Chapter 11
Desituating Context in Ubiquitous Computing:
Exploring Strategies for the Use of Remote Diagnostic Systems for Maintenance Work

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ABSTRACT

Context awareness forms a core concern in ubiquitous computing and goes hand in hand with today's extensive use of sensor technologies. This paper focuses on the use of sensors as part of remote diagnostic systems (RDS) in industrial organizations. The study shows that the process of desituating context, that is, capturing context and transferring it to another context, is critical for the successful use of the technology. The processes of capturing and transferring context are explored in industrial maintenance work through interviews with suppliers and users of RDS. To successfully manage the desituation of context, industrial organizations must find strategies of creating and managing a center of calculation, a center where the captured contexts meet and merge. To enable the long-distance control of the equipment, all data must be compiled into one manageable view without losing the specifics of the local contexts. The data collection must be designed with this in mind. Moreover, to bridge the gap between the digital and the physical world created by the new way of organizing the maintenance work, a new kind of maintenance network must be formed, one in which local technicians' practices are reconfigured and instituted.

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INTRODUCTION

Context awareness forms a core concern in ubiquitous computing and goes hand in hand with today's extensive use of sensor technologies in industrial organizations. As noted by Dey et al. (2001), sensors enable close attention to detail in their context and allow for automatic data collection. However, capturing context is not enough in ubiquitous computing environments. In this paper, we will see that desituating context – capturing context and transferring it to another context – is essential for ubiquitous computing use. This paper focuses on remote diagnostics systems, an application family within ubiquitous computing (Lyytinen & Yoo, 2002b). To date, the use of RDS has primarily focused on enabling effective and timely equipment maintenance (e.g., Jonsson et al., 2008). Sensors and network access are installed into equipments – mostly equipments and engines in industrial settings – to collect and access data remotely related to their performance. Critical performance indicators of industrial equipment can be monitored to ensure continuous and satisfactory performance and to guarantee timely and cost-effective maintenance. With RDS, centralized service centers can monitor and diagnose a large number of equipments remotely. Maintenance groups at these service centers engage in problem diagnostics and solving as well as value-adding services such as learning from failures and formulating forecasting models for equipment performance (Kuschel & Ljungberg, 2004; Tolmie et al., 2004).

RDS is often viewed as a harbinger of a new kind of practice that offers new possibilities for organizing maintenance. Improved uptime and lowered cost motivate the organizational use of RDS immersed in new settings and equipments. The impact of this technology may be observed in new work routines that separate technicians and the monitored equipment over time and space. In contrast to traditional maintenance, where local skilled workers use their senses and local data as the main source of information during maintenance, remote diagnostics depend on the content and quality of data plus the process of collecting and transferring it to the remote service centers. Local maintenance work has also been shown to be organized around communities characterized by collaboration and information sharing (Brown & Duguid, 1991). RDS reach beyond these local practices by transforming equipment's physical condition into a digital representation, which is then transferred from the local setting to a remote site for analysis. To this end, context is desituated: captured and transferred to another context.

The term "context" can seem obvious but at the same time obscure. Commonly, people find it hard to elucidate what it is, and in attempts to explain its meaning, synonyms as background, situation, milieu, and environment are often used. Dahlbom and Mathiassen (1993) argue that our understanding of context varies between individuals' own choice of underlying thinking and perspectives. Hence, context could be understood as a perceptual condition that to some extent is flexible and negotiable rather than a factual environment.

In context-aware computing, typical context information is: location, identities of nearby people and objects, and changes to all these things over time (Dey, 2001; Schilit, 1995). Dey (2001, p. 5) elaborates the definition of context as "any information that can be used to characterize the situation of an entity. An entity in such a view is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves."

Contextualism in organizational change means that events should be explained within the context of their occurrence (Pepper, 1948). It views organizational life as complex with interconnected events and continuously changing patterns. In this tradition, context is dichotomized into the outer and inner contexts of organizations (Pettigrew et al., 2001). The outer context includes the economic, social, political, and sector environment.