Modeling Linked Open Data (Poster)

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1. Introduction

Nowadays, many entities (e.g., business companies, government institutions) move toward sharing their data online for reuse [1], leading to the incremental growing of *Open Data* [2]. In public administrations, Open Data increases transparency [3] and allows citizens access to valuable information. Usually, the information provided by a unique dataset coming from Open Data sources are very limited as they are not integrated with other data sources. We propose to leverage the concept of Linked Open Data (LOD) [2] which, besides the benefits of Open Data, exploits Linked Data best practices for publishing and connecting structured data on the Web [4]. Thus, LOD supports knowledge sharing and information enrichment by adding links to both properties and values of a data object. In the literature, traditional modeling approaches exploit semantic Web features to model LOD. For instance, Alaoui *et al.* [5] propose data modeling in the context of enterprise applications development in a semantic-oriented perspective by using RDF and OWL ontologies. Meanwhile, Jamil *et al.* [6] present an approach for the semantic modeling of events using the case study of refugee registration and repatriation. Although ontologies offer powerful solutions, they are specialized in conceptual modeling and inferring new knowledge. This does not facilitate the development of various software artifacts (e.g., automatically generated code, APIs or libraries). Moreover, using ontologies implies good knowledge of the domain and the understanding of the used technologies, requiring a considerable effort and leading to a steep learning curve. For this reason, we propose a novel approach to model LOD based on Model-Driven Engineering (MDE) as it presents a wide range of tools and techniques supporting not only conceptual modeling but also the development and generation of different software artifacts, easy integration, and non-functional requirements analysis. MDE has been successfully applied in different domains and has proven to be a promising approach to follow due to the benefits it offers (e.g., code generation or model transformation). In addition, MDE enables the linking between models through the exploitation of *weaving models*. Thus, weaving models can be exploited in the scenario of LOD to integrate different models (e.g., Open Data models), while maintaining the separation of concerns and avoiding the construction of large and monolithic models for LOD, which could be difficult to handle, maintain and reuse [7].

2. Modeling LOD exploiting MDE Techniques

In LOD, data elements are linked to each other in such a way that they can be effectively navigated to provide additional context. In a smart city context, LOD together with

MeSS'22: International workshop on MDE for Smart IoT Systems, July 04–08, 2022, Nantes, France
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data provided by IoT devices could contribute to the creation of new knowledge about a city. For instance, multiple information are provided by IoT devices installed around a smart city, such as air quality, traffic, noise, etc. In this context, anybody interested in pollution, could not only see the information about pollution but could also navigate towards other factors that can have an impact on pollution, such as road traffic, or that can be impacted by it, such as health, among others. In Figure 1 we report an example as an abstract representation of our proposal to model LOD exploiting MDE techniques. On the left-side (a) we report an example of LOD in which we have three different domains, namely *Population*, *Mobility*, and *Pollution* that could be expressed as data objects defined by different classes and relationships. In the figure, we report at least one class for each domain representing how the data is linked to each other to enable information sharing. For instance, in the *Pollution* domain we have a class *AirQuality* which is linked with a class *Health* in the *Population* domain with a relationship (*has impact on*) that indicates the impact *AirQuality* has on *Health*. On the right-side (b) of the figure, we report how the example can be modeled by using MDE techniques, by means of the typical structure of data objects in the three domains through metamodeling. As can be seen, we propose to use three models (i.e., Population Model, Pollution Model and Mobility Model) which are conforming to their corresponding metamodels (i.e., Population metamodel, Pollution metamodel and Mobility metamodel). To establish the link between these three models a Weaving Model is introduced. This way, we integrate different modeling domains that contributes to the megamodelling by enabling an ecosystem of models.

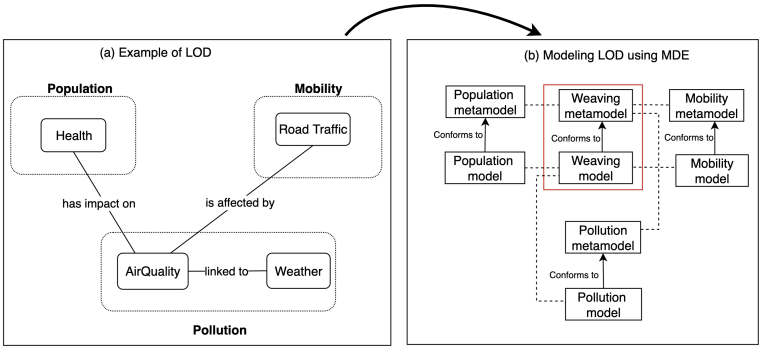

Figure 1: Example of modeling LOD exploiting MDE Techniques.

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