A software tool to analyze clinical workflows from direct observations

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Abstract

Observational data of clinical processes need to be managed in a convenient way, so that process information is reliable, valid and viable for further analysis. However, existing tools for allocating observations fail in systematic data collection of specific workflow recordings. We present a software tool which was developed to facilitate the analysis of clinical process observations. The tool was successfully used in the project OntoHealth, to build, store and analyze observations of diabetes routine consultations.

Keywords:

Observation, process analysis, BPMN.

Introduction

Direct observation is a valuable method for collecting data about physicians' interactions with patients and others, such as the EHR, without depending on their direct collaboration. This method was selected to identify clinical workflows and processes related to IT-usage during the physician encounter as part of the OntoHealth project. Our goal was to identify clinical workflows to later enable their implementation through a computer system and make the interaction with the EHR easier for users. Observational workflow data needs to be gathered and stored in a convenient way to facilitate further analysis. However, existing tools (e.g. [1]) often fail at managing observational data in a versatile and flexible manner so that specific information about executed tasks and the interrelation among them may be handled. We developed a software tool that allows managing of context-related workflows, facilitating observation storage and analysis.

Materials and Methods

The literature review towards identifying workflows [2] led us to a tripartite categorization for generic actions, diabetes-specific data-elements and contexts that could be imported into the application for initial workflow categorization. In order to provide a graphical view and facilitate the analysis, we used the business process model and notation (BPMN) v2.0 for workflow visualization.

Results

The developed JAVA-application provides a SWING user-interface, enabling users to record and visualize observations regarding clinical workflows (Figure 1). The creation of a new observation as a business process diagram is realized using the open-source framework jGraphX (www.jgraph.com) tailored to the requirements of BPMN. A limited set of BPMN

elements were integrated: users can create start/end events, tasks, gateways and connect all the elements to represent a sequence flow. Each task allows users to define properties of task-related characteristics (name, duration, IT-relation, executed person, etc.) that also comprise context-related information organized as a hierarchical categorization. The current version allows management of three categorizations. All emerging data is stored in a MySQL-database. BPMN- and context-related statistical values (e.g. process execution time, number of assigned elements) can be determined within the application and exported for further statistical analysis. Observations of diabetes routine examinations were documented using this application. During the input-process, categorizations were modified and final results were used for further analysis. This tool allowed for systematically identifying and quantifying the most common actions, data-elements and contexts used within diabetes routine examinations.
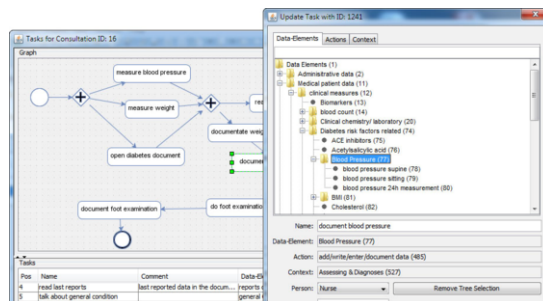

Figure 1: Screenshot of the application

Acknowledgments

References

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