Chapter 73
Internet of Things in Asset Management:
Insights From Industrial Professionals and Academia

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ABSTRACT

The emerging Internet of Things (IoT) technologies could rationalize data processes from acquisition to decision making if future research is focused on the exact needs of industry. This article contributes to this field by examining and categorizing the applications available through IoT technologies in the management of industrial asset groups. Previous literature and a number of industrial professionals and academic experts are used to identify the feasibility of IoT technologies in asset management. This article describes a preliminary study, which highlights the research potential of specific IoT technologies, for further research related to smart factories of the future. Based on the results of literature review and empirical panels IoT technologies have significant potential to be applied widely in the management of different asset groups. For example, RFID (Radio Frequency Identification) technologies are recognized to be potential in the management of inventories, sensor technologies in the management of machinery, equipment and buildings, and the naming technologies are potential in the management of spare parts.

1. INTRODUCTION

As a result of the rapid and world-wide globalization in the industry today, companies and other organizations are networking, whether intentionally or unintentionally, at an increasing pace. Complex interdependencies in the organizational interface set entirely new requirements for data acquisition and data transmission as well as for generating usable decision-making information from the data. Based upon the above-mentioned need to manage and control inter-organizational environments, academia is producing a growing number of decision-making models and tools designed for industrial asset management. The authors of this paper have previously developed a number of models to support asset management decision making, including "Life-Cycle Model for Maintenance Service Management", created for inter-organizational operation and maintenance planning and decision making of a production asset (Kivimäki et al., 2013; Sinkkonen et al., 2014), and the "Flexible Asset Management Model" or "FAM-model", targeted for optimizing a network's asset quantities and balance sheet -positioning in a strategic level (Marttonen et al., 2013).

The amount of data in companies and the numerous information systems are constantly growing, which has created a number of problems in separating relevant data from irrelevant data. Therefore, it has proven very difficult to generate accurate, adequate and timely data for industrial asset management models and tools, such as the "Life-Cycle Model" or the "FAM-model". One viable solution to improved data acquisition and transmission are the Internet of Things (IoT) technologies that will automate asset-related data processes in smart factories of the future through embedded communication within the existing internet infrastructure (Vermesan & Friess, 2013). IoT does not however intrinsically solve any difficulties in data utilization, i.e. turning data to business information, where suitable data penetration and analytics software or techniques, so-called middleware is highlighted instead (Wang et al., 2008). There is a trend to generate more value from an array of ubiquitous sensors utilizing the IoT which will have the ability to monitor and measure the assets, the operators, the business and the environment in which they work (Baglee and Knowles, 2010). As IoT technologies are altogether a novel approach, the field remains somewhat unclear, which creates a need to carry out research especially from an industrial asset management perspective. Therefore, research is needed to clarify industrial applications in order to improve data exploitation and data-based decision making in an industrial environment. The objective of this paper is to collect, correlate and study the Internet of Things technologies which are relevant for asset management systems by connecting an industrial asset group to an IoT technology both in theoretical and at a practical level. The remaining sections of this paper are structured to support the following research questions:

1. What are the essential IoT technologies to be employed in the data acquisition and data transmission of various physical industrial assets in smart factories of the future?
2. How do the industrial professionals and industrial engineering and management academic experts foresee the industrial asset management potential of IoT technologies?

2. METHODOLOGY

This research is qualitative research by nature. Qualitative research aims to understand and interpret the phenomena and highlight the viewpoints of research participants (Bryman & Bell, 2011). Our research

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