

# e-System for public administration reporting services

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## Abstract

*An important process in any government is collecting data about businesses in order to develop efficient short- and long-time strategies. Although business enterprises are required to provide such statistics, many times these reports prove to be costly, time-consuming and based on redundant data. For example, information about employees is used for labor reports, health-plan reports, etc. Furthermore, this data is already available in the back-office systems being already used by many business organizations. We present an e-Services platform designed to automatically collect such data, aggregate them according to government-defined rules and help the company/enterprise by automatically generating reports and statistics that are automatically sent to the public administration entities. In particular, we detail on the implementation of the service designed to automatically collect data from back-office systems and map them to certain report templates. We also detail on the implementation of workflows describing the tasks involved to generate such statistics and reports, as defined by the public administration. The solution is designed to help government better plan its strategy and facilitate a better interaction between business organization and the public administration.*

**Key Words:** Reports, e-System, e-Services, public administration.

## 1. Introduction

One important problem with public administration is collecting data about companies. Various government processes require information from businesses. Examples include statistics about number of employees, revenue data, etc. However, collecting such data is not always an easy task. It generally requires the data to be voluntarily transmitted by business organizations. In many cases on the business side the data, instead of being electronically transmitted, is copied manually from the database in the internal back-office system and then sent to the public administration entities.

We present an e-Services system for optimized automatic data transfers, document workflows and

business reporting of business organizations. The system is designed to optimize businesses by helping them better deal with routine tasks such as periodical reporting data or automatically managing interactions between the organization and the public administration. The article presents a pilot implementation of this solution, designed to prove its value in a real-world environment.

The rest of this paper is structured as follows. Section 2 presents related work. In Section 3 we present the architecture of the system. We next detail on the implementation of the data interpretation service. Section 5 presents details on the implementation of the workflow process mapping of the report generation tasks. Finally, in Section 6 we give conclusions and present future work.

## 2. Related Work

In many countries companies are required by government to periodically report their fiscal, social and statistics information to various institutions. Many data required by these reports are redundant and in many cases the company has to report the same information to different institutions. Such reports and the methodology for filling them are well documented by the local legislation. According to [1] the public administration will be affected by various changes and challenges due to the private sector's expectations. Thus this paper strives to fulfill a part of these challenges.

In Romania, in particular, many institutions adopted their own "in-house" systems for managing data using different technologies. The existing heterogeneous means of communication can have a negative impact on the reporting workflow between enterprises and public authorities. Due to this issue it is important to model the reporting process as close to administrative reality as possible. According to [2] online public services can be classified in three categories: life event/business situation, public services, processes. In addition to these aspects, we also concentrated on solving the data redundancy issues currently existing in the administrative system and affecting the reporting activity of most of the private entities.

A platform designed to provide data interoperability is Talend Open Studio [3]. This application offers the possibility to connect to various data sources, extract and

manipulate data. However, it lacks the capability of our platform to dynamically define process rules for the automatic generation of reports and statistics.

Except for that, there are not many similar solutions to the proposed architecture. In Canada, the Employment Insurance Internet [4] reporting service was created to allow users to submit their reports using the Internet. The weak point of this system is that it only allows employees to submit reports on their activities, and not companies.

The presented system continues the research efforts started in [5]. It addresses a series of issues that regard not only the improvement of the public administration reporting services, but also the improvement of the business environment. Our organization, e-Caesar, plays an important role in developing eGovernment solutions. The solution proposed for the EUSDRO project [5] is similar to the current solution, the main common features being the document workflows and email communication between entities.

In our work we have tried to keep the principles and definitions of eGovernment which are described in various papers, such as [6].

### 3. The Reporting e-System and Its Services

The architecture of the e-System (presented in Fig. 1) involves a high degree of interaction between the system and the public institutions. It consists of several software components, called Processors, responsible with the automatic generation of reports based on the data available within a business organization. A Central Authority is responsible with communicating with all processors, updating their rules and report templates and managing their processes. In addition, public institutions interact with the Central Authority and provide information regarding the reports using a natural language.

Based on this architecture, we developed a pilot implementation based on the business realities in Romania. The basis of such an implementation consisted of a series of specific Romanian public administration documents used in domains such as social insurance, environment and fiscal reporting. The analysis of the reporting processes between businesses and public authorities revealed the existence of 4 classes of reports, for reporting fiscal, social, environmental and statistical data.

Such reports can generate a lot of documents and bureaucracy that can have a negative impact on performance of the private business enterprises.

For the pilot implementation we concentrated, in particular, on the 010 Fiscal Registration Declaration, officially known as declaration of amendments for judicial persons, associations, and other entities without judicial personality. The sensitive data that has to be

inserted into this report consists of the identification data of the taxpayer and the categories of declaration tax obligations according to the law, hereinafter called fiscal vector. The fiscal vector can be defined as the permanent obligation of the taxpayer and consists of data regarding the following financial aspects: VAT, excises, petrol tax and natural gases from the internal production tax, gambling tax, profit tax, fiscal royalties, micro corporation income tax, wages income tax, special taxes such as: social health insurance tax, unemployment tax, professional illness and accidents tax, social insurance tax.

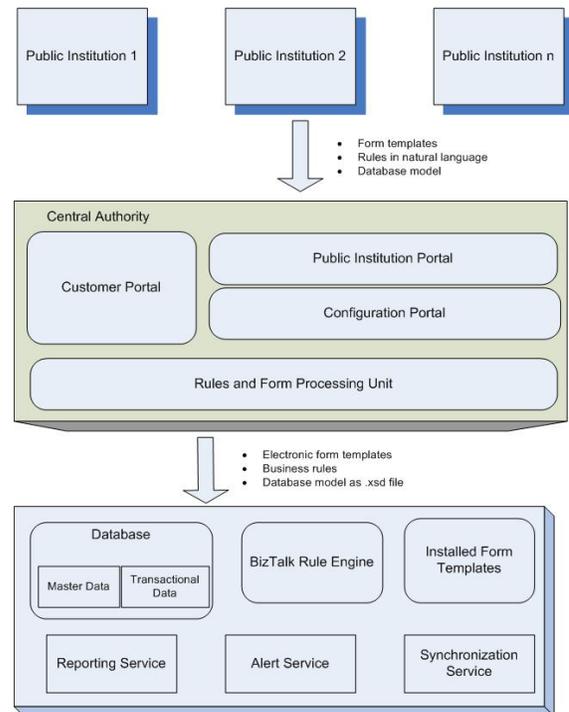


Fig. 1. The Architecture of the reporting e-System.

For generating reports the system uses form templates, sets of rules to fill in the report and a list of data fields specifying the data needed for the report. This information is passed to the Central Authority using the service provided by the Public Institution Portal. The information uploaded by the public institution is processed and transformed in an electronic format. The XML-format of the electronic templates makes it possible to fill them in either online or offline. The computing rules are also electronically represented.

Furthermore, in the current implementation the computing rules are mapped onto BizTalk Business Rules. Lastly, the data model from the public institution is transformed in an XSD form. The three generated components can be uploaded in the Configuration Portal and a service inserts them into a package, which is sent to

all the Processors in the system, this being known as the synchronization service. The upload procedure to the Configuration Portal is enhanced by a specially designed form that collects information regarding the starting date of the report, the name of the database the report is associated with, the periodicity of the report and its ending date.

On the Processor side, after the package is received a series of services are started. First, the data model is processed. This is accomplished by automatically creating a database that is to be associated with the form template in the package. The data model is described by a XSD file containing the database structure (tables, columns and data types) which is parsed using a web service and the new database is created using the SQL Server Management Objects (SMO). These are objects designed for programmatic management of Microsoft SQL Server. SMO is implemented as a Microsoft .NET Framework assembly which increases performance, control, and ease of use. Secondly, the new database is filled in with data from existing databases in the processors' data warehouse. The process of automatic data interpretation is described in the following Section.

On a processor, the reports are generated automatically according to the data filled in the Configuration Portal. An alert service check periodically the information received regarding the installed templates and if the deadline of a report is discovered the report generation service is called.

#### **4. The Data Interpretation Service**

The Data Interpretation Service is responsible with gathering data for the Processor. For this, the Service handles two types of data: master data and transactional data. The master data describe the business organization as known by the public administration entities. The data includes the id of the company, the company's name, the company's address, the legal representative of the company, etc. This data is entered in the Customer Site of the Central Authority and is transferred along with the processor. The transactional data, on the other hand, is obtained by aggregating master data using the Business Process Rules that are received from the Central Authority.

The processor also uses master data available only on the company's premises. Such data is used, for example, to describe the employees of the company. The data includes the name, salary, starting date of the activity in the company of each employee.

For gathering this type of data the e-System includes a service that is capable of automatically collecting data from the local databases of the already-existing back-office systems in the company. This service is configured using a web interface that helps the company set up

relations between local back-office systems and the Processor. The service further connects to the company's database and to the database inside the Processor. The user must provide credentials and localization data for its own database in for the service to be able to connect. After the connections are done, the user can see the extended structure of the both databases. Using the web interface, the user can define mappings of columns and tables, meaning he can choose data from one column in his database to be transferred in another column in the processor's database.

One issue when developing this service was data conversion. For solving such inconsistencies between databases the system tries to map data types using a best-effort approach. In this process the user has the responsibility to make the final data mappings. This means that the user must approve the conversions that are necessary in order to transfer the data between the entities chosen. For example, the user should approve to convert data from a column that holds Boolean values into data from a column that holds numerical values. The approval for all the conversions necessary has to be done before the data transfer is started. If the user does not agree with at least one conversion, the data transfer is not initiated.

The problem arising from the automatically information classification is that a report may need both master and transactional data to be filled in, for the report generation. In this case, the data has to be kept persistent between the databases, as each new report is associated with a new database that contains a series of master data and specific transactional data. The solution consists of a service that compares the structure of a given database with the structure of the master data database and transfers information in the direction of the given database. This service identifies similarities between the two databases, consisting of identical tables. Whenever two identical tables are discovered the data is transferred in the report specific database. Identical tables are defined as tables that have the same name, the same column names and the same data types records. The synchronization of data between databases is achieved by extracting the data from the source table and inserting it into the destination table. This process is sequential as it processes one table a time.

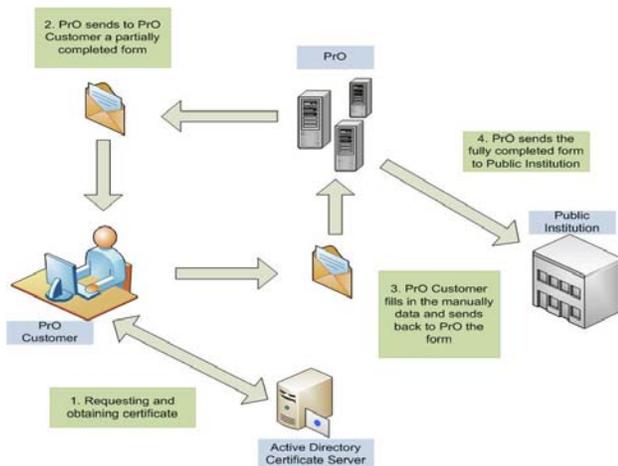
#### **5. The Implementation of the Workflow**

One important function of the Processor is to gather data and generate the statistics and reports as needed by the public organizations, conforming to existing rules and regulations. We started by analyzing the steps involved in several report generation processes and mapped them into electronic business rules and processes. In the pilot implementation the chosen technology for managing the resulting electronic workflows was BizTalk [7]. The

resulting BizTalk orchestrations exclude most of the human interaction, and keep the flow of the document as close as possible to the real public administration workflows.

Figure 2 presents a workflow describing a business process used to report data to the public administration. The premises for this workflow are that the Central Authority sends a report to be filled in along with specific information such as the periodicity of this report, the name and structure of the database to be used for retrieving the data and the rules that are used to define how to obtain aggregated sets of data from the existing records in the database. The periodicity of the report can be defined as the period of time which elapses during two consecutive actions of filling in the forms. Forms may need to be filled in monthly, annually or per semester.

The information used to generate a report is kept in a table in the metadata database. It includes the identifier of the form, the timestamp when the data was added, the timestamp of the first run, the next date when the run is scheduled to be executed, the periodicity, the name of the template and its version, etc.



**Fig. 2. A workflow describing a business process for reporting data to public administration.**

For standardization purposes, the communication between the components described by the workflow is accomplished using either web services or email. For email, we integrated Outlook with Infopath, allowing the visualization and the possibility to fill in the forms inside the email. The steps presented in the figure are:

**Step 1:** The processor generates a report using existing data, triggered by the date of the next scheduled run. The automatically generated report is sent to the person configured as being the responsible from the company for validation and digital signature.

**Step 2:** The person responsible with the Processor fills in the manually data (if such data is required) and sends

the data back to the Processor (using either e-mail or the web interface).

**Step 3:** The Processor archives the report and sends it to the Public Institution. The BizTalk orchestration offers the possibility to retrieve the content of an xml attachment using the POP3 adapter. The XML generated data is also stored locally.

For communicating with the public institutions, the Processor uses automatically sent email by default for every form. These emails contain the form filled in only with the automatically generated information. The Business Rule Engine, used to fill in the fields of the form with the information from the database, is triggered when an empty form reaches a certain directory from the server where the Processor is installed. The workflow sets up several parameters for the current policy, as well as the database and the needed tables. Then it calls the policy rules describing how data is inserted into the form. The result will be the form having the fields filled in with data. The resulting form is further used by the next workflow that deals with sending the final report to the public institution.

## 6. Conclusions

In this paper we presented an e-System designed to help business organization optimize their reporting processes required by public administration. This solution further facilitates a better interaction between business enterprises and the government and can help the later better plan the short and long-time strategies based on reports and statistics and the private sector.

Currently many such companies already use back-office systems. The e-Services platform is designed to automatically collect the data, aggregate them according to government-defined rules and help the business by automatically generating reports and statistics and send them to the public administration. In particular, we detailed on the implementation of the service designed to automatically collect data from back-office systems and map them to report template. We also detailed on the implementation of workflows describing the tasks involved to generate such statistics and reports, as defined by the public administration.

The solution was successfully implemented within the Romanian business environment, for the 010 Fiscal Registration Declaration, officially known as declaration of amendments for judicial persons, associations, and other entities without judicial personality.

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