First Experiences Implementing an IHE-based Open Source Patient Portal

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Overview

• Background / Motivation
• The INFOPAT Project
• Personal Electronic Health Record
• Patient portal development
• Methods
• Results
• Discussion and conclusion
• Outlook
Background / Motivation
Metropolitan Region Rhine-Neckar (MRN)

- 3 states (Baden Wuerttemberg, Hesse, Rhineland-Palatinate)
- area of 5637 km² with 2.4 million inhabitants
- seventh largest economy in Germany

more information: www.m-r-n.com
The INFOPAT Project
Project overview

• 1 of 5 BMBF\(^1\) sponsored health regions of the future
• 27 project partners
• Project duration: 4 years by the end of 2016
• 12 sub-projects
• 4 clusters
  • Personal electronic health record and patient empowerment
  • Drug safety
  • Network-based case management
  • Data warehousing and Healthcare monitoring

\(^1\) Federal Ministry of Education and Research
Project partners

Department of General Practice and Health Services Research
Clinical Pharmacology and Pharmacepidemiology

Personalizing health. Together.
Personal Electronic Health Record
Classic Health Record Architecture

Personal Health Record (PHR) → Patient / Citizen →

Electronic Health Record (EHR)

Hospitals
GPs
Pharmacies
Homecare Devices
Personal Electronic Health Record (PEHR) in the Metropolitan Region Rhine-Neckar

1. Fully controlled by the patient
2. Based on IHE Profiles
3. Open Source for connectivity

Patient / Citizen

Hospitals
GPs
Pharmacies
Homecare Devices
Integrating the Healthcare Enterprise (IHE) Initiative

- Initiative to improve interoperability in health care using standards (e.g. HL7, DICOM, ..)

![Diagram showing an actor initiating a transaction with another actor, using HL7 Version 2.3.1 ADT A01.]
PEHR architecture overview

PEHR
Personal Electronic Health Record

Patienten Portal
Open Source
IPF
Open Source
Professional Portal
commercial

Primary Systems
IHE compliant software
IHE Adapter
non IHE compliant software

PEHR Core
Master Patient Index
Healthcare Provider Directory
Policy Enforcement Point
Policy Decision Point
Document Registry
Document Repository
Imaging Repository
Log Repository
Policy Repository

Commercial and Open Source

IHE based Interface

IHE

Commercial and Open Source

Personalizing health. Together.
Patient Portal Development
Methods

• First Step:
  • Development of a requirement catalogue
  • Definition of success factors (usability, expandability..)
  • Development of a consent management

• Second Step:
  • Market analysis
  • Technologies compared (LIFERAY vs. IndivoX)
  • IHE support

• Third Step:
  • Implementing patient portal with LIFERAY
  • Implementing IHE support with IPF
Results
## Requirements and Features

<table>
<thead>
<tr>
<th>Module</th>
<th>Patient Portal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>Control access privileges</td>
</tr>
<tr>
<td>Base</td>
<td>Control the contents</td>
</tr>
<tr>
<td>Base</td>
<td>Viewing of professional med. contents</td>
</tr>
<tr>
<td>Base</td>
<td>Input of own contents</td>
</tr>
<tr>
<td>Base</td>
<td>Viewing of access protocol</td>
</tr>
<tr>
<td>Extension medication</td>
<td>Medication plan</td>
</tr>
<tr>
<td>Extension medication</td>
<td>Drug interaction checks</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>Requirements from focus group for colorectal cancer patients</td>
</tr>
<tr>
<td>Base</td>
<td>Multilingual (German, English, Turkish)</td>
</tr>
</tbody>
</table>
## Requirements catalogue

<table>
<thead>
<tr>
<th>Main aspects</th>
<th>LIFERAY</th>
<th>IndivoX</th>
</tr>
</thead>
<tbody>
<tr>
<td>functional requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>user: account settings</td>
<td>✔️</td>
<td>x</td>
</tr>
<tr>
<td>patient administrated data</td>
<td>✔️</td>
<td>x</td>
</tr>
<tr>
<td>non functional requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>reliability</td>
<td>✔️</td>
<td>x</td>
</tr>
<tr>
<td>usability</td>
<td>✔️</td>
<td>x</td>
</tr>
<tr>
<td>programming language</td>
<td>Java</td>
<td>Python</td>
</tr>
</tbody>
</table>

## Success factors

<table>
<thead>
<tr>
<th>Main aspects</th>
<th>LIFERAY</th>
<th>IndivoX</th>
</tr>
</thead>
<tbody>
<tr>
<td>usability</td>
<td>✔️</td>
<td>x</td>
</tr>
<tr>
<td>license fee</td>
<td>x*</td>
<td>x</td>
</tr>
<tr>
<td>modularity</td>
<td>✔️</td>
<td>x</td>
</tr>
</tbody>
</table>

* Enterprise Edition
## Supported IHE Profiles

<table>
<thead>
<tr>
<th>Profiles</th>
<th>Transactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIX</td>
<td>Patient Identity Feed [ITI-44] / Record Revised</td>
</tr>
<tr>
<td></td>
<td>PIX Query [ITI-45]</td>
</tr>
<tr>
<td>PDQ</td>
<td>Patient Demographics Query [ITI-47]</td>
</tr>
<tr>
<td>XDS.b</td>
<td>Provide and Register Document Set-b [ITI-41]</td>
</tr>
<tr>
<td></td>
<td>Register Stored Query [ITI-18]</td>
</tr>
<tr>
<td></td>
<td>Retrieve Document Set [ITI-43]</td>
</tr>
<tr>
<td>XDS Metadata Update</td>
<td>Delete Document Set [ITI62]</td>
</tr>
<tr>
<td>HPD</td>
<td>Provider Information Query [ITI-58]</td>
</tr>
<tr>
<td>ATNA</td>
<td>Record Audit Event [ITI-20]</td>
</tr>
<tr>
<td>BPPC</td>
<td></td>
</tr>
<tr>
<td>XUA</td>
<td></td>
</tr>
</tbody>
</table>
Personalizing health. Together.

Patient Portal

visit Open Source Village for Live Demo!
View list of documents
Discussion and Conclusion
UNDER CONSTRUCTION
Conclusion

- Patient portal is realizable with LIFERAY
- IHE support is realizable with IPF
- Interaction between LIFERAY and IPF works well
- IPF community is very active

- Learning LIFERAY and IPF took a long time
- LIFERAY is not a pure open source software
  - Existing OS and commercial editions
  - Updates are not immediately available
Outlook
Outlook

- Further development focused on colorectal cancer
- Studies (application study) with real patients
- Usability evaluation
Thank you for your attention!

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Visit us on our website!
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References


