Chapter 31
Mobile E–Services:
State of the Art, Focus Areas, and Future Directions

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ABSTRACT

E-services are services delivered over the Internet. Such services have different properties and dimensions, e.g. targeting different sectors, being accessible through different channels, or intended for frequent or infrequent use. Throughout this article the authors address e-services from a mobility perspective. They do this by 1) positioning mobile e-services within the research field; 2) reviewing related work on mobile e-services; and 3) presenting and examining existing challenges (both difficulties and opportunities) when combining mobility and e-services. They see mobile e-services as the next generation of internet-based services and discuss important focus areas and future directions, giving extra notion to challenges and opportunities in the areas of acceptance and adoption, availability anytime and anywhere, and co-operation. In turn, these areas potentially set the scene for enhanced e-participation.

1. INTRODUCTION

Mobile computing is defined as using portable computers capable of wireless networking (Forman & Zahorjan, 1994). This is what the International Telecommunication Union (ITU, 2002) denote as *terminal mobility*, i.e. *the ability of a terminal to change location […] and still be able to communicate* (p. 2). Throughout the last decades, computing enabled by devices with wireless interfaces has been part of a greater computing infrastructure, but this has rapidly changed as recent statistics show that the mobile computing paradigm in many ways has surpassed computing in fixed networks. ITU (2013) reports that the number of active mobile broadband subscriptions superseded its fixed counterparts in 2008, and as

per now, the estimated ratio is almost three times as high (more than 2 billion active mobile broadband subscriptions compared to almost 700 million fixed).

Besides terminal mobility, there are three additional mobility types, namely user mobility, session mobility and service mobility. *User mobility*, or personal mobility, (ITU, 2002) is when the user can maintain the same identity regardless of terminal or network, either through roaming or while maintaining active data streams and sessions. The latter is called is called continuous user mobility, or *session mobility*. The fourth mobility type, *service mobility* (Held & Ziegert, 1999), is about making services available anytime, anywhere, and thus dependent of the other three. Mobility reaches into all areas of computing and information-based technologies and, as the last mobility type implies, e-service research should eminently be such an area.

Definitions of e-services vary (and will be discussed in the next section of this paper), but a central component is the delivery of services through the Internet (e.g. Rowley, 2006). E-services are used to automate customer and citizen relationships, deliver and manage information, and have in many ways transformed markets and competition in supporting new value chains and structures (e.g. Lu, 2001; Sharma, 2007). Furthermore, e-services have found its place in the convergence of services and goods. Whereas goods are tangible and consumed separate from the moment of production, and services are intangible and consumed while produced, e-services are intangible but separable from the moment of production, thus becoming digital goods. (Hofacker et al, 2007; Scupola, Henten & Westh Nicolajsen, 2009). There is no doubt that e-services have grown to be an essential element (as a commodity, as well as an enabler) in the societies of the information age.

Research (e.g. Di Guardo, Galvagno & Cabiddu, 2012) shows that there are still large gaps to fill within the e-service area, especially regarding what aspects are unique to specific subareas or contexts. The main purpose of this article is to shed light on e-services from a mobility perspective. Our efforts are threefold. First we want to position *mobile* e-services within the research field, mainly through a review of e-service definitions and dimensions. Secondly, we will review related work on mobile e-services, to produce an overview of the state of the art in this subset of e-services. Third, this work will give us a basis for presenting and discussing existing challenges that have to be addressed by the research community, to overcome difficulties as well as making good use of the opportunities mobile e-services give rise to.

1.1. e-Service Definitions

There are many different definitions of e-services. Early definitions (e.g. Tiwana & Ramesh, 2001; Rust & Kannan, 2003) often derive from (traditional, non electronical) service definitions, paired with new networking paradigms, i.e. the offering of non-material goods, e.g. *deeds, efforts, or performance*, to use Hoffman and Bateson's (1997, p. 5) words, through ICT technology. Grönroos et al (2000) problematize the definition by dividing it into a technical dimension, i.e. how the service is delivered, and a functional dimension, containing the outcome of the service. Tan, Benbasat and Cenfetelli (2013) adopt the similar notions of *service delivery* and *service content* (p. 77).

Surjadjaja, Ghosh and Jiju (2003) stress the importance of interaction between the service provider and the user in their definition, so does e.g. Rust and Lemon (2001), and Boyer, Hallowell and Roth (2002), underlining that e-services are not only Internet delivered, but also consumer driven. Rowley (2006) focuses on the nature of e-service delivery, but also on the importance of information and the user's role, when technology mediation is described as *a defining characteristic of e-service* generating *two inherent characteristics: e-service as information service; and e-service as self-service, each*

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