Enhancing Application Interoperability and Enabling B2B Transactions over the Internet for Small and Medium Enterprises : The PRAXIS Project

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Abstract. The paper presents an approach towards executing transactions between enterprises, governmental bodies and banking institutions, based on ERP applications connected over the Internet. The work builds on a review of current XML standards for representing business processes and data (e.g. ebXML, UN/EDIFACT, RosettaNet, ebisXML) as well as standards for the technological deployment of such solutions (CORBA, .net, J2EE). Next, using proven enterprise modeling methodologies, key inter-enterprise transactional processes are being described (e.g. invoicing, banking transactions, VAT or Tax declaration). For the automation of those processes, application-neutral protocols, electronic data formats, and messages for interoperating applications are defined, in XML-based schemas. Finally, a server-based system for managing electronic transactions, such as e-invoicing, e-VAT, and e-payment is designed and deployed among the various transacting organisations.

1. Introduction

Today, the typical European enterprise interacts on a daily basis with a multitude of external entities, which include the public sector (Ministry of Finance, Revenue and Tax Offices, Insurance Agencies, etc), Financial and Banking Institutions as well as other enterprises in the roles of supplier or customer. In Greece only, there are several hundred thousand enterprises, including approximately 700,000 Small and Medium (SME's) and Very Small Enterprises (VSE's), which typically have minimal IT infrastructure.

The majority of the above transactions are still carried out in the traditional manner, typically sending the various transaction documents through mail or fax, manually inserting data in their internal ERP applications or, at the best case, manually filling in Web-pages from Banks or Governmental Agencies, as most of the companies are still reluctant to entrust the internet and current B2B or even B2C application for their transactions.

The PRAXIS project, co-funded by the 3rd Community Support Framework (CSF) under the Information Society Programme and led by Singular Software SA, brings

together companies, research centers and public sector bodies in Greece, aiming to provide a solution that will allow the automation of the aforementioned transactions.

The proposed solution will have to follow the current European legal and statutory framework with respect to electronic business transactions and electronic invoicing, taking into account the on-coming evolutions in this framework, also creating some legal directions from the practical application of the resulting system.

2. Objectives

The main objective of the proposed approach is to research, develop and apply, at least in pilot operation stages, the required methods and infrastructures that will allow the typical Greek SME to carry out most of the transactions described above through the Internet, and in particular through the seamless interconnection of their ERP systems with the corresponding software applications of other businesses, the public sector, and financial institutions.

In particular, the main goals of the approach are:
- The formation of a set of processes, protocols, and a reference architecture for the electronic interconnection of applications and the execution of financial transactions.
- The design and development of a prototype software system that will allow the interconnection of said applications and the safe asynchronous transfer of transaction data between businesses or other legal entities.
- The pilot operation of the above system with typical users (including Alpha Bank, the General Secretariat of Information Systems of the Ministry of Finance, various companies, and independent accountants).
- The study and re-working (in the form of proposals) of the current legal and institutional context with respect to electronic B2B transactions and eBusiness applications.
- The implementation of a financially viable software solution to be adopted by Greek SMEs.
- The continuous dissemination of the methodologies and know-how that will be acquired during the execution of the PRAXIS project, through existing Networks of Excellence and other channels.

3. Methodology

The methodology for the presented approach consists of three main and overlapping axes:
- The analysis, specification, and design axis which consists of:
    - The analysis of business processes and transactions that are currently carried out in a traditional manner

- The development of detailed specifications and the design of data schemas to support the above automatic, application-to-application transactions,
- The drafting of detailed specifications for the technological infrastructure of the PRAXIS system

- The implementation axis which consists of:
  - The implementation of the PRAXIS server,
  - The implementation of a set of reference PRAXIS client applications, which will allow the interconnection of different existing ERP systems.
  - The trial and pilot operation of the entire system with select users

- A vertical crosscutting axis which consists of:
  - Validation and adaptation of the system and the results obtained, in a variety of users including SME's, VSE's, Banking Institutions and Governmental Bodies
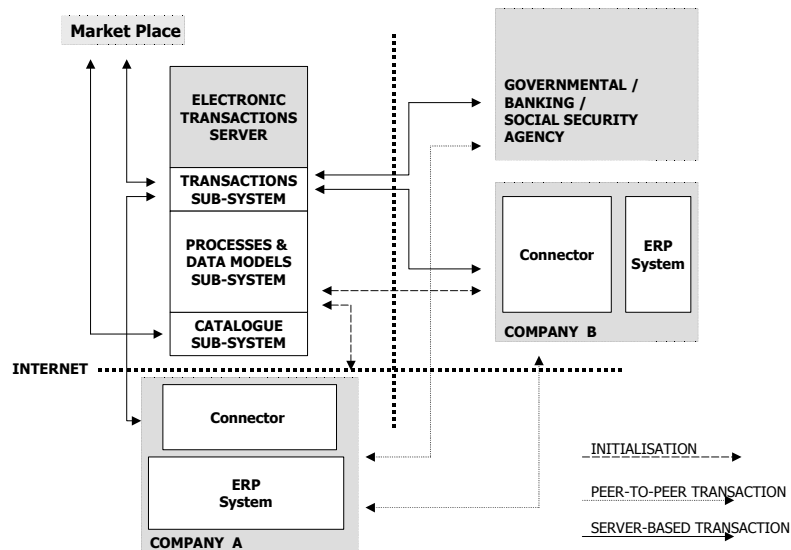 - Dissemination and exploitation of the projects results.

Fig. 1: The Overall Architecture of PRAXIS system

4. Technology

The technological infrastructure of PRAXIS system is intimately related to the currently available standards and solutions for the modeling of business processes, the modeling and description of data (including XML-based hierarchical languages) and the current technological standards for developing Internet-based systems and applications such as Web-services, UDDI/SOAP protocols, the .NET architecture, the Java/J2EE framework, and the associated development platforms.

The PRAXIS data infrastructure (messages and electronic documents) is being developed through applying and modifying the existing XML-based standards for business transactions such as ebXML (a widely adopted open standard proposed by the UN for the interchange of business oriented documents and messages), ebisXML (proposed by the BASDA organization), xCBL (supported by major International Software Vendors), RosettaNet etc.

The PRAXIS overall architecture, as illustrated in Figure 1, consists of a central transaction server that allows the asynchronous interconnection of different client systems, in an application-to-application mode. The server is comprised of three entities: The Registry, the Store-and-forward system, and the Web Front-End. Three types of client systems are supported: fat clients (which allow the complete PRAXIS system functionality), thin clients (which provide reduced functionality) and a "zero-client" option, in which the transactions can be completed through standard Web-browser applications. Security considerations are of central importance, and state-of-the art technological and design solutions are applied to ensure the safe and risk-free operation of the proposed system.

5. Conclusions

The main expected outcome of the proposed approach and PRAXIS project is a complete proposal and a validated implementation for the execution of business transactions over the Internet that will comply with the current European legal framework and will stimulate its evolution.

The resulting benefits for the SME's and VSE's that will adopt the PRAXIS system can be summarized as following:
- A significant reduction in the required time and effort for carrying out everyday transactions. It is estimated that for a typical SME, the time saved will be of the order of several person-months per year.
- A significant reduction in rate of errors that are currently made due to the repeated data entry and manual interventions in these transactions.
- A major decrease in the cost of adoption of e-Business processes for the SMEs, as the PRAXIS system will be made widely available and distributed at relatively small cost.