ABSTRACT

The agility with which Enterprise Information Systems (EIS) can be changed is of primordial importance in today’s fast paced and competitive market. This depends on the changeability of EIS, which in turn is heavily influenced by the coupling between the services implemented in enterprise value chains, in which EIS need to cooperate. This paper describes the concept of enterprise as a service, a collection of dynamically assembled services with a lifecycle centered on the customers, and addresses EIS interoperability as a means to achieve EIS integration. To help systematizing the various aspects relevant to interoperability, this paper proposes a multidimensional interoperability framework, which includes the following dimensions: Lifecycle (with typical development stages), Concreteness (with various levels of abstraction), Interoperability (based on structural compliance and conformance), and Concerns (to deal with non-functional aspects such as security, quality of service and social and legal issues).

Keywords: Agility, Compliance, Conformance, Coupling, Enterprise Architecture, Framework, Integration, Interoperability

INTRODUCTION

The terminology concerning integration and interoperability is not universally consistent, given its wide breadth of application, from simple data up to complex systems and their interaction behaviors. Throughout the literature, the two terms are sometimes used inconsistently, depending on context, or even interchangeably.

It starts by the inexistence of a universally accepted definition of interoperability, since its meaning can vary accordingly to the perspective, context or domain under consideration. Although limited to information, the ISO/IEC/IEEE 24765 standard (ISO, 2010) provides the seemingly most cited definition of interoperability, as “the ability of two or more systems or components to exchange information and to use the information that has been exchanged”.

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Reducing the context to Enterprise Information Systems (EIS), the EN/ISO 19439 standard (ISO, 2006) refers to enterprise integration as the process of ensuring the interaction between enterprise entities necessary to achieve domain objectives.

Therefore, interoperability asserts the ability of two systems to understand each other’s messages, whereas integration requires collaboration to achieve common goals. Interoperability is thus necessary but not sufficient to achieve enterprise integration (Chen, Doumeingts, & Vernadat, 2008), which usually entails cooperation and coordination at higher abstraction levels. This paper concentrates on interoperability, as a means and an enabler to achieve enterprise integration.

Just ensuring interoperability is already a daunting task, given the complex, heterogeneous and highly variable enterprise networks that characterize today’s enterprise IT landscape, in particular when considering the most recent, game-changing developments, such as cloud computing (Mezgár, & Rauschecker, 2014), Big Data (Marz, & Warren, 2015; Reed, & Dongarra, 2015) and Internet of Things applications (Want, Schilit, & Jenson, 2015).

Figure 1 illustrates a scenario that may well be applicable to many enterprises, to interconnect either subsystems of an EIS or complete EIS, in value chains or other cooperation agreements. An EIS will have to deal with conventional web servers, in-house servers, several general-purpose clouds types (private, public and hybrid) and specific cloud-like systems, involving mobility (Fernando, Loke, & Rahayu, 2013), sensor networks (Rawat, Singh, Chaouchi, & Bonnin, 2014) and RFID tags (Aggarwal & Han, 2013), increasingly used for supply chain control. All this needs to be interoperable, so that enterprise integration, as whole, can be achieved.

Figure 1. An example of a complex enterprise IT environment, needing integration
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