Chapter 4.9
RFID in Healthcare:
A Framework of Uses and Opportunities

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ABSTRACT

With its potential and unique uses, healthcare is one of the major sectors where radio frequency identification (RFID) is being considered and adopted. Improving the healthcare supply chain, patient safety, and monitoring of critical processes are some of the key drivers that motivate healthcare industry participants to invest in this technology. Many forward-looking healthcare organizations have put the potential of RFID into practice and are realizing the benefits of it. This study examines these empirical applications and provides a framework of current RFID deployment in the healthcare industry and opportunities for continued deployment. This framework also presents a categorical analysis of the benefits that have been observed by the healthcare industry. In addition, major implementation challenges are discussed. The framework suggests asset management, inventory management, authenticity management, identity management, and process management are the broad areas in which RFID adoptions can be categorized.

INTRODUCTION

Although RFID has been around for more than 50 years, it has only recently received much atten-

tion due to the very well publicized and promoted mandates by Wal-Mart and the United States Department of Defense for its use in their supply chains (Jervis, 2005). This increased awareness of the technology has resulted in various uses in a variety of industries, well beyond the niche applications it has enjoyed for the past 50 years. As one extension of its use, RFID has started to emerge as a major technology in the healthcare industry. RFID has some compelling advantages that make it particularly attractive for healthcare including robustness, unobtrusiveness, ease of use, and value proposition (Garfinkel and Rosenberg, 2006). The Food and Drug Administration (FDA) of the Department of Health and Human Services (HHS) recommended using RFID on all drugs at the unit level by 2007 to prevent drug counterfeiting (Wicks *et al.,* 2007). In addition, a number of pilot projects have proven to improve the quality of care and reduce costs. Furthermore, these pilot programs have shown that RFID applications have unquantifiable benefits that include saving lives, preventing injuries, and reducing medical errors. Since the healthcare market's consumption of RFID services is expected to increase more than 23 times, from $90 million in 2006 to $2.1 billion in 2016, it makes sense to take a closer look at the current status to see how RFID is being used in the industry (Harrop, 2006). As RFID technology becomes cheaper and more reliable, the next topic that needs to be discussed is how to strategically implement RFID into healthcare operations.

This study provides an overview of current RFID technology deployments in the healthcare industry and the potential opportunities for expanding them. In addition to its short-term benefits and long-term payoffs, this study also discusses main implementation challenges faced. A categorization framework of RFID uses and opportunities are introduced that suggest five empirical application areas: asset management, inventory management, authenticity management, identity management, and process management. Representative applications in these areas are given to provide good insight into the uses and potential uses of RFID in healthcare.

The paper is structured as follows. First, a brief background on the technology and an overview of the healthcare participants are provided, followed by an analysis of the current uses of RFID in healthcare. Then, the opportunities for RFID in healthcare are discussed, followed by the major challenges RFID currently faces in the healthcare industry.

RFID TECHNOLOGY BACKGROUND

RFID is a data collection, acquisition, and storage technology, which uses radio waves to automatically identify individual items and provide real-time information. The goal of any RFID system is to carry data in suitable transponders, generally known as tags, and to retrieve data at a suitable time and place to satisfy particular application needs (Finkenzeller, 2003). RFID was originally developed for and used in military applications, such as in World War II where it was used to identify friendly aircraft (Jervis, 2006). In the late 1960s, it found its way into the retail industry with the intent of creating electronic article surveillance products to fight shoplifters. It was in the 1970s that the first commercial application of the technology was introduced in vehicle tracking (Shepard, 2005).

Typically, RFID systems consist of three components (Keskilammi *et al.*, 2003): (1) a small electronic data-carrying device called a transponder (also called a tag); (2) a reader that communicates with the transponder; and (3) a data processing system that contains information about the tag-carrying item. There are two types of RFID systems: active systems and passive systems. The tags in active systems are powered by an internal battery while the ones in passive systems derive the power to operate exclusively from the field generated by the radiation emitted