Applying standards for EHR interoperability: a software vendor experience

Alain Maskens
HEALTH One Global Ltd
Health one Global is active in the healthcare information technology sector, where it offers solutions for the management of individual healthcare data based on its fully owned electronic health record (EHR) technology, HEALTHone™.
<table>
<thead>
<tr>
<th>Health One: family history</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HDMP</strong> (Brussels) 1986</td>
</tr>
<tr>
<td>Belgian GPs and Hospitals</td>
</tr>
<tr>
<td>Health Ireland Partners (Dublin) 1998</td>
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<tr>
<td>Irish GPs</td>
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<tr>
<td>Croix Rouge Française 1999</td>
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<tr>
<td>CRF hospitals</td>
</tr>
<tr>
<td>HEALTH One Global (London) 2005</td>
</tr>
<tr>
<td>All other markets</td>
</tr>
</tbody>
</table>
Data model?

An EHR server and system

- based on the GEHR architecture
- with progressive architecture enrichments towards
  CEN EN 13606 compatibility
  HL7 CDA rel. 2 compatibility
  openEHR archetypes compatibility
Terminology?

Terminology-independent data model

Own terminology for
  Observable entities
  Clinical findings and procedures

Adoption of external terminologies
  as required by customers and applications
Terminology?

Terminology-independent data model

Own terminology for
  Observable entities
  Clinical findings and procedures

Adoption of external terminologies/
coding systems as required by customers and applications:
  ICD10            Loinc
  ICPC             SNOMED
  ATC              ATC
  BNF              Swiss drug code
  Etc..
Data layer?

- Relational
- XML type (portable individual EHRs)
Data model and terminology: illustration
• Folders
• Compositions
• Sections
• Entries
• Elements
Station 5: Pure Tone Threshold Test
Screener’s name: Dr. Puretone
Threshold Testing Done: 

Test frequencies
<table>
<thead>
<tr>
<th></th>
<th>1000</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
<th>8000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Left</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Bone-Conduction

*without masking Key: D = Did Not Test C = Could Not Test

Type of hearing loss, and degree of loss using better ear:
- Bilateral Sensorineural Hearing Loss
- Unilateral Sensorineural Hearing Loss
- Left
- Right
- Mild
- Moderate
- Severe
- Bilateral Conductive Hearing Loss
- Unilateral Conductive Hearing Loss
- Mixed Bilateral Hearing Loss
- Mixed Unilateral Hearing Loss
- Normal Hearing
Mapped into the underlying data model and terminology

Pure Tone Threshold Test

- audiometry:
  - right ear:
    - 1000 Hz: 10
    - 2000 Hz: 10
    - 3000 Hz: 10
    - 4000 Hz: 10
    - 8000 Hz: 10
  - left ear:
    - 1000 Hz: 20
    - 2000 Hz: 20
    - 3000 Hz: 20
    - 4000 Hz: 20
    - 8000 Hz: 20
- bone conduction:
  - 1000 Hz:
  - 2000 Hz:
  - 3000 Hz:
  - 4000 Hz:
- audiometry conclusions: auditory loss unilateral sensorineural
- severity: moderate
available in several natural languages

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Left Ear</th>
<th>Right Ear</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 Hz</td>
<td>10</td>
<td>20</td>
</tr>
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<td>2000 Hz</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
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<td>10</td>
<td>20</td>
</tr>
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<td>20</td>
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Conduction osseuse:

<table>
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<td>1000 Hz</td>
<td>20</td>
<td>20</td>
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</table>

Audiométrie [conclusions]: perte d'audition unilatéral(e) neurosensoriel(le)

Sévérité: modéré(e)(s)
Use of external terminologies: « coded text » datatype
Example: cluster of elements for one « prescription entry »

Terminologies / coding schemes:
H1: element names
Code Vidal (France)
Code CIP (France)
ATC Code
CAS code
EHR Interoperability: can it work?

Communication capacity: very high (level 1 interoperability).

This is still the main requirement from users:

- Labs
- Radiology
- E-prescribing
- Hospitals / practices
- Central EHR repository

Exchange formats:
- HL7 V2, HL7 V3, many local formats
- Kmehr
EHR Interoperability: can it work?

Communication capacity: very high

Comprehensiveness and flexibility:
Adaptable to a variety of different medical specialities different healthcare organizations
South Africa

The AIDS team of the healthcare services of a mining company, South Africa
USA

An 80 physician healthcare center,
Washington State, USA
Europe

A 250-bed hospital in Brussels, Belgium
China

The EHR services for
The Special Olympics
World Summer Games,
Shanghai October 2007
EHR Interoperability: can it work?

Communication capacity

Comprehensiveness and flexibility

**Portability**: individual files are portable and can be shared between all users of our system

User requirement?
- Practice installation < > hospital installation
- Offline facilities
EHR Interoperability: can it work?

Communication capacity
Comprehensiveness and flexibility
Portability

**Interoperability:** partial only
EHR Interoperability: can it work?

Partly interoperable: why?

- Use of different terminologies
- Inconsistent use of common terminologies
- Divergent medical opinions and practices
- Flexibility and adaptability vs constraints
EHR Interoperability: next steps?

Investigate usability of « standard » archetypes

Specify/experiment detailed EHR exchange formats
EHR Interoperability: next steps?

Investigate usability of « standard » archetypes

Specify/experiment detailed EHR exchange formats

Concentrate on subareas both « easy » to standardize and with high benefit

Investigate ways to manage data diversity