

# A Tool for e-Business Process Definition

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## Abstract

SMEs (small and medium-sized enterprises) need simple generic solutions to ensure smooth transition towards e-business. In order for SMEs to adopt e-business, appropriate framework has to be created and necessary infrastructure developed. Having acknowledged the importance of e-business, we are carrying out research projects aiming to develop generic solutions that will enable SMEs transition to e-business. In this paper we are focused on building tool for the creation of customized business processes - electronic Business Process Tool (eBPT).

We accepted ebXML standard as a technical infrastructure backbone, as it offers the solutions to variety of recorded problems. Tool for business process design creates customized, ebXML compliant processes.

## 1. INTRODUCTION

Tremendous possibilities of Internet-based technologies and applications opened a new perspective for communicating and doing business electronically. Large number of companies is turning into new economy enabled with evolving digital media. C2C (*Consumer-to-Consumer*), B2C (*Business-to-Consumer*) and B2G (*Business-to-Government*) trade have been boosted by all of these Internet technologies. B2B (*Business-to-Business*) is considered to have the potential of a next big step of business evolution. Several standards for B2B (Business to Business) cooperation have been pushed into market by leading software companies, supported by big industrial companies or branched consortiums. Electronic data interchange standards and/or recommendations are aiming to achieve interoperability between horizontal partners and vertical industries in B2B communications. Simple Object Access Protocol (SOAP), Universal Discovery, Description and Integration (UDDI), RosettaNet and Electronic Business XML (ebXML) are just some of the initiatives with global perspective.

The problem space in such kind of implementation of different "private" B2B models is obviously in interoperability. Partner companies need to implement B2B models established by industry leaders, so they are often forced to change their own business models to conduct B2B transactions. Complexity in implementing different business models to comply with business models for each new partner discourages companies, especially small and medium sized ones, to transfer to B2B trading. Development costs, as result

of absence of standardized B2B model, are also a huge problem.

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 [1] was established to conduct a series of experimental projects. One of these projects aims at developing a model for designing customized business processes that are ebXML compliant (and therefore support interoperability between partners). As the result of a project a need for efficient and simple application tool for describing business processes was emerged. The tool creates business process description based on concepts developed within the project. EbXML was adopted as a technical infrastructure backbone.

In section 2 basic facts on B2B communication infrastructure with regard to ebXML as selected technical backbone is given. Section 3 describes the concepts of B2B business processes over ebXML infrastructure. Section 4 elaborates on business process tool (eBPT) application. Conclusion given in Section 5 is followed by references.

## 2. EBXML AS B2B COMMUNICATION INFRASTRUCTURE

B2B model [2] has to be flexible, expandable, interoperable, and above all - standardized. EbXML is already perceived as one of the greatest global standards for B2B communication. EbXML as a standard is a solution to a variety of problems in business communication between trading partners that emerge as a result of current systems incompatibility.

As global standard for electronic trade, ebXML consists of five architectural components: TRP (Transport, Routing and Packaging), Registry/Repository, TP (Trading Partner), BP (Business Process) and CC (Core Components). 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. Conceptually, ebXML defines the following:

- Standard mechanism for registration and storage of Business Process and Information Meta Models, so that they can be stored, interchanged and re-used;
- 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 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.

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. 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. BSI can be built as the ebXML compatible plug-and-play solution, for smaller companies lacking in human and financial resources. It can be a huge push-up for such companies.

These elements of ebXML specifications are ideal for storage, retrieval and implementation of customized business process definitions developed through eBPT tool described in this paper. *Business Service Interface* can implement any given business process, as long as it is compatible with ebXML specifications. The necessity of implementing generic business process solutions especially designed for small and medium sized companies (SME) can be efficiently fulfilled using ebXML infrastructure.

### 3. BUSINESS PROCESS CONCEPTS

Putting a developing country on the Internet-networked economy in a consistent and well-defined manner means adding many values to its economy [3]. For small and medium-sized enterprises transition towards e-business can

be provided through third-party concern for develop necessary infrastructure. Research project aiming to develop generic solutions is focused on conceptual prerequisites for building customized business processes and tool for the creation of electronic Business Process Tool (eBPT).

Although ebXML offers standard mechanism for Business Process description, we have decided that new approach should be taken in defining conceptual model for e-business processes. Two key concepts are defined: Actor and Service Port. Actors are using Service Ports to exchange resources. Actors implement business manager point of view, while Service Ports implement ideas and economical concepts in technical infrastructure. As this paper describes eBPT tool, we will describe Service Ports and its role in business process definition in more detail.

Figure 1 describes steps in defining business process and the role of eBPT tool. Electronic Business Conceptual Model (eBCM) is used as meta model in form of XML Schema to validate Business Process description created by eBPT tool. Once created and eBCM valid XML document can be stored through ebXML Registry Client in any ebXML compliant Repository. Unique ebXML Registry Client has been developed over ebXML specification [4] as part of the same project of creating customized but ebXML compliant environment for SME in Croatia [5].

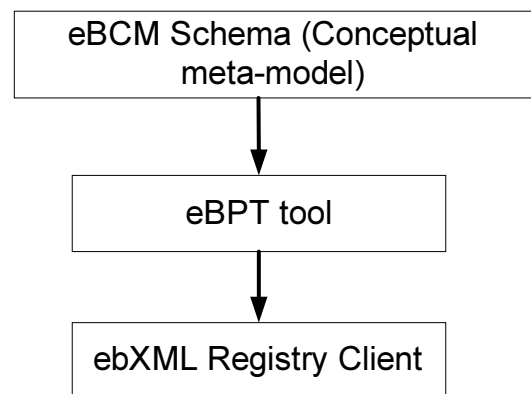


Figure 1 – eBPT role in business process modeling

Service Port is described with XML document which defines parameters for incoming and outgoing XML messages, technical specification of BSI in which they are implemented and messaging details. A typical simple Service Port would implement single business event within company. For example company invoices can be delivered electronically through Invoice SP (Service Port).

A Service Port can be consisted of many Service Ports. The main advantage is in re-using patterns of Service Ports in complex Service Ports. For example, if a SME implements

any simple Service Port within its BSI, a larger company communicating through e-business with this SME can use and implement the same Service Port within its BSI. An example of complex Service Port usage would be customized BSI consisted of a single Service Port that has 10 or more simple Service Port definitions. Some of these can be: Invoice SP, Simple\_Order SP, Transport SP, Warehouse SP etc. Such a custom BSI can be provided to SME with complete infrastructure for B2B, and therefore enable easy, affordable and interoperable implementation of basic B2B processes.

The most important issue in modeling business process is to understand that the users for whom the models are created are business people. We came into conclusion that the concepts defined as well as business processes must be presented graphically to analysts and business process designers. Therefore we have decided to build a graphical tool for business process creation.

#### 4. EBPT APPLICATION

To ensure that the creation of new customized e-business process definitions will be efficient and easily understandable to non-technical people, we have developed eBPT as an intuitive graphical interface. Its functionality enables quick creation and analysis of created business process definitions. The primary goal at this early stage of development was to develop a prototype that will be modular and therefore easily expandable. Application is based on open standards and therefore should be by its nature open and cross-platform operable, so Java 2 platform was chosen for development purposes. Java language is globally accepted as Internet programming language, support and available resources for Java platform are therefore huge [6]. The only negative side of selecting Java is slower execution, compared to some other 'native' programming languages that are optimized for certain platforms. JBuilder 7.0 is chosen for development, as it enables visual representation of Java code, and has good support in documenting development life-cycle. Application was created through Swing interfaces, while XML output was created through JAXM technology (Java API for XML messaging), more specifically through JDOM API.

XML is *de facto* standard in the ebXML specification, so the resulting business process description is stored as XML file, validated over pre-defined XML schema.

##### 4.1. Example business process

If we want to verify the efficiency of our e-business process tool, we need to implement a complex real-life business process, and show that the tool enables fast, accurate and efficient description of corresponding e-business process elements and activities. We have selected customized purchase\_order (Cust\_PO) business process that involves

four Actors (Buyer, Supplier, Bank and Transport\_Company) with multiple Service Ports for each of the Actors.

Service Ports are in the text marked using the following key marks: [FirstLetterOfTheActorName][ServicePortName]SP. In example, Transport\_Company Selling Service Port is marked with TSellingSP.

Buyer has two Service Ports: BWarehouseSP and BOrdersSP. An example definition of any of the Service Port (in form of XML) through XML triplets would be:

```
<http://www.primjer.hr/kupac/1>  
<http://www.primjer.hr/kupac/service_port>  
<http://www.primjer.hr/kupac/ SP_definitioon >
```

The same Service Port definition can be used by other Actors. Supplier has three Service Ports Defined: SWarehouseSP, SSellingSP, SOrdersSP. Bank has defined BClearanceSP which guarantees for payment and BPaymentsSP which transfers money. Transport\_Company has TSellingSP that accepts transport orders. SellingSP that is used by Supplier and Transport\_Company is composed of PaymentCheckSP, Accounting\_SP, VerificationSP. Suppliers SOrdersSP has two Service Ports: STransporOrderSP and SPaymentSP. PaymentSP is, as it can be seen, reused several times. All Actors have ACKnowledgmenSP Service Port.

The process is shown in Figure 2. The main idea was to create eBPT, which will present complex e-business process through simple GUI. Application should create XML document for business process description automatically, so that the user should focus only on functionality of the business process.

Communication between Actors (more precisely, between their Service Ports) is preformed through standard messaging mechanism, using XML documents. These XML documents are not crucial for our application tool presentation, so they are not elaborated in detail. The only important thing is that standardized XML documents (compliant to ebXML) are used for communication purpose.

The Cust\_PO business process is conducted as follows: Buyer uses BOrdersSP to order some goods from SSellingSP. SSellingSP conducts parallel communication with SWarehouseSP and BClearanceSP to check whether he has the goods on stock, and to check on Buyers credibility. After receiving acknowledgments on SAcknowledgmentSP Supplier orders transportation, goods are delivered by Transport\_Company and payment is performed. All the details and usage of different Service Ports is presented on Figure 2. Dark circles mark the beginning and the end of the process. Service Ports are marked as circles. XML documents exchanged between Service Ports are marked as envelopes; their content is irrelevant for this paper.

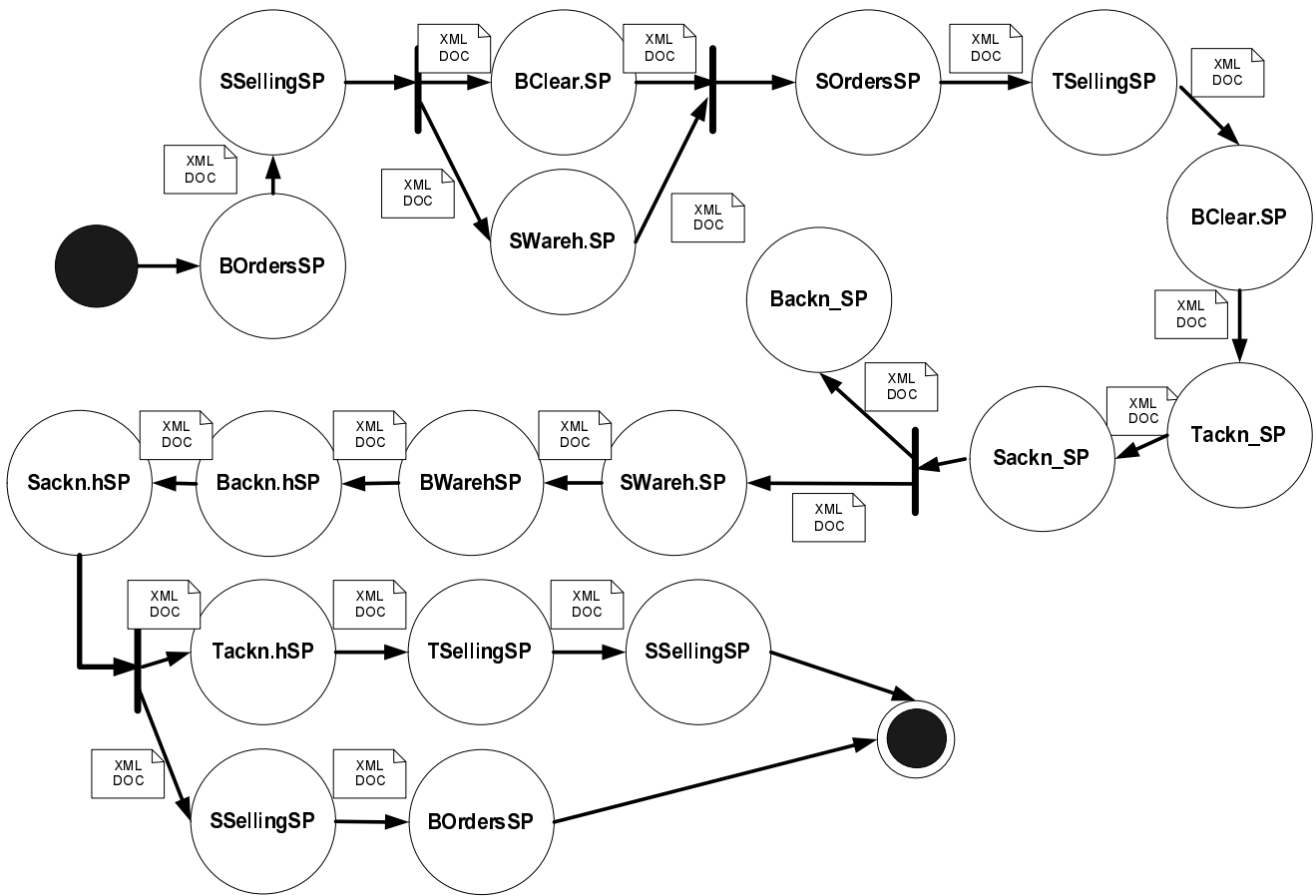


Figure 2 – Cust\_PO business process

#### 4.2. Implementation

The implementation of the business process shown in Figure 2 through ebPT is presented in this section. Application consists of the following ten classes:

- *Application.class*
- *MainFrame.class*
- *XMLProducer.class*
- *Komponenta.class*
- *MalaKomponenta.class*
- *Poruka.class*
- *Prijelaz.class*
- *Stanje.class*
- *Usluga.class*
- *Veza.class*

*Application.class*, *MainFrame.class* and *XMLProducer.class* are used for graphical presentation of the model, and are not connected with the model functionality. *XMLProducer.class* class uses JDOM interface to create XML document describing the business model. *Komponenta.class* and *MalaKomponenta.class* are parent classes to all the classes that implement the business model itself. They encapsulate

common attributes of the model. Inheritance diagram is presented on Figure 3.

The diagram is drawn as nodes-and-branches graph. Nodes are *MalaKomponenta.class* instances while connections are implemented through *Veza.class* and *Poruka.class*. All of the leaf classes from the diagram are abstractions of business process model components. Implementation of these classes combines presentation logic and functionality of the graph node or branch as a part of the business process.

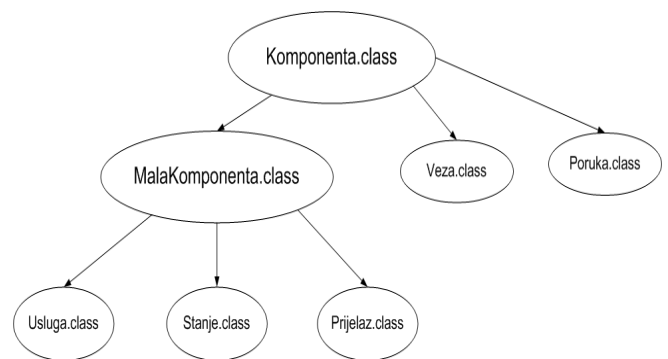


Figure 3– Inheritance diagram

The Cust\_PO business process drawing presented on Figure 2 does not correspond to its counterpart in the application screen due to the lack of space, but one part of it at the certain stage of creation is presented in Figure 4.

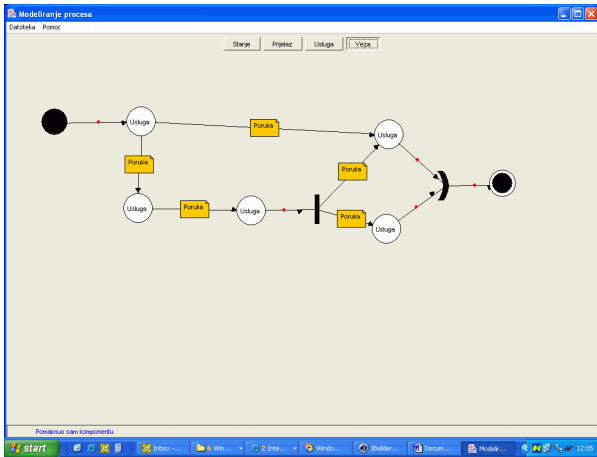


Figure 4 – Creating Cust\_PO business process

Using the application is very simple. A user chooses the desired components (nodes and branches), connects them, positions them on the screen etc. Business rules are implemented in the application, i.e. in the *MainFrame.class* a method exists that implements a variety of rules and permissions concerning the connections between components. If the user tries to make a forbidden type of connection a warning window pops up, as presented in Figure 5.

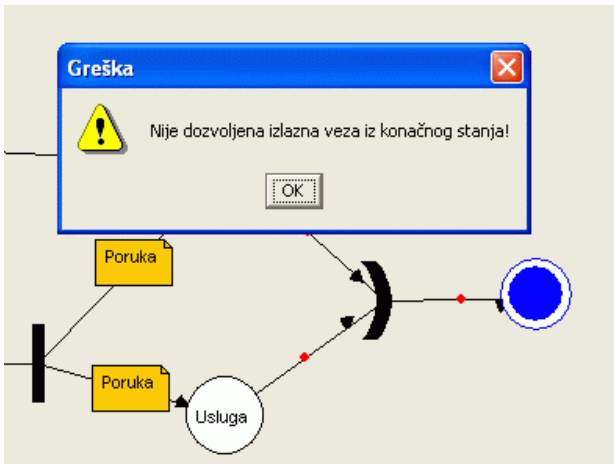


Figure 5 – Application creates warning window

Clicking on the right mouse button invokes a contextual *pop-up* menu (Figure 6), whose options are dependent on the type of element clicked. Some options like ‘move’ or ‘delete’ are common to all elements. More options and features can later be implemented in the application easily.

User stores created eBPT model in XML file, from which it can be uploaded into eBPT application. Created XML file

corresponds to the XML schema defined in the research project, and can be stored in an ebXML Repository.

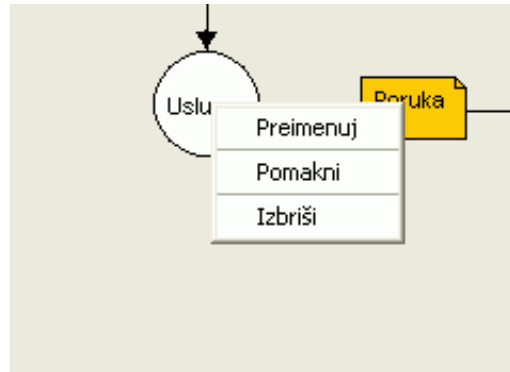


Figure 6– Pop-up menu

## 5. CONCLUSION

EbXML is a central paradigm in our concept of implementing e-business. We found that the interoperable, secure and consistent open XML-based infrastructure is perfect for SME and the developing countries. Offering low-cost plug-and-play solutions for small enterprises will result in interoperability, modularity and low-costs of implementation. Simple generic solutions are vital for the success. eBPT is one of these solutions: it implements using advantages of Internet technologies. eBPT enables non-technical users to create business processes in an easy and standardized windows GUI application approach. Application uses business process concepts developed within research project, and creates ebXML compliant business processes. Modularity of the application enables us to use many modules in similar applications, i.e. application for business process analysis and application for business process monitoring and control.

## REFERENCES

- [1] Marko Topolnik, Damir Pintar, Mihaela Sokić: *Experimental Implementation of Emerging e-Business Technologies: EbXML and PKI*, MIPRO, Opatija, Croatia, may 2002.
- [2] [www.w3.org](http://www.w3.org)
- [3] Aleksander N'toko: *Bridging the digital divide*, ITU-T press <http://www.itu.int/ITU-D/e-strategy/ecdc/pressarticles/ECDC-ISRMarch2001.pdf>
- [4] UN/CEFACT-OASIS: *"ebXML Registry Information Model, v2.0"* December 2001
- [5] Ivan Matasić, Zoran Skočir: *EbXML as developing Country e-business strategy proposal*, SOFTCOM2002, Split-Venice-Ancona-Dubrovnik, october 2002.
- [6] Bruce Eckel: *Thinking in Java, Second Edition*, Prentice Hall, 2000