Process-Driven Mobile Data Collection (Extended Abstract)

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Abstract: Structured instruments are commonly used to collect data in various application domains (e.g., psychology). Still, the former are handled in a traditional paper-based fashion. In this context, the widespread use of smart mobile devices offers promising perspectives with respect to the controlled collection of high-quality data. The design, implementation and deployment of such mobile data collection applications, however, is challenging in several respects, turning both the programming and maintenance of mobile data collection applications into a costly, time-consuming, and error-prone endeavor. In order to empower domain experts to create mobile data collection applications themselves, a powerful framework, applying process management concepts in a broader scope, was developed. The framework enables the development of sophisticated mobile data collection applications by orders of magnitude faster compared to current practices on one hand. On the other, domain experts are relieved from manual tasks, like digitizing the data collected. The work summarized in this extended abstract has been published in [Sc16a, Sc16b, Sc16c, Sc17].

Keywords: Mobile Data Collection, Process-Aware Information System, End-User Programming

The QuestionSys Framework

In the light of digital transformation and cloud computing, mobile technology has become a salient factor for large-scale data collection scenarios, which have been accomplished based on paper and pencil so far. In this context, mobile applications offer promising perspectives with respect to the collection of high-quality data. However, platform-specific peculiarities as well as domain-specific requirements need to be properly addressed when engineering such mobile applications. For example, heterogeneous mobile platforms need to be supported, taking their short release cycles into account, or common usability styles need to be obeyed. Altogether, this turns both the programming and maintenance of mobile data collection applications into a costly, time-consuming, and error-prone endeavor.

In the QuestionSys framework, we developed a generic approach for transferring paper-based instruments (e.g., questionnaires) to digital ones (cf. Fig. 1). To properly assist domain experts during data collection, the developed framework considers the entire *Mobile Data Collection Lifecycle*. The *Design & Modeling* phase allows creating sophisticated data collection instruments based on a specific modeling notation. In particular, domain experts without any technical background are enabled to realize mobile data collection applications in a model-driven way. The models created by them are directly mapped to process models expressed in a common modeling notation (e.g., BPMN 2.0). In turn, this allows representing the *logic* of an instrument as an executable process model. In order to empower domain experts to create sophisticated instruments themselves, a configurator

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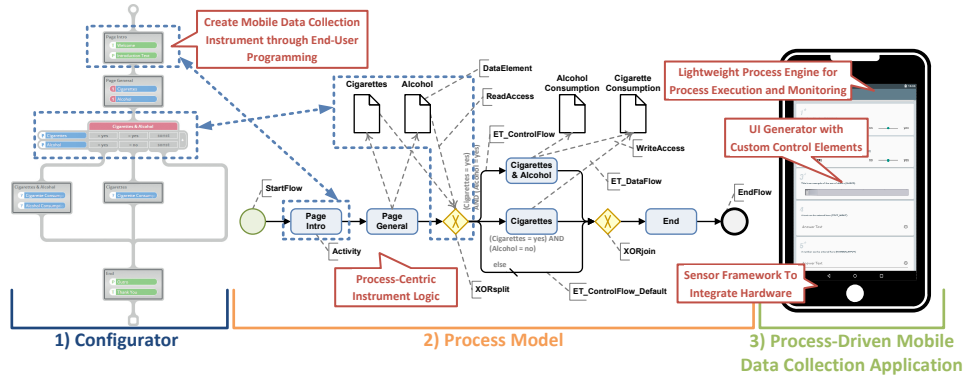
Fig. 1: The QuestionSys Approach

component is provided that combines process management concepts with end-user programming techniques [Sc16a]. This configurator, in turn, was evaluated in a controlled experiment measuring the mental effort of end-users during modeling [Sc17]. The created models can be distributed to registered smart mobile devices in the *Deployment* phase. During the *Enactment & Execution* phase, multiple instances of the respective mobile data collection instrument may be executed on a lightweight process engine running on heterogeneous smart mobile devices [Sc16b]. Moreover, the *Monitoring & Analysis* phase allows domain experts to evaluate the collected data in real-time on the respective device. Finally, the *Archiving & Versioning* phase allows managing different versions of a deployed instrument [Sc16c].

Overall, the QuestionSys approach applies process management concepts in a broader scope. This, in turn, will significantly affect the way mobile data collection applications can be developed for large-scale scenarios in future (e.g., clinical trials).

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