

## Guest Editors' Introduction

# Electronic Document Interoperability in eBusiness and eGovernment Applications

Businesses and Government Organizations need to exchange documents to execute transactions with the parties they trade or collaborate with. Providing the interoperability of electronic documents exchanged has been a huge challenge: Several domain specific standards have appeared such as RosettaNet Business Documents (Electronic Components, Telecommunications Industry), ACORD (Insurance Industry), CIDX (Chemical Industry), HL7 (Healthcare Industry), Papinet (Paper and Forest Industry), PIDX (Oil and Gas Industry), and SWIFT (Financial Industry) to name but a few. Although such standards developed so far have proven to be very useful for industry and government applications, cross industry communication still remains to be a challenge. Indeed, data interoperability in cross industry applications is handled by the mapping experts and data consultants who understand the semantic meaning of each entity in a specific interface and define the mappings among different document artifacts.

The leading effort for creating a standard semantic basis for business documents came from the UN/CEFACT (United Nations Centre for Trade Facilitation and Electronic Business) ebXML Core Components Technical Specification (CCTS) (also known as ISO 15000-5) which provides a methodology to identify a set of reusable building blocks, called Core Components together with their semantic properties. The Core Components represent the common data elements of everyday business documents such as "Address", "Amount", or "Line Item". These reusable building blocks are then assembled into business documents such as "Order" or "Invoice". Core components are defined to be context-independent so that they can later be restricted to different contexts.

OASIS Universal Business Language (UBL) 2.0 (Site 1) is one of the first implementations of UN/CEFACT CCTS in XML. UBL has gained wide spread acceptance and is being adopted by several communities around the world, especially in the electronic government applications. For example, the use of UBL Invoice is mandated by law for all public-sector businesses in Denmark. Also in Sweden, the National Financial Management Authority recommended UBL Invoice customized to Sweden, namely, Svefaktura for all government use. Following the success of Danish and Swedish examples, representatives from Denmark, Norway, Sweden, UK, Finland and Iceland have created a Northern European Subset (NES) for UBL to ensure interoperability among these countries. Furthermore, CEN/ISSS Business Information Interoperability Workshop (Site 2) is designed to create interoperability between government e-procurements documents across all of Europe starting with the NES and CODICE customizations of OASIS Universal Business Language 2.0.

Recently, an OASIS initiative has started, namely, Semantic Support for Electronic Business Document Interoperability (SET) TC (Site 3) to exploit the semantics defined through UN/CEFACT CCTS to facilitate cross industry electronic document interoperability. This initiative, realized within the scope of the ICT 213031 iSURF Project (Site 4), aims to provide standard semantic representations of electronic document artifacts based on UN/CEFACT Core Component Technical Specification (CCTS) and hence to facilitate the development of tools to support semantic interoperability. The basic idea is to use the semantic information explicated from the CCTS based document standards, again in a standard way and to make this information available for automated document interoperability tool support.

This special issue contains articles addressing document interoperability from several different perspectives. The first three articles demonstrate the use of UN/CEFACT CCTS and OASIS UBL specifications.

The first paper, entitled "*A Core Component-based Modeling Approach for Achieving e-Business Semantics Interoperability*" co-authored by Till Janner, Fenareti Lampathaki, Volker Hoyer, Spiros Mouzakitis, Yannis Charalabidis, and Christoph Schroth proposes a comprehensive core component-based business document modeling approach which builds upon the OASIS Universal Business Language (UBL) and the UN/CEFACT Core Component Technical Specification (CCTS). These standards are extended by introducing the concept of generic business document templates out of which specific documents can be derived according to the user's needs. The modeling framework developed provides tool-supported graphical data models as well as the technical representation of the business documents as XML schema documents designed in compliance with the UN/CEFACT XML schema Naming and Design Rules (NDR).

The second paper entitled "*Service and Document Based Interoperability for European eCustoms Solutions*" co-authored by Tobias Vogel, Alexander Schmidt, Alexander Lemm and Hubert Österle, concentrate on deriving documents and services from current eCustoms procedures in EU. The approach is based on the UN/CEFACT CCTS standards framework to tackle the challenge of handling different document configurations imposed by divergent national legislations, different customs procedures (export, import, transit, and excise) and different industries. The resulting conceptual model is transferred to XML schema serving as a basis for Web Services design and implementation.

The third paper entitled “*Modeling and Document Standardization Using Core Components Technical Specification for Electronic Government Applications*” co-authored by Yannis Charalabidis, Fenareti Lampathaki, and Dimitris Askounis describes the approach applied within the Greek Electronic Government Standardization Framework. The article explains the steps taken in realizing the framework which include gathering and analysis of governmental service forms at field level; customization of UN/CEFACT Core Components or definition of new information entities; semiautomatic XML Schema Definition files creation, using sets of naming, structuring and verification rules; adoption of international or development of country-specific code lists and finally development of guidance and training material.

In the fourth paper entitled “*Achieving interoperability in e-government services with two modes of semantic bridging: SRS and SWRL*” co-authored by Saravanan Muthaiyah and Larry Kerschberg, addresses the use of semantics in document interoperability. The authors propose a shared hierarchical knowledge repository and a semantic bridging process methodology using scores for semantic relatedness together with Semantic Web Rule Language (SWRL) rules. The hierarchical knowledge repository makes it possible to borrow general concepts from upper ontologies to create more specific local concepts. In this way, public agencies can share definitions of their respective domain specific ontologies through the upper ontologies. This approach is similar to the shared upper ontologies developed by the OASIS SET TC.

The fifth paper in this special issue is entitled “*Standardization of e-Government documents and processes for interoperability*” authored by Malgorzata Pankowska. The author gives an overview of the present e-Government interoperability frameworks in different countries around the world and concludes that although open document standards have produced many positive results, there is a need for the standardization of administrative processes.

The last two papers address some of the essential requirements of document interoperability: privacy and security.

The first paper in this group, entitled “*Securing Uniqueness of Rights e-Documents: A Deontic Process Perspective*” co-authored by Ronald M. Lee, Vu Nguyen, and Anastasia Pagnoni, argues that some of the features of paper documents, in particular the recognizable uniqueness of an original document, are not sufficiently represented in digital form. A key challenge is recognized as the secure digital transferability of unique rights. The article explains this challenge in detail, points out some existing solution strategies and proposes improvements.

The second paper in this group entitled “*The Use of Digital Watermarking for Intelligence Document Distribution*” co-authored by S.C. Cheung, Dickson K.W. Chiu, and Cedric Ho gives a watermark-based document distribution protocol to address the problem of tracing unauthorized distribution of sensitive intelligence documents. The distribution protocol is made of three processes: watermarks and intelligent user certificates generation; acquisition of watermarked intelligent documents and policy violation resolution.

The guest editors wish to express their deep gratitude to the reviewers of this special issue for their time and effort in providing detailed and timely reviews.

## Websites List

Site 1: OASIS Universal Business Language (UBL) TC  
[http://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=ubl](http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=ubl)

Site 2: CEN - European Committee for Standardization: Ws\_BII  
[http://www.cen.eu/CENORM/BusinessDomains/BusinessDomains/ISSS/Activity/ws\\_bii.asp](http://www.cen.eu/CENORM/BusinessDomains/BusinessDomains/ISSS/Activity/ws_bii.asp)

Site 3: OASIS Semantic Support for Electronic Business Document Interoperability (SET) TC  
[http://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=set](http://www.oasis-open.org/committees/tc_home.php?wg_abbrev=set)

Site 4: iSurf: An Interoperability Service Utility for Collaborative Supply Chain Planning across Multiple Domains Supported by RFID Devices  
<http://www.iSURFProject.eu>

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