Chapter 61
An Approach to Efficiency Evaluation of Services With Smart Attributes

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ABSTRACT

Nowadays amount of "smart" services in e-Tourism is growing rapidly. This is due to widespread use of mobile devices with new input methods and large amount of digitized data. In addition, Internet of Things and Big Data analytics has a major impact on development of e-Tourism services and cultural heritage services. At the same time the smart services implementation requires complex methods and high cost of their creation. Thereby there is an actual problem to estimate efficiency of smart services. This paper presents an approach to efficiency evaluation of services with smart attributes. The evaluation is based on service's work time utilization and required manual work. For each used attribute the execution scenario, ordinary (non-smart) service for comparison and used estimates are defined. Each estimate is calculated by taking into account the user's experience. Presented approach is relevant for smart services with big data analytics. The demonstration of the approach was carried out using Cultural trip planning service with possible ordinary services.

INTRODUCTION

E-Tourism covers a wide niche of the digital services market (Guttentag, 2010; Borras, Moreno & Valls 2014; Smirnov, Kashevnik, Ponomarev, Shchekotov & Kulakov, 2015). Its particular subarea, named cultural heritage tourism, becomes its essential part (Wecker 2014; Varfolomeyev, Ivanovs, Korzun & Petrina, 2015). These services are becoming smart by virtue of large amount of diverse information about the target region, big data analytics (Buhalis & Amaranggana, 2013) and various required functions. In addition, Internet of Things (IoT) has a major impact on development e-Tourism (Balandina, Balandin, Koucheryavy & Mouromtsev, 2015) and cultural heritage services (Korzun, Marchenkov, Vdovenko, & Petrina, 2016).

DOI: 10.4018/978-1-5225-8060-7.ch061

The term "smart" is actively used as a software characteristic as well. So, the term "smart objects" was coined in 1998 for virtual reality objects, which is able to describe their proper behavior (Kallmann & Thalmann, 1999). There is the concept of smart technologies for software development (Bičevska & Bičevskis, 2007), which involves the software ability to self-testing and context-awareness. Now the "semantic space" (Krummenacher, Kopecký & Strang, 2005) and "smart space" (Ovaska, Cinotti & Toninelli, 2012) concepts are widespread, they describe an information environment, which combines program agents and information broker. Such software environment is able to provide high level of adaptability, context-awareness, and proactivity by semantic technologies of representation and information processing. There are also examples of smart (intelligent) personal assistants, smart clients, and smart services elaboration projects.

In the situation of term's wide dissemination, some criteria are need to decide that digital service is either smart or non-smart (ordinary). A smart service can be considered as an extension of ordinary services, which is numerous in today's Internet. The distinctive aim of a smart service is to making every day human activity more automated and digitally assisted (Balandin & Waris, 2009; Augusto, Callaghan, Cook, Kameas & Satoh, 2013). In the paper (Kulakov, Petrina, Korzun & Varfolomeyev, 2016) a list of smart attributes which characterize smart services in cultural heritage area are introduced.

The implementation of smart service requires complex methods, integration with physical objects, third-party services and libraries, and the use of Internet of Things, other innovative technological approaches and so on. It leads to increase in development costs and complication of use. At the same time, smart service produces the same result as an ordinary service with manual work. Thus, the problem of comparing smart and ordinary services is arises.

In this paper, the evaluation of smart service efficiency by comparing them with an ordinary service is carried out. The evaluation is based on service work time and required manual work. The evaluation is demonstrated using Cultural trip planning service as an example (Kulakov & Shabaev, 2014). This service is based on software platform Smart-M3 (Honkola, Laine, Brown & Tyrkkö, 2010; Korzun, Kashevnik, Balandin & Smirnov, 2015) for creating smart space. This platform software implementation of a smart space includes "program agents" and "information broker". Each agent is an autonomous knowledge processor (KP), which is a software module running on some device. Cultural trip planning service provides ability to process personalized search requests and make routes for selected points accordingly to a time plan.

SMART SERVICE DEFINITION

In recent years, several efforts have been done to define the smart digital service concept. For example, in the paper (Maglio, 2014) the smart service defines as: "... capable of self-detection, self-diagnostic, self-corrective, or self-controlled functions through the incorporation of technologies for sensing, actuation, coordination, communication, control, and more". Another way to determine smart service is to make them mostly proactive (Allmendinger & Lombreglia, 2005). In the report (Austin, 2009) the "smart" technologies defines as "... technologies that do what we thought only people could do. Do what we thought machines couldn't do.". Summarizing "smart" definitions, "smart service" can be determined as an information service with the addition of proactive approach, high degree of autonomy and users activity replacement. This definition is not very acceptable to use in practice because it requires the presence of non-smart service analogues for comparison.