Chapter 46
Rule-Based Domain-Specific Modeling for E-Government Service Transactions

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ABSTRACT

There is an explosion of different software platforms and protocols used to achieve systems interoperation. Among those platforms are the e-government transactions systems used mainly by public sector organizations to deliver demanded services to citizens. This scenario brings the appearance of communications gap among public organizations that share common processes, services, and regulations. Therefore, to find a solution to integrate these platforms becomes a relevant issue to be treated. This chapter proposes a rule-based domain-specific modeling environment for public services and process integration formed by common public service elements and a set of process integration rules. This approach provides a mechanism to integrate the conforming pieces of public transactions among different platforms. In addition, a service and a process meta-model is proposed in order to formalize the information structures. A set of process integration rules is also presented to complete the proposed model.

INTRODUCTION

The objective behind Information Technology (IT) projects in e-government contexts as argued in (Buhl & Löffler, 2011) are: simplification and realization of information, communication, and transaction processes within and between public administrations and citizens by using digital information and communication technology.

There have been an increased research activity on e-government field in recent years and the development of theoretical and conceptual models to understand its different aspects (Dawes, Pardo, & Cresswell, 2004; Gilgarcia & Pardo, 2005; Gupta, 2003). This recent interest in this domain is caused by the increased government's reliance on information and communication technologies (ICT) in their everyday transactions. One of the

particular fields of interest in this domain is the study of the different relations established among the e-government actors to achieve service transactions. In (Abramson & Means, 2001) there is a classification of three major categories or relationships called Government-to-Government (G2G), Government-to-Citizen (G2C), and Government-to-Business (G2B). This chapter mainly focuses on Government-to-Citizen relationship where the information sharing between Public Administrations' (PAs) processes and services takes place. These information interchanges or interoperability between PA organizations have been classified as a relevant subject and a critical prerequisite for the adequate performance of PA systems (Klischewski, 2004; Peristeras, Loutas, Goudos, & Tarabanis, 2007; Tambouris, Manouselis, & Costopoulou, 2007).

The European Interoperability Framework for Pan-European e-Government Services (EIF) (Overeem, Witters, & Peristeras, 2007) of the European Commission defines interoperability as the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable sharing of information and knowledge.

EIF defines three interoperability types such as the technical level, semantic level and organizational level where this chapter focuses on. The interaction among different business processes and services is addressed. At this level the following aspects are covered:

1. **Domain Specific Integration Modeling:** This includes the definition of the metamodel that contains common processes and services elements to undertake their integration.
2. **Business Rules Integration:** This describes the construction of the integration knowledge base used to validate instances of the defined model both in modeling time and runtime.
3. **Domain Specific Modeling Editor Development:** This address the description of the necessary steps to undertake the

development of a domain specific modeling tool as proof of concept for the proposals introduced in this chapter.

BACKGROUND

Process modeling has gained a lot of attention over the past decade involving process reengineering and innovation (Wang & Wang, 2006). The use of Service Orientated Architectures (SOAs) has changed the process orientation to service orientation modeling approach. These architectures are mainly dedicated to issues related to advertise, discover, invoke, compose and monitor services available from multiple providers over the web. This change resulted in the development of the Web Services (Alonso, Casati, Kuno, & Machiraju, 2004; Moitra & Ganesh, 2005).

There are discussions on different approaches to undertake process-service integration modeling. The workflow and SOA approaches are discussed in (Gortmaker, Janssen, & Wagenaar, 2005) presenting two reference models: Workflow Reference Model (Eder & Liebhart, 1996) and the SOA reference model (Papazoglou & Georgakopoulos, 2003). Relevancy of these models in the implementation of service-process integration in e-government is questioned. According to (Gortmaker et al., 2005), the workflow reference model is mainly focused on technology and therefore fails to address the non-technical integration issues. Instead the SOA reference model manages to address several of these issues in a rather descriptive way. Hence the SOA model manages the required functionality but does not indicate how this should be implemented. Therefore, the conclusion from this works is that a new domain specific process-service integration model is needed to facilitate process integration in e-government context.

There are a number of generic process models proposed for e-government domain. Amongst this models can be found the Federal Enterprise Architecture Business Reference Model (Chief, 1999)

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