Chapter 1

The Application of Virtual Organization Technology for eHealth

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ABSTRACT

Several years ago any talk related to the Internet would have to be proceeded by an explanation of what it is and how it works. At present information and communication technologies became the essential part of our life and practical activity. eHealth can be designated as a special form of information and communication technologies. It is obvious that eHealth has a great potentiality; however today there are unfortunately only a few examples of its large services. Efficient, effective and reliable systems for remote consultations and distance education are the top requirements for eHealth. Grid technologies have emerged as an important new field, distinguished from conventional distributed computing by its focus on large-scale sharing, innovative applications, and, in some cases, high-performance orientation. “Grid technology” we are going to define as flexible, secure, coordinated resource sharing among dynamic collections of individuals, institutions, and resources—what can be described as “virtual organizations”. The present chapter will discuss the application of Virtual Organization technology for eHealth purposes. Over the past five years, research and development efforts within the mentioned technology have produced protocols, services, and tools. Virtual Organization technology will offer the opportunity for improving healthcare services and for making healthcare expertise available to underserved locations.

INTRODUCTION

The term globalization involves a complex series of economic, social, technological and political changes seen as increasing interdependence and interaction between people and companies in disparate locations. The phenomenon of globalization has already reached the medical field, most importantly in the areas of knowledge, diagnosis and therapy. The access of as many people as possible to these areas should be guaranteed by a technically efficient man-machine interacting

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system and by an effective organization of specialists around the world. An efficiently operational and organized exchange of medical information increases the quality of diagnosis and therapy, and assures the training and continuous education of the medical personnel. The main task of a medical informatics system is to enable medical non-experts to gather, exchange and discuss relevant data at any time with experts at any place of the world. A wise conception of such a structured dialogue for consultations and continuing medical education is based on a user-friendly, fast, simple, efficient and sustainable system for the exchange of medical information.

Several years ago any talk related to the Internet would have to be proceeded by an explanation of what it is and how it works, but at present information and communication technologies (ICT) became the essential part of our life and practical activity. eHealth can be designated as a special form of ICT; as a method of delivering medical services by electronic means of communication, with the provider and the recipient of these services being at different places.

The introduction of eHealth applications often result in substantial changes in healthcare practices. Investments in eHealth are usually accompanied by improvement in the quality of care and services, shorter turnaround times and more availability of information. As a consequence there are significant changes in health outcomes and patient satisfaction. A continuous assessment is required to appreciate and respond to changes after the introduction of eHealth in a healthcare system. A proper evaluation should include: assessment of advantages, disadvantages, costs (transaction and incremental costs), investment schedules, fluency and quality of communication, needs of access to different services, changes in work process, and the division of work evoked by the new “instrument”. Since telemedicine can also influence the conventional decision making of clinicians, the legal and ethical consequences of telemedicine and eHealth should also be assessed.

Efficient, effective and reliable systems for remote consultations and distance education are the top requirements for eHealth. However, solutions have so far proved elusive and the deployment of ICT in many health sectors has required major transformational changes. One of the major problems for a full potential delivery of telemedicine is to provide the tools for the world-wide access. Thus, it is necessary to make radical improvements in service productivity, access to medical services, and improved quality of diagnostic with acceptable levels of patient safety. A well developed ICT could serve to breakdown many of the existing barriers to the access of eHealth in the world.

The term “Grid” was coined in the middle 1990s to denote a proposed distributed computing infrastructure for advanced science and engineering. Considerable progress has since been made on the construction of such an infrastructure, but the term “Grid” has also been conflated, at least in popular perception, to embrace everything from advanced networking to artificial intelligence. One might wonder whether the term has any real substance and meaning. Is there really a distinct “Grid problem” and hence a need for new “Grid technologies”? If so, what is the nature of these technologies, and what is their domain of applicability? While numerous groups have interest in Grid concepts and share, to a significant extent, a common vision of Grid architecture, there is no consensus on the answers to these questions. One of the main strategies of grid computing is using software to divide and apportion pieces of a program among several computers, sometimes up to many thousands.

The purpose of the present chapter is to argue that the Grid concept is indeed motivated by a real and specific problem and that there is an emerging, well-defined Grid technology base that addresses significant aspects of this problem. In the process, it develops a detailed architecture and roadmap for current and future Grid technologies. Furthermore, the chapter asserts that while Grid technologies