge we have implemented an access mode that, by tightly integrating in MoKi the Oryx editor<sup>4</sup>, a full-fledged business process editor, allows the user to edit the BPMN process diagram described in the page, as shown in Figure 2 (up).

*The lightly-structured access mode* The purpose of this access mode is to allow users with limited knowledge engineering skills, to edit/view the content of the structured part of the MoKi page in a simplified and less formal way. For ontological knowledge the lightly-structured access mode is provided through a form made of two components, as depicted in Figure 1 (left). In the top half part the user can view and edit simple statements which can be easily converted to/from OWL statements. If the OWL version of any of these statements is already contained in the structured part of the page, then the

<sup>3</sup> See <http://dkm.fbk.eu/index.php/Latex2owl>

<sup>4</sup> See <http://bpt.hpi.uni-potsdam.de/Oryx/>



**Fig. 2.** Fully-structured access mode and lightly-structured access mode for processes.

corresponding fields are pre-filled with the appropriate content. Similarly, when any of these simple statements is modified in the lightly-structured access mode, the changes are propagated to the content of the structural part of the page. The bottom half of the form provides a description of those OWL statements which cannot be intuitively translated/edited as simple statements as the ones in the top half of the page. In the current implementation, this part contains the translation of those statements in Attempto Controlled English, provided by the OWL 2 Verbalizer<sup>5</sup>. For procedural knowledge we have implemented an access mode based on a light-weight graphical process editor which uses a restricted subset of process building blocks, as shown in Figure 2 (down).

### 1.3 Model Overview pages in MoKi

Model Overview pages are MoKi special pages dynamically created from the (structured) content of the pages describing model elements. For ontological knowledge, the model overview pages allow to explore the generalisation and part/subparts decomposition hierarchies of ontology concepts, as well as the classification of the ontology individuals. In particular, MoKi provides two kinds of model overview pages. In the tabular-based one, the user can access a table listing every concept (resp. individual) of the ontology together with the concepts of which it is a specialisation and the concepts in which it decomposes according to the part of relation (resp. the concepts to which the individual belongs to). In the graphical-based one, a tree-like view shows the hierarchy of concepts according to either the subclass or the part-of relation, or the membership of individuals to concepts. Drag and drop editing facilities are also provided to rearrange

<sup>5</sup> See <http://attempto.ifi.uzh.ch>.

the tree. For procedural knowledge, the model overview page provides an overview of the process/sub-process decomposition mechanism by means of a table listing every process defined in MoKi together with the processes in which it decomposes.

#### 1.4 Usages of MoKi

The different versions of MoKi have been applied in several scenarios. Focusing on the usages with real domain experts, MoKi has been successfully applied by four application partners within the FP6 EU-project APOSDLE<sup>6</sup> to develop enterprise models (composed of a domain ontology and a process model) in six different domains, and it is currently used by a team of knowledge engineers and domain experts to collaboratively build an Organic Agriculture and Agroecology Ontology within the FP7 EU-project Organic.Edunet<sup>7</sup>.

Although the version of the tool here presented is tailored to the development of ontologies and business processes, the tool can be customized to support modelling other kinds of knowledge. For example, a preliminary version of the tool which support modelling of clinical protocols according the ASBRU language is described in [2].

## 2 Conclusions

In this paper we have presented a completely revised version of MoKi, a tool for modelling ontologies and business process models in an integrated way. The main novelties of the tool w.r.t. the previous version presented ([1]), are (i) a different content organisation of the page, which now comprises an unstructured part and a structured part, and (ii) the implementation of a multi-mode access to the page content, to support easy usage both by domain experts and knowledge engineers, thus facilitating them to play an equally central role in the modelling activities.

In our future work, we aim at improving the support for process modeling, in particular in providing an extensive automatic support for aligning the fully-structured access mode and lightly-structured access mode in case of procedural knowledge. We also aim at evaluating our tool further, on larger case studies.

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<sup>6</sup> See <http://www.aposdle.org/>

<sup>7</sup> See <http://www.organic-edunet.eu/>