

Lessons Learned in Aligning Data and Model Evolution in Collaborative Information Systems - A Summary Report

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Abstract: In this work, we present a hybrid approach for supporting data and model co-evolution, wherein either the data is aligned to the model or vice versa. We further elaborate on our experiences of applying the approach in projects for over five years. The issues faced in those projects and their respective solutions are formulated as lessons learned, which should guide the design and implementation of software systems supporting the co-evolution of data and its model.

The work summarized in this paper has already been published in [Re16a] and [Re16b].

Keywords: Lessons learned, model and data evolution, collaborative information systems.

1 Introduction

The data model of an information system is subject to frequent changes due to the correction of mistakes or the adaption of new laws and regulations. If the information system is not able to adapt to the changing environment, the quality of the system's support will decrease over time. Therefore, meta-model based collaborative information systems (CIS) that allow users to dynamically update and evolve the data models are becoming popular. Achieving such a collaborative environment that supports the evolution of both the model and its data in a consistent manner is a non-trivial task. Matthes et al. [MNS11] tackle this challenge with the **Hybrid Wiki** approach. Wherein, the data represented by the unstructured wiki pages can be structured collaboratively by attaching types, attributes, and integrity rules. At the same time, model designers can define and adapt the model which imposes certain constraints on the underlying wiki pages and thus induces a schema on the data. Our experiences related to the application of a CIS that implements the Hybrid Wiki approach in a variety of use-cases revealed a couple of challenges related to collaborative approaches for the co-evolution of data and its model. In this paper (cf. [Re16a]), we discuss our experiences of applying the Hybrid Wiki approach in industrial and research projects, and the consequences for the redesign of this approach.

2 Lessons Learned in Aligning Data and Model Evolution

In this paper, a lesson learned is an issue that we faced in the application of the Hybrid Wiki approach and the consequential reimplementations of the Hybrid Wiki system.

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Relevance of Terminology: The Hybrid Wiki approach was not only applied as a means for wiki-based knowledge management but also as a model-based repository. Since, stakeholders in the respective cases referred to their information objects using general terms (e.g. *Entities* or *Workspaces*), we applied those implicitly proposed terminology changes to the Hybrid Wiki meta-model.

Simplicity vs. Expressiveness: The assignment of multiple types to an entity seemed to be too complicated for a majority of users. As a consequence, we redesigned the meta-model accordingly, i.e., now entities can only be assigned to a single type. The meta-model however was extended by additional constraints to differentiate between additional attribute types such as Date and Boolean.

Configurability of Modeling Approach: Depending on the maturity of the model, either a flexible *data-first* or a more restrictive *model-first* approach is desirable. Consequently, means for seamlessly changing the modeling approach so as to align it to the current needs were proposed. For e.g., by activating or deactivating the so-called free attributes (attributes which are not defined by the data model), or by configuring the strictness of constraints.

Searchable Inconsistencies: Since inconsistencies between data and its model are inevitable in hybrid modeling approaches, users need to be supported in identifying and resolving them. This resulted in new functionalities to search for inconsistencies and to create data consolidation views.

3 Conclusion

The main conclusions derived from the applications of the Hybrid Wiki approach are: first, finding the right balance between data- and model-first approaches is decisive. The focus on the data-first approach enables model designers to harness collective intelligence among the users and as soon as the model reaches a certain degree of maturity, the design space should be restricted to enforce a convergence of the data and its model. Second, the data and model co-evolution leads to inconsistencies between them and hence needs to be handled through adequate tool support. Finally, an approach enabling the co-evolution of data and its model must have the right balance between simplicity and expressiveness.

Bibliography

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