Chapter 4.2
Care2x in Medical Informatics Education

Andreas Holzinger
Medical University Graz (MUG), Austria

Harald Burgsteiner
Graz University of Applied Sciences, Austria

Helfrid Maresch
Graz University of Applied Sciences, Austria

ABSTRACT

In this chapter the authors report about their experiences in education of both students of healthcare engineering at Graz University of Applied Sciences, and students of medicine at the Medical University Graz, gained during the winter term 2004. Care2x is an open source Web-based integrated healthcare environment (IHE). It allows the integration of data, information, functions, and workflows in one environment. The system is currently consisting of four major components, which can also function independently: hospital information system (HIS), practice management (PM), a central data server (CDS) and a health exchange protocol (HXP). Although the components are under heavy development, the HIS has reached a degree of stability, where one can use it at least for educational purposes. Various groups also report the usage of enhanced versions of Care2x in real life settings. Our experiences in both—very different—student groups have been very promising. In both groups the acceptance was high and Care2x provided good insights into the principles of a hospital information system. The medical students learned the principal handling of a HIS, whereas the engineering students had the possibility to go deeper into technical details.

INTRODUCTION

In this chapter, the authors report about their experiences in the education of students of healthcare engineering (HCE) at Graz University of Applied Sciences, and students of medicine at the Medical

University Graz, gained during the winter term of 2004. Care2x is an open-source Web-based integrated healthcare environment (IHE). It allows the integration of data, information, functions, and work flows in one environment. The system currently consists of four major components, which can also function independently: the hospital information system (HIS), practice management (PM), a central data server (CDS), and a health exchange protocol (HXP). Although the components are under heavy development, the HIS has reached a degree of stability so that one can use it at least for educational purposes. Various groups also report the usage of enhanced versions of Care2x in real-life settings. Our experiences with both—very different—student groups have been very promising. In both groups, the acceptance was high and Care2x provided good insights into the principles of a hospital information system. The medical students learned the principal handling of an HIS, whereas the engineering students had the possibility to go deeper into technical details.

How to prepare both medical and engineering students in the best possible way for their later work with modern HISs is a common question. Whereas students of engineering are rather enthusiastic about IT, students of medicine are skeptical in general about using it. However, HISs are not widely accepted by healthcare professionals; that is, barriers to the use of HIS are primarily sociological, cultural, and organizational rather than technological (Moore, 1996).

It seems plausible to not only give students theoretical background about the structure, functions, and common tasks of an HIS, but to also let them work with a fully functional HIS during lectures. This is essential, particularly if students are required to be able to work with possibly any HIS in practice after only a short period of vocational adjustment. However, it depends on many different factors regarding which HIS to choose. One of the most important is whether it is necessary to teach (with) a particular HIS of a certain

vendor, for example, if this system is deployed in a network of local hospitals. Another key factor, especially for noncommercial educational institutions, is the economic impact of the introduction of a commercial HIS at the university. Third, for the education of students of medical informatics, it might also be reasonable to teach the process of developing (parts of) a bigger software engineering project. Hence, the need for an open-source system arises if one does not want to start the development of his or her own HIS. Although there are many more factors to consider in general, we chose Care2x as our primary educational HIS for the following reasons.

Care2x

Care2x is a generic multilanguage, open-source project that implements a modern hospital information system (the Web page of Care2x is located at http://www.care2x.org/). The project was started in May 2002 with the release of the first beta version of Care2x by a nurse who was dissatisfied with the HIS in the hospital where he was working. As of today, the development team has grown to over 100 members from over 20 countries. Care2x is a Web-based HIS that is built upon other open-source projects: the Apache Web server from the Apache Foundation (http://www.apache.org/), the script language PHP (http://www.php.org/), and the relational database-management system (RDMS) mySQL (http://www.mysql.com/). There exist several source-code branches that try to integrate the option to choose from other RDBMSs like Oracle and postgreSQL. The latter one is already supported in the current version at the time of this writing (Deployment 2.1). For our investigations, we chose the most feature-rich version that was available from the Care2x Web page in early fall of 2004. This release had the version number 2.0.2. Some minor deficiencies that we report later may already be fixed in the current version, Deployment 2.1.

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