Chapter 5.10

Information Management in a Grid-Based E-Health Business Environment:
A Technical-Business Analysis

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ABSTRACT

E-business today has moved focus to information sharing and integration across organisational boundaries in an effort to transform business processes throughout the value chain and standardize collaboration among communicating entities. Healthcare comprises a strongly collaborative distributed business environment in which information value plays a strategic role and informational privacy comprises a great concern. This new era in e-business, however, is followed by a series of issues that need to be addressed both at application and infrastructural level, such as information heterogeneity, system interoperability, security and privacy. The Grid as a technology enables sharing, selection, and aggregation of a wide variety of distributed resources comes to fill these gaps. In this chapter, the communication of information among healthcare organisations operating over a Grid infrastructure will be presented and analysed both from a technical and a business perspective.

INTRODUCTION

Healthcare provision organisations (hospitals, clinics, etc), pharmacies as well as insurance organisations typically perform their operations from keeping and tracking patients' records and billing records to exchanging and retrieving e-health information through various computer systems. The efficient, reliable and effective operation of these intra- and inter-organisational collaborations requires the communication of these trusted systems. In fact, in such a strongly collaborative distributed business environment information comprises a valuable resource that requires cost-effective and efficient management. Yet, the variety of the systems and the data and message formats involved in such collaborations lead to serious interoperability and standardisation problems concerning the exchange, integration, sharing and retrieval of e-health information. Moreover, great differences are met across these entities in terms of data collected, database and file structures, software systems, politics, payment structures, business models; in other words each entity and even each department of theirs (such as doctor's office, out-patient clinics, imaging center, microbiological laboratories and so on) has specific requirements related to data queried and collected and interaction with patients. These issues combined with the reluctance of organisations to share their data due to lack of trust and/or security concerns lead to limitations to the successful operation of the collaborations. Moreover, given the nature of the data exchanged crucial privacy issues rise that pose even stricter requirements for prudent management of information flows, access and storage within the collaborations.

From a technical point of view these interoperability and performance issues in the healthcare environment can be distinguished into infrastructure-related and application-related. In the infrastructural level, organisations in the extended healthcare environment, including not only hospitals, clinics and doctors but also insur-ance organisations and pharmacies among others, use a variety of computers, networks, topologies, operating systems, configurations and data management systems offering and supporting various levels of reliability, performance, availability and security depending on their needs, budget and management policies. The existing systems improve internal processes of organisations but are not robust and secure enough to efficiently support the load of information and transactions and enable the efficient and effective cooperation, communication and sharing of information across organisational borders among the participating entities in the collaborative healthcare environment from start to finish.

At the application level, current limitations of health information systems to a specific department or healthcare organisation in the environment comprise an important obstacle to the interoperability of these systems beyond organisational boundaries. The lack of a universally accepted encoding for representing information about drugs, diseases and Electronic Health Records (EHRs) and a globally adopted message protocol for the exchange and sharing of information among the different entities in the collaborative healthcare environment pose serious restrictions to the interoperability of their systems and the efficient communication of information among them. Significant delays of information communication, when the latter is required, are posed and more importantly great inconsistencies in the EHR of the patient across healthcare providers are met leading to significant implications in care provisioning, quality of treatment and related costs.

BACKGROUND

There are several ongoing development efforts on health care standards globally aiming at information sharing and processing among healthcare stakeholders in a uniform and consistent manner. An important effort towards the treatment of the

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