Using Model-Driven Engineering and Health Standards for Improving Healthcare Processes Management

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Defining Healthcare Processes Support Systems (HPSS) in a clinical context is an essential and not always easy task. It is critical to provide mechanisms to assure that the HPSS implementation matches the clinical expert definition.

In this paper, we propose the use of the Model-Driven Engineering (MDE) to solve this topic. Within MDE, we have chosen to represent concepts with User Interfaces Design and Unified Modeling Languages (UML) profiles. Moreover, several standards were applied within HPSS definition: EN/ISO13606, ISO21090 and ISO/DIS3940.

In this sense, two metamodels are defined in our approach. The first one is an extension of EN/ISO13606 metamodel and it is combined with ISO/DIS13940 in order to include concepts related to continuity of care and semantic interoperability. The second one enables defining business processes adapted to the Healthcare Processes environment, incorporating the required attributes standardized with ISO/IEC TR 24744.

We have developed a systematic procedure that generates an executable HPSS from an instance of our metamodels, adapted to a concrete environment introduced within the "Virgen del Rocío" University Hospital (VRUH). We have implemented model-to-text transformations in an automatic procedure in order to generate executable HPSS with in VRUH environment from instances of our metamodels.

Our UML Profiles have been applied to a real HPSS that describes the medical examination of a patient with spinal cord injury. We have obtained a Java executable version of our models as a result of the performed automatic procedure, after defining both models.

We are working in an effective application of MDE to the HPSS context, reducing the complexity of defining HPSS to guarantee the quality of the results.

Currently, the clinical professionals are validating the spinal cord injury HPSS in a testing phase of this executable version. This proof of concept allowed testing the capabilities of Model-Driven Engineering to provide implementable solutions of above detailed standards within our healthcare environment.

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