

# EbXML AS DEVELOPING COUNTRY E-BUSINESS STRATEGY PROPOSAL

Ivan Matasić, Zoran Skočir  
Faculty of Electrical Engineering and Computing  
University of Zagreb  
Unska 3, HR-10000 Zagreb  
Phone: +385 1 6129 748; +385 1 6129 831; fax: 01 6129 616;  
e-mail: [ivan.matasic@fer.hr](mailto:ivan.matasic@fer.hr); [zoran.skocir@fer.hr](mailto:zoran.skocir@fer.hr)

## Abstract

Developing countries, such as Croatia, have 90% or more of their economy in SME (small and medium-sized enterprises). If these countries want to develop further, they have to ensure smooth transition of economy towards e-business. In other words, they must adopt e-business framework and develop necessary infrastructure. Having acknowledged the importance of e-business, we are carrying out the research aimed primarily at defining the strategy for implementation of e-business in Croatia. We are focused on e-business frameworks and conceptual prerequisites for building necessary e-business infrastructure. Based on the results, we adopted the ebXML standard as a technical infrastructure backbone. We have found that EbXML as a standard for electronic business offers the solutions to variety of recorded problems.

This paper explains main features of ebXML standard. Ideas and strategies as well as wider perspective of ebXML goals will explain opportunities concerning developing countries. Research elaborations on ebXML, as a perspective framework will be presented, as well as results of a pilot project on ebXML functionality.

## 1. INTRODUCTION

The authors consider Internet a new media that allows relatively low-cost solutions for e-business. It is vital for the developing countries and small and medium sized enterprises (SME) that have never adopted any previously developed standards. Putting a developing country on the Internet-networked economy in a consistent and well-defined manner means adding many values to its economy [1]. Low-cost solutions, flexibility and modular architecture granted by ebXML are argued as the best practical solution.

Electronic Data Interchange (EDI) has two main standards: one applied mainly in the US (X.12) and the other (EDIFACT) in the rest of the world. Electronic Business XML (ebXML) is an initiative that is becoming the global standard for business-to-business (B2B) communication. EbXML has a goal to "provide an open XML-based infrastructure enabling the global use of electronic business information in an interoperable, secure and consistent manner by all parties"[2]. The initiative is founded by UN/CEFACT ([www.uncefact.org](http://www.uncefact.org)) and OASIS ([www.oasis-open.org](http://www.oasis-open.org)). UN/CEFACT has significant experience in the field of e-commerce. OASIS is a non-profitable international

consortium of organizations and industries cooperating on bringing new standardized XML specifications. Combination of organizations such as IBM, Oracle, Sun, and Commerce One ensures wider perspective. Basic characteristic of ebXML is in that it approaches the data on transaction level and is oriented towards description of business processes.

Department of Telecommunications, Faculty of Electrical Engineering and Computing works on the research projects dealing with the processes vital for e-business implementation. Main goal of the research is to define strategy proposal for e-business implementation in Croatia. The work is financed by Agrokor d.d., the largest Croatian private company. It is also a part of a larger project named "Networked Economy", backed up by Croatian Ministry of Science and Technology. In the course of research, e-business technology laboratory [5] was established to conduct a series of experimental projects. Based on the results, ebXML standard was adopted as a technical infrastructure for e-business. This paper proposes the strategy for e-business implementation and presents the research results and the results of the pilot project for ebXML functionality, interoperability, modularity, simplicity and costs.

Section 2 of this paper describes the concepts and architecture of ebXML as a technical infrastructure backbone. Section 3 elaborates laboratory experiments implementing B2B transactions over ebXML infrastructure. Conclusion given in Section 4 is followed by references.

## 2. EbXML CONCEPTS AND ARCHITECTURE

The problem space in implementation of different "private" B2B models [3] is obviously interoperability, which is extremely dangerous for developing countries. Partner companies being in a need to implement B2B models established by industry leaders are often forced to change their own business models so as to perform B2B transactions. Complexity of implementing different business models to comply with business models for each new partner discourages the companies, especially small and medium sized ones, in transferring to B2B trade. Development costs, resulting from the absence of standardized B2B model, are also their huge problem. EbXML resolves all these problems.

Key feature of ebXML is in that it complements and is not competitive to other similar initiatives, such as SOAP, UDDI, RosettaNet or OAGIS. EbXML Messaging Service specification defines ebXML messages using SOAP, while ebXML Registry Service can be regarded as one of UDDI registries. Compared to other B2B frameworks, ebXML cannot be defined as 'vertical' (specific for industry), or 'horizontal'. EbXML tries to be defined as generic, and therefore, suitable as vertical and horizontal approach.

A large number of highly sophisticated Internet-based technologies provide solution to B2B transactions in ebXML. XML [4] is used primarily for document standardization and description of information through ebXML, but it also improves transport and security solutions.

Conceptually, ebXML defines the following:

- Standard mechanism for Business Process description and appropriate information model;
- Standard mechanism for registration and storage of Business Process and Information Meta Models, so that they can be stored, interchanged and used more than once;
- Discovery service which includes descriptions for each party, such as:
  - a. Supported business processes;
  - b. *Business Service Interface* used;
  - c. Business Messages implemented in Business Service Interfaces, and
  - d. Technical configuration of transport, security and coding protocols;
- Registration mechanism that enables storage of the information about all above parameters and specifications, and enables searching for appropriate trading partners through standardized search methodology;
- Collaboration Protocol Agreement – CPA and Company Protocol Profile – CPP;
- Standardized Messaging Service that enables interoperable, secure and reliable transfer of messages, and
- Sophisticated mechanism for messaging service configuration.

As a global standard for electronic trade, ebXML [6] consists of five architectural components (Figure 1): TRP (Transport, Routing and Packaging), Registry/Repository, TP (Trading Partner), BP (Business Process) and CC (Core Components). We must point out that, compared to others, Core Components are still insufficiently defined part of the ebXML standard. All ebXML components cooperate on fulfillment of ebXML. For example, EbXML TRP uses the information defined in ebXML TP, while ebXML TP can be stored through ebXML Registry. EbXML BP is implemented through ebXML TRP, TP and Registry. All components have elements of transport and the implemented content security.

Figure 2 shows how the ebXML-based EDI can be established. At the design phase, different organizations can propose, develop and implement definitions of Business Documents based on description of Business Processes in general or in their specific industry branch. Definition of the standard, common and widely accepted business documents is for obvious reasons as vital as developing technical infrastructure. A developing country has two strategies: development of its own set of documents or implementation of a set of documents adopted as the standard. Given that standardization in the EU will be completed relatively fast, Croatia and other countries-EU candidates will profit from the adoption of EU standard documents.

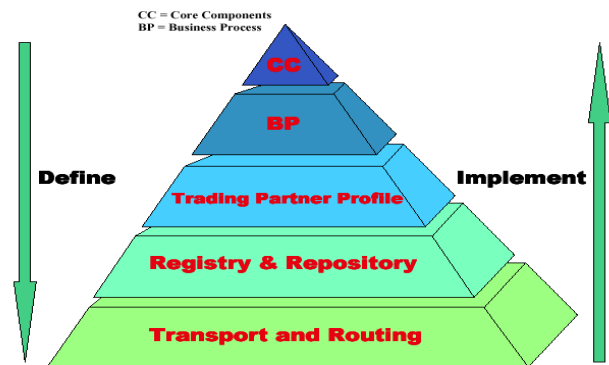


Figure 1 - EbXML specification 'pyramid'

Core components can be used to define consistent documents and serve as templates for designing business documents. Registry/Repository stores specifications of business documents, core components, software modules, company profiles and other information that can be defined as useful in ebXML communication.

A company can find another company profile in the Registry/Repository, and propose an Agreement on future interchanged documents. Once approved (in the process of negotiation), this agreement can be implemented through Business Service Interfaces in both companies. Implementation of Registry/Repository for its own economy, or joining the existing Registry/Repository is the prerequisite for e-business solution with ebXML.

Business Service Interface (BSI) serves as a middleware between ebXML infrastructure and the company internal information systems. When the companies agree on future cooperation, their Business Service Interfaces are responsible for data interchange, and do not need communication with other parties (such as Registry/Repository). Because implementation of ebXML requires implementation of BSI, this can be the opportunity for the companies to perform BPR (Business Process Reengineering). BSI can be built as the ebXML compatible plug-and-play solution, for smaller companies lacking in human and financial resources. It can be huge push-up for such companies.

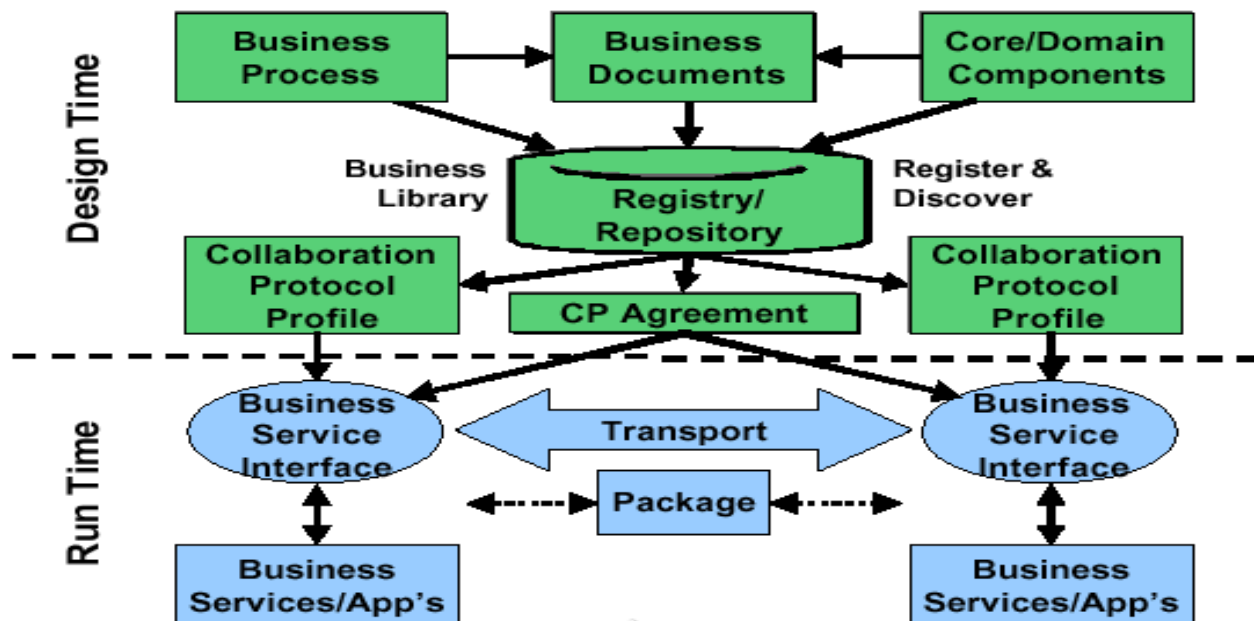


Figure 2 - ebXML elements

In order to present how each of the afore mentioned ebXML layers cooperate and perform their functionality, we will explain their main functionality and role in ebXML. It must be taken into account that these layers can be implemented as modules.

### 2.1. Core Components

Business processes determine the characteristics of business documents to be exchanged between the trading partners. Some parts of trading documents will vary significantly, due to specificity of goods or services described. Business documents semantically describe business transactions in all details. This is why ebXML makes special effort in defining Core Components.

Core Components resolve the above mentioned problems through combination of structured information that uses the context information for interpretation. Core Components structure uses layers designed to define general descriptions of business processes, and layers which define specific details using context arguments. A context is description of the processes in which specific usage will be implemented. For example, if a business process is defined as "hammering my car", the difference in the statement appears if the context is "my car is at the mechanics". Core Components are still the incompletely defined part of the ebXML standard.

### 2.2 Business Processes

Business processes describe the roles, responsibilities and relationships between the trading partners in business cooperation. Business Documents can be created combining

re-usable Business Information Objects. These can, on the lower layer of complexity, be created as a combination of Core Components. Reusability and well established definitions of business processes are crucial for reducing the costs and complexity of solutions for developing countries.

Business process models need to be transferred into programming components that enable electronic cooperation of business partners. EbXML specification schemes ensure nominal set of specification elements needed to specify cooperation between the trading partners.

Business Process Specification Scheme (BPSS) is an additional view of ebXML Business Process and Information Meta Model. BPSS is one of the key elements in ebXML and as a model is defined and created from the data model, extracting the information required to define and specify the number of elements needed to configure the run-time stage in implementation of ebXML business.

### 2.3 Trading Partner Profile

To conduct e-business, potential business partners need a mechanism to provide information on business processes and technical solutions they implement. This has been achieved through Collaboration Protocol Profile (CPP).

CPP contains vital information on a trading partner, such as contact information, industry classification, supported business Processes (referencing appropriate BPSS), messaging service requirements, etc. Once created, CPP is stored in the ebXML Registry service, so that the trading partners in a search for e-business collaboration can find it.

Collaboration Protocol Agreement (CPA) is a documented agreement between the trading partners that defines collaboration details between them. CPP and CPA are well described in [7]. We argue that for the open economy upon which developing countries (especially small ones) depend on ebXML, the solution is the only available well-defined mechanism that will enable cross-countries cooperation and, hence, open the exporting opportunities. International law as a major obstacle is not considered in this paper.

### 2.4 Transport, Routing and Packaging

T.R.P component is in EbXML often referred to as ebXML Messaging Service. EbXML Message Service defines standardized Business Document transport between the trading partners. Message enveloping as a header structure is pre-defined and transferred through communication protocols, such as HTTP, SMTP, etc. Messaging service can be conceptually divided into three layers (Figure 3): Service Interface, Message Service Handler and Mapping to a lower layer (Transport service).

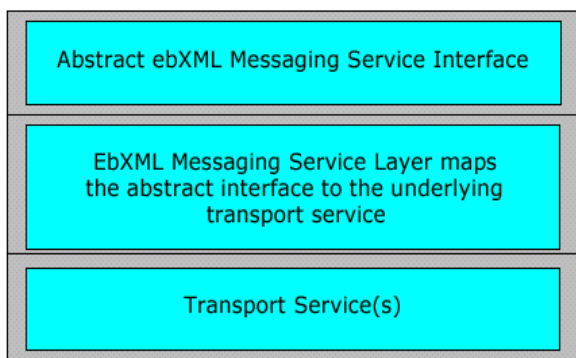


Figure 3 - Messaging service layers

### 2.5 EbXML Registry/Repository

EbXML Registry can be described as ebXML brain, because it stores all information that ebXML trading partners need (e.g. information on the trading partners and their CPP).

The term “Repository” describes the mechanism for data storage, while “Registry” describes interface services through which the repository objects can be reached. Data in repository are viewed, inserted, stored and deleted through user requests on the registry. Registry and repository services are separated so that one can use repositories from multiple different clients through only one registry interface.

Two specifications define Registry/Repository service:

- *Registry Information Model (RIM)* describing objects that can be stored in the repository, meta data on these objects, and repository structure, and
- *Registry Service Specification, (RS)* describing detailed view on interfaces for users, as well as functionality of the registry services in these interfaces.

Registry service specification defines the interfaces for user interaction with Registry using ebXML Messaging service. Interfaces are defined for Registry Service and Registry Client. There are three possible architectures, depending on where Client interface is implemented:

- ‘Thin client’ uses the web interface on the server side,
- ‘Fat client’, with Registry Browser application implemented on the client side, and
- Non-human interaction.

For a developing country it is important to ensure that the Registry can be used for many business purposes, rather than for e-business only. It can serve as database for its company profiles, and therefore give vital information for i.e. Ministry of Economy (to use it for presentation).

### 3. EbXML LABORATORY IMPLEMENTATION

In cooperation with 'Agrokor d.d.' we decided to implement business process named 'PURCHASE ORDER PROCESS WITH KNOWN VENDOR'. Data between the buyer and seller are interchanged electronically using ebXML messaging service. We have built CPP (Figure 4) and CPA interface (Figure 5), which were used to construct two CPP and CPA as the prerequisite for ebXML messaging. The described business process used several predefined documents:

- PURCHASE ORDER (OAGIS ver 7.2: S3\_003\_process\_po\_007.doc)
- ACKNOWLEDGE PURCHASE ORDER (OAGIS ver 7.2: S3\_004\_acknowledge\_po\_008.doc)
- SHIP NOTICE (OAGIS ver 7.2: S3\_161\_show\_shipment\_004.doc)
- ACKNOWLEDGE DELIVERY (OAGIS ver 7.2: S3\_196\_acknowledge\_delivery\_001.doc)
- INVOICE (OAGIS ver 7.2: S3\_171\_process\_invoice\_002.doc).

Agrokor selected these documents, and transactions were performed using SOAP messages with the attachments [8]. A XML editor was developed and used to send these messages (Figure 6). SOAP message can be viewed as a directory tree, and can be edited.

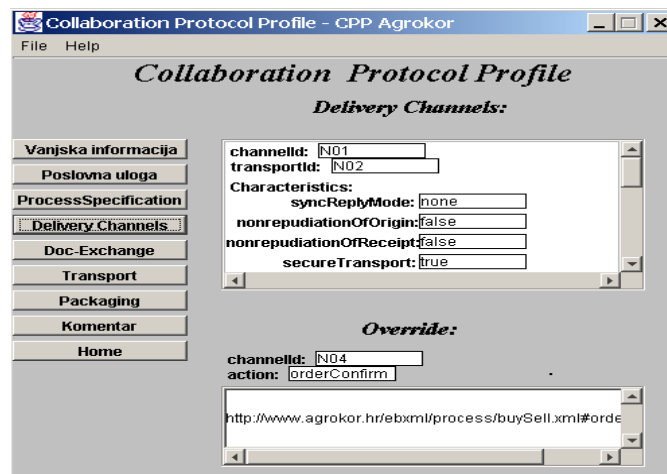


Figure 4 - CPP interface

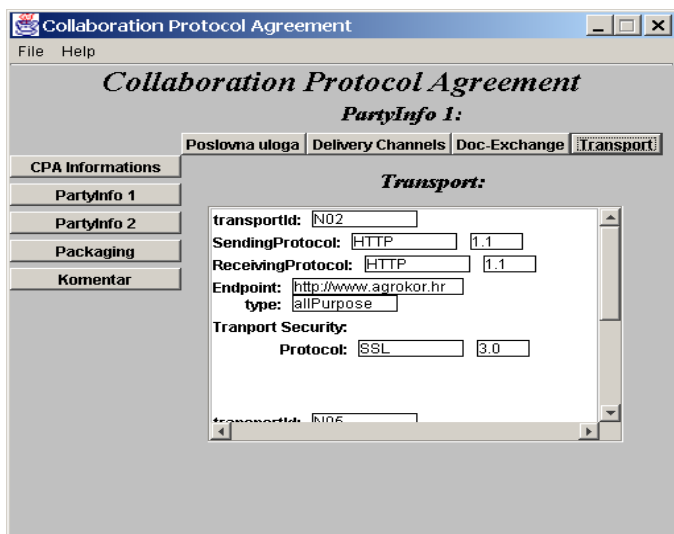


Figure 5 - CPA interface

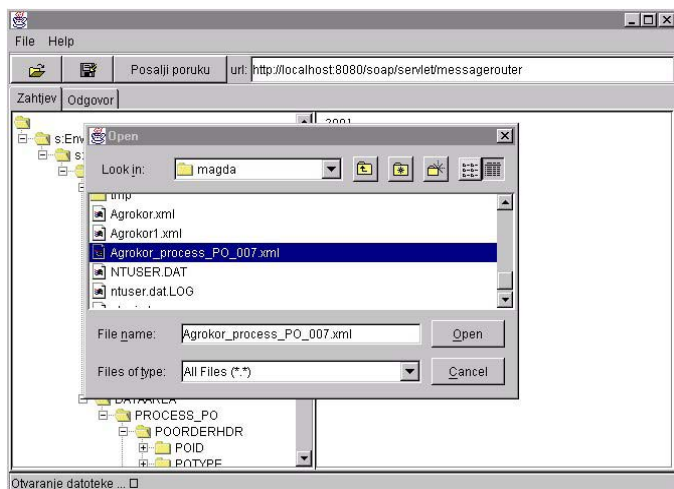


Figure 6 - Sending a XML message using SOAP over HTTPS using developed XML editor

These SOAP messages were easily integrated in JBA and SAP accounting solutions. We implemented neither the whole ebXML Messaging service specification nor ebXML Registry/Repository, but have only simulated the parts from all three 'bottom' layers needed to prove functionality of ebXML specifications as a whole. We wanted to prove that, based on ebXML, we could start an e-transaction between two companies at low costs, and that these companies can benefit from e-business way of doing business. We have confirmed modularity and low-costs of implementing ebXML as an e-business framework. At the current stage of the on-going project we are implementing Registry/Repository as the prerequisite of future development.

For development purposes we used JAVA programming language, Windows NT Server, Unix Solaris 8 with ORACLE 8i database and TOMCAT 3.2.2. container.

#### 4. CONCLUSION

EbXML is a global standard for B2B e-business. Open ebXML infrastructure and position of the founders will probably ensure ebXML global perspective. EbXML is the only globally developed and recognized open standard based on XML and created on rich experience from previously adopted standards. Flexibility, expandable infrastructure and interoperability are key features that will make it most appreciated and implemented global standard in e-commerce in near future. All these characteristics make it the best available solution for starting e-business based economical changes in developing countries, such as Croatia. We found that the interoperable, secure and consistent open XML-based infrastructure is perfect for SME and the developing countries. As the result of research, this paper describes the proposed strategy for implementing e-business in Croatia. We propose implementation or compilation of the existing free Registry/Repository and implementation of business document standards created by the EU. We are offering low-cost plug-and-play solutions for small enterprises and are notifying all enterprises about the advantages of doing business electronically. The result of the trial project is confirmation of interoperability, modularity and low-costs of implementing ebXML as a framework for SME and developing countries e-business solution. In addition to these advantages, we consider ebXML a central paradigm in our concept of implementing e-business in the developing countries because it enables and promises the advantages of e-commerce to all parties, regardless of their size and global position. Social issues and implications are not within the scope of this paper.

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