

## Requirements for Knowledge Mining of Consumer Health Information Systems

Goebel G, Masser J, Molterer C, Panosch B, Pfeiffer KP  
Department of Medical Statistics, Informatics and Health Economy  
Medical University of Innsbruck  
georg.goebel@i-med.ac.at

### Background

We present requirements and an outlook how Knowledge Mining within a future oriented Consumer Health Information System (CHIS) could meet the needs and expectations of healthy citizens and patients within a knowledge based society. We highlight issues containing both functional and technical requirements for Consumer Health Information Systems and also include an approach how to connect general quality assured medical knowledge with individual health information.

Consumer health information can influence the health status of millions of people [1]. The top motivation for most of the users of CHISs is the improved understanding of specific conditions for their own health status. Most users are using Web Search Engines to find medical information on the internet [2]. The challenge for health information providers comprises information quality issues, information and information process modeling, search functionalities and technical requirements.

This issue has been included in many national and international e-health strategies and action plans. The European Union stresses the importance of the access to electronic health services for all members of the European citizens very strongly in its "Action plan for Europe" [3]. This enforces the development of international, interregional CHISs based on national health strategies and action plans.

### Methods

Based on the definition of Consumer Health information provided by Patrick and Koss [4] we use the framework of the *ISO/IEC 9126* [5] to define requirements for CHISs which will face mainly two major challenges in the future:

- User support in building comprehensive medical queries
- At least presentation of reliable, quality assured medical information

The *ISO/IEC 9126* is a considerable norm for the evaluation of software products and was issued by the International Standardization Organisation in cooperation with the International Electrotechnical Commission in the year 2001. The norm is divided into 4 parts: Quality model, External metrics, Internal metrics, Quality in use metrics. Especially the first part offers a framework where both issues can be integrated to a general view of the system and can be used as a basis for further development. Key elements of the first part are functionality, reliability, usability, efficiency, maintainability and portability of software systems. All of these key elements contain several subcharacteristics which are helpful for a systematic requirement definition process.

### Results

We identified six fields of interest for Knowledge Mining within CHISs: users, query builder, available (medical) information objects, representation of (medical) information objects, medical knowledge base and search functionality modul. The application of the *ISO/IEC 9126* on each of these fields results in a detailed matrix of qualitative requirements. For example the requirements for query builder result in the following definition of tasks: The query builder transforms the question of one user into a formal query. Its main functional requirements are: query expansion/reformulation, use of medical knowledge, adaptive functionalities, access possibilities to personal health information, user interaction. Considering the subcharacteristics of the *ISO/IEC 9126* more specific issues for this field like user profiling, adaptive learning based on query sequences, residence time of user, user satisfaction evaluation etc. must be examined.

### Discussion

Our work is based on the international state of the art Consumer Health Information Systems, results of health search engine providers and integrates experiences of our Tyrolean Health Information System GIN, which was developed and run by us since 1995 [6]. Despite health issues are among the most popular queries worldwide, general search engines don't offer additional query support for users or any quality assurance for the information they provide. One of the most promising projects in this context seems to be WRAPIN [2], which represents an alternative to existing search engines combining "high quality" web pages with basic medical domain knowledge (MeSH). In this context it is realised that the provision of high quality medical information the internet will be separated from the provision of specific search functionalities. As the *ISO/IEC 9126* provides a very wide framework for the requirement process, our approach can be understand as more comprehensive generic cue for the further developments of CHISs.

### References

- [1] <http://www.nlm.nih.gov/medlineplus/survey2005/index.html> (access on 2 Apr 2006)
- [2] Gaudinat A. et al, Health search engine with e-document analysis for reliable search results. *Int J Med Inform.* 2006 Jan;75(1):73-85.
- [3] [http://europa.eu.int/information\\_society/europe/2005/all\\_about/action\\_plan/index\\_en.htm](http://europa.eu.int/information_society/europe/2005/all_about/action_plan/index_en.htm) (access on 2 Apr 2006)
- [4] Patrick K, Koss S. Consumer health information: white paper. <http://nii.nist.gov/pubs/chi.html>
- [5] *ISO/IEC 9126* <http://www.iso.org/>
- [6] Gobel G et al, A MeSH based intelligent search intermediary for Consumer Health Information Systems, *Int J Med Inform.* 2001 Dec;64(2-3):241-51