Chapter 1.7
Context-Awareness in Mobile Commerce

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INTRODUCTION

Advances in wireless network and multimedia technologies enable mobile commerce (m-commerce) information service providers to know the location and surroundings of mobile consumers through GPS-enabled and camera-embedded cell phones. Context awareness has great potential for creating new service modes and improving service quality in m-commerce. To develop and implement successful context-aware applications in m-commerce, it is critical to understand the concept of the "context" of mobile consumers and how to access and utilize contextual information in an appropriate way. This article dissects the context construct along both the behavioral and physical dimensions from the perspective of mobile consumers, developing a classification scheme for various types of consumer contexts. Based on this classification scheme, it discusses three types of context-aware applications—non-interactive mode, interactive mode and community mode—and describes newly proposed applications as examples of each.

UTILIZING CONSUMER CONTEXT: OPPORTUNITY AND CHALLENGE

M-commerce gets its name from consumers' usage of wireless handheld devices, such as cell phones or PDAs, rather than PCs as in traditional e-commerce (Mennecke & Strader, 2003). Unlike e-commerce users, m-commerce users enjoy a pervasive and ubiquitous computing environment (Lyttinen & Yoo, 2002), and therefore can be called "mobile consumers."

A new generation of wireless handheld devices is embedded or can be connected with GPS receivers, digital cameras and other wearable sensors. Through wireless networks, mobile consumers can share information about their location, surroundings and physiological conditions with m-commerce service providers. Such

information is useful in context-aware computing, which employs the collection and utilization of user context information to provide appropriate services to users (Dey, 2001; Moran & Dourish, 2001). The new multimedia framework standard, MPEG-21, describes how to adapt such digital items as user and environmental characteristics for universal multimedia access (MPEG Requirements Group, 2002). Wireless technology and multimedia standards give m-commerce great potential for creating new context-aware applications in m-commerce.

However, user context is a dynamic construct, and any given context has different meanings for different users (Greenberg, 2001). In m-commerce as well, consumer context takes on unique characteristics, due to the involvement of mobile consumers. To design and implement context-aware applications in m-commerce, it is critical to understand the nature of consumer context and the appropriate means of accessing and utilizing different types of contextual information. Also, such an understanding is essential for the identification and adaptation of context-related multimedia digital items in m-commerce.

CONSUMER CONTEXT AND ITS CLASSIFICATION

Dey, Abowd and Salber (2001) defined "context" in context-aware computing as "any information that can be used to characterize the situation of entities (i.e., whether a person, place or object) that are considered relevant to the interaction between a user and an application …" (p. 106). This definition makes it clear that context can be "any information," but it limits context to those things relevant to the behavior of users in interacting with applications.

Most well-known context-relevant theories, such as Situated Action Theory (Suchman, 1987) and Activity Theory (Nardi, 1997), agree that "user context" is a concept inseparable from the goals or motivations implicit in user behavior. For specific users, interacting with applications is the means to their goals rather than an end in itself. User context, therefore, should be defined based on typical user behavior that is identifiable with its motivation.

According to the Merriam-Webster Collegiate Dictionary, the basic meaning of context is "a setting in which something exists or occurs." Because the typical behavior of mobile consumers is consumer behavior, the user context in m-commerce, which we will term *consumer context*, is a setting in which various types of consumer behavior occur.

Need Context and Supply Context

Generally speaking, consumer behavior refers to how consumers acquire and consume goods and services (both informational and non-informational) to satisfy their needs (e.g., Soloman, 2002). Therefore, consumer behavior is, to a large extent, shaped by two basic factors: consumer needs and what is available to meet such needs. Correspondingly, consumer context can be classified conceptually into "need context" and "supply context." A *need context* is composed of stimuli that can potentially arouse a consumer's needs. A *supply context* is composed of resources that can potentially meet a consumer's needs.

This behavioral classification of consumer context is based on perceptions rather than actual physical states, because the same physical context can have different meanings for different consumers. Moreover, a contextual element can be in a consumer's need and supply contexts simultaneously. For example, the smell or sight of a restaurant may arouse a consumer's need for a meal, while the restaurant is part of the supply context. However, it is improper to infer what a consumer needs based on his or her supply context (see below). Therefore, this conceptual differentiation of consumer contexts is important for the implementation of context-aware applications in