A Task Context Aware Physical Distribution Knowledge Service System

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ABSTRACT

A physical distribution task has typical characteristics of dynamic mobility: dynamic locations, time criticality, and environmental complexity. Research has focused on creating an environmental and task adaptive knowledge service system to support collaborative management of the physical distribution tasks. In this paper, four task context functions are established on the basis of defining customer context, product context, resource context, and network context of distribution task. A task context aware collaborative distribution knowledge service system is built with elaboration and discussion of the service system using an example of distribution center.

Keywords: *Collaborative Physical Distribution, Context Awareness, Knowledge Services, Service Systems, Task Context*

1. INTRODUCTION

An effective physical distribution system is important not only in supporting the business to respond customers quickly, but also in improving enterprises' competitiveness and customers' satisfaction(Cho, Ozment, & Sink, 2008). Compared to other tasks, physical distribution tasks have typical mobile characteristics such as dynamic locations in movement, environmental complexity, time criticality and involvement of multiple participants (Murillo, 2001; Zheng & Yuan, 2007). These characteristics bring great challenges for collaborative management in physical distribution.

DOI: 10.4018/jkss.2011010102

Context aware technology has many advantages in dealing with mobile and collaborative tasks(Hong & Tam, 2006; Wakefield & Whitten, 2006). Context aware computing is defined as the use of environmental characteristics such as users' location, time, identity, profile, accessible devices, and activity to inform the computing device so that it may provide information to the user that is relevant to the current context (Burrell & Gay, 2001).A system is context-aware if it can extract, interpret and use context information and adapt its functions to the current context of use (Byun & Cheverst, 2004). By recognizing users' activity pattern and the environmental change in electronic and physical spaces, a context aware system can provide suitable services for users 'anytime, anywhere'

(Yoon, Kim, & Lee, 2007). The context-aware systems have unique characteristics such as portability, mobility, proactive, nomadicity, and so on (Hong, Suh, & Kim, 2009). They operate independently of human control (to provide customized services autonomously by using user context and preference without disrupting the user). They often act in anticipation of future goals or problems. In these systems, various devices are interconnected and they recognize each other in a certain distance. They provide a rich set of capabilities and services to the nomad as she moves from place to place in a transparent and convenient form. Moreover, they support sustained and effortless communication between group members enabling them to build up and maintain an understanding (be aware) of other's activities which is very important for collaboration (Carroll, Rosson, Farooq, & Xiao, 2009). So, by using tasks' context to label and index the distribution information and knowledge, to establish a context aware based physical distribution knowledge service system could be an effective way to solve the collaborative problems in finishing mobile distribution tasks (Khedr & Karmouch, 2005; Xiao, 2009).

The applications of context aware based system are improved greatly over time such as intelligent space, providing information based on context, mobile context sharing application (Han, Jyri, Ma, & Yu, 2008).

However, most existing researches on context aware knowledge service systems are limited to providing simple context based information services according to specific users' geographical context such as digital tourist guide (Bruns & Bimber, 2009; Kenteris et al., 2009), point-of-care access to medical information (Dahl & Svanæs, 2008), context-aware adaptation of maps (Chalmers, Dulay, & Sloman, 2004), context-aware weather forecasting application. Applications in physical distribution knowledge service faced tremendous difficulties: ①lack of systematic understanding of the context factors of physical distribution tasks. ②Although abundant physical distribution knowledge and cases have been accumulated in physical distribution companies with the recent development of information and network technology, there still short of studies on context based calling mechanism for these cases and knowledge. ③It is difficult to support collaborative management of the physical distribution tasks without effectively integrating distribution knowledge calling and sending with the task context information processing. In this paper, we intend to define the context of physical distribution tasks and establish a context-aware based physical distribution knowledge service to support collaborative management of the physical distribution tasks.

2. DEFINITION AND STRUCTURING DESCRIPTION OF THE CONTEXT OF PHYSICAL DISTRIBUTION TASK

2.1 Definition and Connotation of Physical Distribution Task Context

Context has been studied and defined in abundant research fields from different points of view (Mowday & Sutton, 1993; Schilit, Adams, & Want, 1994; Dey, 2001; Hofer, Schwinger, Pichler, Leonhartsberger, Altmann, & Retschitzegger, 2002; Johns, 2006; Doulkeridis & Vazirgiannis, 2008; Han, Jyri, Ma, & Yu, 2008; Decouchant, Escalada-Imaz, Martinez-Enriquez, Mendoza, & Muhammad, 2009). Dey (2001) defines context as any information that can be used to characterize the situation of an entity, where an entity 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. Context is a multi-dimension concept. According to the entity dimension, context could be classified into user context, computing or service context, implementation environment context (Schilit, Adams, & Want, 1994; Doulkeridis & Vazirgiannis, 2008) and the user context could be divided into activity or task(what), identity or occupation (who), rationale (why), location (where) and time (when) (Dey, 2000; Johns,