Chapter 14

Software Solutions Construction: An Approach Based on Information Systems Architecture Principles

Sana Bent Aboulkacem Guetat
Le Mans University, France

Salem Ben Dhaou Dakhli
Paris-Dauphine University, France

ABSTRACT

Information has become an essential resource for the survival and sustainable development of modern organizations, which face the constraints of their unstable and continuously changing economic and technological environments. In order to manage effectively this valuable resource, organizations need information systems that play a critical role in information management and in supporting complex organizational processes. In particular, to support innovation processes and short time-to-market constraints organizations’ information systems must be agile and flexible. The information systems’ urbanization may be considered as one of the main solutions proposed by researchers since the late 1990s to help organizations build agile information systems. Nevertheless, despite the advantages of this concept, it remains too descriptive and presents many weaknesses. For example, there is no useful approach dedicated to urbanized information systems construction. In this chapter, the authors propose a development approach of software solutions that are compliant with the information system urbanization rules characterized by their main dimensions.

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INTRODUCTION

Information Systems play a critical role in helping modern organizations reach various difficult and often conflicting goals. Such a role has evolved from data processing and automating of back-office routine tasks like accounting and stock management, to supporting most organizational processes which are of strategic importance to organizations (Toffolon, 1996; Agerou, 1998; Alter, 2001; Laudon & Laudon, 2010). Information systems are nowadays a necessary condition for organizations survival and sustainability within unstable and continuously changing economic and technological environments. Moreover, to take into account the constraints imposed by the economic, political, social, legal, and technological environments, organizations must evolve their strategies. This results in significant structural changes leading to greater interdependence and overlapping of applications that support organizational processes. The growing complexity of information systems results in important impacts on costs, delays, and risks related to the development and maintenance of software applications. Furthermore, to support innovation processes and, short time-to-market constraints, organization’s information system must be agile and flexible. The concept of information systems urbanization has fast emerged since the late 90’s as a critical issue to building agile information systems that help organizations reach their business goals through linking and aligning their business and information technology strategies, and identifying and exploiting opportunities offered by information technology so that they can gain and hold a competitive advantage.

Nevertheless, despite the advantages of this concept, it remains too descriptive and presents many weaknesses. In particular, there is no useful approach dedicated to the construction of urbanized information systems. In this paper, we propose a framework which improves existing work related to information systems urbanization and describe a development approach of software solutions which is compliant with the information systems urbanization rules. This framework distinguishes two main concepts. On the one hand, we define an application as a standalone set of software artifacts aimed at partially supporting at least one organizational process. On the other hand, a software solution is a set of interrelated models which describe the architecture of an application. In other words, a software solution is a formal description of an application organized in a way that supports reasoning about the structural properties of the application. It defines the building blocks that make up the application, and provides a plan from which artifacts can be procured or developed. Moreover, a software solution describes how the building blocks of an application will work together and take into account the overall information system architecture rules and standards. Therefore, an application results from the implementation of a software solution. Furthermore, we point out that the effective use of the proposed information systems urbanization framework—while building software solutions—is based on the definition of a repository containing a set of architecture rules to be respected by software architects and developers. This is why we describe, in this work, the characteristics of information systems architecture rules through their main dimensions. Our paper is organized as follows. Section 2 defines the urbanization concept and synthesizes the related work. In section 3, we present the foundations of information systems urbanization based on the “city landscape” metaphor. Three sections are dedicated to the dimensions of information system architecture rules. In section 4, we present the spatial dimension. The communication dimension is presented in section 5. Section 6 describes the informational and functional dimensions. In section 7, we present a multi-view model which synthesizes and completes the existing contributions to information systems urbanization proposed by academics and practitioners. In section 8, we use the concepts and models described