

Appendix A: overview of the most prevalent formats for representing clinical guidelines

Femke Ongenae^{*1}, Femke De Backere¹, Kristof Steurbaut¹, Kirsten Colpaert², Wannes Kerckhove¹, Johan Decruyenaere² and Filip De Turck¹

¹Department of Information Technology (INTEC), Ghent University - IBBT, Gaston Crommenlaan 8, Bus 201, 9050 Ghent, Belgium

²Department of Intensive Care, Ghent University Hospital, De Pintelaan 185, 9000 Ghent, Belgium

Email: Femke Ongenae^{*} - Femke.Ongenae@intec.ugent.be; Femke De Backere - Femke.DeBackere@intec.ugent.be; Kristof Steurbaut - Kristof.Steurbaut@intec.ugent.be; Kirsten Colpaert - Kirsten.Colpaert@ugent.be; Wannes Kerckhove - Wannes.Kerckhove@intec.ugent.be; Johan Decruyenaere - Johan.Decruyenaere@ugent.be; Filip De Turck - Filip.DeTurck@intec.ugent.be;

^{*}Corresponding author

Representing clinical guidelines

A lot of standardization efforts and formalisms for representing clinical guidelines have been proposed in literature [1–4]. Below an overview is given of the most prevalent formats:

- **The Arden Syntax** [5]: The Arden syntax is a formal, procedural language for representing medical guidelines. The Arden Syntax is adopted as a HL7 (Health Level 7) standard in 1999 [6]. This format uses Medical Knowledge Modules (MLMs), containing the logic necessary for making and implementing one medical decision. An MLM is a hybrid between a production Rule and a procedural formalism. Each MLM is invoked as if it were a single-step IF-THEN Rule, but then it executes a sequence of instructions, including queries, calculations, logic and write statements. The Arden Syntax supports time functions by ensuring that every data element and every event has a timestamp that is clinically significant.
- **PROforma** [7, 8]: PROForma consists of a formal specification language, a knowledge representation language and a set of Prolog and Java tools for building applications in the language. The aim of PROforma is to use a minimal set of constructs to model a guideline. PROforma defines four tasks. Each task has some attributes describing the goal, control flow and conditions for executing the task. An ontology is used to check the soundness.

- **EON [9]:** EON is a component-based suite of models and software components for the creation of guideline-based applications. It was developed in 1996 by Stanford University. EON includes an extensible set of models to represent information in a clinical guideline such as domain ontologies and models of patient data. The guideline model, called the Dharma model, defines the structures necessary to create guideline knowledge. Protégé is used as the environment to create and maintain the models. Patient data is obtained from user input or from a temporal database. Explanations of the given recommendations by the guideline can also be requested.
- **GLIF [10]:** The aim of GLIF was to come to a uniform format, used as an exchange format for guidelines [11]. Therefore, GLIF combines the properties of the Arden Syntax, GEODE-CM (a state-transition framework for clinical management), MTBA (Modeling Better Treatment Advice, a client-server architecture) and EON. GLIF has a formal representation. It defines an ontology for representing guidelines, as well as a medical ontology for representing medical data and concepts. GLIF uses HL7 RIM (Reference Information Model) as data model.
- **PRODIGY [12]:** PRODIGY is a format used to model chronic disease management in primary care, such as asthma, hypertension and angina. PRODIGY's main aim is to create a simple, comprehensible and readily model for representing such guidelines. It supports a series of decisions that a nurse or general practitioner may have to make by enabling a guideline to be organized as a network of patient scenarios, decisions concerning management and actions. HL7 RIM is also used to model patient information.
- **Asbru [13]:** Asbru is a time-oriented guideline format. Asbru enables the intentions and goals of a guideline and the temporal dimensions and uncertainties to be defined as an intrinsic part of that guideline.
- **Guide [14]:** GUIDE consists of 3 main modules. The Guideline Management System (GIMS), the Electronic Patient Record (EPR) and the Workflow Management System (WfMS) (also called the Care flow Management System, CfMS). GIMS provides the clinical decision support, while WfMS takes care of the organizational support. The different modules interact based on messages. These messages are defined by specific contracts. SNOMED CT tags can be used for terminology abstractions.

List of abbreviations used

CfMS: Care flow Management System; EPR: Electronic Patient Record; GIMS: GuIdeline Management System; GLIF: GuideLine Interchange Format; HL7: Health Level 7; MKM: Medical Knowledge Modules; MTBA: Modeling Better Treatment Advice; RIM: Reference Information Model; SNOMED CT: Systematized Nomenclature of Medicine-Clinical Terms; WfMS: Workflow Management System.

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