DEVELOPMENT OF AN OPEN SOURCE PROVIDER AND ORGANIZATION REGISTRY SERVICE FOR REGIONAL HEALTH NETWORKS

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Abstract: In the Rhine-Neckar Region a Healthcare Information Exchange Network (HIEN) should be implemented providing a personal electronic health record for patients and health professionals. Therefore a standards-based architecture following IHE profiles especially from the IT-Infrastructure domain was conceptualized. One of the central components will be a provider and organization registry service (PORS) in order to provide a unique identification and to resolve identifications to concrete information. Each network partner has to be registered via manual data entry or preferably by standards-based massage interaction (HL7 v2 MFN M02). The PORS will be implemented as open source project using current technologies in order to be a reference implementation to be available for other related projects. It consists of a multi-tier-layer architecture fitting into an over-all service oriented architecture. A PORS will be a central component of any HIEN to provide a unique identifier and to resolve information of providers and organization. The described open source project can be used by other related projects to avoid the reinvention of the wheel.

1 INTRODUCTION

The University Hospital Heidelberg is implementing a personal electronic health record (PEHR) to improve the information exchange between other hospitals, primary care givers and the patient itself (Heinze et. al., 2009). Based on the first experiences of a pilot of two hospitals and one medical practice a regional Healthcare Information Exchange Network (HIEN) should be implemented as part of a joined initiative led by the Metropolitan Region Rhine-Neckar in the mid-west region of Germany. The HIEN should provide a PEHR and other services for citizen, patients and health professionals. The sub-project "Health IT Platform" of this initiative led by the University Hospital Heidelberg has conceptualized a standards-based health IT architecture using IHE (Integrating the Healthcare Enterprise) profiles in a service oriented architecture. The following profiles are considered to be used: ATNA, BPPC, CT, PDQ, PIX, XDS.b, XDS-I, XPHR. The implementation itself and all of the applied software components have to be open source software. An important component of this architecture is a Provider and Organization Registry Service (PORS) whose principles and architecture will be described in this article.

2 OBJECTIVES

By now in Germany a unique identification for physicians, the so called "lifelong physician number" and for organizations, the so called "permanent establishment number" are available for billing purposes but there is no central electronically repository to use them in other systems. Hence, the Provider and Organization Registry Service (PORS) was determined to be one of the first essential components of the HIEN to be implemented. Every organization and its providers participating to the HIEN in the Rhine-Neckar Region have to be registered to PORS in order to enable their administration and unique identification.

On the one hand PORS will enable other services and components to resolve an ID to specific

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information about a provider or organization to e.g. enhance document meta-data located in the XDS Registry with the “confidentiality codes” to ensure legal data access to authorized providers. On the other hand it can be used as yellow pages providing unique and consistent information about all participating healthcare providers.

Providing, updating and querying information should be only possible for authorized users and systems via a graphical user interface as well as via a HL7 v2 message-based or file-based web service interfaces. The access will be secure, auditable and controlled. For that reason other components of the HIEN will be used following the IHE IT - Infrastructure whitepaper “Access control” (Caumanns et. al., 2009).

3 METHODS

The PORS will be developed as Open Source Software (OSS) hosted on the gforge platform[1] as a project of the Open eHealth Foundation under the Apache Software Licence 2. Until the first stable release it will be a closed project.

The technical implementation is based on Java and Groovy. In addition to the Open eHealth Integration Platform (IPF) the ICW eHealth Framework (eHF) is used. IPF is an enterprise service bus with a Groovy-based domain specific language (DSL) which enables easy HL7 message parsing pre-processing and routing. The eHF focuses on modularization and supports model driven software development. Because the framework provides modules for standard functionalities like security and authorization it is possible to spend most of the development time on the functional aspects. Supported standard-based messages are the functionalities add, update and disable of the master file notification HL7 v2 MFN M02. The graphical user interface (GUI) for manual administration is based on Java Server Faces (JSF). Data storage for testing is realized via HSQL data base.

4 RESULTS

The PORS is designed to fit into a service oriented IHE compliant HIEN architecture. As the PORS will be published as open source software the service can be used in any other HIEN.

The PORS can be linked to each health system uniquely identifying all providers (hospitals, physicians, nurses, pharmacists and dentists) allowing all the information related to a healthcare provider to be pulled from multiple sources into a single holistic view.

The PORS itself consists of a multiple-tier-layer architecture (see Fig.1). To add, update and disable data sets in PORS automatically, flat files (XML, CSV) as well as HL7 messages (HL7 v2 MFN M02) can be received via a web service interface provided by the IPF. IPF has two adapters, one for flat files and one for HL7 messages, to receive data sets and to route them to the application logic layer provided by eHF. On this layer data will be extracted, processed and converted into Java objects according to the specific domain model (see Fig. 2). These objects can be stored to the database. All changes will be stored in a history. Additionally PORS can be administrated through a web based GUI realized with JSF.

A web service interface is foreseen to query the PORS using the GUI or by HL7 query/response conformance statements interfaces.

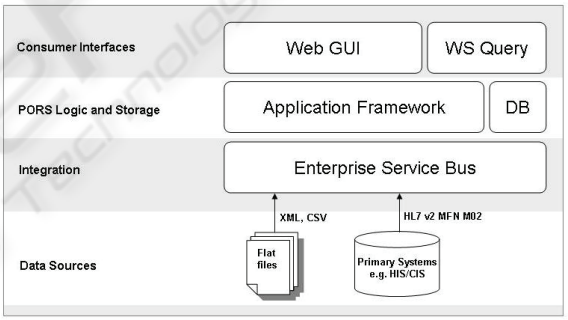

Figure 1: Architectural overview of PORS.

5 CONCLUSIONS

The PORS will assist healthcare providers in communicating with each other by acting as a type of electronic ‘yellow pages', making it easier for them to coordinate care for patients. Without a PORS a regional HIEN will not be realizable because it is a central component necessary for all other services to have a unique identifier. The fact that it will be open sourced will make it easer for other related projects to make a quick progress because it is not necessary to reinvent the wheel.

Another issue is to enforce security and authentication. Technically in this project it is not vital to cope with it due to the use of eHF which foresees to provide security to all eHF-based

[1] http://gforge.openehealth.org/gf/project/pors/

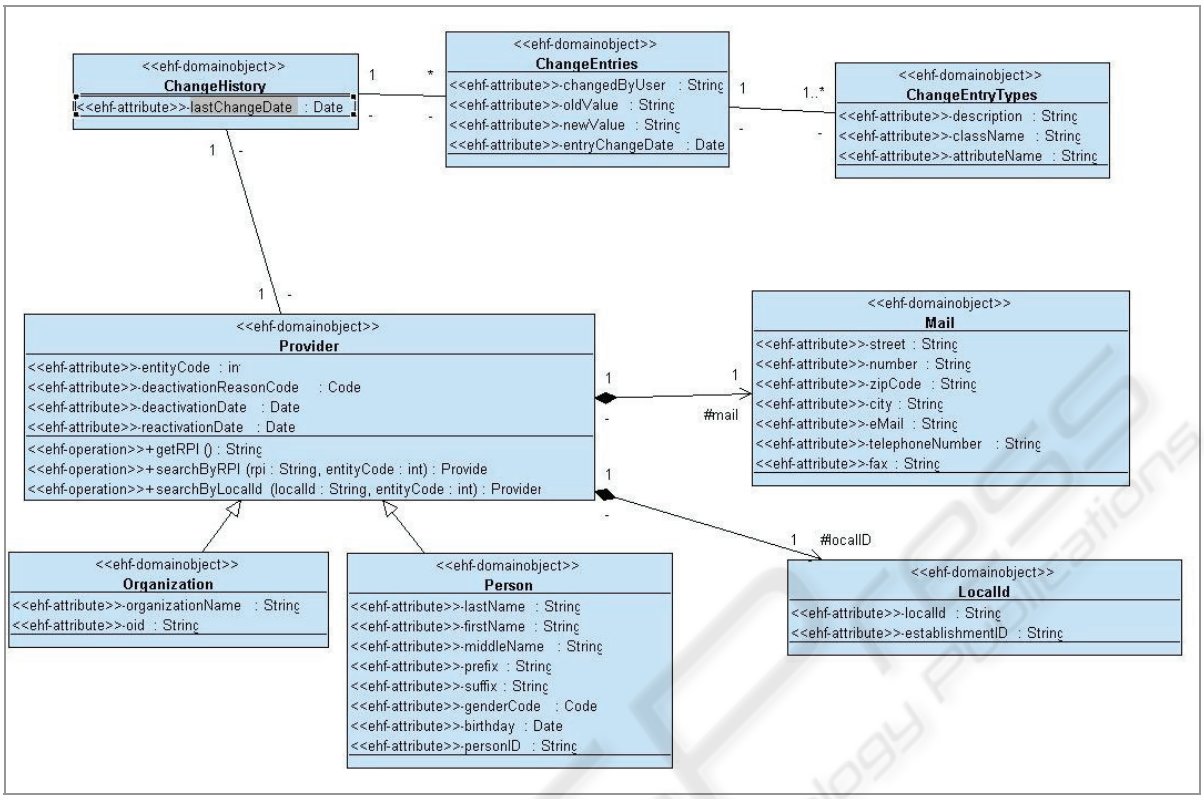

Figure 2: Specific domain model of PORS.

applications. If the implemented service will be plugged into the overall architecture these security mechanisms will be used. Authentication can be supported by client certificates. It is possible to run in problems due to the lack off certificate support of older applications like many primary systems are.

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