ACCOUNTING INFORMATION INTEGRATION TROUGH AN ENTERPRISE PORTAL

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If companies are lacking integrated enterprise software applications, or they simply do not use them on a large scale, accounting departments have to face lots of difficulties, concerning both the inflexibility in achieving good results and the limited possibility of communicating these results. Thus, most times, accounting departments are limited to generating predefined reports provided by a software application and the most they can do is export these reports into Microsoft Excel. Another cause which leads to late obtaining and publishing of accounting information is the lack of data from other departments and their corresponding software applications. That is why, in many enterprises, accounting data becomes irrelevant for the users. The main goal of this article is to show how accounting can benefit from an integrated software solution, namely an enterprise portal.

Keywords: Accounting Information, Accounting Reports, Integration, Information integration, Enterprise Portal

JEL: M15, M49

1. Introduction

Nowadays, accounting departments cannot do their job, which is to provide accurate and relevant information, without collaborating and integrating with other enterprise organizational structures. The most recent marketing studies (PAC[24], 2010, 2011, 2012) show a very low rate of adopting integrated software solutions for Romanian companies, especially for small and medium-sized businesses, but also for big companies (Avram, 2010). Besides that, in many companies where these solutions are present, they are only partially implemented (certain modules only). In the 2012 PAC study *ERP Romania 2012*, one can see that the number of ERP implementations exceeding 500.000 Euros is very small, which shows either that they are only partially adopted within large enterprises (only some modules, while others are intentionally omitted) or they are adopted by small and medium-sized businesses, but which prefer cheaper solutions that don't always possess all the features of an ERP system. *The Global Information Technology Report 2010–2011 Study* which was performed on a global scale by the World Economic Forum and INSEAD, concerning the ICT usage in business, places Romania on the 70th place of 138 analyzed economies, behind countries like Poland, Hungary, Slovakia or Slovenia (WEF and INSTEAD, 2011).

In addition, the informational demands of the managers become more and more complex, while taking decisions implies analyzing and using more and more items of information, in ever more different formats (Lupasc et al., 2009). In our opinion, nowadays obtaining relevant accounting information in a timely manner should not be a problem for any enterprise accounting department. Even if an enterprise integrated software solution like an ERP is not present, there are still other numerous software tools and technologies which can be used in order to reach informational integration of an enterprise (Andone and Tabara, 2006; Rizescu, 2010). In this article, we shall present two of the functions of an enterprise portal, which we chose to develop as a solution for the informational integration of an enterprise, insisting on the matter of integrating accounting data in the enterprise organization.

We chose an enterprise portal to be an organizational integration solution in general and its' accounting function in particular for several reasons:

[24] PAC-Pierre Audoin Consultants is a company which specializes in IT&C software and services market research and strategic consulting. They annually publish reports regarding the ERP market in Romania.

- A portal provides both a unique integrated access point to the organization's data sources and software applications and a collaborating work environment;
- The same time, it provides security, search, collaboration and workflow features;
- The high scalability of portal technologies allows them to be used for building solutions for a very large palette of organizations, from very small ones to quite big ones, not having to consider their particularities or field of activity;
- The flexibility during the development phase, which allows an easy transition from simple, small-sized solutions to extremely complex ones, without having to replace old versions;
- And, from our point of view, the most important thing: a portal can be implemented over the existing applications structure without having to modify any of them in any way. The portal is developed directly over the existing organizational particularities.

The solutions presented in this article are part of a bigger set of solutions, implemented in an enterprise portal prototype, prototype which we intend to develop it further. Part of them were published in other papers (Rizescu, 2010; Rizescu and Andone, 2010; Rizescu et al, 2010) and another part are still to be published. Until now, all these solutions are:

- Managing and sharing accounting data and documents in a secured and controlled environment;
- Obtaining and securely sharing MS Excel accounting data in a controlled environment using Microsoft Excel Services;
- Automating accounting processes using workflows;
- Building an integrated reporting system in order to provide real-time access to accounting data and integrating it with other organizational software applications;
- Collaboration and communication between accounting professionals by the means of the newest collaborative technologies: blogs and wiki sites;

2. The software architecture of the enterprise portal

In order to provide a unified environment, we only used Microsoft technologies when we built the portal and implemented the practical solutions. For the building and integration of the portal and also for future development, the following software components were installed and configured:

- Operating system - Windows Server 2003 SP2 or later;
- Web server - IIS 6.0 or later and ASP.NET 2.0 or later;
- Database Server - SQL Server 2005 or later;
- E-mail server – POP3 and SMTP;
- SharePoint Server - Microsoft Office SharePoint Server (MOSS) 2007 including Forms Services for development of sites;
- Reporting Server – SQL Server Reporting Services 2005 with SP2 including Reporting Services Add-in for SharePoint 2007 for integration of reporting server with SharePoint server;
- Excel Calculation Services, Excel Web Access and Excel Web Services – extend the portal's functionalities for accessing external data sources in Excel workbooks and for their integration in the portal.

Thanks to the solution we chose, the upgrade of any of the earlier mentioned components is very easy. The scalability of our solution allows the installation of all these components either on a single server or on separate servers, using an 3-Thier architecture. Figure 1 presents the deployment of the solution on a single server.

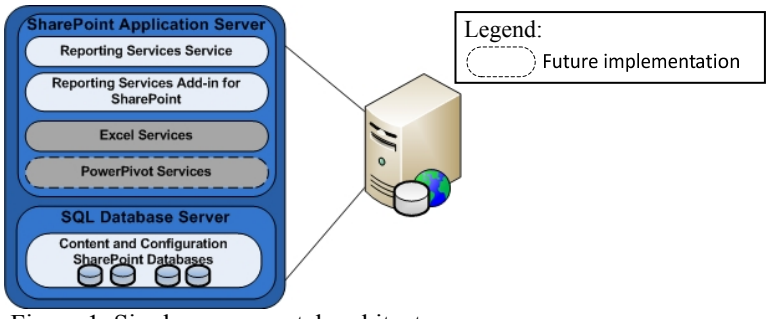

Figure 1. Single server portal architecture

3. Functional architecture of the enterprise portal

When planning the informational structure of the portal, we considered a series of factors. The informational structure of the portal should help users navigate to the documents they are interested in

without requiring any additional searching. The informational structure must allow users to contextually see documents and other portal components in order to help them decide whether the respective documents or components are relevant for what they wish to accomplish. Generally, users are both searching and navigating in order to find what they are looking for in a portal. The peculiarity when planning this kind of a portal is that although building an optimal informational structure is vital for an optimal experience, such a structure cannot be obtained until users interact in real-time with the portal. Thus, while users are interacting with the portal, providing real-time post-implementation feedback, the informational architecture can be modified, in order to become more efficient and more adequate.

The analysis of information regarding user requirements and the way users further employ the data provided by the portal in their specific activities, must always be performed considering the conceptual organization of an enterprise. In other words, the important thing is to find ways to organize and group information based on several criteria, like business workflows, important projects, the main roles of a business or the organizational structure.

We were mainly interested in analyzing the way in which the collaboration and integration roles of a portal can help improve the accounting role and thus we decided to organize the information provided by the portal according to its organizational structure. In conclusion, we built the portal around the enterprise departments in the way shown in figure 2.

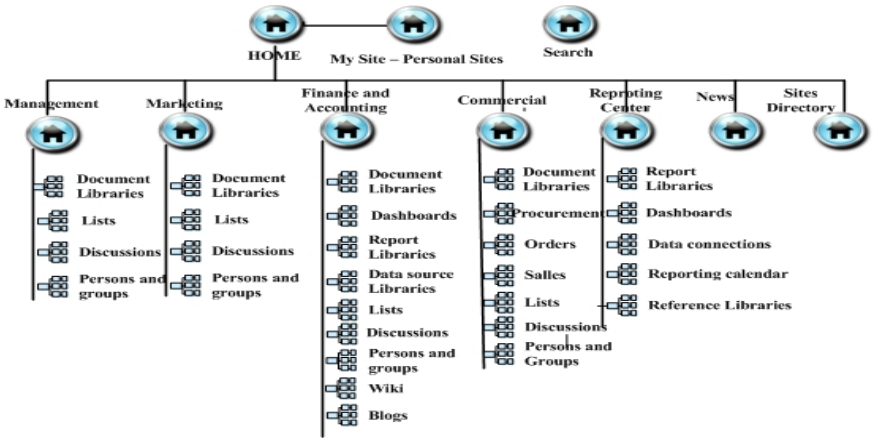

Figure 2. *Informational structure of the portal*

Having a well-designed informational architecture can bring an important contribution in the process of achieving organizational goals. This structure must allow users to quickly find the information they need for their job tasks and the same time must improve their operational efficiency. It must also permit users to correctly identify their roles in the general organizational context and understand the portal and what it can provide as a whole, in spite of the fact that in the beginning they may only be searching for information they are directly interested in.

4. Sharing and centralized management of accounting reports

One of the major problems that accounting has to face is offering in due time the information that other employees need in order to do their jobs. For example:

- In order to accept an order which exceeds a certain amount of money, the employees in the commercial department need to know if the customer is a good payer;
- In order to plan actions which require employees to travel, the human resources head of department needs to know the travel expenses budget and how much of it is still available;
- In order to sign new contracts, the manager must be aware of the available cash in the company banking accounts and also of the status of the customer or of the supplier;
- Planning and maintaining budgets for all departments, for new projects or certain activities also requires financial and accounting information;

The Accounting Department has this information and must provide it. However, very often it takes a lot of time for the information to travel between those who request it and those who provide it.

In nowadays systems, accounting data and reports are most often provided as print, e-mails or over a network, using different sharing techniques. So, if an enterprise doesn't possess a high-performance, integrated ERP system (and, sometimes, even if it does), not all decision factors can gain access to the data they need. Sometimes, in spite of having access, they still can't reach the data, as they

don't have the time or the necessary knowledge to get to it themselves. The sharing methods we presented earlier have numerous disadvantages:

- Difficult tracking of different versions of documents;
- Necessity to transmit the same document several times, by a certain user or by different users;
- Difficult, time-consuming searching process;
- Difficult tracking of the changes made to the documents;
- Difficult management of user rights;

The solution we propose in order to solve these problems is to share documents and accounting reports by the means of document libraries, within a portal. This has numerous advantages, among which we mention:

- *Managing any kind of document or accounting report*: doc, xls, jpg, gif, pdf, rar, zip, tiff, txt, csv etc. It is possible to block certain types of files from loading into the document library, for security reasons (exe, bat, zip, rar, etc.);
- *Managing document versions*. All changes made to a document are automatically stored in the library. One can choose between a simple tracking of versions (containing only date and time for each release) and keeping a more complex history, with both major versions (1.0, 2.0,...), and minor versions (1.1, 1.2,...);
- *Describing and storing an unlimited number of properties for each document*. Accountants can add as many columns as they want to the document library in order to describe properties or any other kind of information regarding the stored documents;
- *Adding custom views*. Accountants can set their own custom views and group the documents in the library as they please. They can define these custom views for them only or they can make them available for other employees accessing the library;
- *Blocking documents*. Using *check in* and *check out* features, accountants can block documents for any period of time, regardless of them being opened or closed;
- *Collaborative work process in dedicated workspaces*. When creating a workspace, a copy of the document is automatically generated and a sub-site is built around it. Inside this sub-site, several employees can access the document and work with it. When the document is ready, the new version is published in its original location in the portal;
- *Automatic notifying on the changes made to documents*. Accountants can use both the *Alert Me* feature, and RSS feeds for the automatic notifying on changes made to documents or on the occurrence of new ones in the respective library;
- *Cancelling deletion*. Deleted documents are kept in a recycle bin and they can be restored from there if needed;
- *Workflow implementation*. A document library can provide accountants a very large range of workflows, from simple ones, used to create a new document or change the properties of an existing one, to very complex ones, which require using data collected from operational software applications;
- *Authorizing published documents*. Accountants can activate the authorizing feature for certain or all documents in the library. Thus they will need authorization before being made public in the portal;
- *Policies and rules*. Accountants can define policies and rules and apply them to documents. For instance, all documents older than six months must be converted to pdf and moved to another location. Accountants can also audit each action performed on a document: reading, editing, deletion, moving or copying;
- *Document types*. Accountants can create an unlimited number of templates for a library. The templates may contain attached workflows, properties columns, rules and policies;
- *Document-level security*. Each document, when uploaded into a library, will automatically inherit the properties and settings of that library. However, it is possible to define different permissions and properties, if needed. This way, document-level security becomes available. It is also possible to set permissions on a certain folder and this way all documents uploaded to that folder will inherit its properties and settings.

The image in figure 3 presents the contents of the *Forms* folder from the shared document library of the *Financial-Accounting Department*. This way, all the accounting documents' forms used in an enterprise can be stored in one place and shared in a secure and controlled manner between all employees.

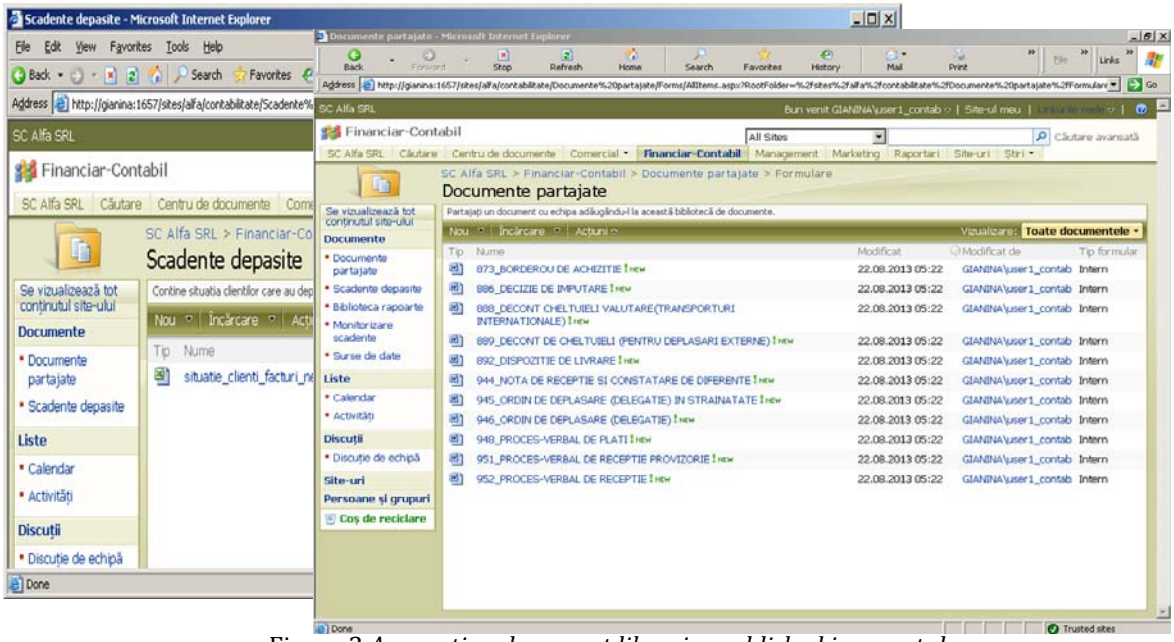

Figure 3 *Accounting document libraries published in a portal*

Even in the situation where accounting information is shared by the means of document libraries, delays can occur when accessing the data necessary for different activities in an enterprise. Accountants or other employees must track the documents they are interested in and must find out whether they were modified, deleted or if new documents appeared. These checks, especially in the case of large document libraries, can become very time-consuming, thus leading to lower employee efficiency. In order to avoid this kind of situation, we use electronic notifications (warnings, announcements).

The most common way of receiving notifications is via e-mail. Our solution integrates one of the newest electronic notification technologies: RSS (Really Simple Syndication) feeds. Inside the portal, with the help of RSS feeds, people can automatically follow changes occurring in libraries (no matter the content: documents, reports, data sources), lists, news, blogs, wiki sites, activity lists of different workflows etc.

In order to implement the electronic notification system in a portal, the following tasks should be resolved:

- Building an e-mail server by installing and configuring the POP3 and IMAP protocols;
- Integrating Microsoft Outlook with the SharePoint server;
- Defining RSS feeds for the document libraries;
- Synchronizing document libraries with Microsoft Outlook;

Accountants can benefit from using RSS feeds in their activity in at least two ways:

- By subscribing to the RSS feeds on the component sites of the portal and on document libraries, they receive updated information on important events occurring in the enterprise and on documents they are directly interested in for their daily tasks. This way, they can save time, as they are not forced anymore to search for the information they need;
- By defining RSS feeds for the content they create (sites, document libraries, blogs, wiki sites, reports libraries, data source libraries), accountants can provide updated information to other enterprise employees.

To demonstrate, let us consider the following *scenario: the Accounting Department* periodically warns and updates the *Contracting* and *Sales Departments* on long delays in customer payments, so that in turn, these departments should be able to accept or deny new orders, based on this information. Usually, accountants send this kind of report in print, according to a previously settled schedule. If such a schedule does not exist, they edit the report and send it when they are requested to. Like any other type of printed report, it can be lost, accountants may forget to send or even create it, or the request may come at a very bad time, when accountants are very busy with other tasks. All this leads to delays for the other departments, which have to wait for the data provided by Accounting.

When using document libraries, accountants can edit the due date invoice situation using the accounting application, point out invoices that are overdue by a certain number of days and then load the report into a document library in the portal. (figure 3).

Once loaded into the document library, the report is available for all the employees who need it and are allowed to view it. By implementing RSS feeds, all accountants must do is define an RSS feed for the "Overdue invoice" documents library. When a new report concerning due dates is loaded, or the existing one is modified, the SharePoint server will automatically send to the RSS Feeds folder in Microsoft Outlook a message announcing the occurrence of a new document in the library. The message will be sent to all employees who subscribed to the RSS feed in the "Overdue Invoice" document library. The message has an inserted *View Article* link, which allows viewing the document by simply clicking on it (figure 4).

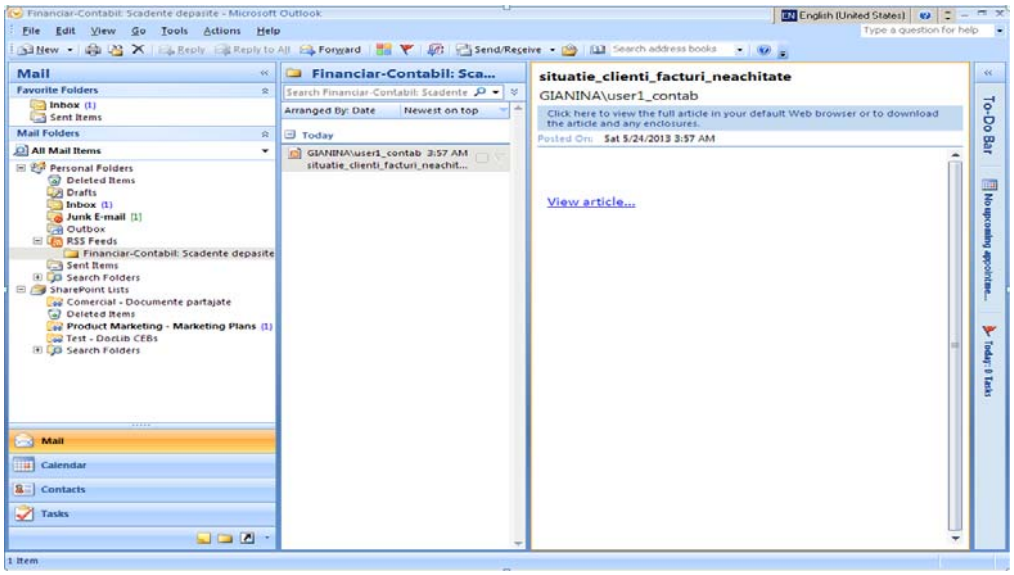

Figure 4 The contents of *RSS Feeds folder in Outlook*

Users can also be warned by an alert that starts the moment an RSS feed message is received by their e-mail account. The document can also be viewed by simply clicking the Open Item button in the alert window (figure 5). The messages received in the RSS Feeds folder are not notified by the means of default desktop alerts, like it happens in the case of the Inbox Folder. In order to provide alerts for the updates in the RSS Feed folder, we created a rule associated to it which makes an alert pop up any time there is a new message in that folder.

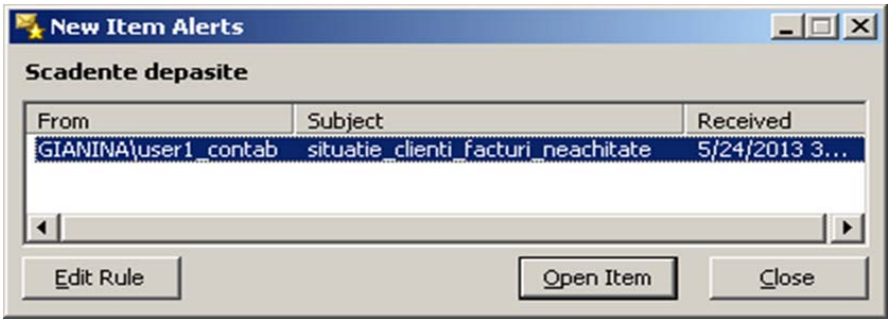

Figure 5 *Warning message displayed when receiving new messages in the RSS Feeds Folder*

The amount of time accountants can save by using document libraries and automated notification systems is tremendous. If an accounting professional needs to track 10 reports in order to perform his daily tasks and it takes him about 2 minutes to search for them over the network, he can save 20 minutes (about 5% of his daily working time) by using the document libraries and the RSS Feeds. Given the fact that the process is rarely accurate and employees tend to divagate, the searching time can increase accordingly, by browsing unnecessary content. The same amount of time can be saved by other employees. If we multiply the 20 minutes saved by one employee to the total number of employees in the enterprise, we can find that the amount of time saved during one labor's day is quite important.

5. Creating and sharing accounting reports with Microsoft Excel Services

Microsoft Office SharePoint Server 2007 Excel Services is a new server technology, which can be used together with MOSS 2007 and which provides loading, calculating and publishing excel worksheets

on servers. Excel services have two main interfaces: a web-based user interface, which allows users to view excel worksheets in a web-browser and an interface built for programmatic access to the data and logic contained in the worksheets. Excel Services will only work in the presence of Microsoft Office SharePoint Server 2007 and provides the following features:

- Viewing Excel workbooks in a web browser;
- Accessing the data in the worksheets directly from the portal, by the means of dashboards and Excel Web Parts;
- Controlling the access and protecting the intellectual property of workbooks;
- Eliminating multiple versions of the same workbook;
- Employing server processing power, thus saving client computers processing power;
- Using a model developed in Excel in other applications or by other employees, by the means of parameters;

Excel Services is integrated in MOSS 2007, which means, for instance, that when an accountant saves a workbook in Excel Services, the workbook is automatically saved (published) in a document library in the portal, thus benefitting from all the features implemented by such a library. The extra-functions provided by Excel Services together with those provided by SharePoint allow the enterprise and the users to share, manage and control workbooks. These features include workflows, version management, auditing functions and full-time access to the data.

There are three main components to Excel Services (figure 6):

- Excel Web Access – provides viewing and editing of Excel files by the means of HTML pages;
- Excel Web Services – provides a means to develop applications which, by invoking the Excel Calculation Service component can compute, set or extract values from the workbooks. They can also update connections to external data sources;
- Excel Calculation Services – loads workbooks, calculates them, invokes user-defined functions and updates external data.

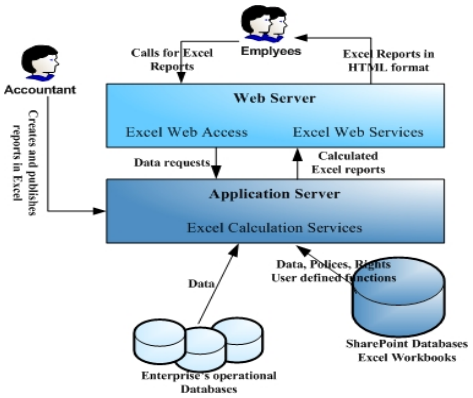

Figure 6 *Functional diagram of the Excel Services implementation*

Excel Services can be used for the following purposes:

- To share workbooks between the employees by the means of the portal;
- To create dashboards;
- To reuse the logic contained in the workbooks in other software applications;
- To create and share connections to the data contained in the databases of operational applications in the enterprise environment.

Accounting applications, no matter how good they are, can almost never cover the variety of reports that accountants need to produce. There will always be reports that they need to create and accounting applications can't help them. Most often, accountants use MS Excel to create these reports. Many times, these Excel workbooks contain important information or formulas, take a lot of time and effort to be created, or must be shared with other accountants or enterprise employees. In these scenarios, the usual methods (sharing by e-mail or over the network) don't work anymore. For example, sending reports through e-mail produces a lot of copies. The employees receiving the file can easily modify it, which leads to several versions of the same file. This way, it becomes very difficult to establish the correct version. It is also very difficult to protect part of the data contained in the reports, since they contain both confidential data and data that must be shared with other employees. Also, it's not appropriate to send complex reports, which take a lot of processing by e-mail. Each employee must first wait for the workbook to download and perform the calculations it includes, before being able to use it.

Excel Services provides the means to solve all these problems. By using it, the accounting reports created in Microsoft Excel are published on the Excel server, in the document library folder delegated with trust for documents published on the server. The other employees can view the documents in the library in their web browsers. When an employee views the accounting report, Excel Services loads the workbook, performs the necessary calculations, updates the data and sends the results to the browser. If several users access the same workbook at the same time, the workbook is loaded and calculated only once by the server and then it is saved in its cache memory, thus decreasing network traffic and the time it takes for complex calculations. It is also possible to save and audit logs of the workbooks access history.

The accountant who created the workbook can restrict access to certain worksheets or cell areas, so that others can only see the data resulted after performing certain calculations, but not the formulas they used. They can also restrict access to confidential data.

All these features provide a powerful tool for sharing workbooks by the means of the browser, in a secure and controlled manner.

The reports which can be shared with other employees of the accounting department or of other departments can be:

- Reports provided by the accounting software application exported in .xls format;
- Reports obtained from the accounting software application which need further processing and calculations;
- Certain reports that accountants need to create by manually inputting data that cannot be provided by the accounting software;
- Reports created in Excel by the means of ODBC connections and interrogations of the accounting database, which do not have predefined templates in the accounting software application;

The image in figure 7 shows a balance of trade exported from the accounting application into Excel and published on the Excel Services server, in the folder delegated with trust for Excel workbooks.

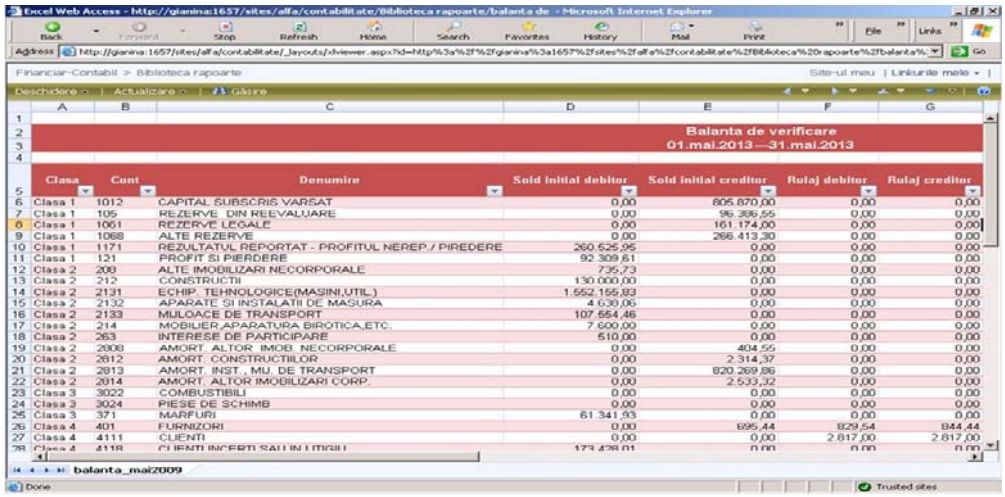

Figure 7 *Balance of trade, in HTML format as it appears in the portal*

Sharing Microsoft Excel Services workbooks provides the following advantages:

- Even if the whole workbook is saved on the server, accountants can choose to share only parts of it: only tables, cell areas, diagrams, only output data, but not formulas, a pivot table, a pivot diagram, certain worksheets, etc.;
- Other employees can interact with the report in their web browser, by the means of parameters. Excel Services displays in the browser a panel containing parameters with the help of which the user input values can be uploaded to the server. The server performs the calculations according to the new input data and then displays the results in the browser (figure 8).
- As far as interacting with the workbook inside the browser, users can navigate through the workbook exactly like in they would do in Microsoft Excel. They can group and filter the data in the workbook and change parameters in order to perform What-if analysis;
- If the tables in the workbooks have auto-filters enabled, users can group and filter workbook data in different ways: multiple value selection, Top 10 filters, quick filters (Above Average, Below Average, Contains, Last Month etc.) or custom filters (Less than, Greater than, Contains, Between, etc.)

Figure 8 presents a workbook with manual input data, which uses parameters and provides a forecast of future profit/loss of the period of an enterprise. Accountants are often asked to provide forecasts when employees need to establish budgets, plan activities, plan income and expenses, elaborate different strategies etc. In figure 8 there is a five year forecast model, which can be used by all those who need this information in order to motivate their decisions. This way, they don't need to ask accountants to send them forecasts all the time.

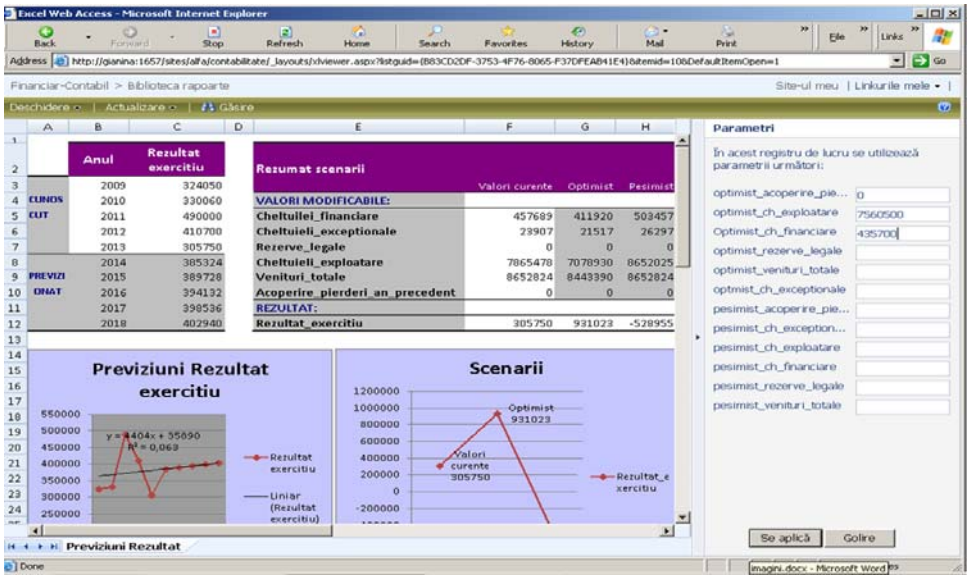

Figure 8. *Forecast model of the profit/loss of the period, built in Excel Services*

The forecast is made based on the profit/loss obtained in the last 5 years, using the TREND feature. Next to the table containing the estimated profit/loss, there is another table, which calculates future enterprise results based on two scenarios: an optimistic one and a pessimistic one. For each element affecting the profit/loss of the period, we defined a parameter. In the model, it's easy to observe the extent to which expenses affect the final result. If all enterprise expenses increase by 10% while the income stagnates, the balance quickly changes from a significantly positive result to a negative one. Once the model is created and published in the portal, it can be used by all those interested and parameters can be changed for either of the two scenarios. This way, an infinity of scenarios can be made, without affecting the original file. So, any changes performed on the workbook in the browser will not affect the original workbook saved on the server. Only the author and the users who have been granted administration rights can modify the data in the workbook and publish the new data on the server.

This service is extremely useful, as it allows employees who normally do not have access to the accounting application to use the data provided by it. So the service practically saves accountants from sending several different copies of the same report to several users, customizing each of them according to the requests of each user. Also, instead of sending the same report over and over, each time they modify it, accountants can publish it on the server, which will always contain the last updated version. Employees can view and interact with the data directly in the portal, by the means of their web browser, or they can save a copy of the report on their computers, where they can further process the data. This is only one example of how Excel Services can be used in a portal in order to create different report/analysis models, which can afterwards be used as needed by other employees and decision makers.

6. Conclusions

The IT systems and software applications used in the Romanian enterprises are still characterized by a very high degree of fragmentation. Even where there are ERP systems in place, a unique integrated system is still a dream. There are always areas or features that cannot be covered by a single integrated system, no matter how powerful it is. That is why additional integration solutions will always be needed.

The speed required to move data and information in enterprises and the rapidity with which enterprises must respond to the economic environment, require also the implementation of communication and integration solutions across the enterprise. In our opinion, a portal is the ideal solution which can provide the software infrastructure that is necessary in order to ensure full enterprise collaboration and integration of all employees, applications, systems and structures.

Accounting, as a central subsystem of an enterprise, which uses the data provided by all the other subsystems and provides information for all internal and external enterprise users, must integrate and collaborate with all the other subsystems. An enterprise portal eliminates all the problems caused by the unavailability of accounting information. The incontestable advantages that portals have were the reason why we chose to integrate accounting within an enterprise, from an informational point of view, with the help of an enterprise portal.

In this article, we described only two of the proposed solutions used to integrate Accounting with the other organizational subsystems by the means of an enterprise portal. The complete solution provides incremental development and integration, from simply sharing documents and accounting reports up to real-time access to Accounting or other departments applications data.

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