Chapter XV

An Evaluation of Context-Aware Infomobility Systems

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ABSTRACT

The delivery of real-time, context-aware, and personalized information to end-users for mobility support is a high-priority objective in improving mobility services efficiency and effectiveness. This chapter aims at providing an analysis of existing studies in the field of context awareness research targeted to the infomobility application domain. The authors propose an evaluation framework for infomobility services based on the elicitation of context information items and high-level requirements. The framework is applied to some relevant state-of-the-art research works among personal navigation systems, infomobility service integration frameworks and context-aware location-based communication platforms. Evaluation results are discussed in order to highlight open research challenges in the infomobility application domain.

INTRODUCTION

The mobility of people and goods and the efficiency of transport systems are calling for requirements which are more and more critical in our society in terms of social, economical and individual issues. Traffic congestion and related environment problems represent serious threats to citizens’ quality of life and economic development. According to a study for the European Commission, it is estimated that congestion costs will represent 1% of the gross domestic product of the European Union in 2010 (European Commission, 2001).

In order to face these problems, national and local governments are promoting several efforts...
to make mobility more efficient and sustainable. Sustainable mobility relies on the capabilities of optimizing each transport mode with respect to safety, environmental friendliness and energy efficiency.

Obviously, proper actions for transport services and infrastructure enhancement are needed in order to improve the efficiency and effectiveness of mobility services. Nonetheless, providing valuable on-time information services to end-users can strongly contribute to more efficient mobility. Thus, the delivery of real-time and personalized information services to end users for mobility support (i.e. “infomobility services”) is a high-priority objective. At present most commercially available infomobility services are conceived as static information delivery. They are usually targeted to drivers and rarely to pedestrians and often focus on a single transportation mode (e.g. either private, pedestrian or public transport) (Rehrl et al., 2007). As a consequence, the burden of managing different transportation modes when planning travel and modifying travel plans according to up-to-date information about traffic events (e.g. accidents and congestion, parking places availability, delays in public transportation) is mainly placed on end-users.

Infomobility services typically include a wide range of services: navigation, route planning and re-planning, geo-referenced content delivery (e.g. Points of Interest descriptions, localization of nearest shops, railway and bus stations, parking facilities, etc.), alerts about critical events (incidents, congestion, public transport delays, etc.), payment services and facilities booking (e.g. parking and seat reservation). Infomobility services for mobility of persons can also be named as Traveler Information Services (U. S. Department of Transportation, 1998).

Research on context-awareness can provide significant progress in the infomobility application domain with respect to the systems and applications state of the art. As a matter of fact, information delivery for user mobility support (infomobility) is a domain that is especially challenging for research activities in the field of context awareness. This is due to several reasons, but mainly because application focus is on user location, which is a first-level context attribute. Not surprisingly, initial research studies on context awareness have focused on location-aware applications, such as the Active Badge Location System (Want et al., 1992) and location-aware tour guides (Abowd et al., 1997; Cheverst et al., 2000). In the infomobility domain, location strongly influences user information and service requirements, as well as other contextual attributes (especially those related to the environment surrounding the user). User requirements for infomobility services’ content and delivery channel adaptation may be influenced by context events, such as incidents, traffic congestion and public transport delays that may require assisting users with appropriate navigation services and re-planning trip schedules.

A relevant challenge is also determined by the fact that in this application domain, context knowledge should include a large amount and a variety of information (ex. user location, current transport mode, traffic and public transport events, weather conditions, etc.) to be appropriately acquired and managed in order to provide users with up-to-date, reliable and complete information for navigation and mobility assistance.

**Aim of the Chapter**

Our objective is to investigate how research on context-aware and mobile communication and computing might provide significant progress in the infomobility domain, with special focus on persons’ mobility.

This chapter aims at providing an analysis of existing research studies and trends in the field of context awareness research targeted to the infomobility application domain. Several surveys and state-of-the-art analyses exist in the field of context-aware mobile computing and applications...