Software Services Delivered from the Cloud: 
A Rising Revolution for the Implementation of Healthcare Workflows

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ABSTRACT

Picture Archiving and Communication Systems (PACS), alongside Radiological Information Systems (RIS) are nowadays widely disseminated, proven useful, hospital information systems components. The “Région Sans Film” (“Filmless Region”) program was launched in 2009 by the French ministry of health in order to help the generalization to all healthcare structures such as hospitals or general physician practices, of PACS, RIS, and archiving of medical images. It is done by means of a mutualized service platform whom building and running has been entrusted to an industrial consortium. This platform implements the latest technologies of medical image processing and of cloud computing. It is built in order to support service-oriented enterprise architecture composed of one main layer of software services. This natively scalable platform is innovative because it is the first one which contains all the materials for the implementation of all services in the cloud. The corresponding SLA are defined in order to be adaptable to the needs of further health structures which could later join the platform by participating in its mutualized purchasing. The goal is not only to share the costs but also to deliver new images sharing services. New business processes/services around sharing of images such as teleradiology or access to the images produced in hospitals to the general practitioners are defined towards the exercise of real filmless radiology.

Keywords: Cloud Computing, Healthcare, Information Systems, Mutualized Purchasing, PACS, SLA, Software Services

1. INTRODUCTION

1.1. PACS and RIS Definitions

Picture Archiving and Communications Systems, more commonly known as PACS, enable images such as x-rays and scans to be stored electronically and viewed on screens, in such a way that doctors and other health professionals can access them, treat them and compare them with previous images at the touch of a button. The first implementation of such systems appeared in the 1990’s (Harno et al., 2002; Lebozec et al., 2000).

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PACS deal with large amounts of data. This implies that they must be scalable. For most critical applications of PACS, the physician user needs to compare all the images of the patient history. Depending on the underlying technical architecture of the systems, this need can eventually lead to the necessity of prefetching of images.

PACS are usually run alongside with Radiological Information Systems, more commonly known as RIS. Such systems implement the workflow management of radiology centers including e.g. the management of patient identities, appointments, admission forms, and medical reports. This is illustrated on Figure 1.

As the tasks that they process are critical, PACS and RIS users ask for high service levels: no interruption, fast service and no data failure. Laws in most countries state that health structures must remain able to demonstrate a capacity to restore any medical image data until 20 years have passed since these image data were seen for the last time.

All this leads to high costs for the health structures for acquiring and maintaining PACS. Traditionally, health structures which were already running their own PACS were facing huge troubles with the complexity of the problem of archiving of images after several years of use because the cost of the necessary infrastructure to maintain was increasing exponentially.

1.2. Cooperative Procurement Definition

The primary role of procurement is to obtain quality materials, supplies and services to support effective and efficient business. The expected added value listed in National Association of State Procurement Officials, 2006, includes:

- Lowering the costs;
- Providing efficient delivery of products and services;
- Obtaining best value through the competition;
- Offering fair and equitable competitive contracting opportunities for suppliers;
- Maintaining public confidence through ethical and transparent procurement practices.

An applicant structure joining a cooperative procurement becomes one of its members. As contracting workloads increase, purchase requirements become more complex and cuts on expenses are generalized, procurement professionals are turning to various forms of cooperative contracts. More generally, cooperative purchasing are becoming increasingly popular because it can indeed save significant time and money in contract production as well as lower prices through the power of aggregation (GSA Federal Supply Service, 2003).

Figure 1. Classical workflows of radiology data in health structures
Cloud Computing: Locally Sub-Clouds instead of Globally One Cloud
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