Workshop on semantic interoperability

Thoughts from the HIS’ perspective

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Aims of IT in healthcare

- IT addresses various roles (medical, care, administration)
- Overall, IT has to decrease work load of the hospital staff
- Direct benefits for users, e.g.
  - Availability of reliable information
  - Unambiguously documented information
  - Reusability of (structured) information
- Indirect benefits for users, e.g.
  - Increase the quality of treatment
  - Cost reduction/transparency
- Optimal support of the users cannot be reached by unstructured documentation only
Acceptance of coded documentation

Acceptance by physicians varies

- Information systems per se are usually accepted as long as they support the clinical staff
- Additional documentation tasks are usually not well accepted (e.g. use of a separate coding system)

In Germany, parts of the documentation have to be formally documented

- DRG related information: Diagnoses, procedures
- Before DRG, quality of coded ICDs varied

Some information are coded “by nature”

- Lab, medication

Other information are usually not coded
User acceptance as first step for semantic interoperability

- As long as information is not entered in formalized way, architectures for semantic interoperability have no information to work on
- Formalized information required for automated support
  - Error prevention, computer assisted diagnoses, pathways, etc.
- Acceptance of information systems can be increased by
  - Help to reducing the amount of boring work (e.g. by automatically creating discharge letters from data stored in the EPR)
  - Save user’s time, optimize organizational structures (processes)
  - Increase quality of medical treatment
  - Let the user benefit from the data entered into the system
Semantic interoperability within HIS

- IS 1
- IS 2
- IS 3

External IS
HIS/EPR
knowledge bases (CDSS)
Semantic interoperability within HIS

- Exchange of information not limited to patient data
- Reusability & standardization of knowledge bases for CDSS
  - Interoperability of rules, process definitions, etc.
  - Interoperability of data models
  - Interoperability of terminologies
- Reusability of clinical documentation
  - Machine-processable for clinical decision support
  - **Clinical documentation is the starting point for semantic interoperability**
### Passive coding as part of documentation

#### Allgemeine Anamnese:

<table>
<thead>
<tr>
<th>Allergien:</th>
<th>ja</th>
<th>Penicillin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risikofaktoren:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alkohol:</td>
<td>ja</td>
<td></td>
</tr>
<tr>
<td>Nikotin:</td>
<td>ja</td>
<td>2 pk/day</td>
</tr>
<tr>
<td>Sonstiges:</td>
<td>ja</td>
<td></td>
</tr>
</tbody>
</table>

- **Kinderkrankheiten:**
  - ☐ Scharlach
  - ☐ Masern
  - ☐ Diphtherie
  - ☐ Röteln
  - ☐ Varizellen
  - ☐ Mumps
  - ☐ Pertussis
  - ☐ Sonstiges

- **Familienkrankheiten:**
  - Mutter:
  - Vater:
  - Sonstige:

- **Free text:** content has to be coded during runtime, type can be pre-classified.
- **Pre-structured:** content and type can be pre-classified during application development.
Influence of terminology

Once the data is entered and coded

- Is the selected terminology suitable for the given tasks?
- In routine, more than one terminology will be used
- If different terminologies are used within the same system, can concepts be mapped?

Coding will be imprecise, users may look up wrong codes

- What if coding was too precise? (e.g. user entered “heavy smoker, 2 pk/day” while rule author used “heavy smoker”)
- What precision is required?
- How to deal with concepts that are almost semantically equivalent

While knowledge and concepts are fuzzy in general, every explicit coding step leads to a crisp set of knowledge representation

- Two fuzzy minds could mean the same thing but model two different, crisp concepts
**Research opportunities**

1. Hide the coding from the user
   - Coding from free text or semi-structured documentation as external (free or commercial) service
   - Define API and message exchange format for coding request
   - Coding may be asynchronous

2. Deal with imprecise, over-precise, semantically equivalent coded concepts
   - Deal with terminology 2 terminology mappings
   - Deal with fuzziness of human thinking
Thank you