A federated database system based clinical decision support software for a multinational clinical trial

Zhengru Shen, Michiel C. Meulendijk, Marco R. Spruit
Utrecht University, Department of Information and Computing Sciences, Princetonplein 5, 3584 CC, Utrecht, the Netherlands

Universiteit Utrecht

European Commission

Introduction

The Needs

» age ≥75 years
» multiple chronic diseases (multi-morbidity)
» multiple medications (polypharmacy)

» a medication review method: Systematic Tool to Reduce Inappropriate Prescribing (STRIP)
» time-consuming and complex

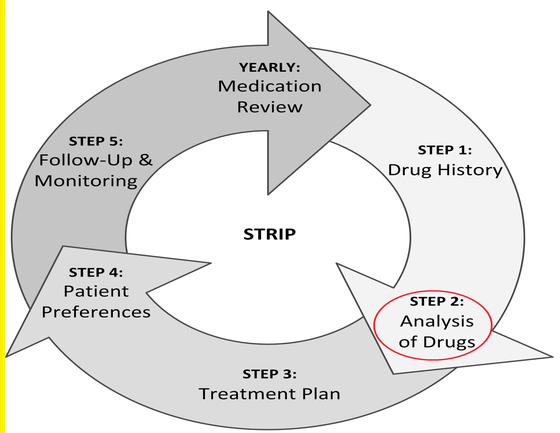


Figure 1: the STRIP process.

The OPERAM project: a multi-center large-scale cluster randomized clinical trial (RCT) in four European countries: *the Netherlands, Switzerland, Ireland* and *Belgium*.

Ojectives

» To develop a software tool (web app) that facilitate the use of STRIP in daily practices

» To implement and use the software tool in multiple countries

Federated database system

Architecture

» ETL: Extract, Transform and Load
» EMR: Electronic Medical Records

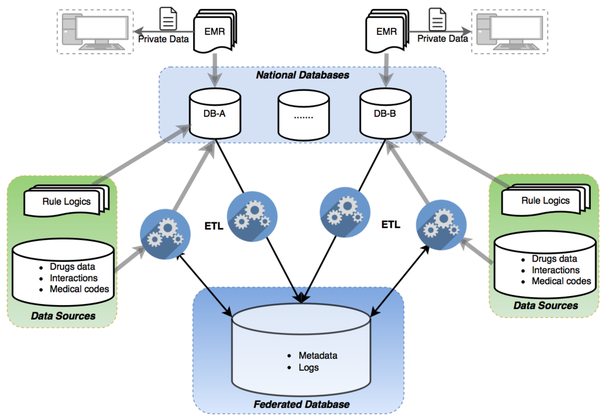


Figure 2. Integration Architecture of STRIPA.EU

Data models

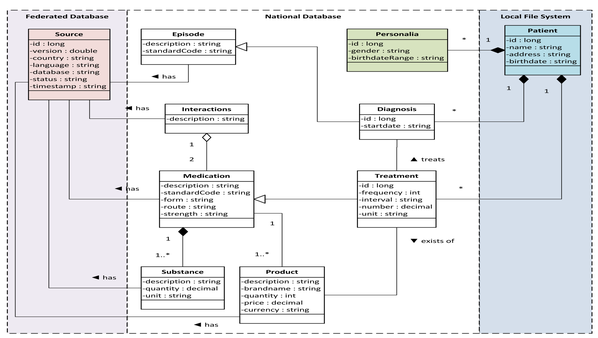


Figure 3. Class Diagram depicting main data models

To keep track of medication data, a unique identifier for each data item is created and recorded in *source*.

To maintain privacy, patients' identification information, such as name, address, are stored as *patient* in local file system, and the rest are put into *personalia* in national databases. They are linked with a unique patient identifier.

ETLs

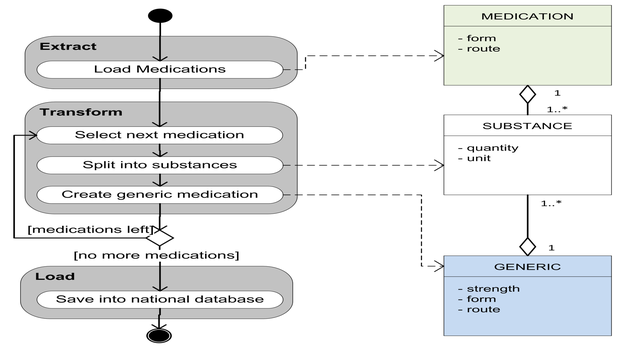


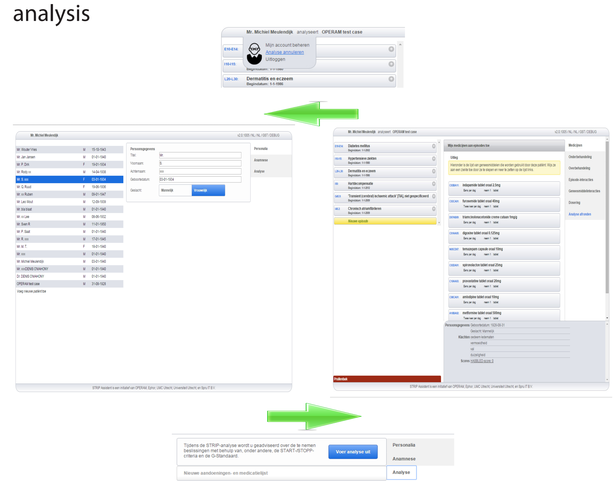
Figure 4 The ETL process of extracting medication data in the Netherlands

Figure 4 shows a simple example of ETL processes that is designed to extract generic medication data from a Dutch medication database. A powerful open source tool (*Talend Open Studio for Data Integration*) has been used to operationalize ETL processes.

STRIPA.EU

Interfaces

» Dashboard
a user interface for recording the results of patients' anamneses
» Analyzer
a user interface for performing the pharmacotherapeutic analysis



Conclusions

» A running software that is deployable in multiple clinical trial sites.

» STRIPA is proven to be efficient and effictive among Dutch physicians in a test study (Meulendijk et al, 2015).

» Federated Database Architecture ensures data consisitency across countries and data security and privacy in each country.

» The software will be further evaluated and improved after its implementation in multiple clinical trials of the OPERAM project.

References

1. Meulendijk, et al. (2015). Computerized Decision Support Improves Medication Review Effectiveness: An Experiment Evaluating the STRIP Assistant's Usability. Drugs & Aging, 1-9.
2. Meulendijk, M. C., Spruit, et al. (2015). STRIPA: a rule-based decision support system for medication reviews in primary care. In Proceedings of the European Conference on Information Systems (ECIS).
3. http://www.operam-2020.eu/

Acknowledgements

This work is part of the project "OPERAM: OPtimising thERapy to prevent Avoidable hospital admissions in the Multimorbid elderly" supported by the European Commission (EC) HORIZON 2020, proposal 634238, and by the Swiss State Secretariat for Education, Research and Innovation (SERI) under contract number 15.0137. The opinions expressed and arguments employed herein are those of the authors and do not necessarily reflect the official views of the EC and the Swiss government.

Further information

The authors are working on the OPERAM project at Utrecht University. They are responsible for the implementation and use of STRIPA in the EU project. Meanwhile, they will explore more opportunities to improve the performance of STRIPA, such as using user behavior analysis to personalize the software. If you want to know further information, contact us via z.shen@uu.nl

Optimising Therapy to prevent avoidable hospital admissions in the multimorbid elderly

OPERAM