Development of Knowledge Profiles for International eHealth eLearning Courses

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Abstract. Professionals working in the multidisciplinary field of eHealth vary in their educational background. However, knowledge in the areas of medicine, engineering and management is required to fulfil the tasks associated with eHealth sufficiently. Based on the results of an analysis of national and international educational offers a survey gathering user requirements for the development of knowledge profiles in eHealth was conducted (n=75) by professionals and students. During a workshop the first results were presented and discussed together with the network partners and the attendees. The resulting knowledge profiles contain knowledge areas of all three thematic content categories including fundamentals of medical terminology, standards and interoperability and usability as well as basics of all three content categories. The knowledge profiles are currently applied in a master’s degree programme at the UAS Technikum Wien and will be developed further.

Keywords. Certification, Distance Education, eHealth, Standardization

Introduction

The use of ICT for health attracts high attention of industry and, consequently, education. The various backgrounds of different professions lead to a multidisciplinary area also resulting in different definitions of the term eHealth. For the purposes of this paper, the definition made by Eysenbach [1] was used. Harmonising the educational offers for the EU-US area and facilitating the effective use of eHealth/health IT by healthcare professionals the objectives of the EU-US Workforce Development Workgroup’s (EU-US-WDG) efforts contain the “definition and agreement of common eHealth standards for competence and professionalism” [2]. The workgroup is active within the EU-US eHealth cooperation initiative developing strategies to support the development of qualified eHealth workforces. The group identified health care settings and roles therein, classified these roles in domains, settings and skill levels and categorised the competencies collected. The skills defined were finally mapped to the professional roles building up a competency matrix [3].

The design of health IT needs the expertise from many fields like healthcare professionals and IT workforce. This aspect is taken into account by the “eHealth
The European Interoperability Framework” (EIF) [4] issued by the European Commission. The EIF reports four levels of interoperability: semantic, technical, legal, organisational. Out of these levels three main professions working together in eHealth can be identified: “Engineers”, “Medical Experts” and “Management/Legal Experts”.

The participation in this workgroup and a previously conducted study on the state of the art education in eHealth [5], [6] in the research project eLearning4eHealth Network (eHL) forms the basis of this paper. Therefore the objective of this paper is to define knowledge profiles based on the recent research results and a survey conducted for acquiring user requirements for eHealth education.

1. Methods

After having conducted two analysis studies [5], [6], the next step was the gathering of user requirements for the development of knowledge profiles in education at the UAS Technikum Wien (UASTW). This was done by the preparation of a survey answered by professionals in eHealth from healthcare, IT and management with industry and academic background, and students from medical informatics and biomedical engineering study programmes. The survey [7], [8] was conducted by the network partners and within the Austrian eHealth community by distributing it in their universities and related standards development organisations like HL7 (Health Level Seven) and IHE (Integrating the Healthcare Enterprise). The network partners from the eHL project [9] (from Germany, Canada, Portugal, Czech Republic and Switzerland) were interviewed regarding their experiences and opinion to necessary content for eHealth courses [10].

In a public workshop [11] the first results of the survey and drafts of knowledge profiles were presented. Another part of this workshop included the network partners’ presentations answering the questions about the:

- Target audience – Whom do we teach?
- Content – What they have to know?
- Materials and methods - How do we teach and assess?

Afterwards, the educational eHealth landscape and the draft knowledge profiles were discussed with the attendees. Based on the feedback from the workshop the knowledge profiles were refined.

2. Results

A total of 75 persons (21 students and 54 professionals) returned the questionnaire. The answers are classified as professionals and students and then further categorised regarding the profession, education, gender, work experience in general and in the field of eHealth. Figure 1 represents the knowledge areas most and least often used to work in eHealth. Half of all professionals use electronic data exchange in their daily work. The professionals also work in the areas of standards and interoperability, security, safety and privacy as well as project and quality management. However, the areas pHealth, economics, Ambient Assisted Living (AAL), Decision Support Systems (DSS) and medical physics are infrequently or never covered. The 5 most and 5 least
necessary knowledge areas to work in eHealth in the opinion of all professionals are represented in Figure 2. Almost all professionals think that security, safety and privacy, standards and interoperability, electronic data exchange, healthcare information systems as well as fundamentals of medical terminology should be part of education in eHealth. Knowledge of AAL, medical imaging, big data, economics and medical physics were not considered as highly important in eHealth education.

Figure 1. The 5 most and 5 least often knowledge areas applied in the daily routine of all professionals

Figure 2. The 5 most and 5 least required knowledge areas to work in eHealth in accordance to the opinion of all professionals

Figure 3. The 5 most and 5 least required knowledge areas to work in eHealth in accordance to the opinion of all students

From the students’ perspective eHealth education should contain aspects of security, safety and privacy, electronic data exchange, basics of databases, usability and standards and interoperability. Topics like AAL, big data, medical physics, DSS and economics are not yet the focus of the students.

The network partners work in tertiary education and are proficient specialists in the fields of medicine and engineering. In their impulse statements during the workshop, the network partners emphasised their experiences and expertise in eHealth and described how they implement educational offers in eHealth. They are teaching persons with an interest in health care and science in full- and half-time programmes and in continuing education. The programmes include knowledge about medicine/nursing (e.g. health system, terminologies, medical documentation, medicine and workflows), IT (e.g. standards, data exchange using IHE, EHRs, healthcare information systems, information processing, telemedicine, databases and network techniques as well as security and privacy), technology (e.g. medical technology, imaging systems and accessibility) and business administration (e.g. project management, process management, usability, controlling and legal and regulatory issues). The methods used are practical experiences, excursions, labs and blended learning combining eLearning sessions with seminars. The so called “Lego brick” method which emerged as appropriate is also applied due to self-contained topics using different delivery methods like videos, texts and quizzes.
Finally the workshop included the discussion with the attendees on the draft profiles. It resulted in specific skills necessary for professionals in eHealth: IT basics, security, interoperability, fundamentals of management and law, theory of medicine, usability and terminologies of all professions.

Based on these results the drafts of the knowledge profiles were further developed. These profiles are based on requirements necessary to be fulfilled in order to perform activities in eHealth. Derived from the previous work of the EU-US-WDWG, the profiles are represented in a matrix including examples of roles in the columns and selected thematic content categories in the rows, as shown in figure 4.

Figure 4. Final knowledge profiles derived from the survey results, the expertise of the network partners and considering the feedback from the workshop

Figure 4 represents a summary of knowledge profiles needed in basic education in eHealth. All roles (as examples for the professions) need fundamentals of IT and medicine to work in eHealth. In contrast, the knowledge area “Usability” is not needed by every profession at the same skill level.

The first knowledge profiles developed are partially applied in a course of the Master’s degree programme “Biomedical Engineering Sciences” at UASTW. The course is structured in five blocks including the modules: IHE Basics, IT Infrastructure, Security, Medical Device Connectivity and Clinical Document Architecture. The content is strongly related to standards in medical informatics.

3. Discussion

The survey results provide an overview of the different user requirements concerning the content of an internationally harmonized education in eHealth. For creating the survey, the conducted analysis [5] and the recommendations of different organisations (e.g. IMIA) considering the education in health IT, biomedical and health informatics have been used. The results of both user groups, professionals and students, are at least partially identical with regards to the five most and five least necessary knowledge areas to work in eHealth. Differences concern the question whether health information systems, fundamentals of medical terminologies, databases and usability are required in education or not which can be explained by the varying experience of both user groups. The opinions and experiences of all participants of the survey combined with the results of the network partners’ interviews and the outcome of the workshop influence the knowledge profiles developed in order to reach the largest possible audience. The
profiles are designed for persons who want to gain knowledge about eHealth at a foundation level and are still in development due to further modules for higher skill levels.

In contrast to the EU-US-WDWG this work provides knowledge profiles not only for the profession “Direct Patient Care” but also for the fields of Engineering and Management. The EU-US-WDWG will consider these domains at a later time. Additionally, the workgroup has defined two more domains than those set out by the eHL project team: Research and Health Informatics. However, the domain of Finance, Management, Law was suggested to the workgroup by the eHL project team due to the fact that health IT professionals should have knowledge of administrative, financial and legal issues. This suggestion was accepted by the EU-US-WDG.

The development of educational offers in eHealth is a currently important topic stressed by the formal foundation of a further workgroup belonging to the IHE [12]. The eHL project team is part of this education group which is developing a framework for certified professionals working in fields covered by IHE like IT-Infrastructure.

Further steps will include the definition of detailed competencies and their assignment to the different knowledge profiles and roles. Another objective is the establishment of a virtual lab to provide a practical simulation environment in the learning units. For this purpose, the survey results targeting relevant applications of eHealth for the respondents can be used as appropriate examples.

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References