Chapter 14

Intention Prediction Mechanism in an Intentional Pervasive Information System

Salma Najar
Université Paris I – Panthéon Sorbonne, France

Manuele Kirsch Pinheiro
Université Paris I – Panthéon Sorbonne, France

Yves Vanrompay
Ecole Centrale Paris, France

Luiz Angelo Steffenel
Université de Reims Champagne-Ardenne, France

Carine Souveyet
Université Paris I – Panthéon Sorbonne, France

ABSTRACT

The development of pervasive technologies has allowed the improvement of services availability. These services, offered by Information Systems (IS), are becoming more pervasive, i.e., accessed anytime, anywhere. However, those Pervasive Information Systems (PIS) remain too complex for the user, who just wants a service satisfying his needs. This complexity requires considerable efforts from the user in order to select the most appropriate service. Thus, an important challenge in PIS is to reduce user’s understanding effort. In this chapter, the authors propose to enhance PIS transparency and productivity through a user-centred vision based on an intentional approach. They propose an intention prediction approach. This approach allows anticipating user’s future requirements, offering the most suitable service in a transparent and discrete way. This intention prediction approach is guided by the user’s context. It is based on the analysis of the user’s previous situations in order to learn user’s behaviour in a dynamic environment.

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INTRODUCTION

Nowadays, the development of mobile and pervasive technologies has allowed a significant increase of services offered to users by Information System (IS). Instead of having Information Technology (IT) in the foreground, triggered and manipulated by users, IT is gradually residing in the background, monitoring user’s activities, processing this information and intervening when required (Kourouthanassis & Giaglis, 2006). In other terms, we are observing the emergence of a Pervasive Information System (PIS) that intends to increase user’s productivity by making IS available anytime and anywhere. Indeed, PIS arise from the ambition to provide pervasive access to IS, while adapting itself to user’s context. The notion of context is employed in order to make these systems more intelligent and adaptive. It corresponds to any entity considered as relevant to the interaction between the user and the application (Dey, 2001).

Contrarily to traditional IS, whose interaction paradigm is the desktop, PIS deals with a multitude of heterogeneous devices, providing the interaction between the user and the physical environment (Kourouthanassis & Giaglis, 2006). As pointed out by Kourouthanassis & Giaglis (2006), the main characteristics of PIS are not only the heterogeneity of devices, but also the property of context-awareness. Therefore, the evolution of IS into PIS leads us to consider PIS as more than a simple set of logical services.

Weiser (1991) suggests that a pervasive environment will be characterized by its transparency and homogeneity. Twenty years later, we can notice that this pervasive environment, which was meant to be an invisible or unobtrusive one, represents a technology-saturated environment. This environment combines several devices highly present and visible. PIS has to deal with such an environment, in which a rapidly evolving and increasing number of services is available, with multiple implementations. In spite of this rapid evolution, PIS remains too complex for the user, who just wants a service that satisfies his needs. This complexity requires considerable effort from the user in order to understand what is happening around him and in order to select the service that best fulfills his needs.

Nowadays, pervasive environments represent reactive systems based only on current user’s context. The proactive and anticipatory behaviour of PIS, notably by predicting the user’s future situation, is hardly developed. Thus, most research on this topic remains on a technical level, discovering next context information or suitable service implementations. They do not consider the intentional requirements behind the user’s experience. As a consequence, the user is often provided with several possibilities, even if he is not always able to understand what is proposed to him. We believe that, in order to achieve transparency advocated by Weiser (1991), PIS must reduce the user’s understanding effort. PIS must hide the complexity of such multiple implementations and context situations. This will only be possible through a user-centred vision. This vision is based on the prediction of user’s future requirements in a given context. It ensures a transparent access to a “space of services”. This space of services hides technical details concerning how to perform these services.

In this chapter, we propose a new vision of PIS based on a space of services and on an intentional prediction approach. Our purpose is to predict the user’s future intention based on his context, in order to offer the most suitable service that can interest him in a transparent and discrete way. This approach considers PIS through the notion of intention. The notion of intention can be seen as the goal that a user wants to achieve without saying how to perform it (Kaabi & Souveyet, 2007). It is described also as a goal to be achieved by performing a process presented as a sequence of goals and strategies to the target goal (Bonino et al., 2009). In other words, an intention is a requirement that a user wants to be satisfied without really caring about how to perform it or what service allows
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