Data Integration Framework for Interventional X-Ray

"Thanks to Kostadinka's talents and drive for excellent results she managed to develop the data integration part in the Business Intelligence Solution within Philips Healthcare. We now have a solid base to continue our work on Business Intelligence."

Stefan van Gorkom
Philips Healthcare

Philips Healthcare is committed to continuously improving their medical systems and services. Consistent with Philips Healthcare’s mission, the Interventional X-Ray (iXR) unit enhances its products with new functionalities. By adding more features, the complexity of the products increases and the maintenance becomes more challenging. On the other hand, correctness, availability, and reliability, which are the top quality concerns of the products, should not be compromised by this increase in complexity. For this reason, an extensive monitoring of the system behavior is needed throughout the entire product lifecycle.

The Automated Testing team (ATT) developed an application named ProMise that analyzes the logging data of one iXR system family, Allura. It is a poorly extensible solution that cannot support other medical systems and functionalities. Due to these drawbacks, the ATT decided that new architecture and implementation is needed. They created a new solution concept that consists of three Business Intelligence compartments, Data Integration Framework, Analysis Framework, and Reporting tools. The scope of my project was limited to one component, the Data Integration Framework.

The goal of this project was to deliver an extensible framework that facilitates extract, transform, and load functionalities. The delivered framework is a hosting engine with well-defined extension points to which newly developed functionalities can be attached as plug-ins. In addition to the framework, a plug-in that integrates reliability relevant data for the XtraVision medical systems was developed. The plug-in serves as a proof that the framework complies with the user requirements and intended uses.
Challenges
The Interventional X-Ray medical systems generate huge amount of event log data. The major challenge of this project was to select a technology that is suitable for processing this data and is extendable to new data formats. Additionally, the process of understanding the data generated by the XtraVision systems was itself a challenge because it contains a lot of exceptional cases that needed to be handled by the developed plug-in.

Results
The basis of the Data Integration Framework that was delivered with this project is formed by a third party ETL tool, Microsoft SQL Server Integration Services (SSIS). The requirements that were not satisfied by SSIS were designed and developed as framework extensions. To verify that the framework meets the business needs, a plug-in that extracts, transforms, and loads reliability relevant data for the XtraVision systems was developed and attached to the framework.

Benefits
The deliverables of this project serve as proof that the Business Intelligence concept created by the ATT members can be realized. Moreover, the Data Integration Framework enables them to start implementing functionalities that can support internal department processes. The calculation of the XtraVision reliability is an example that helps the testers to analyze the failure frequency of the system applications.