Establishing a Personal Electronic Health Record in the Rhine-Neckar Region

Sarajevo 31th of August 2009

Oliver HEINZE¹, Antje BRANDNER¹, Björn BERGH¹

¹Department of Information Technology and Medical Engineering
University Hospital Heidelberg, Germany
Overview

1. Objectives
2. Overall concept
3. Architecture of PEHR
4. Lessons learned
5. Outlook
Objectives - What shall be achieved?

- Support integrated care with strong focus on the patient
- Improve quality of diagnosis + treatment
- Avoiding multiple examinations
- Reduce costs / Optimize cost-benefit-ratio
- Infrastructure which enables a seamless communication
- Web-based integrated view
  \( \rightarrow \) PEHR!
Types of records
# EMR, EHR and PHR

<table>
<thead>
<tr>
<th>Record type</th>
<th>Characteristics</th>
<th>Main Advantages</th>
<th>Main Disadv.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMR</td>
<td>All clinical data of a patient to document, monitor and manage care delivery in one institution</td>
<td></td>
<td>Not accessible for other doctors or the patient</td>
</tr>
<tr>
<td></td>
<td>Case-based accessible within the care delivery organisation (CDO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EHR</td>
<td>Subsets of each CDO's EMR presently assumed to include summaries (CCR, etc.)</td>
<td>Viewing in other CDOs possible</td>
<td>No patient involvement for viewing and access management</td>
</tr>
<tr>
<td></td>
<td>Longitudinal access across multiple institutions</td>
<td>Easier data import from professional systems (high quality and completeness)</td>
<td></td>
</tr>
<tr>
<td>PHR</td>
<td>Contains patient input (home care devices, diet, sports). Access for multiple player is managed by the patient</td>
<td>Fully controlled by the empowered patient</td>
<td>No automated data import from other systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PEHR Vision

Patient

Personal Electronic Health Record (PEHR)

HIS CIS

GP Pharmacy

Home Care System
PEHR Scope

- Rhine-Neckar Region about 2,4 Mio. inhabitants

1 Phase: EHR

2 Phase: EHR more practices and hospitals

3 Phase: PEHR
Partner

- InterComponentWare AG Walldorf
  - Product: Professional Exchange Server (PXS)
  - MPI and Record Module (EHR)
  - Lifesensor (PHR)
- CHILI GmbH
  - WADO+ Gateway + DICOM Webserver
- Rhine-Neckar Health Centers (GRN gGmbH): 4 Hospitals (1000 beds)
- Specialist practices (2 oncology)
- University Hospital Heidelberg (2000 beds)
  - Maximum medical care
  - 60,000 inpatients/a
  - 250,000 outpatients/a
How? Technical concept
Network structure

- PEHR
- PXS
- Wado+ DB
- University Hospital HD
- HIS/CIS
- RIS/PACS
- DMZ
- Wado+ and Apache Webserver
- Other Hospitals
- SSL over VPN tunnel
- Medical Practices
- SSL + Client Certificates

**DMZ:** Demiliterized Zone
**WADO:** Web access to DICOM Objects
**SSL:** Secure Socket Layer
**VPN:** Virtual Private Network
**H(C)IS:** Hospital or Clinic Information System
Patient allocation and document sharing

MPI: Meier
HIS 1 = 1234
HIS 2 = 4711

EPR: Meier
OP-Report HIS 1
Discharge Letter HIS 2 ...

Hospital 1
HIS 1
Patient data
diagnoses, documents
viewing

(P)EHR
MPI
EPR
Web

Hospital 2
HIS 2
Patient data
diagnoses, document
viewing
Patient allocation, document sharing and integration of PACS

HIS 1

(P)EHR

MPI

EPR

Hospital 1

HIS 2

PACS 1

Web

Diagnoses, documents

Patient data

Diagnoses, document

Patient data

WADO

Image-ref.

Image-request

Images

Viewing

Viewing

Viewing

Viewing

Hospital 2
Privacy Consent
Decentralized Consent Management

- Consent is paper-based
- Each CDO has to implement their own storage solution
- Administrative stuff has to fill in the consent flag in the local HIS/CIS
Centralized Consent Management

referring to IHE BPPC

- **PEHR**
  - MPI
  - Authorization Manager
  - Record Module

- **Consent Creator**
  - Policy 1: ✓
  - Policy 2: ✓
  - Policy 3: ❌
  - …

- **HIS/CIS**
  - EMR
  - Digital Archive

- **XACML via HL7 MDM**

- **Print for Signature**

- **Scan**

---

IHE: Integrating the Healthcare Enterprise
BPPC: Basic Patient Privacy Consent
XACML: OASIS eXtensible Access Control Markup Language
Experiences
## Lessons learned

<table>
<thead>
<tr>
<th></th>
<th>Privacy consent</th>
<th>Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CIS</strong></td>
<td><strong>Decentralized:</strong> Development required to store and send consent flag; viewing and sending modules have to check this flag; <strong>Centralized:</strong> no development necessary; a consent creator has to be connected (→ Interface!)</td>
<td><strong>Document export:</strong> Development required due to lack of support of HL7 MDM interfaces; <strong>Viewing:</strong> Development for https-based context integration required; GUI for consent flag management</td>
</tr>
<tr>
<td><strong>PACS</strong></td>
<td><strong>Decentralized:</strong> Communication server has to filter HL7 Messages in order to check if forwarding to WADO component is allowed or not <strong>Centralized:</strong> WADO component has to ask the authorization manager if QR is allowed (→ Interface required)</td>
<td>Highly complex message interaction between several system modules; Much logic inside the WADO module required; solution is dependent on local conditions and not as generic as initially intended (IHE based) due to the proprietary interfaces of our vendor</td>
</tr>
<tr>
<td><strong>PEHR</strong></td>
<td><strong>Decentralized:</strong> No adaption to PEHR systems required <strong>Centralized:</strong> authorization manager and processing of XACML policies required</td>
<td>Only little adaption of pre-processing required at communication server (ESB)</td>
</tr>
</tbody>
</table>
Outlook

- And in future?
  - Usable cross-linkage to medical practices: Webinterface vs. direct primary system integration
  - How to deal with data from the „before consent“ period?
  - New services inside the PEHR e.g. drug safety
  - Keep focusing on IHE profile usage
Thank you!

University Hospital Heidelberg
Center of Information Technology and Medical Engineering (ZIM)

Tiergartenstr. 15 | 69121 Heidelberg | Germany

Oliver Heinze (M. Sc. in Medical Informatics)
Mail oliver.heinze@med.uni-heidelberg.de
Fon +49 6221 56 37571

Antje Brandner (M. Sc. in Medical Informatics)
Mail antje.brandner@med.uni-heidelberg.de
Fon +49 6221 56 37800

Prof. Dr. med. Björn Bergh (Director ZIM)
Mail bjoern.bergh@med.uni-heidelberg.de
Fon +49 6221 56 2000