CliP-MoKi: A collaborative tool for encoding Asbru Clinical Protocols

Marco Rospocher1, Claudio Eccher1, Chiara Ghidini1, Rakebul Hasan1, Andreas Seyfang3, Antonella Ferro2, and Silvia Miksch3

1 Fondazione Bruno Kessler, Trento, Italy
2 Medical Oncology, S. Chiara Hospital, Trento, Italy
3 Danube University Krems, Austria

Introduction. Encoding treatment protocols in formal and computer-executable form is not a trivial task and requires the collaboration between clinicians and knowledge engineers. These different actors usually have different degrees of expertise on the knowledge about diseases, treatments, and clinical protocols, and on the ability of encoding such knowledge into formal computer-processable statements. Furthermore, they may not be located in the same place, and may not be able to physically participate in meetings. In this system demonstration, we present CliP-MoKi (Clinical Protocols Modelling wiKi), a Semantic MediaWiki based tool for the collaborative encoding of cancer treatment protocols in a distributed environment. The chosen target modeling language is Asbru. The tool, the first version of which was developed inside the Oncocure project 4 exploits the great flexibility of Semantic MediaWiki technology to mix unstructured information and semantic annotations, which allow to automatically generate the final formal Asbru model with minimal adaptation cost. In addition, semantic forms and a graphical representation of the resulting plan hierarchy are used to help the encoding and the comprehension of the model. The proposed approach allows remotely located people to actively participate to the encoding of cancer protocols into a (skeletal) valid Asbru model. These features render our tool a natural candidate for small to medium scale modeling tasks, where the use of more complex encoding frameworks may require a big adaptation and training effort. A demo version of CliP-MoKi can be tried out on-line at https://moki.fbk.eu/clip-moki.

ABRU plans in CliP-MoKi. The main idea behind CliP-MoKi is that an Asbru guideline model is expressed as a collection of interrelated wiki pages connected by typed links. A wiki page is associated to each element of an Asbru guideline model, and is usually composed of two parts. In the structured part the element is described by means of triplets of the form (subject, relation, object), with the element itself playing the role of the subject; the purpose of this part is to represent the connection between the elements of the Asbru models (e.g., a plan and its subplans), as well as the element data that must be present in the model (e.g., the title of a plan). In the informal part, the element is described mainly using natural language sentences (images or drawings can be attached as well); the purpose of this part is to enrich the description of the model by documenting it and clarifying it to users not trained in the formal representation, and

4 For more details on the Oncocure project, see http://oncocure.fbk.eu.
as such it can contain textual or graphical descriptions, reference to source documents, annotations about modeling choices, open problems, comments, and so on.

The user fills a page via forms, so he/she does not need to know any particular syntax or language to participate in the creation of the Asbru model. The structured part of each CliP-MoKí page is organized via template according to the type of Asbru building block it is meant to represent. For the first versions of the tool, we have defined a template for each plan body type (plan with subplans, plan activation, ask, user performed, cyclical plan, variable assignment, if-then-else), two templates for parameters (raw data definition and qualitative parameter definition), and two templates for abstractions (qualitative scale definition and secondary qualitative entry). In the current release, conditions on plan state transitions can only be sketched in free text in a CliP-MoKí page (e.g. to be refined and formalized outside CliP-MoKí), but we are currently investigating the possibility to express them directly in the CliP-MoKí page in a user-friendly but structured manner (e.g. by using controlled natural language tools).

**Functionalities of CliP-MoKí.** To support the creation of an Asbru model, CliP-MoKí provides groups of functionalities that can be accessed via a wiki-style sidebar menu.

**Import** With this functionality the user can set-up CliP-MoKí with an already available XML serialization of an Asbru model. The aim of this functionality is twofold: (i) showing in a user-friendly way a formal Asbru model to users not familiar with formal models, and (ii) allowing to reuse the loaded Asbru model as a starting point to develop a new model, instead of starting modelling from scratch.

**Model Management** This is a set of functionalities that supports the user in the creation, editing and deletion of pages that describe model elements.

**Visualization** These functionalities allow to produce two kinds of global overviews of the models: (i) a tabular-based one, which returns a detailed list of the different elements of the model filtered by type (e.g. all the plans with children, all the parameters), and (ii) a graphical-based one, which is a tree-like view, dynamically created from the content of the CliP-MoKí pages showing how plans are related with their subplans. The user can expand/collapse parts of the tree to efficiently browse even large, complex models. Beside the plan name, an icon concisely and intuitively represent the plan type.

**Export** This functionality supports the automatic export of the model described in CliP-MoKí to an Asbru XML model according to the Asbru DTD. This model has those fields set to their final value, for which sufficient and precise information is available in CliP-MoKí. For those cases where the model in CliP-MoKí contains only a sketch in free text (e.g. conditions in the current version), the available information is inserted as comment, and the completion of the model is left to dedicated Asbru modeling tools.

CliP-MoKí is built in a modular way in order to facilitate the plugging-in tools which may complement the functionalities currently available (like alternative visualisations of the specifications, or plug-ins to support the early stages of the knowledge acquisition process). Furthermore, CliP-MoKí can be generalized to collaboratively encode protocols in languages different than Asbru, by defining ad-hoc templates with slots specific for the language used.