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## **Chapter II**

# **It's High Time for Application Frameworks for Healthcare**

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## **Abstract**

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*This chapter discusses the impact of adopting application frameworks in the healthcare (HC) domain. It argues the shortcomings of existing HC applications and systems, examines the benefits of application frameworks use during and after the software development, and presents such an application framework. The authors hope that this chapter will put on the table the discussion about the necessity of application frameworks in HC because they strongly believe that the software industry can tremendously benefit from the work done so far in the area of the HC standardization, in order to provide HC-specific application frameworks that will make software development easier and more efficient.*

## Introduction

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Healthcare Information Systems (HIS) development is by definition very challenging since it involves many domains apart from the health domain (e.g., Enterprise Resource Planning, Financial and Billing Services, etc.). The usual scenario for a healthcare (HC) organization is to have a lot of different applications/systems in order to cover all required functionality. As a result, heterogeneity has been a key problem for HIS as Kuhn and Giuse report (2002, p. 66). Understanding the needs of HC in the HIS area, CEN-TC 251 introduced the Healthcare Information Systems Architecture (HISA). HISA describes a “middleware of common services” that should exist within every HIS. In the HISA scenario, applications “acting” within the HIS are using these common services. CEN and other standardization organizations such as the International Organization for Standardization (ISO), Health Level Seven (HL7) and Object Management Group (OMG) have put a lot of effort towards the direction of providing standards, mainly not in contradiction to each other (even if they are not always perfectly aligned) as Jagannathan et al. report (Jagannathan, Wreder, Glicksman & alSafadi, 1998, p. 24), covering other issues of the HC domain as well as implementations of the middleware of common services.

Although today, a set of standards to use in various circumstances exist, the lack of HC standards use is a reality. That is not the only reason for the weaknesses of current HIS. As Beale underlines (2002, p. 1), another important reason is the usual practice of having the domain concepts hard-coded into the software and database models. The shortcomings of such practices are especially evident in the HC sector, where the total number of concepts and the observed rate of change are very high. Limited interoperability and application lifespan result in overwhelming costs for the maintenance and extension of healthcare information systems, minimizing the benefits of IT infrastructure for the healthcare providers.

Our intent is to “put on the table” the discussion about the necessity for Application Frameworks for HIS. The term Application Framework uses for the purpose of this chapter, Johnson and Foote’s (1988) definition for object-oriented frameworks: It is a set of classes that embodies an abstract design for solutions to a family of related problems. We are especially concerned about the applications layer of the HISA approach, because there are already implementations and approaches concerning the middleware of common services such as the Distributed Healthcare Environment (DHE) and OpenEMed. The adoption of an Application Framework allows the rapid designing and development of robust, portable and secure HC applications, tailored to the needs of each specific HC provider. The main features of an application framework for HIS should be inherent support of global HC standards, such as HL7 and DICOM, inherent support of open standards and interoperable protocols, such as XML and SOAP and the ability to design and build highly customizable and adaptive applications and user interfaces. In order to provide future-proof applications, domain concepts, business rules, and workflow, as well as user interface design should not be hard-coded, but maintained externally to the applications.

In the following pages one will find reference to HC related standards and outstanding work, concise reference to IT related standards and architectures but no reference to the significant work done in the field of security and trust due to space limitation except for

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