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# Semantic Data Integration for Public Health in Brazil

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## 1. Introduction

- The Brazilian Ministry of Health requires more than 45 information systems for reporting the national health situation [1];
- Independent, redundant and non-interoperable information systems [1];
- Integration projects ignores semantic meaning [1];

## 2. Proposal

This project aims to develop an ontology layer to integrate distinct health-care databases (Natality - SINASC, Mortality - SIM, Hospitalization - SIH) and to do complex analysis, such as to track the patient care pathway, allowing better resource management and to answer questions like:

- What was the level of education of the mother when the child was born?
- Did the mother have any records of hospitalization during pregnancy? Was hospitalization related to the pregnancy?
- Did the mother have any records of ICU admission?

## 3. Semantic Data Integration Method

Different approaches can be used for integrating data, such as schema mapping and matching, model management, record linkage and data fusion. Ontology Based Data Integration - OBDI, is a useful approach for solving the absence of interoperability between the databases and identifying semantic correspondence in concepts. The OBDI method followed in the project is based on the works of [2, 3], Figure 1.

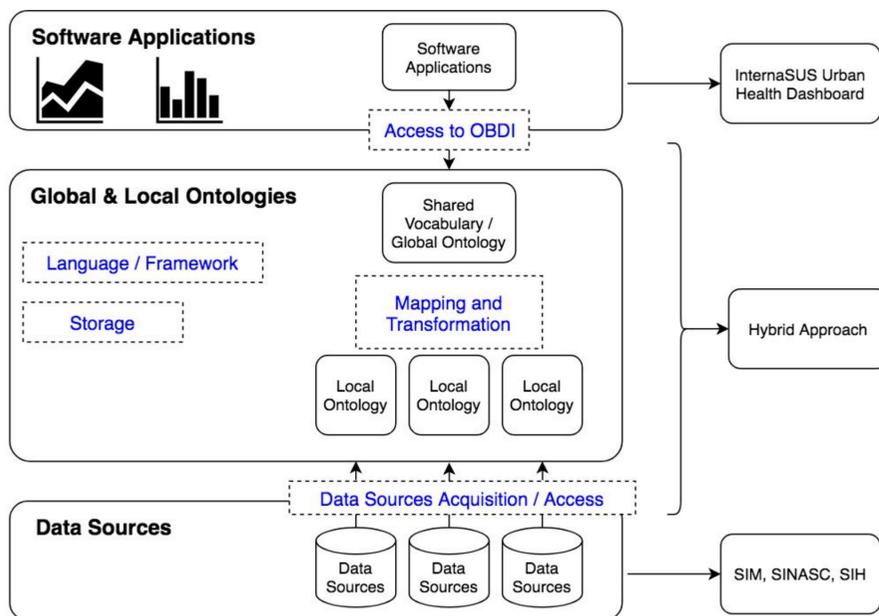


Figure 1(a). OBDA elements, by F. J. Ekaputra et al. [2]

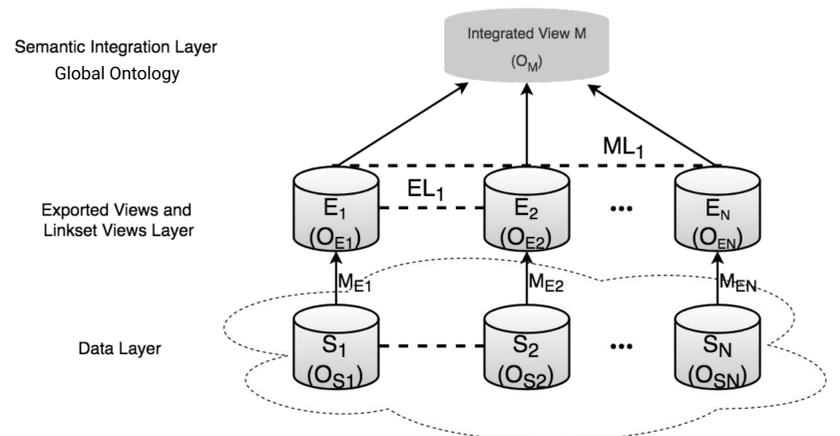


Figure 1(b). Hybrid Approach from ontology layer, by Vidal, V. M. et al. [3]

## 4. Current and Expected Results

The ontologies of the proposed application are being created and validated by a board of experts, as described in Table 1. A clipping of the Global ontology is shown in Figure 2. For the next steps, we will publish ontologies in open standard and integrate the ontology layer with the visualization layer.

Table 1. Ontology creation stage

| Ontology  | Stage           |
|-----------|-----------------|
| SINASC_DT | Validating      |
| SIM_DT    | Validating      |
| SIH_DT    | Will be created |
| SINASC_EX | Validating      |
| SIM_EX    | Validating      |
| SIH_EX    | Creating        |
| Global    | Creating        |

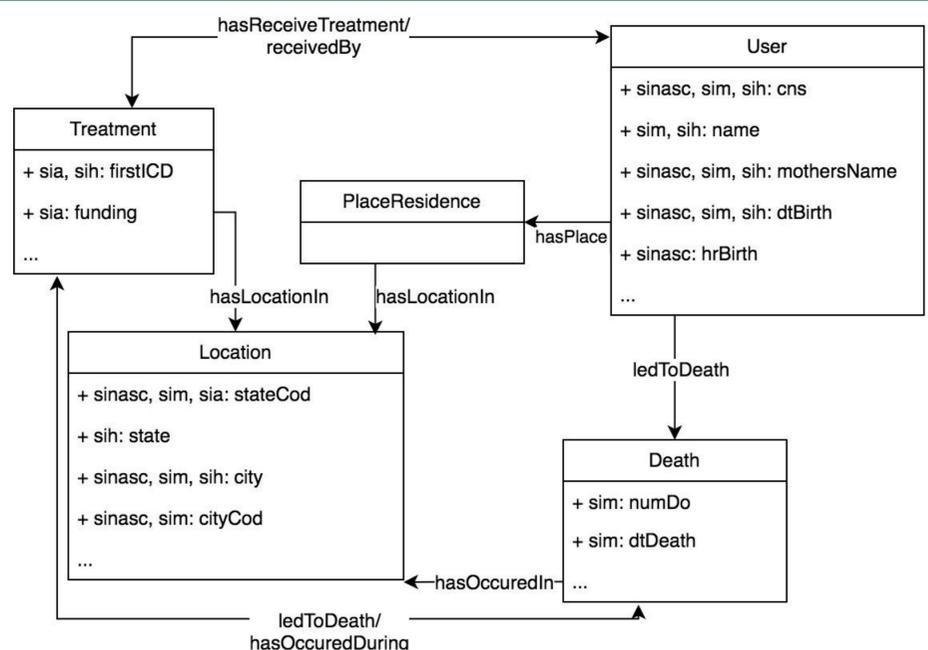


Figure 2. Clipping of the Global ontology.

## 5. Acknowledgements

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## 6. References

- [1] Ministério da Saúde. Sistemas de Informação da Atenção à Saúde: Contextos Históricos, Avanços e Perspectivas no SUS (Org. Pan-Americana da Saúde, 2015).
- [2] Ekaputra, F. J., Sabou, M., Serral, E., Kiesling, E. & Biffi, S. Ontology-based data integration in multi-disciplinary engineering environments: A review. Open J. Inf. Syst. (OJIS)4, 1–26 (2017).
- [3] Vidal, V. M. et al. Specification and incremental maintenance of linked data mashup views. In International Conference on Advanced Information Systems Engineering, 214–229 (Springer, 2015).