Chapter 22
HLA Supported, Federation Oriented Enterprise Interoperability

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ABSTRACT
This chapter aims at presenting some future trends given in the final results of the INTEROP Network of Excellence (Chen et al., 2007) that prospect ways to support federation oriented enterprise interoperability. At first, a detailed definition of enterprise interoperability is given and the relevant concepts are structured in an Enterprise interoperability framework. A review will show two early collaborative interoperable platforms developed in the 90’s. Then, a review of more recent solutions to establish interoperability, which aim to solve previous shortcomings, is proposed. The study in this chapter focused on ongoing researches for solutions based on the High Level Architecture (HLA) at the technological level because it tends to provide the desired properties. This standard was originally developed for military interoperability of large simulators with real environment. Indeed, the HLA standard has been successfully transposed for enterprise interoperability at the implementation level, reusing modeling and simulation developed through years of experiences in distributed systems to manage causality, confidentiality and interoperability. The presentation of HLA platforms will be followed by a synthetic comparison of the various approaches. The state-of-the-art is concluded by presenting MDA (Model Driven Architecture) methodology which supports the transformation of enterprise models from conceptual level to models for execution or simulation and the emerging MDI (Model Driven Interoperability) methodology. From

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that postulate, it is proposed to rationalize the development lifecycle of distributed enterprise models by merging the HLA FEDEP and the MDA / MDI methodology to a unified lifecycle that will guide the development of distributed enterprises models from conceptual level to the implementation of an HLA compliant solution. At the end, and as a perspective, some discussion is given on methodology to facilitate the reuse of legacy platforms in new interoperable system of systems.

1 INTRODUCTION

In the globalised economic context, the competitiveness of an enterprise depends not only on its internal productivity and performance, but also on its ability to collaborate with others. This necessity led to the development of a new concept called interoperability that allows improving collaborations between enterprises. No doubt, in such context where more and more networked enterprises are developed; enterprise interoperability is seen as a more suitable solution than total enterprise integration.

Since the beginning of 2000, several European research projects have been launched to develop enterprise interoperability (IDEAS, ATHENA, INTEROP). Three main research themes or domains that address interoperability issues were identified, namely: (1) Enterprise modelling (EM) dealing with the representation of the internetworked organisation to establish interoperability requirements; (2) Architecture & Platform (A&P) defining the implementation solution to achieve interoperability; (3) Ontologies (ON) addressing semantics necessary to assure interoperability (IDEAS, 2002).

This chapter investigates the contribution of Information Technology (IT) architecture and platform to develop enterprise interoperability, in particular the interoperability of enterprise models built at higher level of abstraction and the transcription of it to the execution level.

The first part, aims at presenting the various approaches of interoperability and the current consideration of interoperability stated as conclusion of the Interop Network of Excellence (FP6, 508011) (Chen et al., 2007). Then, we propose a state of the art on enterprise collaborative platforms that enable interoperability of communication. Then we present two pioneer collaborative platforms developed in the 90’s. We conclude on their innovative approach but also the lack of interoperability. From this experience, we detail three desired properties for enterprise interoperability not tackled in 90’s solutions.

The first desired property for interoperability concerns time management in enterprise interoperations, the dynamic aspects have to be tackled with sound techniques. For example time synchronisation algorithm recently proposed for Workflow management (Zacharewicz et al. 2008a) can be transposed. The second property concerns the definition of Enterprise ontology. Federation approach in interoperability requires high-level representation of data to be exchanged. Computer science ontology, Object, and Interaction in HLA can give keys to this problem. The last property concerns the confidentiality of data. Indeed, enterprises must manage data confidentiality shared with other entities. Level and strategies of rights on enterprise data must be defined. The experience coming from information systems, databases and games theory can be studied to find out a way of keeping data safe.

Then, we propose to observe most recent interoperability platforms to see if they are able to provide enounced desired properties. We choose to focus on High Level Architecture (HLA) (i.e. a standard for Distributed Simulation) compliant platforms because of their ability to make interoperable existing systems, to synchronise the information exchange and to manage confi-