



Predictive maintenance as an internet of things enabled business model: A taxonomy

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Abstract

Predictive maintenance (PdM) is an important application of the Internet of Things (IoT) discussed in many companies, especially in the manufacturing industry. PdM uses data, usually sensor data, to optimize maintenance activities. We develop a taxonomy to classify PdM business models that enables a comparison and analysis of such models. We use our taxonomy to classify the business models of 113 companies. Based on this classification, we identify six archetypes using cluster analysis and discuss the results. The “hardware development”, “analytics provider”, and “all-in-one” archetypes are the most frequently represented in the study sample. For cluster analysis, we use a visualization technique that involves an autoencoder. The results of our analysis will help practitioners assess their own business models and those of other companies. Business models can be better differentiated by considering the different levels of IoT architecture, which is also an important implication for further research.

Keywords Taxonomy · Predictive maintenance · Business models · IoT · Cluster analysis

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Introduction

The introduction of the Internet of Things (IoT), in terms of both theory and practice, is currently the subject of intense discussions (Whitmore et al. 2015). The IoT has enormous potential in both the private and industrial environments (Manyika et al. 2015). The term Industrial Internet of Things (IIoT) is used for such applications. Prior research discusses the characteristics of business models that successfully use the

possibilities offered by IIoT (Herterich et al. 2016). Previous research on the IoT environment shows that understanding the business models of company partners is important for long-term success (Dijkman et al. 2015). Digital business models in general are analyzed in prior research (e.g., Hartmann et al. 2016; Bock and Wiener 2017; Rizk et al. 2018). However, the more general taxonomies used for digital business models include aspects that are not relevant for every company with an IoT or IIoT business model (Bock and Wiener 2017). Particularly in the context of Industry 4.0, in which IIoT is a major component, a more concrete consideration of the changes that have been made to business models is important. In the area of value creation, value offer, and value capture, specific aspects must be considered in Industry 4.0 (Müller and Buliga 2019). Initial research has been conducted on business model archetypes involving Industry 4.0, but current knowledge needs to be deepened to understand the interactions among the different actors involved in value creation networks. Previous research focuses on service-driven business models, but business models in the manufacturing industry are rarely addressed (Müller and Buliga 2019).

In many industrial applications, maintenance is an important factor that is often discussed in terms of cost savings (Khazraei and Deuse 2011). Considering maintenance

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