

# Chapter XXVIII

## Collaborative Virtual Environments and Multimedia Communication Technologies in Healthcare

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### **ABSTRACT**

*This chapter shows how recent computing technologies such as collaborative virtual environments, high speed networks and mobile devices can be used for training and learning in healthcare providing an environment with security and quality of service. A number of studies have been conducted so far in these research areas. However, the development of integrated care has proven to be a difficult task. Therefore, we aim also to discuss the promising directions of the current work and growing importance on these subjects. This includes comparative analysis of the most relevant computer systems and applications developed so far that integrate modern computing technologies and health care. We believe this work is considered to be primarily for the benefit of those who are working in the field of computer science and health care, as well academic community, practitioners, and those involved in the development, implementation and study of integrated care using new computing technologies.*

## INTRODUCTION

In this chapter, we investigate how recent computing technologies such as collaborative virtual environments (CVEs), high speed networks and mobile devices can be used for training and learning in healthcare providing an environment with security and quality of service (QoS).

In our view, there is a considerable gap between the promises that the new computing technologies hold, and the expectations that they cause in the medical area, particularly, in the simulation and training of surgical procedures. The evidences indicate that these expectations should be fulfilled in the next few years. This partnership will require the improvement of several computational technologies (storage devices, high-speed networks, distributed systems for mobile environments, etc), as well as changes in the background of health professionals before their routine adoption. New areas of interdisciplinary research can emerge, such as multimedia surgical support, interventional radiology, and even less invasive surgical procedures. The development of system architectures utilizing new computing technologies that support interactive computer graphics and CVEs is another growing necessity. Examples are computer systems developed to support virtual training and learning, which are becoming more and more realistic (Blezek et al., 2000; Hosseini & Geordanas, 2001; Dev et al., 2002; Gunn et al., 2005a; DiMaio & Salcudean, 2005; Lee et al., 2006; Rodrigues et al., 2007). Some of these systems are used to construct a virtual world where users (trainer and trainees) can interact with one another and the environment in which they preside when performing training exercises.

Nowadays, geographically distributed computing technologies can be interconnected to create an integrated computing environment. Healthcare professionals in different places can collaborate using this environment. Collaborative virtual environments involve several participants working in a network, using a shared virtual

environment to analyze the same object from different points of view, and in which the action of any participant is viewed by all others sharing the environment. In order to make communications more realistic the environment must supply voice, video and data multimedia applications. This will favor comprehension of the actual intent of each participant, thus improving the collaborative environment.

Networked computers and corresponding applications facilitate collaboration activities through a constellation of various tools (such as shared spaces, whiteboards, etc) having appropriate approaches to collaboration and social interactions. A World Wide Web tem proporcionado uma plataforma comum para que pessoas em qualquer parte do mundo possam interagir. Com o incremento do uso de dispositivos móveis, abre-se um vasto campo para novas pesquisas especialmente nas áreas de redes sem fio e colaboração distribuída. O aumento da disponibilidade de facilidades de comunicação tem provocado uma mudança no conceito de utilização de inúmeras aplicações, uma vez que dispositivos móveis possuem um comportamento diferente e oferecem possibilidades de interação diferentes, dependendo do contexto em que a aplicação está sendo usada. Para analisar estes diferentes cenários, muito esforço tem sido direcionado em pesquisas para mitigar possíveis ataques e para prover padrões mínimos de qualidade de serviço.

The World Wide Web has provided a collective platform where people in any part of the globe can interact. The increasing number of mobile devices in use has opened a vast field for new research, especially in the areas of wireless networks and distributed collaboration. The increase in availability of communications facilities has brought about changes in the concept of use of many applications, considering that mobile devices have a different behavior and offer different possibilities of interaction, depending on the context in which the application is being used. In order to analyze these different settings, a lot of effort has been di-

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