A Semantic Approach to Support Cross Border e-Justice

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Abstract. The possibility to file and exchange legal procedures between European Member States is essential to increase cross-border relations in a pan-European e-Justice area. In this paper an overview of the e-Delivery platform developed within the e-CODEX project, as well as the semantic solution conceived to transmit business documents within a scenario characterized by different languages and different legal systems, are described.

Keywords: e-Justice · Semantic interoperability · Knowledge representation · e-Delivery · Domain model · Document model

1 Introduction

The e-CODEX[1] project is a Large Scale Pilot in the domain of e-Justice aiming to implement building blocks for a system supporting cross border judicial procedures between European Member States and to provide citizens, enterprises and legal professionals with easier access to platforms that support transnational judicial issues. In this paper the main features of the e-CODEX system, based on semantic technologies and Web services, are presented. In particular the e-CODEX e-Delivery platform (Sect. 2) is briefly described. Moreover an approach, based on document standards and semantic models, able to provide a semantic interoperability layer for message exchange is shown (Sects. 3 and 4). Finally some conclusions and future developments are discussed (Sect. 5).

2 The Architecture of the e-CODEX e-Delivery Solution

The e-CODEX platform provides facilities for cross border communication via gateways, behind which national domains are unchanged. Reliable messaging and non-repudiation between the actual endpoints located within the national

[1] e-Justice Communication via Online Data EXchange (http://www.e-codex.eu) (Retrieved: 25/04/2014).

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V. Presutti et al. (Eds.): ESWC Satellite Events 2014, LNCS 8798, pp. 204–208, 2014.
DOI: 10.1007/978-3-319-11955-7_19

domains are guaranteed by a so called "circle of trust", based on legal agreements, and by evidences based on ETSI REM specifications, respectively [1]. Gateways[2] are endowed with routing capabilities able to resolve gateway physical addresses and national competent courts. Connectors, developed by each Member State, act as interface between national and European e-Delivery systems, facilitating message routing and document semantics management. For the piloting phase two use-cases have been foreseen: application forms exchange within Small Claims and European Payment Order procedures, as ruled by the corresponding EU regulations [2]. The way document semantics is managed is discussed in the next sections with respect to the foreseen use cases.

3 Semantic Interoperability

For document exchange between member states, having different legal systems and traditions, a semantic interoperability layer is essential for sharing and harmonizing the meaning, as well as highlighting nuances of national jurisdiction-dependent concepts. e-CODEX uses three knowledge models for facing semantic interoperability. The *Conceptual Model* is the model for communication and concept harmonization. The *Logical Model* is the set of data types and code lists ensuring data reusability[3]. The *Physical Model* is the syntax and data formats (XML and PDF for e-CODEX documents) ensuring mutual understanding between information systems. Within such a framework, domain and document modeling has been conceived: the *Domain Model* is the model of the addressed scenario and the *Document Model* is the model of a document instance pertaining to that scenario. Each of them can be further distinguished as follows (Fig. 1 as reference). The Document Model can be viewed in terms of *Document Physical Model*, collection of document objects viewed on the basis of their domain independent function (input fields, check boxes, etc.), and *Document Logical Model* [3], collection of document objects viewed on the basis of the human-perceptible meaning of their content (Claimant, Claimant name, Court name, etc.). Similarly, the Domain Model can be viewed in terms of a *Domain Logical Model*, as a set of building blocks (data types, code lists, etc.) to describe documents of a particular domain, and a *Domain Conceptual Model*, as semantic description of a specific domain. The Domain Model gives semantic interpretation to the document elements (physical objects) in terms of logical objects.

From a technical point of view two strategies for implementing the proposed knowledge modeling are given. In a short term strategy the Document Physical Model is the view of an HTML or PDF form in terms of physical objects, while the Document Logical Model is the view of such objects as logical components, described in XML, compliant to an XML Schema representing the Domain Model including elements and relations (Domain Conceptual Model), as well as

[2] http://holodeck-b2b.sourceforge.net (Retrieved: 25/04/2014).

[3] CCTSUN/CEFACT Core Components Technical Specification. Version 3.0. Second Public Review. 16-April-2007.

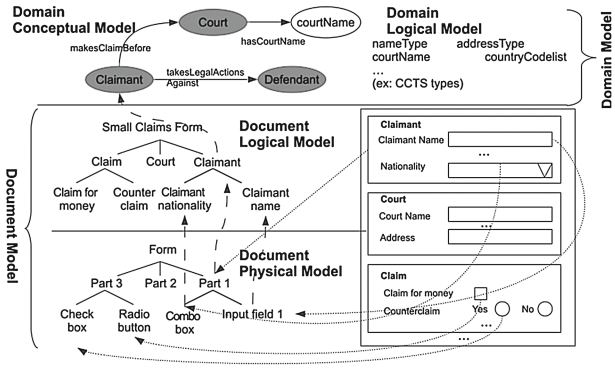

Fig. 1. Relations between domain and document models

datatypes (Domain Logical Model). In a long term strategy, the Document Physical Model is the view of an HTML or PDF form in terms of physical objects, while the Document Logical Model is the logical view of such objects, described in RDF. The meaning of such entities and relations can be given by an ontology (Domain Model) composed by classes and relations (Domain Conceptual Model) as well as datatypes and codelists (Domain Logical Model). In a long term strategy the Domain Model is expressed using RDFS/OWL technologies, following the methodology used by the European Commission DIGIT's ISA Program[4]. In Table 1 implementations of the short and long term strategies are summed up.

Table 1. e-CODEX short and long term implementations

Knowledge Modeling	Short Term Implementation	Long Term Implementation
Domain Model		
a) Domain Conceptual Model	XMLSchema	RDFS/OWL model (ontology)
b) Domain Logical Model	Data types, code lists (ex. CCTS or specific e-CODEX proprietary datatypes)	Data types, code lists (ex. CCTS or specific e-CODEX proprietary datatypes)
Document Model		
a) Document Logical Model	XML	RDF
b) Document Physical Model	HTML or PDF forms	HTML or PDF forms

4 e-CODEX Knowledge Modeling Deployed on Example

A narrative example, concerning a dispute leading litigants to start a European Small Claim procedure, is used as example to show our semantic approach:

[4] DIGIT: Directorate-General for Informatics; ISA: Interoperability Solutions for European Public Administration. http://ec.europa.eu/isa/ (Retrieved: 25/04/2014).

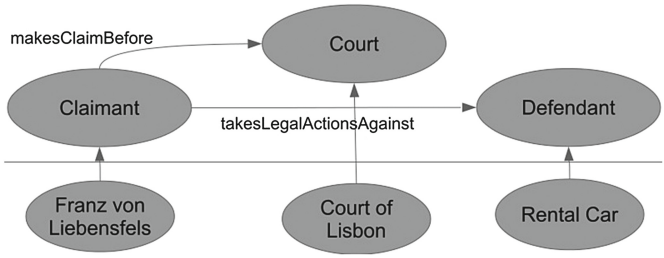

Fig. 2. Relation between Document Logical Model and Domain Model representations (lower and upper part, respectively) of a small claim scenario.

Franz von Liebensfels from Klagenfurt rented a car on the Internet for use in Portugal. Due to the existence of damage to the vehicle he decided to go to the company's office and the employee agreed to the change. The employee discovered damage to the windscreen. Mr. Liebensfels assured this was already there when he had collected the vehicle. Then he saw that his credit card had been charged with 400 Euro. He decides to file a claim against Rental Car at the court of Lisbon using the European Small Claim Procedure.

This narrative can be generalized into a more abstract form as follows:

A claimant from a Member State files a claim against a defendant in another Member State. The claimant filed the claim at a court in the other Member State demanding reimbursement of the money taking form his credit card by the defendant.

In e-CODEX the real case extensional description is represented by a Document Logical Model generated by a document template (Document Physical Model) which, in our narrative case, is a Small Claim procedure form. The connection between the extensional (Document Logical Model) and intensional (Domain Model) representations of a small claim scenario stemming from our example is shown in Fig. 2.

5 Conclusions

e-CODEX aims to represent an effective implementation of the current e-Justice policies of the EU. Legal contents representation and content transport infrastructure are the key activities currently under implementation in a scenario characterized by language and legal systems diversity. In the next phases of the project particular attention will be payed to the implementation of a secure and reliable data exchanged system, as well as an e-Payment system for a complete on-line finalization of judicial proceedings.

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