Chapter 71
Underpinning EISB with Enterprise Interoperability Neighboring Scientific Domains

Carlos Agostinho
Centre of Technology and Systems (CTS) – UNINOVA, Portugal

Ricardo Jardim-Goncalves
Centre of Technology and Systems (CTS) – UNINOVA, Portugal

Adolfo Steiger-Garcao
Centre of Technology and Systems (CTS) – UNINOVA, Portugal

ABSTRACT

Over the last decade, interoperability appeared as a key enabler towards unlocking the full potential of enterprises, products, processes, and systems. With methods to support their lifecycle, contributing towards removing communication barriers, and fostering a new-networked business culture in industrial domains, Enterprise Interoperability (EI) requires tangible scientific foundations. This chapter recognizes that, in terms of content, any scientific field exists in an ecosystem of neighboring domains and presents a methodology to identify EI's relationship with its neighbors, thus supporting the foundations of EI Science Base (EISB). It can be agreed that formalisms like logic and mathematics are an integrant part of every science, but others also share relationships such as application fields' boundaries, methodologies, techniques, or even tools. With the support of the European Commission, through the Future Internet and Enterprise Systems (FInES) cluster of research projects, the authors have initiated an analysis of comprehensive domains (e.g. complexity and software).

INTRODUCTION

As enterprise information systems evolve and become more complex, the need for interoperable operation, automated data interchange and coordinated behavior of large scale infrastructures becomes highly critical (Agostinho, Jardim-Goncalves, & Steiger-Garcao, 2011; Athena IP, 2007; INTEROP NoE, 2007). In fact, Interoperability of Enterprise Systems and Applications

DOI: 10.4018/978-1-4666-8111-8.ch071

(I-ESA) has been a strong focus of research in the latest years both motivated from industry and research community alike, and is recognized as a high-impact productivity factor within the private and the public sectors (Charalabidis, Lampathaki, Kavalaki, & Askounis, 2010; Jardim-Goncalves, Grilo, Agostinho, Lampathaki, & Charalabidis, 2013).

Worldwide researchers, working on interoperability domains such as data, process, software and other issues, are exploiting the core components of EI (Koussouris, Lampathaki, Mouzakitis, Charalabidis, & Psarras, 2011). However, due to the increasingly fuzzy boundaries of each domain, the loosely coupled architectures, and virtual resources of enterprises, interoperability is becoming even more complex. Not only new technologies such as social networks or e-ID are constantly being taken up by enterprises, but also as there is a need to address interoperability at knowledge, services, clouds, and even enterprise ecosystems. Whereas in the past it was said that EI was unachievable until seamless interaction could take place at the technical, semantic, and organizational levels of the enterprise (Jardim-Goncalves, Grilo, & Steiger-Garcao, 2006), today this vision is extended, foreseeing that EI will be fully achieved only when the benefits brought by the new technology paradigms are harvested, including those of the Future Internet (http://www.future-internet.eu), e.g., Internet of Things, Internet of Services.

Notwithstanding the research developed so far, only recently have the scientific foundations of EI begun to be formulated (Lampathaki et al., 2012). Following a methodological approach based on two development axes, the Enterprise Interoperability Science Base (EISB) is being defined according to two parallel-running processes, under constant bi-lateral communication and coordination. They ensure proper execution and alignment for the specifications of the areas and the contents to be included in the EISB. As explained by Jardim-Goncalves et al. (2013), axis I is focused on the definition of the contents and structure of the EISB considering the EI neighboring scientific domains, while axis II is strictly concentrated on the internal domains of EI and Future Internet Enterprise Systems (FInES). This chapter reports advances of the activities of axis I.

The classical concept of science is generally related with observable knowledge, described in the form of testable laws and theories (Morris, 1992; Wilson, 1999). Nevertheless, there is a plurality of sciences that differ very much from each other. Formalisms like logic and mathematics are integrant part physics, less important for natural sciences, and their significance continues to decrease towards the more social and humanistic sciences spectrum. Thus, it can be agreed that in terms of content, scientific domains exist in an ecosystem of neighboring domains, and should recognize their relationship with these neighbors and with formal definitions of science bases already established for them. Normally, this relationship includes boundaries between application fields, which may be sometimes fuzzy, shared methodologies, techniques and tools, as well as conflicts in approach.

Acknowledging the existence of these, the authors, supported by the FInES cluster of EU research and most specifically the ENSEMBLE project (ENSEMBLE CSA, 2011), have initiated an analysis of EI neighboring scientific domains in search for commonalities and contributions to the EISB formulation. In this context, *Fluid Knowledge* is a designation proposed to accommodate all that is located within the fuzzy borders of EISB under the frame of development axis I. Section 2 includes a background analysis of the activities conducted towards the development of the EISB. Section 3 includes a literature review on a small set of neighboring domains, which will be used to formulate the Fluid Knowledge in the form of relationships with EI, in section 4. Lastly, sections 5 and 6 conclude the chapter with some final remarks and considerations to the future.