Services-based Integration of Urbanized Information Systems: Foundations and Governance

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ABSTRACT

Information systems urbanization has been proposed by many academics and practitioners to facilitate building agile information systems needed by modern organizations to take into account continuous change and overcoming problems induced by external pressures. Nevertheless, as stressed by many authors, integration of urbanized information systems is among the most important challenges faced by organizations. Indeed, urbanized information systems of modern organizations are composed of an important number of applications available for almost every business domain which behave as islands of processing systems either within organizations or across organizations boundaries. Accordingly, they involve high costs and long time to provide consistent information needed by organizations. The integration of an urbanized information system consists in the governance of the relationships between its components (applications, software systems layers, components, etc.). Starting from the 5+1 architecture model of urbanized applications, there are three categories of information systems integration: data-based integration, process-based integration, and service-based integration. In this paper, the authors focus on the third category and analyze the contribution of services to urbanized information systems integration. In particular, they demonstrate that the dependencies between applications belonging to an urbanized information system are based on exchanges of reusable public applicative services. Moreover, they highlight the role played by such services in the integration of urbanized information systems and underline that the effectiveness of reusable public services as instruments of information system integration requires the governance of these services.

KEYWORDS

Governance, Information City, Information System Integration, Information System Urbanization, Service, Service Contract, Service Reuse, Service Versioning, Urbanized Information System

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1. INTRODUCTION

Modern organizations are today facing many changes to their economic, legal, technological, and social environments which have been altered by three powerful worldwide changes: the transformation of industrial economies, the transformation of organizations structures, and the emergence of global economy. Besides, the accelerated product lifecycles, the reduced time-to-market, the increased rate of change due to the globalization and the deregulation of economy, and the increasing volume of information to be processed are among the main impacts of the continuously changing, demand-oriented and highly dynamic business environment of modern organizations. As a result, the role of information systems is ever more critical in supporting complex organizational processes (Gurbaxani & Whang, 1991; Toffolon, 1996; Fisher & Kenny, 2000; Dewett & Jones, 200; Laudon & Laudon, 2012). Agile Information systems are proposed by academics and practitioners to help organizations in managing continuous change and overcoming problems induced by external pressures. Information systems urbanization, based on the “information city” framework (Guétat & Dakhli, 2009) is among the main approaches proposed in recent years to build agile information systems (Toffolon & Dakhli, 2002; De Souza, 2006; Hovorka & Larsen, 2006). This framework links enterprise architecture (Zachman, 1987; Zachman & Sowa, 1992; Kaisler et al., 2005) and information systems governance. In particular, it describes how agile information systems support organizations strategies through the development of new applications or the evolution of existing ones. Nevertheless, the integration of urbanized information systems is among the major problems to solve in order to maximize and sustain the benefits of information systems urbanization. Indeed, urbanized information systems of modern organizations are composed of an important number of applications available for almost every business domain which behave as islands of processing systems either within organizations or across organizations boundaries. Accordingly, they involve high costs and long time to provide consistent information needed by organizations. Moreover, as pointed out by Davenport (1998), organizations businesses rely on integration of internal systems not only to have a global, open and distributed computational capability made up of a large scale, complex and integrated applications, but also to avoid fragmentation of their organizational structures. Despite information systems integration has been on the foreground of organizations computerization for many years, academics and practitioners don’t always agree on the definition of this concept. In this paper, we define information systems integration as linking together applications developed independently and using various compatible or incompatible technologies so that they function as a coordinated whole while remaining independently managed. The integration of an urbanized information system consists in the governance of the relationships between its components (applications, software systems layers, components, etc.). Starting from the 5+1 architecture model of urbanized applications (Guétat & Dakhli, 2013), there are three categories of information systems integration: data-based integration, process-based integration, and service-based integration. In this paper, we focus on the third category and analyze the contribution of services to urbanized information systems integration. Our paper is organized as follows. Section 2 presents synthetically the “Information City” framework and the information systems urbanization concept. In section 3, we analyze the dependencies between the components of urbanized information systems and highlight the role of services in these dependencies. In section 4, we analyze how services contribute to urbanized information systems integration. Section 5 is dedicated to the governance of services for urbanized information systems. Section 6 concludes this paper by describing its contributions and listing the future research directions.

2. THE INFORMATION CITY FRAMEWORK

The “information city framework” (Guétat & Dakhli, 2009) generalizes the use of the “city planning” metaphor by stating that – within a modern organization – an information system may be considered as a city whose inhabitants are the applications belonging to this information system. In this city, called
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