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MACROECONOMIC FACTORS AND DYNAMICS ANALYSIS USING ECONOMETRIC TECHNIQUES AND SOFTWARE

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Abstract: *Macroeconomic modeling has seen exponential growth in recent decades derived from the need to make relevant decisions by governments, industrial and financial institutions. Models are used to analyze and forecast national and global economic phenomena. On their basis comparative analysis of the developments of economies in the context of the new economy may be done.*
This is facilitated by the rapid development of computing techniques. This paper proposes a brief overview of the main models used in this field, as well as of the computer techniques used in modeling, analysis and prediction of macroeconomic phenomena.

Key Words: macroeconomic modeling; dynamic factors; software tools.

JEL classification: C13; C20; C22; C51; C61; E10; E17.

1. Introduction

The explosive development of econometric modeling as a tool of scientific knowledge, simplification and consolidation of the complexity of causation in different fields, was also boosted by the development of electronic computing. The emergence of computers based on microprocessors and their wide accessibility in terms of price and software determined that currently there is no area of research in which the computer is not the most frequently used to solve the most various issues. The computer became a favorite and irreplaceable instrument in econometric analysis, in prediction and, in general, in any scientific activity based on mathematical modeling. Processing a huge volume of information based on very complex algorithms in conditions of high accuracy can be achieved only with the help of a computer.

A relatively recent and spectacular use of the computer is related to analysis, synthesis and graphical processing of information, as important activities of econometric approach. Extraordinary possibilities offered by current ICT in this area are one reason that makes the use of computer indispensable in any econometric analysis.

Currently, there are dozens and dozens of software products dedicated to solve problems in econometric modeling, products emerged and developed over the last 3-4 decades, along the development of ICT and as response to the extraordinary development of econometric approaches. An inventory made recently on the existing software tools in the world dedicated to the econometric field, which was far from being exhaustive but only minimal, led to the identification of over 100 such software tools. This number is especially significant, since these software products are recognized worldwide, having a wide use in econometric practice. Through complexity, the many facilities offered and the user friendliness, the software packages developed for econometrics can be considered as true computer environments for conducting scientific research in this area.

This paper proposes an inventory and an overview of the main models used in this field, as well as of the computer processing techniques used for macroeconomic phenomena analysis, modeling and prediction.

2. Brief presentations of some models used for economic phenomena modeling

Macroeconomic modeling is central to decision making by governments, industrial and financial institutions. Models are used to describe the evolution of national and global economic phenomena, to provide a common framework for communication, to forecast future economic developments under alternative scenarios, and to assess potential outcomes of policies and external events.

Lately, the modeling of economic phenomena is based on the recent developments in macroeconomic theory and time series econometrics, and provides a transparent framework for forecasting and policy analysis.

Different purposes require different models. A theoretical model may be appropriate for certain purposes, while for other purposes a purely statistical model may be appropriate for describing the data. However, in many cases, there is a need to combine consistency with a good theoretical description of the data. Sometimes, in the literature one may find that this synthesis can take four main forms:

i)   Models that may contain hundreds of variables and equations and are usually constructed in detail on sub-models for different sectors of the macro-economy. Such large-scale macro models are the UK economy model, and the U.S. Federal Reserve Board model. These models made many important innovations over the years but, by their very nature, have evolved relatively slowly.

ii) In accordance with the methodology developed by Doan, Litterman and Sims (1984), Litterman (1986) and Blanchard and Quah (1989), these models are not limited and may use various modeling techniques. For example, the Bayesian methods and vector autoregressive methods are used extensively in the literature for the analysis and forecasting of economic phenomena.

iii) Some approaches are closely associated with the stochastic general equilibrium model (DSEG). This approach is the result of research by Kydland and Prescott (1982) and Plosser (1983), and provides an explicit inter-temporal model of general economic equilibrium based on optimization of decisions made by households and firms. Initially, these models focused on real factors (e.g., caused by productivity shocks), but more recently, the "new Keynesian DSEG models" were developed to allow monetary policy rules, adjustment costs, heterogeneity, and technological progress, etc.

iv) Development of a macro model that has transparent theoretical foundations, providing insights on the behavioral relationships underlying the macroeconomic operation.

Using a dynamic structural model allows to clarify the differences between the short- and long-term effects and to illustrate the problems involved in identifying these effects.

With such a model, one can get a general description of the modeling strategy involved in building a "cointegrated structural macroeconomic model." This strategy provides a consistent approach in both the short and long term.

Also, the structural dynamic model helps to highlight the dynamics of macroeconomic indicators in the short term due to significant shocks in the economy, and to quantify their effects. These models can be expanded in various ways, among which the most used are:

i) any national macroeconomic model there may be influences that are exogenously determined in the model and, therefore, the model can be easily expanded to allow for the study of macroeconomic indicators evolution under the action of shocks, also considered as exogenous;

ii) any national macroeconomic model can be only one element of a broader scenario of the economic behavior of a number of economies: for instance, the economy of any Member State of the European Community or, in the global economy. The model applied to a national level can be expanded to describe its behavior in a global context;

iii) in any modeling exercise the interest might focus more on a particular sector of the national economy, than on the whole. A detailed understanding of macroeconomics could be an essential element for understanding the behavior of a certain sector, but it is not an end in itself. Thus, the way the analysis of a particular sector could be developed in such circumstances is considered.

One example of general linear structural dynamic model for determining the $m \ x \ 1$ components of a z_t vector is the VECM model (Vector Error Correcting Model), which in a general form may be written as:

$$A \Delta z_t = \tilde{a} + \tilde{b}\, t - \tilde{\Pi} z_{t-1} + \sum_{i=1}^{p-1} \tilde{\Gamma}_i \Delta z_{t-i} + \varepsilon_t \qquad (1)$$

where: $A, \tilde{\Pi}, \tilde{\Gamma}_i$ are $\in M_{3x3}$ matrices;

matrix $\tilde{A}$ contains current structural coefficients;

$\tilde{\Pi}$ and $\tilde{\Gamma}_i$ contain Δz_t dynamic coefficients relative to the z_t historical ones;

ε_t is an error vector with m components, and it is assumed that errors are uncorrelated;

Ω is the covariance matrix;

$\tilde{a}$ and $\tilde{b}$ are vectors with m components of the structural coefficients.

Relation (1) is useful in circumstances where the z_t variables are stationary in first-order differences, or integrated of order one I(1).

Sometimes, it is assumed that there are r cointegration vectors and, in such conditions $0 < r < m$, and $\beta \in M_{mxr}$, and the $\tilde{\Pi}$ matrix will have the *r* rank and can be written as product of matrices: $\tilde{\Pi} = \tilde{\alpha}\beta'$.

Thus, the α' matrix is interpreted as a matrix of adjustment coefficients, which measures how quickly the deviations from steady state influence the z_t variables.

In this context, the cointegration relations act as an attractor for the system and, despite the persistent effect of shocks on individual variables, they have no persistent effect on the equilibrium relations.

The simplified form of the model (1) is:

$$\Delta z_t = a + bt - \Pi z_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta z_{t-i} + v_t \qquad (2)$$

where: $a = A^{-1}\tilde{a}$,

$b = A^{-1}\tilde{b}$,

$\Gamma_i = A^{-1}\tilde{\Gamma}_i$,

$\Pi = A^{-1}\tilde{\Pi} = A^{-1}\tilde{\alpha}\beta' = \alpha\beta'$, with $\alpha = A^{-1}\tilde{\alpha}$ and $v_t = A^{-1}\varepsilon_t$,

Considering equation (2), it is underlined that even if an estimate of the Π matrix of dynamic coefficients was possible without further restrictions, any value of α or β' cannot be identified separately. It can therefore be considered a *(rxr)* non-singular matrix and, thus, we can write the relationship:

$$\Pi = \alpha\beta' = (\alpha Q'^{-1})(Q'\beta') = \alpha_* \beta_*'$$

where the alternative structures $\alpha_* = \alpha Q'^{-1}$ and $\beta_* = \beta Q$ are optional.

It is important to note that the determination of A, $\tilde{a}$, $\tilde{b}$, $\tilde{\Pi}$ and $\tilde{\Gamma}_i$ $i = 1, ..., p-1$ structural coefficients does not solve the problem of identifying the long-term relationships when the z_t are integrated of order I.

Johansen (1988, 1991) provides procedures for testing Π matrix rank and estimation of α and β' parameters by using statistical identification restrictions. They assume that its β' columns are an orthogonal set.

If from the mathematical point of view these restrictions are natural, given the statistical structure of the problem, from economic point of view they have no meaning, because, in general, there is no reason to expect that the economic cointegration relations are orthogonal.

For $r > 1$, in the economic interpretation of Johansen one may see that the estimation of cointegration vectors is almost impossible. Similarly, Phillips conditions for identification of employees (1991) in the context of the VECM model are chosen for their mathematical convenience rather than their suitability for an economic interpretation.

Apart from problems related to long-term relationships, determining the structural coefficients in equations (1) of the parameters of the model in simplified form (2) requires certain restrictions on the structural parameters. They are usually imposed on *A* and/or Ω matrices.

The traditional econometric approach to limit the *short-term dynamics* requires a special form considered plausible on a priori grounds of the lag's functions referring to various components of z_t variable.

Important contributions in this approach were developed by Nerlove (1958), Griliches (1967) and Jorgenson (1966).

In his paper, Dryhmes (1971) presents a comprehensive analysis of works of economic literature referring to restrictions on short-term dynamics.

The VCEM model allows for the analysis of changes in macroeconomic indicators for both short term and long term. In developing a modeling strategy, we need to take into account the different characteristics of the different variables considered in the model.

Each row of the structural model given by equation (1) describes the evolution of one of the variables in the system and the restrictions on the matrix A of contemporary parameters. It also reflects the behavior assumed by an agent or a group of agents in determining the variable. Each equation of the model

presents the factors considered by the decision-making entities when they determine the particular value of a variable by their actions. The factors are either explicitly included in the model through the contemporary values of the variables in z_t, or by their z_t lagged values, or implicitly as part of the ε_t economic shocks.

The modeling strategy involved in building a structural cointegrated model is based on the idea that on long term the errors, ξ_t, can be expressed as a linear combination of the variables of the system, possibly with appropriate deterministic intercept and trend, i.e.:

$$\xi_t = \beta' z_t - b_0 - b_1 t \tag{3}$$

with appropriate values for b_0, b_1 parameters, and where β' is a $r \times m$ matrix of parameters describing the r equilibrium relations (which must be verified by long-term variables).

In the short-term modeling, most times the dynamics of z_t variables can be analyzed using standard VAR approach set by Sims (1980) and others, and it is assumed that the changes in z_t can be well approximated econometrically by a linear function based on a finite number of historical data of the z_t variable.

Assuming that the z_t variables are difference stationary, the model becomes:

$$\Delta z_t = a_0 + \alpha \xi_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta z_{t-i} + v_t \tag{4}$$

which, keeping in mind the definition of error term in equation (3) can be rewritten as:

$$\Delta z_t = a_0 + \alpha \left[\beta' z_{t-1} - b_0 - b_1 (t-1) \right] + \sum_{i=1}^{p-1} \Gamma_i \Delta z_{t-i} + v_t \tag{5}$$

or

$$\Delta z_t = a + bt - \alpha \beta' z_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta z_{t-i} + v_t$$

which has the same form as equation (2), with $a = a_0 + \alpha (b_0 - b_1)$ and $b = \alpha b_1$

Estimating a model of the form (5) can be made using the method described by Pesaran and Shin (2002) and Pesaran, Shin and Smith (2000).

2.2 Econometric model formulation

For empirical purposes, the logarithm-linear approximations of five long-term equilibrium relationships may be considered, as follows:

i) $y_t - y_t^* = \ln(\gamma) + \ln(\lambda / \lambda^*) + \ln[f(\kappa_t) / f^*(\kappa_t^*)] + \eta_{at} + (\eta_{at} - \eta_{at}^*)$

where:

γ captures differences in productivity based on technological features and

η_{at} represents the stationarity, disturbance invalid under the effects of information or technology flows across countries, for instance:

$y_t = \ln(Y_t / Pop_t \cdot P_t)$ is the log of real output per capita;

$\kappa_t = K_t / A_t \cdot N_t$ is the capital stock per unit of labor;

$f(\kappa_t) = F(\kappa_t, 1)$ is a behavior function satisfying Inada's conditions (Barro and Sala-i-Martin (1995, p. 16).

Variables marked with "*" are similar variables, but considered as exogenous to the economy.

ii) $r_t = \ln(1 + \rho) + \Delta p_t + \eta_{fip,t+1} + \eta_{\rho,t+1} + \eta_{\Delta\Delta p,t+1} + \eta_{p,t+1}^e + \eta_{\rho,t+1}^e$;

iii) $r_t = r_t^* + \eta_{\Delta e,t+1} + \eta_{uip,t+1} + \eta_{e,t+1}^e$

where: $r_t^* = \ln(1 + R_t^*)$

R_t is the nominal interest rate on domestic assets held since the end of period t;

$\eta_{fip,t+1}$ is the risk premium;

$$\eta_{\Delta e,t+1} = \Delta \ln(E_{t+1})$$, E_t is the effective exchange rate

iv) the logarithmic version of PPP:

$$p_{t+1} = p_{t+1}^* + e_{t+1} + \eta_{ppp,t+1}$$

where: $p_{t+1}^* = \ln(P_{t+1}^*)$ and

$$e_{t+1} = \ln(E_{t+1})$$

v)
$$\frac{\tilde{H}_{t+1}}{\tilde{Y}_t} = \frac{H_{t+1}}{Y_t} = \mu F_h\left(\frac{Y_t}{P_t}, R_t, t\right) \exp(\eta_{ty,t+1} + \eta_{hl,t+1})$$

where: $H_t = \tilde{H}_t / Pop_t$ or $h_t - y_t = \ln(H_{t+1}/P_t) - \ln(Y_t/P_t) = \ln(H_{t+1}/Y_t)$

These can be considered basic relationships of the long-term theory of the model and may take the following form:

$$\begin{cases} p_t - p_t^* - e_t = b_{10} + b_{11}t + \xi_{1,t+1} \\ r_t - r_t^* = b_{20} + \xi_{2,t+1} \\ y_t - y_t^* = b_{30} + \xi_{3,t+1} \\ h_t - y_t = b_{40} + b_{41}t + \beta_{44}r_t + \beta_{46}y_t + \xi_{4,t+1} \\ r_t - \Delta p_t = b_{50} + \xi_{5,t+1} \end{cases}$$

(6)

Compact relationships can be written as:

$$\xi_t = \beta' z_{t-1} - b_0 - b_1(t-1)$$

where:
$$\begin{cases} z_t = \left(p_t^0, e_t, r_t^*, r_t, \Delta p_t, p_t - p_t^*, h_t - y_t, y_t^*\right)^T \\ b_0 = (b_{10}, b_{20}, b_{30}, b_{40}, b_{50})^T \\ b_1 = (b_{11}, 0, 0, b_{41}, 0)^T \\ \xi_t = (\xi_{1t}, \xi_{2t}, \xi_{3t}, \xi_{4t}, \xi_{5t})^T \end{cases}$$

(7)

and

$$\beta' = \begin{pmatrix} 0 & -1 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & -1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & -1 \\ 0 & 0 & 0 & -\beta_{44} & 0 & -\beta_{46} & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 & 0 & 0 \end{pmatrix}$$

(8)

The modeling strategy described above has the advantage that it is capable of adjusting the relationships that exist among variables in the long term and that the estimated model reflects the complexity of dynamic relationships among the variables on short term.

2.3. Software techniques for modeling, analysis and prediction of macroeconomic phenomena

Due to the complexity of macroeconomic models, in the literature have been developed, also following the development of computer technology, a number of programs that allow the analysis and forecast of macroeconomic phenomena.

Much of the estimation and analysis of econometric models is made using econometric software packages such as: Microfit 4.0 and Microfit (Pesaran and Pesaran, 1997).

However, a series of calculations and evaluations can be conducted using a series of Gauss programs, which offer flexibility and files sequencing for the base model. In general, for a macroeconomic model eight such programs may be used, namely:

- GLPS-GIR.g - calculates the generalized impulse responses (GIR), the orthogonalized impulse responses (OIR), the profile durability (PP), estimating the VECM model and analyzing the stability of the VECM. The GLPS-GIR.g program can calculate the GIR, OIR, PP and robustness of estimate, stability and VECM model analysis. It also provides an option to calculate confidence intervals for the PP, GIR and OIR in compliance with the errors reduction;

- GLPS-SIR.g - calculated responses of the macroeconomic phenomena resulting from oil price shocks (exogenous) and shocks (unexpected) to monetary policy, if policy shocks are defined in terms of short-term identification system. As an additional option of the program, it can examine the impact of a change (exogenous) in the interest rate equation as an autonomous or exogenous alternative to the shock to monetary policy. The program also provides for confidence intervals for generalized response functions of structural shocks in oil prices, exchange rate, domestic and foreign interest rate, the interest rate equation, as well as a change in the interest rate equation. In all cases, the shock size is equal to the standard deviation of error in the selected equations.
- GLPS-PFS.g - allows forecasting of events in a random sample, for h steps ahead;
- GLPS-PFB.g - allows forecasting of events in a random sample, for h steps ahead, taking into account in the forecast the parameter uncertainty;
- GLPS-DEC.g – calculates the permanent and transient decomposition of all endogenous variables in the z_t vector using the estimated VECM model and estimates based on limited growth rate, g.

As input data can be considered:
- ML estimates (maximum probability method) of long-term cointegrated relationships subject to general linear non-homogeneous restrictions,
- estimation of results for integrated of order I.

In order to use this software package is necessary to define the variables and their source in the base model, as follows:

1. y_t : natural logarithm of real GDP per capita;

2. p_t : natural logarithm of domestic price index;

3. $\tilde{\Delta}p_t$: inflation rate;

4. r_t : nominal interest rate on the domestic market;

5. $h_t - y_t$: natural logarithm of real stock of money per capita, expressed as a share of real income per capita;

6. e_t : natural logarithm of the nominal exchange rate;

7. y_t^* : natural logarithm of real GDP per capita outside (the world);

8. p_t^* : natural logarithm of the foreign price index;

9. r_t^* : nominal interest rate on foreign markets;

10. p_t^0 : natural logarithm of the price of oil, calculated as $\ln(POIL)$, where POIL is the average oil price in U.S. dollars per barrel.

The first step in each program is phase sequencing and data definition. Some initial information necessary for the remainder of the program is also specified, such as the order of lags in the model and grade and estimates of cointegration vectors.

Given the estimates of cointegration vectors, the program estimates dynamically the short-term parameters. It then combines these results with the results of the estimates for the I(1) exogenous variables.

They form the basis for further analysis of short-term dynamics, such as impulse responses and forecasts.

3. Conclusions:

Structural modeling of economic phenomena using multidimensional econometric models faces a series of theoretical and practical difficulties, especially in the special case of simultaneous equations models. In the context of such models, the most important difficulty is the so-called identification property of these models.

In addition to the aforementioned software tools, there is a variety of computer products non-specialized in econometrics that includes software procedures dedicated exclusively to solve problems in the field of econometrics.

Given the development of software tools dedicated to special econometric analysis, econometric modeling can be regarded as representing an effective combination of economic statistics, general economic theory, probability theory, mathematical statistics and informatics.

Although initially the subject of econometric modeling was linked exclusively to the economic field, later the use of econometric methods and techniques has been extended beyond that, they being currently used in other fields, such as sociology, psychology, medicine, biology, political science, etc.

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IMPACT OF WEB TECHNOLOGIES IN FUNCTIONALITY AND AESTHETICS OF WEB APPLICATIONS

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Abstract: *In order to achieve full potential from a web application, a developer must find a balance between aesthetics and functionality. Although looking good isn't always the equivalent of being functional, it represents a psychological factor for any user to continue browsing and using a particular application. Due to the continuous change of the WWW, web technologies have become extremely user friendly, providing interactivity and usability. The paper aims to present two case studies on e-commerce and e-testing web applications regarding aesthetics and functionality as well as a survey of the most commonly used web technologies, related to the two concepts.*

Key words: web technology, functionality, aesthetics, web application

JEL classification: C83, C88

1. Introduction

In the context of an extremely rapid expansion of the World Wide Web, with technology evolving and improving in an astonishing rhythm and information availability being bigger than ever, it came natural for the Internet user to become more and more selective into choosing the websites he browses. Therefore, developers must become aware of the importance of the aesthetics aspect inside their web application besides the functionality issues, giving web design a key role in achieving both of these two primal needs of a web interface.

Regarding web design, it defines a rather generic term. Whereas occasional users of the Internet find no difference between the terms *web design* and *web development*, these two terms need different approaches, since they define and cover totally different areas of the web. While the first one is the definition of the creation of web pages, especially in terms of layout and presentation rather than functionality, the second one defines the process of developing web applications in terms of algorithms, programming and obtaining maximum functional results with less focus on presentation. Nowadays, a web developer must carefully choose his workflow in order to be able to satisfy both aesthetic and functional needs and expectations of the end user. Since creating an appealing and functional web application is not always only a one-man job, projects are divided into tasks where the creative work comes from a graphic designer, while the development job comes from a web developer or a programmer, making the deadline easier to complete and the application fully operable. Djamasbi (2010), states that generation Y (people with ages between 18 and 31) represent a large and economically powerful generation (usually, young entrepreneurs with no time and lots of cash to spend online) is the perfect target for online marketing. It has come, inevitably, to a moment of sharp competition over this segment of the market, where the main focus is, above functionality, aesthetics. A model-driven approach has been made by Yong Jian Wang (2010), where a case study has been made upon four websites on the cognitive, affective and conative responses of online consumers taking into consideration the customers' motivational orientations.

Concerning web technologies, the growth of the Internet in the mid 90's allowed software developers to migrate from desktop development to a newly created branch, web development, allowing World Wide Web to become the home ground of programmers who needed more than desktop programming. What started up as static web, with HTML as a base markup language, provided extremely large potential of expanding, and, as Darcy DiNucci (1999) notices: „The Web we know now [...] is only an embryo of the Web to come". The early 2000's represented the transition from static to dynamic, whereas the mid 2000's meant the fully growth of the WWW, starting the era of Web 2.0, an era where the main keyword would become ‚*interaction*' (Cervinschi, 2010). Therefore, new and sophisticated technologies have emerged, while

standardization becomes a significantly '*must have*' of any web application. Terms like semantic web, ontology or XML data integration are more often discussed by different researchers (Joo, 2011; Lampathaki, 2009), thus the paper will present a short survey of the emerging web technologies, as well as a case study over a rather small sample of Internet users.

2. Web technologies' impact over functionality and aesthetics of an application

As previously mentioned, considering the wide variety of web technologies, it is the developer to choose which one to use in its application. Depending on the tasks the application needs to execute and on the developer's experience, a software system can be build using different web-based technologies. Considering the fact that each technology has its strong and weak parts, it remains to the programmer's work experience into deciding which one to use in the development of its software platform. This section will first create a theoretical approach on the terms *functionality* and *aesthetics* of web-based applications and then present some of the most common technologies used to implement web applications, attempting to create a high-level overview of them.

2.1. Functionality in a web application

Wikipedia, through its dictionary interface, Wiktionary, defines **functionality** (*countable and uncountable; plural* **functionalities**) as the ability to perform a task or function; that set of functions that something is able or equipped to perform. Starting from this definition, the set of functions a web application needs to perform is defined by McAfee (2006) with the generic term of SLATES:

Search – the capability of the user to find anything he needs inside the web page he is browsing;

Links – the density of page links inside a web application creates an overlay of the most valuable ones, giving users information about the most important pages

Authoring – the ability to post and to interact with a webpage is important to Internet users, therefore they must be made part of the online process by posting comments or interacting with the application

Tags – mechanisms through which users can leave traces after visiting web pages

Extensions – the ability of a web application to smartly save the user's preferences and retrieve them back to him whenever he browses back into the application (e.g. phrases like "*Maybe you would also like...*")

Signals – refer to mechanisms through which users can be alerted in real time about changes made inside their favorite web application (e.g. Facebook)

Even though these 6 characteristics may seem enough for an application to work perfectly, programmatic precautions must be taken really serious. Aspects like algorithms, standardization, integration or workflow management must be put into discussion. While algorithms are basic programming tools, methods of standardization require research and a well driven documentation. Semantic web aims at adding semantic information to web contents in order to create an environment in which software agents will be capable of doing tasks efficiently (Castellano-Nieves, 2011) and represents the *web to come,* since adding meta-data to web pages will make them more recognizable for web clients and more SLATES – compliant.

Functionality can be achieved both by a good analysis of the main target of users an application addresses to and by a proper choose of the development technologies to use. Thus, after the project analysis, a decision must be made upon the server-side technology to use, as well as the client side one. Expected results should appear if the choices are made correctly.

2.2. Aesthetics in a web application

Wiktionary defines **aesthetics** (*uncountable*) as the study or philosophy of beauty. Beauty in World Wide Web stands for a creative, original, functional and usable layout. An interface that would generate admiring comments, lots of traffic, link exchange and link passing (a term we propose for the transmission of the link between Internet users through different communication

channels, e.g. Yahoo! Messenger or Facebook). Aesthetics inside a web application is mainly due to the web designer, the person who has the vision to create a layout following a list of specifications but also putting his fingerprint in the project. A good layout would guarantee at least one thing to a web application: that people would not instantly click the browser's *Close* button when they start browsing it, instead they would be tempted to continue using the application.

After checking the design part, it becomes the developer's job to create the functionality as appealing as possible. Thus, different client-side technologies are used in order to achieve spectacular visual effects like multimedia files embedded into web pages, special features modal windows, hover, floating or fading effects, small details that make an interface both user-friendly and functional.

2.3.Server-side technologies

The server-side technologies refer to scripting where a client generates a request to a server, the server analyzes this request and generates a response back to the client. The process is executed on the server and the response returns as HTML code to the client (the web browser). They are mostly preferred by developers due to ease of integration within mark-up language and because of their capability to generate dynamic HTML. Some of the most popular server-side technologies will be listed below.

Table 1: Server-side web technologies

Technology	Short Description
PHP	Since its release, in 1994, PHP (the acronym for Personal Home Page) became very popular due to its ease of nesting into HTML code, but started to fully expand since its fourth release, when Zeev Suraski and Andi Gutmans rewritten the PHP engine under the acronym Zend (Săulescu, 2003).
ASP	The acronym stands for Active Sever Pages and has been developed by Microsoft as a response to the open-source technology and rapid expansion of the PHP language; it can easily be nested in HTML code, and represents one of the best precursors of Web 2.0
JSP	Similar to ASP, its acronym stands for Java Server Pages, but this would be the only resemblance between the two technologies; JSP is a part of the Java Enterprise Edition (Java EE) and the .jsp files can dynamically generate HTML, XML or other types of documents (Byrnel, 2010), as well as Java Servlets (the Java class type that responds to HTTP request)
Python	Is an interpreter, general purpose high-level programming language, whose design emphasizes code reliability (Wikipedia). What Python offers is a fully dynamic type system and automatic memory management, therefore often being used as scripting language.
ASP.NET	The successor of ASP, ASP.NET has been developed by Microsoft as a web application development framework; offering OOP (Object Oriented Programming) support through its XML-based components, ASP.NET runs compiled code, increasing the speed of execution, separates HTML code from scripting code and supports over 20 programming languages (even though Visual Basic and C# are mostly used)

2.4.Client-side technologies

Opposed to server-side technologies, client-side technologies are the ones that generate the events directly on the client application (usually, the web browser), in order to cut out the time needed for the server's interrogation and response delay and, most important, to create visual an functional effects similar to desktop applications, for an excellent browsing experience to the user. The resemblance to desktop applications is quality in ease and use while the difference comes from the mobility and accessibility (Castellanos-Nieves, 2011). Therefore, RIAs (Rich Internet Applications) have emerged in the last years, providing developers a large set of tools to use.

Table 2: Client-side web technologies

Technology	Short Description
JavaScript	As its name states, JavaScript has been originally developed to have a Java look, but a less difficult syntax; it is commonly used in client-side scripting, even though it can be used on server side also; as an empirical definition, JavaScript is the assembler language of the web [...] but one does not want to be exposed to it (Puder, 2009).
AJAX	Asynchronous JavaScript and XML, AJAX, is, probably, the most spectacular technology on client-side scripting; because the requests are called in the background of the user-interface, the effect of a non-freezing window creates an excellent browsing experience for the user;

	because several different AJAX libraries are available for developers (e.g. YUI, jQuery, MooTools), this technology is continuously improving and providing better functionalities
Adobe Flash	The Flash technology allows the manipulation of media files (audio & video), and it runs on the client machines through a plug-in, the Adobe Flash Player; the scripting language it uses is ActionScript which is similar to JavaScript
Adobe Flex	Flex is a Flash-based collection of technologies used for development of RIAs (Byrne, 2010).
Java applets	A Java applet is a program usually written in Java that executes on the client machine, running either through a browser plug-in, using Java Virtual Machine (JVM) or in Sun's AppletViewer, a stand-alone tool for testing applets (Wikipedia).

3. Case study

Our research implies a study on samples of 20 Internet users and aims at finding a correlation between aesthetics and functionality regarding two areas of web: e-commerce and e-testing. For this study, we have developed separate web applications divided as follows: two online stores with different graphic appearance and different products to cover the e-commerce part of our study, and an online testing web platform for student assessment, to cover the e-testing part. Our main concern at this point was how relevant was the aesthetic aspect for a web application, and how appealing is for a user to continue using it, in correlation with how it looks.

3.1. E-commerce web applications

Electronic commerce (e-commerce) has been, since the early expansion of the Internet, a major challenge for developers. Problems like the connection between the parties, security of connection, security of transaction, the implemented mechanism, the participants in the business process all were the subject of many debates and development projects. As for the solution to these problems, the development of e-commerce solutions can be divided into four stages: the pre-web stage, the reactive web stage, the interactive web stage and the integrative web stage (Sung-Chi Chul, 2007).

The experiment conducted towards finding a correlation between aesthetics and usability of an e-commerce web application has been made on a sample of 20 people with ages between 20 and 45. The issue was whether, by visiting two online stores, they became convinced to order products online. The two stores have been developed using PHP server-side technology and AJAX client-side technology (Yahoo User Interface libraries, MooTools, jQuery). The ergonomics of the two software platforms and its role regarding the customer's decision to purchase the products offered for sale has also been tested. Regarding this issue, an Appendix is available upon request.

The results of the study reveal that, for the first online store, which, on a scale of 1 to 10, has a 9.51 average in appearance and an 8.46 average on the traded products' utility, 74.6% of the customers have shown an interest in purchasing products from this store. For the second online store, which received an average of 7.34 for appearance and 6.57 for utility, the results reveal a strong correlation between these indicators and the customers' interest in purchasing the products it sells, the percentage of 47.3% of the subjects interested in buying was clearly lower than the one for the first store.

3.2. E-testing web applications

Software platforms for computer-assisted learning and testing represent a special class of web applications, mainly due to different possible modes of development, integration and implementation. The above technologies are capable of developing modular platforms, easily to improve, easily to manipulate and that creates easy access to data, reports and result graphs (Cervinschi, 2010).

A current trend in computer-assisted learning and testing processes is the standardization of the structure of these software systems. Given the direction of standardization based on metadata the format in which the questions will be integrated into the system must be clearly defined. Thus, they can be of various types (with short, single or multiple answer, with free answer, with adding item answer and so on) and raises two issues - how will the questions be included into the application and the method or algorithm through whom they will be added into the evaluation tests.

Regarding the first problem, research is conducted in the field of automation for the training process (for example, linking the taught material with the assessed one through semantic networks). Regarding the tests generation mechanism, there have been created linear test generating algorithms, dynamic test generating algorithms or adaptive test generating algorithms (dependent on the knowledge of the assessed person, iterative (Armenski, 2005)).

The experimental research towards finding a correlation between aesthetics and usability of an e-testing web application was conducted on a sample of 20 students aged between 20 and 23. The issue was that, after taking three tests using an e-testing software platform, the subjects would complete a questionnaire on aesthetics, efficiency, ergonomics and functionality of the web application. The platform was developed using PHP server-side technology and AJAX client-side technology (YUI libraries, MooTools, jQuery). The questionnaire, the scores and the chosen metrics defined for the reports are presented on request, in Appendix no. 2.

The experimental results show that 82.5% of the subjects have rapidly adapted to the interface and functions of the platform, which is quoted by most of them as having a high level of usability. A correlation between the answer regarding the ergonomics and the tests' scores can be seen, subjects with less good scores defining the application less ergonomic and difficult to use, while the subjects with high scores are those who have rapidly adapted to the interface. Regarding the utility of the application, 79.6% of the subjects consider it a useful tool and are willing to help on improving it by providing comments and suggestions upon it.

4. Discussions and future work

After analyzing the results we received from the questioned persons, we can clearly state that aesthetics plays a decisive role in a user's decision to specially browse a certain online store (if we refer to e-commerce) or to obtain good scores on an e-testing software platform. As mentioned before, people are tempted to browse and to order online products from a more appealing website, making here the designer's job to create such an interface. Nevertheless, functionality is important, so it is mandatory for a developer to create a strong and reliable, functional web application. Assuming that a person would want to buy a product from an online shop, but the order form would not work correctly, over 90% of the users would not try to fill in the form again, but would close the browser window and head to another shop. Regarding the e-testing platform, here, things are a bit different, but, as our study reveals, generates almost the same results. Thus, if such an application, which usually is wide and complex, looks bad, the results would inevitably be worse than expected, since appearance is important for a Internet user, even though, in this situation, it wouldn't necessarily be the case. As our study reveals, people who found the application difficult to use or with an unpleasant design, had worst results than the ones who found it good looking and functional.

For the future, we are planning on improving the web platforms we have developed for our study, adding more functionality to them. Semantic web and standardization is also in plan of our research, since meta data has become almost compulsory in any web platform. Our concerns would also include emerging web technologies and the impact they would have over the market and over the end-user, since we have proven in this study that aesthetics plays a determinant role into people browsing the web.

5. Conclusions

The present paper wishes to provide arguments, both theoretically and experimentally, regarding the parallel impact of aesthetics and functionality in a web application. Given the results of the study for the two areas of research, electronic commerce and computer-aided testing, we state that aesthetics has a bigger first impact on the user than functionality. Anyway, the currently available web technologies on the market and their possibilities of development, both server-side and client-side consist of valuable resources for developing highly reliable and good looking applications.

Correlation between aesthetics and the desire to buy the product, on the one hand, usability and the testing's results, on the other hand, emphasizes that a good design of the user-interface creates

the premises of having a complete and positive experience in interaction with the software platform, positive results increasing with the aesthetic level of the interface.

At the same time, from a functional point of view, it has been proven that the choice of implementing the software platforms using PHP as server-side technology and AJAX (YUI libraries, MooTools, JQuery) as client-side technology, has been a viable solution for the user, the impact of visual and functional effects of the applications being positive, as shown in the statistics.

Essentially, a web application is not necessarily all about functionality, but especially about creating a more attractive environment (both aesthetically and functionally) for the user, improving the browsing experience and, obviously, convincing the user to return to the web application. What we have tried to prove in this paper is that even using cutting-edge technologies and the latest releases in software development tools, the results may not be as expected without a good balance between the two main concepts we have discussed about: aesthetics and functionality. If these two combine smoothly, then the web application would most certainly become a reference in its domain.

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FEATURES OF COMPUTATIONAL MOBILE ARCHITECTURES

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Abstract: *The new generations of mobile computational devices offers advanced capabilities comparative with the old generation. Although mobile devices are still limited by the physical constrains, because of the mobile nature, the new devices have obviously superior capabilities as a possibility to offer similar storage and computational capabilities like a desktop PC, high quality display, multiple communication interfaces (Bluetooth, Ethernet Adaptors, USB, Infrared). This value can be quantified and converted in extra income for mobile services providers, so the different business models and politics go through substantial transformation and adjustments as mobile computing technologies and applications based on mobility reach the age of maturity.*

KEY WORDS: mobile devices, Mobile Grid Concept, computational architectures, mobile agents.

JEL classification: C63, C88

1. Introduction

One of the most sensitive aspects in approaching a new field in research – such as the Mobile Grid technologies – is in elaborate a realistic definition or at least a clear determination of what the Mobile Grid concept represents, absolutely necessary to understand and to advances in this field.

Mobile Grid concept is defined as a platform meant to answer the mobility request through the capability to allow users, either static either mobile, the access to Grid resources, either static either mobile, using technologies implemented efficient and transparent (UDDI,2004).

Mobile computing technologies as a generic term represent the applicability of a vast range of mobile devices, small sizes, with wireless communication capabilities – as laptops with WLAN technologies, mobile phones, PDA (Personal Digital Assistant) with Bluetooth interface or IrDA (Infrared Data Association) – to offer access to information, communication and services in any location at any given moment and through any ways available (UDDI, 2004).

These mobile devices are transient in the network, connecting and disconnecting frequently to and from the network. In consequence, the particular request of the mobile application comes from the fact that these applications must, in a typical way, to be able to function in dynamic and unsure / instable environments and in plus cross heterogeneous environments in the conditions that the operating system, devices, host environments and services varies in different locations (Altintas, 2004).

Technical solutions necessary for reaching these objectives are often very hard to implement, because computing mobile technologies request the development of communications infrastructure which will allow modifying the topology of traditional networks, operating system and applications (Brookshire, 2002). In front of the objective to assure the real mobility exists a series of constrains which must be taken in consideration, which limit the capability of shifting the resources compared with this capability of the static networks.

On the other way, wireless devices (laptops, PDA's) which in general have limited resources (low process power, limited power supply and constrains regarding the storage space), have a great benefits in the case in which using a considerably amount of resources made available by other devices connected to the network becomes possible (GridLab, 2011).

2. Architectural requirements of the mobile computational systems

In designing architectural infrastructure for Mobile Grid and for the sceneries based on this kind of infrastructure, the base idea is to extend the Grid computing system in mobile-based environments computing technologies, in which mobile devices can be integrated in the Grid as receptors / beneficiary of services, or as services providers. These architectural models can be developed and extended in different way to respond to particular requests from different fields of applicability and implementations scenarios.

In particular, the integration of static infrastructure must be approached, with a great computational power, with "light" mobile devices and transient potentially in network. Next are presented the base requests identified in conformity with the specifications from the literature (GEMSS, 2011), (DDDAS, 2011):

- it is necessary an infrastructure which exceeds the limitation and the heterogeneous nature of the mobile network and has the capability to "negotiate" between this mobile network and the static Grid level. The negotiation responsibility of this infrastructure includes the "translation" between static Grid and mobile Grid, for example between the contexts of security and maintaining the connectivity and the transparence of the location of mobile nodes.

- mobile devices require an infrastructure which will allow to discover other nodes in the network and to transmit data and messages to this nodes. This infrastructure must support the transitional character and unstable of the mobile node, which will imply the necessity to support changes in dynamic configuration of the network and of the transport corridors.

- the infrastructure must assure "services" and "resources" mobility. Devices mobility, like the services and resources which they host, must be transparent and on the other hand must be recordable, possible to fallow. Information about the geo-location can represent an important propriety of the devices, which must be taken in consideration, but the capability of tracking can not compromise the services performance.

- the migration of "services" and "resources" must also be supported by the infrastructure. It is possible to be necessary that the resources and the services to change their host in which are implemented, for example, if a mobile device fails then it must be possible for a hosted service to be able to migrate to another device in a transparent way.

- mobile devices must be compatible with the OGSA (Open Grid Services Architecture) standard. Although there are situations in which the communication between two devices can be made through a proprietary system more effective than through a SOAP message system, it is essential – for the P2P network robustness – that devices can communicate in the system standard language. This allows the dynamic changing of the communication ways in case of appearing any modifications in the network or any failure of the existent ways.

- Mobile devices must support a security infrastructure which can be correlated with the security infrastructure of the static Grid level.

- Direct workflow of the data must be possible. It is not necessary that the data goes through an execution engine; it is preferably that the data can be transmitted directly from node to node. To made possible the integration between the static and mobile Grid systems it is necessary to join two important concepts:
  - first of all, the system must be "easily" integrated;
  - second of all, this "easy joining" must be able to support a common frame of transmitting messaging.

The architecture of this kind of systems must have the potential to realize these desiderates through the system design in the OGSA (Open Grid Services Architecture) and his current implementation in WSRF (Web Services Resources Framework). WS-RF allows the system to combine the services orientation with the SOAP standard for interchanging massaging. In particular, WS-RF allows unplugging the resources exposed by the services (called WS-Resources in technology WS-RF) from the exposed services.

3. Types of mobile computational architecture

Two Mobile Grid based-architectural models are proposed which offers more effective solutions for designing and implementing the infrastructure for those operations developed in complex situations.

Model 1 – in the first architectural model it has been investigated the usage of the static and dynamic / mobile technologies for system components integration and the development of the mobile agents (MA) to facilitate these interactions. An important objective in creating this architecture was the investigation of the interactions between static Grid nodes and the collection of mobile devices which works as mobile Grid nodes and in the continuous design of software capabilities needed to build a connection bridge between these two levels/environments.

Model 2 – the second architectural model propose the integration of the Mobile Grid and P2P technologies into a hybrid infrastructure, realizing a step foreword in initial integration from static and mobile Grid levels presented in the first option.

First architectural model do not implies the necessity and the capability that the services/components conventional Grid Middleware to be available on mobile devices. In the second architectural model it has

been invested the usage of the light technologies like J2ME (JXTA, 2005) and toolkits like KSOAP (JXTA, 2005) implemented on mobile devices. This light technologies can improve the capability of the network, offering in a dynamic way interfaces based on the mobile nodes services and assuring the direct communication between intra-Mobile-Grid (between Grid Mobile nodes) and between the clients who use Peer – to - Peer connectivity (P2P).

Architectural Model – Mobile Grid – this kind of architecture shows the way in which the mobile devices can be incorporated in the Grid infrastructure as a services receptors/ beneficiary; for this purpose it is not necessary the conventional set of Grid Middleware components be available on mobile devices, because the devices do not operate as service provider. A major objective for designing this architectural option is the investigation of the interactions between users and static Grid nodes and the collections of mobile devices and the implementation of software components capable to connect those communities – static environment and mobile environment.

There are a number of challenges regarding mobile devices environment: intermittent connectivity because of the communication beam and the limited mobility, heterogeneity of devices, poor relative local resources (regarding computation speed and memory) constrains regarding battery life and security constrains. This limitations and constrains must be solved for the option of integrated mobile grid technology can be taken in consideration. In this purpose, we investigate the usage of static and dynamic grid technology for the integration of system components and the development of components based on Mobile Agents (MA) – to facilitate this interactions. Participating entities must be easily coupled, connected through a Gateway component, which make the negotiations between the wireless mobile devices and the network.

In this architectural model, the Grid system is divided in three parts, an architecture in three levels:
- static grid locations/entities: static Grid nodes;
- a group of mobile devices: mobile Grid devices;
- the gateway component which interconnect the static and mobile nodes/resources.

Mobile devices are connected in wireless mode to the network through a long range wireless network such as GSM and CDMA or the alternative through short range networks like Bluetooth.

Middleware Grid components (GEO, 2005) are implemented static Grid nodes/resources and are interfaced with level of mobile devices through a gateway which assure the interoperability betweens virtual mobile Grid nodes and the static Grid nodes. Must be mentioned the fact that such a middleware level can not be implemented on a mobile devices, because this kind of architecture do not necessitate installation of "heavy"middleware Grid components on "thin" mobile devices .

In mobile Grid architecture, MA (Mobile Agents) components implemented on the Gateway level have the purpose to act as agents for unstable and transitional mobile devices. Mobile Agents (MA) have two key role:

- capability of adapting to a variety of mobile devices interfaces: Mobile Agent (MA) implemented on mobile devices react with the mobile user and respectively the mobile user sends the job to the static Grid system, monitor the execution and observe the results through Mobile Agent. Different mobile devices expose different communication interfaces – for example can have different sizes of screens, do not have keyboards, etc. In consequence, Agent interface on mobile devices must adapt to the specific class of mobile devices to which he belongs, assuring in the same time the same functionality set.

- stabile management of the jobs: Mobile devices is limited to a series of constrains. Most serious problem is the fact the availability of those is unsure because of the intermittent connectivity or because of the high problems of a difficult and unstable environment. In consequence, coordination/management of the jobs in execution directly form the mobile devices isn't a suitable solution.

To solve this problems, due to the instable and intermittent availability of mobile devices, is introduced in the architecture a new object called Job-Proxy. With the help from Job-Proxy objects is still implemented the mechanism of delegation.

4. Conclusion

Open Grid Services Architecture platform (OGSA) was created from the common vision of Globus and IBM to converge Web services technologies with Grid computational technologies. OGSA adopt the services oriented architecture to display the Grid functionalities as a collection of services oriented software elements. OGSA provides extensible sets of services that virtual organizations can aggregate in various ways, offering a holistic vision about Grid technologies and incorporating the benefits of open standards (plus W3C).

The new software components which contribute to develop computing Mobile Grid field are components based on MA (Mobile Agents) technologies and MSQ (Mobile Queuing Server). These

components are implemented on the gateway level and mobile nodes/devices, becoming the base for Mobile Grid middleware level.

Mobility aspects can be transposed in the way that the Mobile Grid network allows the mobility of users who request the access to a static Grid, and the mobility of resources which represents even component parts of the Grid. Both cases – users mobility and resources mobility – represents specific limitations and constrains which require further ways to solve them.

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FINANCIAL ANALYTICS – BUSINESS INTELLIGENCE NEXT BIG STEP

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Abstract: *nowadays the amount of information is increasing with an exponential rate. We also know that today's economical environment is more challenging and competitive than ever. In order to grow revenues, to increase profitability and reduce costs the organizational management stuff is more focused in non-traditional financial aspects than ever. For this they need real-time and relevant information for the internal decision-making processes in order to maximize the financial functions for bringing greater value to their organizations. In this context, it is well known that BI combines operational data with analytic tools for presenting complex and competitive information. And so, the financial analytics is the next big step in Business Intelligence. In this article we present a short overview of the Business Intelligence in today economical environment. Financial analytics are presented as part of BI suite along with their importance. Several BI products which have financial analytics modules are presented.*

Key words: business intelligence, data and text mining, computer based techniques, financial metrics, financial informatics.

JEL classification: C81, C82

1. Introduction

Today's economical environment is more challenging and competitive than ever. More and more organizations are searching for non-traditional techniques on how to increase their productivity, grow revenue and reduce costs in an ever-changing business environment.

Even if an organization has individual software applications which cover well defined areas – projects and time management, customer management, employee management, accounting and others – the process of extracting operational data is neither quick nor cheaper. In order to overcome this problem and cut costs, they were forced to adapt and implement software solutions that can address to specific problems and to gather sufficient information in data warehouses from where with the help of analytics tools they can present complex and competitive information to decision-makers.

According to (Balogh, 2003), the time for BI – Business Intelligence - is now, there, within organizations, as a competitive weapon to improve efficiencies and better manage their position in the value chain. "If implemented as a compressive solution, BI will reduce the time spent on low- to non-value-added activities across the enterprise, as well as enhance the organization's ability to make profit-enhancing decisions".

For financial oriented organizations, the BI is primarily focused on financial operations than on business ones. In this area is proved that the BI implementation brings important value. According to (Skriletz, 2003) "a recent Gartner, Inc. survey evaluated responses from banks, insurers and nonfinancial businesses. The survey found that more than 95 percent of banking respondents agreed that BI is a strategic initiative driven by senior management, and more than 90 percent agreed they received the value expected from their BI investment. This compared very favorably with nonfinancial respondents, where both categories were approximately 20 percentage points lower".

2. Business Intelligence

Business Intelligence, shortly BI, according to (Wikipedia, 2009) refers to computer based techniques used in collecting and analyzing business data, such as revenues per products per periods, costs and incomes, etc. BI provides besides the current data, historical data and predictive views of business operations.

The most common functions exposed by the BI technologies and tools are reporting, analytical processing, data and text mining, predictive analytics. All this functions have a common goal that in creating the right context for taking the good decision regarding the business in the current economical environment.

The BI objective (Negash, 2004) is to improve the time and the quality of a decision making processing within an organization. The technology is used in understanding the organization capabilities, trends and future directions in the market.

As mention, the main BI goal is to improve the decision making processing by providing the latest state-of-art techniques, technologies to store data, extract knowledge from data and build reports in order to highlight the best information. This is the reason why we can call the BI technology a DSS - Decision Support System.

As in (Negash, 2004) we identify BI's key components as being: real-time data warehousing, data mining, automated anomaly and exception detection, proactive alerting with automatic recipient determination, seamless follow-through workflow, automatic learning and refinement, geographic information systems, data visualization.

Knowing the fact that the financial environment is very instable organization have to have a mechanism through which they can analyze their financial trend based on historical data, current data and environment data and trend.

Due the fact that BI offers functions for data mining and visualization, a new module is integrated within existing BI tools for handling the financial analytics itself as a separated, yet integrated, module based on which financial decision are easily taken.

3. Financial Analytics

Starting from the definition given by (Wikipedia, 2011) the financial analysis refers to an assessment of the viability, stability and profitability of a business, sub-business or a project.

As described in (Schroeck, 2001) the main focus of the financial analytics is the way on how an organization uses tangible assets which are difficult to measure and manage them. Many organizations are relying in the financial analytics to help them with a clear understanding of the organization performance, reduce costs, manage enterprise-wide investments, etc.

Basically with the integrated financial analytics module within their existing BI tools, (Schroeck, 2001) organizations are able to aggregate, analyze and share information from and with sources inside and outside the organization. By using the financial analytics the organization can assess (Wikipedia, 2011): profitability, solvency, liquidity and stability.

Many companies are now taking a second look at how their financial reporting is structured, not only from an information standpoint, but with regard to the entire reporting process and the value provided to the organization in terms of planning, management, and control. A number of initiatives are taken in order to achieve the following goals:

- better measure profitability of products and services
- develop proven methods of measuring the profitability
- improve the consistency in reporting financial results
- increase visibility of new services and solutions
- improve speed of the reporting process

4. BI Products which offers Financial Analytics support

SAP ERP (SAP ERP, 2011) offers a powerful analytic tool that provides powerful financial analysis helpful for users to grow their business, develop business plan and budgets and also track the performance during the execution. SAP ERP supports financial analysis and reporting for a wide range of users with different level of understanding.

The most important features exposed by the ERP are (SAP ERP, 2011):
- financial and management reporting
- planning, budgeting, and forecasting
- strategy management and scorecards
- cost and profitability management
- working capital and cash flow management
- payment behavior analysis

Oracle Financial Analytics (Oracle Financial Analytics, 2011) provides a better visibility into those important factors that drive revenues, costs and shareholder value. The financial analytics module is fully integrated within the Oracle Business intelligence application suite which delivers robust financial information.

The product provides a wide and powerful financial metrics, alerts and reports, ways and mechanisms for finance professionals to monitor the performance, organization trends; to analyze specific metrics and to compare budgets and their impact or to perform benchmarks.

The using of Oracle Financial Analytics (Oracle Financial Analytics, 2011) improves business performance by:

- improving financial performance by improving the way on how the expenses are controlled and monitored
- optimizing cash flow
- analyzing at transaction level all those factors that drive the organization revenues, costs and profitability.
- reducing the time spent for retrieving and consolidating data from different financial systems
- improving the cash collecting systems by identifying those customers that are slow paying.

Oracle Financial Analytics (Oracle Financial Analytics, 2011) provides complete insight into the general ledger, tracks profitability, and enables budget analysis. It enables informed and intelligent decisions by proving visibility into payables and receivables.

5. Conclusion

Businesses must adapt in this economical environment which is more challenging and competitive than ever. The finance function starts to have a bigger impact within an organization and managers starts to invest more in their IT systems in order to have more analytics tools for creating the right context for decision making processes.

The role of financial analytics starts to become an important factor in improving the cash flow, in analyzing and identifying the company expenses, in planning budgets, monitor performance and in forecasting profit evolutions.

Knowing the functions and mechanism that BI software offers we consider that the next big step in improving them is by integrating the financial analytics module in order to increase the business performance and growth.

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INTEGRATED MANAGEMENT SYSTEM IN COLLEGE ADMISSION

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Abstract: *This article analyses the prospect of implementing a college administration interface developed using PHP and MySQL technologies. We will present an innovative solution that helps to progress better, faster and more efficient concerning the students admission activity to our faculty. Our solution provides increased security to the original database of the faculty and a better tracking of workflow and college admission in general.*

Key words: IT management, college admission, educational technologies, optimization

JEL classification: L86, M15

1. Introduction

The problem of admission in higher education still faces many problems because each college has autonomy in managing their resources. This paper aims to cover at least some of the existing gaps. Currently, each university has developed its own way of admission, based on which they manage the admissions process.

Expected results and objectives:

- establishing the number of students that could be admitted, both for budget places and for payee places;
- the achievement of pre-enrollment registration via an online form with all necessary personal data and registration in college. Thus certified staff will deal only with the correctness of supplied data. In this way a better and faster sign-in development process will be provided. Student's information that was completed in the pre-enrollment form is sent to a database in a DMZ zone for better security of the original database of the faculty;
- completing the pre-enrollment form is subject of compliance to a period of pre-enrollment: pre-enrollment must occur at least half an hour before the actual registration;
- after the registration process takes place, certified staff displays the list of admitted students. Students are obliged to confirm their places. If one does not confirm he loses it. The budget place is then occupied by the first student that fall on the payee list. Confirmation period takes place according to a schedule and takes several days after posting the list of admitted students;
- after finishing the confirmation process the final admitted students list is posted. The list is ordinate alphabetically and it divides the list in series and groups. For the allocation process we used a textbox in which administrator specifies the desired serial number and the division is done according to this number;
- it will also conduct validation process for fields at pre-enrollment form;
- for the fall admission process, one has to follow the same instructions. However the number of budget places will be set to "0";
- pre-enrollment process will be tested by introducing random data in the database.

Related work

In this chapter we will present methods and systems for admission to other universities, both in Romania and abroad.

In Romania there are several important universities whom admissions Web sites and systems we considered. We focused on those universities which include faculties or departments based on economics and informatics.

"Alexandru Ioan Cuza" University in Iasi is one of our university's main competitors because of their specialization "Cybernetics, Statistics and Economics", which is very well rated at a national level. The admission process is made in two periods: summer and fall. The competition is based on personal files: 75% of the admission score is represented by the high school general score and 25% consists in the Baccalaureate

score. In cases of equal scores or ties, differentiation is made based on: high school general score, baccalaureate score and the mark received at the Romanian language and literature exam that was taken by the student during the baccalaureate. For admission to foreign line studies, one has to promote a written examination in that foreign language. Candidates that possess recognized language certifications will take only one exam. This one is a grid exam. Its result can be pass / fail. (UAIC)

Bucharest Academy of Economic Sciences (ASE) is the largest university based on economic science in Romania. The admission process is based on an algorithm that turns later on an score:

- Maximum General Score (GS) is 30 points;
- GS = (BS * 2) + HS, where BS is the score obtained at baccalaureate, HS is the overall average score obtained in the four years of studies in high school;
- Transformation occurs as follows: M = GS / 3, where M is the general score of admission, which truncates to 2 decimal places.

In cases of equal marks, the shootout is made according to: MS, HS, score obtained in the last year of high school.

European higher education system differs from Romanian. Great European universities have special ways of admission. Regarding admission processes we analyzed the situations in United Kingdom, France, and Austria. We focused on the leading universities in these countries. We also directed attention to the university admission system in the United States of America, the most powerful country in the world.

Cardiff University (CARDIFF) requires for admission IELTS qualification obtained with minimum 6.5 points or TOEFL with at least 580 points. Candidates have to complete an online form called UCAS, which allows them to register within five British universities. UCAS is mandatory for admission to any college in Great Britain. Its deadline is set according to the chosen faculty's regulations. After supplementing it, UCAS shall be sent to all universities for which the candidate wants to apply. He will receive a confirmation email when the admissions committee decides on the candidate's application. If the answer is positive candidate must confirm its place.

Cambridge University (CAM) uses the same system of admission: online form and confirmation by the admissions committee. The committee analyzes carefully the online form and the candidate's interview which is probably the key part of the admission.

University of Vienna (UNIVIE) is the largest state university in Austria to benefit from the work of 6700 scientists and academics. The admission procedure consists of completing an online pre-enrollment form, followed by personal presentation of documents at the office of admissions. In the end candidates must pay the enrollment fee.

University of Strasbourg, famous both within and outside of France, requests for admission to complete an online enrollment form. Candidates must complete their personal data and after that they will take a personal interview in which they must highlight their qualities but also prove their language proficiency and communication skills. (UNISTRA)

U.S. Universities focus on enthusiasm, character and abilities of candidates subsequently verified through an interview. Yale (YALE) and Harvard Universities, (HARVARD) therefore, predict that the admission file is structured as an open letter about all the skills, hobbies and activities of the applicant, recommendations from two teachers, school annual or quarterly report and other supplementary material which may be in favor of the candidate. Admission also requires promoting ACT and SAT tests and completing an online form for pre-enrollment.

Choosing to study abroad can mean a great experience for most students marked by a different mentality and new perspectives on life. Possible benefits while studying abroad are: a new way of teaching, understanding and deepening of knowledge, knowing another culture and the opportunity to discover unknown territories and adopting an improved lifestyle.

Application architecture and implementation details

1. **System architecture**.

We base our approach on an *3-tier architecture.* In this scenario between user interface and database system we intermingle PHP engine. On client side API User Interface deals with designer mode, client sheet formatter for a good looking perspective and complete minimal validation. The main structure of our model

resides in server side validation power by PHP engine. This module realizes correspondence dates that are render on screen and data store on database system represented by powerful SQL Server.

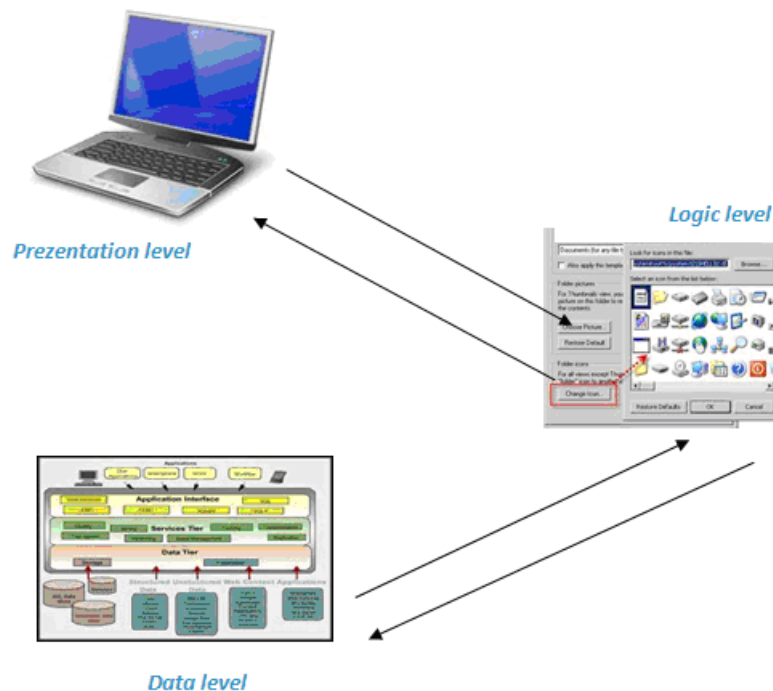**Figure 1: Establish admitted students number**

Figure 2: The 3-tier architecture of the application
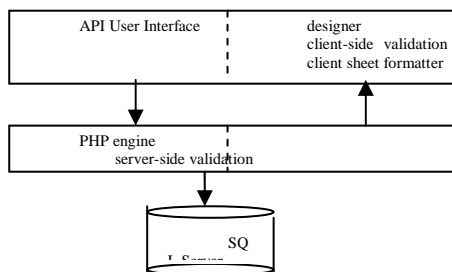
2. Instrumentation

The proposed application model is defined on asynchronous communication, build on server side based on PHP script which transaction data with an mainstream database.

2.1. PHP (Hypertext Preprocessor)

PHP is one of the most used server-side programming languages due to its characteristics. It is easy to use, characterized by simplicity and familiarity. Lot of syntax is given easy and free, being a combination of Java, C, and Pearl. It doesn't include libraries and compiler directives. The mechanisms used for allocating resources as needed for a multiuser environment, such as Web site, is efficiently provided. It is modularized, therefore, it is capable to keep track with new technologies. PHP contains a number of safety measures. PHP can interact with most web servers and can run on most operating systems (Unix, Linux, Windows, Mac OS X).

Advantages of using PHP technology are:
- ✓ Allows content management for Web pages;
- ✓ Permits sending HTTP headers for authentication;
- ✓ Sets cookies;
- ✓ Redirects the user;
- ✓ Allows XML parsing (breaking);

- ✓ Allows image, animations and PDFs creation and manipulation;
- ✓ Allows connection to an e-mail server;
- ✓ Allow executing PHP scripts quickly because the interpreter is included in the Web server;
- ✓ Provides better response time;
- ✓ Contains many useful features;

PHP working **principle**:
- ❖ The browser sends HTTP requests for a PHP file to web server;
- ❖ The server recognize the file containing PHP code, thereby launches the PHP parser, which will receive input from that file;
- ❖ The parser will identify PHP sequences, which are between the HTML tags "<?" and "?>" and interpret them;
- ❖ All that is not PHP code is sent to standard output without any processing;
- ❖ PHP code can in turn write to standard output by default commands like "echo" or "print ";
- ❖ Finally the web server intercepts standard output of the parser and transfers all to the browser that requested page;

2.2. SQL

SQL is the most popular language used for creating, modifying, retrieving and manipulating data by the relational databases management systems. It's a specific programming language for data manipulation. Its name comes from English: Structured Query Language.

2.2.1. MySQL

Currently, MySQL is the most popular relational database management system due to its performance, high reliability and easy to use characteristics. DBMS software is used by new generation of applications based on LAMP stack (Linux, Apache, MySQL, PHP / Perl / Python). Also, many of the largest and most developed organizations in the world, such as Facebook, Google, Adobe, Alcatel Lucent and Zapp, relies on MySQL to power Web sites with large volumes of content and business applications for organizations, in order to save time and money.

MySQL runs on more than 20 platform including Linux, Windows, Mac OS, Solaris, HP-UX, IBM AIX, providing flexibility and control by offering users tools and consulting services.

MySQL **features**:
- ❖ it's the most popular relational database management system;
- ❖ it's open-source;
- ❖ it was developed by TCX DataKonsultAB;
- ❖ it's a multiuser and multithreaded system;
- ❖ it's a client-server system.

Advantages of MySql technology are:
- ✓ speed, stability and ease of use;
- ✓ provides a complete and useful set of features;
- ✓ it's available to everyone;
- ✓ it's easy to use;
- ✓ it's continuously improved;
- ✓ it's pleasant to use and improved;
- ✓ it generates fewer errors.

Disadvantages of MySql technology are:
- ❖ sometimes, it can be considered non-ergonomic because of its stability;
- ❖ it is quite difficult to use without a GUI;
- ❖ the configuration for large databases is quite high.

The facilities provided by MySQL are varied. We will specify the following (BuBois, 2001):
- ❖ it can be accessed concurrently by an unlimited number of users;
- ❖ it can manage up to 50000000 records and even more;
- ❖ orders execution is very fast, perhaps the fastest in the existing market;
- ❖ user rights management system is easy and efficient;

❖ it's free. This fact drew an unprecedented expansion of the use of this database server.

2.2.2. Apache

Apache is a free open source server that had a big role in the Internet's development in general and a big impact on the World Wide Web, in particular. It is used in most web pages. Apache has been developed by a community of programmers called the Apache Software Foundation. It runs on Unix operating mainframe systems. Linux or Windows application are a derivative of the original NCSA web server developed by the University of Illinois at Urbana-Champaign.

Apache supports a wide variety of modules ranging from sede programming to server authentication schemes. These modules (SSL, TLS support, proxyun, URL, custom log files, and filtering support) expand its functionality. Apache benefits from virtual hosting, which consists in the possibility of hosting multiple sites on the same server.

Advantages of Apache are:
✓ it's an open source web server;
✓ high compatibility and portability;
✓ supports SSL and TLS.

Apache **features**:
❖ provide a robust implementation of the HTTP protocol;
❖ remains a platform upon which individuals and institutions can build systems for experimental purposes;
❖ it is an organic entity, often its users contribute to its development after using it;
❖ it is flexible and portable;
❖ provides security and scalability;
❖ distributed free of charge;
❖ can run both Unix and Windows.

3. Use case digram

Below are some diagrams on how the actors (Jacobson, 1992) (Rusu, 2003) interact with proposed system.
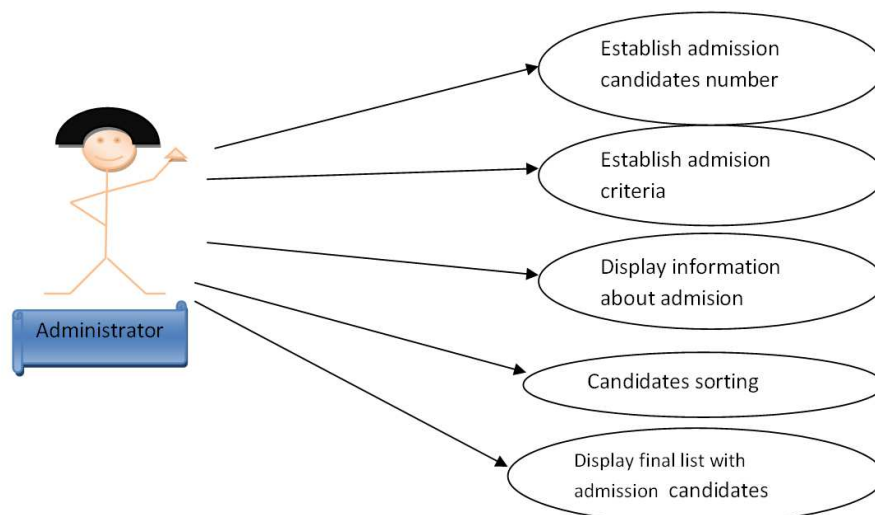
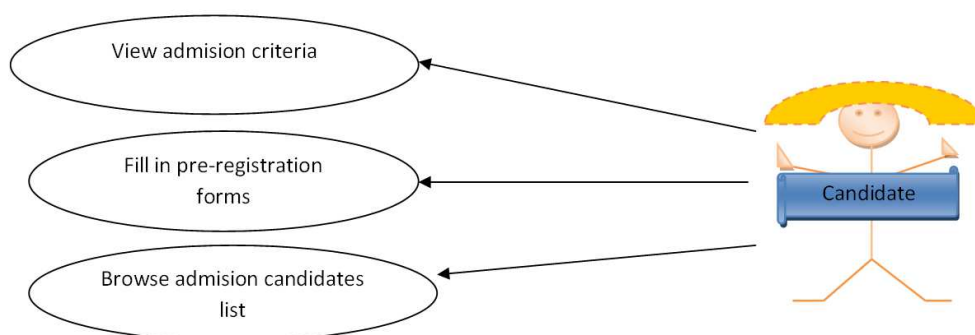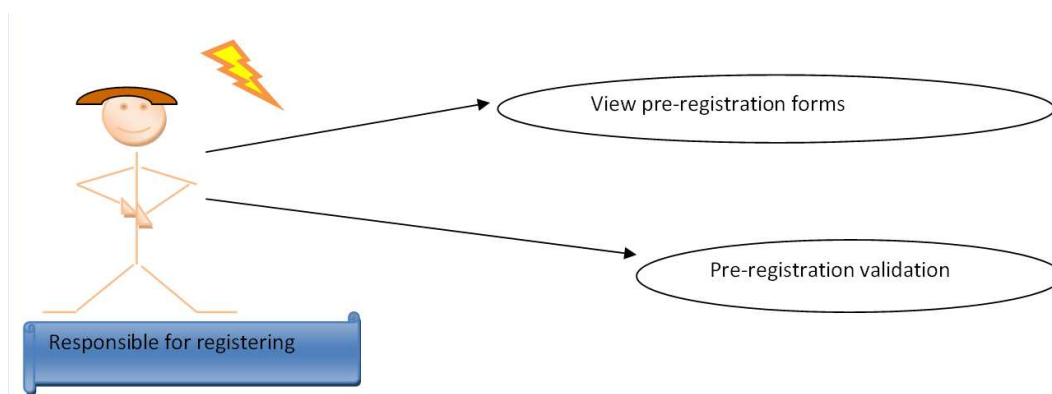**Figure 3: Administrator's rights**

Figure 4: Candidate's view

Figure 5: Responsible for registering view

4. Admission Process

The site has a page dedicated to college admission process where a candidate can find all the information necessary for registering. They can authenticate on the site to see the documents they need, the period of admission, the tiebreaker criteria, and the number of seats, the admission fee and the tuition fee. Then, they can fulfill a pre-enrollment online form with their personal data, information on completed studies and options for university studies. Form data are sent to a database in a DMZ zone to protect the original database of the faculty. Pre-enrollment process aims at improving and simplifying the procedure for admission and must operate according to a schedule, so candidates must fulfill the form at least half an hour before the actual registration.

After completing the form, candidates must come to the college for the procedure for registration. Registration includes the payment of the registration fee at the faculty's cashier, where candidates receive a certificate file which is added to the admission file. After the file is completed, candidates present themselves (with the documents required for admission) to the admission center biro where the accuracy of the completed form is verified. In case of mistakes candidate can fill it on the spot. After collecting data, the sorting process takes place. Candidates are distributed on the tax/budget places, according to the predetermined number of seats for each category. Sorting is made based on admission score which is calculated as a weighted average between the high school score representing 80% and baccalaureate score representing 20% in the final score. To be eligible for English and French courses, candidates are conditioned by the certificate issued by the Center for Linguistic Competence, Lingua. The minimum level for admission is 15 points. Candidates, who have a language proficiency certificate, issued by Lingua center, benefit from a plus of 0.1 points at the final admission score. Candidates who have obtained awards or prizes in contests for county school mathematics, computer science and economic disciplines in the last two years of study in secondary benefit from the following points which are added to the final average for admission:

- ✓ I prize - 0.25;
- ✓ II prize - 0.20 points;
- ✓ III prize- 0.15 points;
- ✓ Mention - 0.1 points;

Candidates who have obtained performances at the national and international competitions and contests are enrolled without admission. Successive one-out criteria in case of equal marks are the following:

❖ High school degree;
❖ XII class graduation degree;
❖ XI class graduation degree.

After the enrollment process takes place, follows the displaying of the list with admitted students. Then, admitted students must confirm their places, so that the remaining seats, that were not confirmed, to be redistributed to candidates that didn't get a place but signed up on the waiting list. If there are still remaining places, then, they will be redistributed to the admission session in the fall. Confirmation period is going according to a schedule and could last a few days after posting the list of admitted students.

For the allocation of the series we have introduced a textbox in which the administrator should set up the number of series. The application will split the list depending on the introduced number, sorting it alphabetically.

The fall admission process follows the same procedure. However, there will be no budgeted places in the fall.

The online pre-enrollment form contains a series of field validations: fields cannot be left blank, the CNP must be numeric, consisting of 13 digits and begin with the digits 1 or 2, name and surname should contain only letters, the address should be alphanumeric, phone number field is restricted to 10 digits.

5. Web design form

For in order to be compatible with main website, we choose to follow procedure that was used for faculty website. (Rusu, 2000)

The design we propose takes into account some of the following context aspects:

- the application designed should be an operational tool to stimulate candidates obtain an pre-registration, in order to speed admission process;
- the person responsible for registering can find necessary information in a simple and fast way;
- there are possibilities to view real time admission state, depending of level access for each user;

Given the particular context of design in the same virtual space supposed coexistence of several users, it is necessary to structure and streamline an extremely large volume of information with a high-heterogeneous character.

In this regard, **we propose viable structure-based information on the main categories of users and identify fundamental areas of research**.

Also we propose that each category of users can be identified by a **specific color** and that color will become the pattern for all pages about the target user in question.

Figure 6: Design layout

6. Testing the admission interface

Tested issues: source code, validation forms, field's size, blank fields, links: anchors destination and target frames, browser resizing, retrieving data from their registration forms and recordings, random basis introduction, spell-checking, terminology, site internationalization, the functionality of the site on different browsers.

Black box web testing

It was noticed that the terminology used is available to all beneficiaries, in Romanian. The wording is simple and concise understandable to all visitors. There is a lack of terms available in international languages.

A) Spelling: errors were detected regarding the accuracy of writing. These were subsequently corrected by using Microsoft Word 2007 Spelling and Grammar tool.

B) CURRENT INFORMATION: The information provided on the site is recent but we cannot discuss the timeliness of information in relation with the pace of updating the site, because the product is in stage of Alpha Build.

C) ACCURACY OF INFORMATION: contact details, information on pre-enrollment procedures, registration and confirmation of admission and general information sites have been tested and are correct. This corresponds with data taken from the Faculty of Economics and Business Administration.

D) BROWSER RESIZEING: there were some problems regarding resizing the browsers.

E) HYPERLINKS: At this level it was noticed that anchors destination and target frames are correct.

G) TEXT FIELDS: length limits were tested. In pre-enrollment form, fields cannot be left blank and must meet the conditions of approval. The tests were successful.

Test case example: name and first name must contain between 3 and 20 characters, the telephone number must contain 10 characters and start with '07 ' and the e-mail must meet the conditions of validation function to validate e-mail site.

White box web testing

Test case example: we have analyzed the data saved after filling the online form, introducing random data using a php function. For this we have created a table:

CREATE TABLE `random` (
`id_inregistrare` int(100) NOT NULL DEFAULT '0′,
`date` varchar(100) NOT NULL DEFAULT "
) ENGINE=MyISAM DEFAULT CHARSET=latin1;

And we populated it with random data, obtaining 1.000.000 record, that is more than any possible scenario:

```php
<?php
function datealeatoare($length = "")
        {$code = md5(uniqid(rand(), true));
        if ($length != "") return substr($code, 0, $length);
        else return $code;}
set_time_limit(300);
$link=mysql_connect('localhost', 'utilizator', 'parola');
mysql_select_db('testviteza', $link);
 for($i=0;$i<=1000000;$i++)
        {$sql="insert            into           random(id_inregistrare,date)            values
    ("'.$i.'","'.datealeatoare(100).'")";
        mysql_query($sql);}
echo "Realizat";
mysql_close($link);
?>
```

Gray box web testing

We have checked and found that HTML tags are correct. We used Notepad ++ and Adobe Dreamweaver CS4, which recognize the HTML and PHP tags and if we had missed any tag the text format would have changed.

Figure 7: Gray box web testing using Adobe Dreamweaver CS4
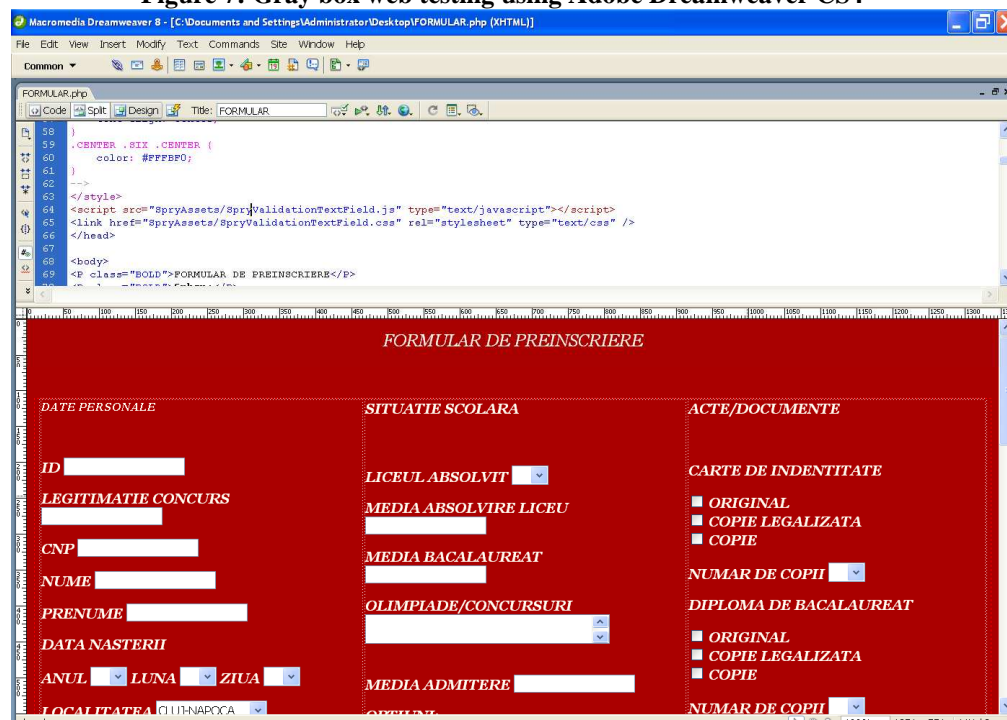
CS CH web testing

Browsers compatibility: Interface for admission to college and pre-enrollment form is functional on all browsers.

7. Conclusions

Using a web-base approach we consider it brings more flexibility in the admissions process. Moreover, candidates may fill in pre-registration form, this resulting to speed up the admission process.

Because we uses two separate databases, one for registering and one for pre-registration form, plays an important role in maintaining the integrity and security of admission.

In our scenario, users with high access level can view any stages of admissions, number of seats filled, incomplete candidates files.

We think that our approach can save both: money and time.

8. Acknowledgment

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- YALE http://www.yale.edu

REDUCING INTERNATIONAL COMPETITIVE PRESSURES THROUGH THE ICT ADOPTION IN SMES

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Abstract
SMEs are the main player in the economic development of a country and also the main source of support the GDP. Joining to the EU area increased visibility of Romanian retail market thereby increasing the internal competitiveness. Thus, SMEs in Romania face the digital divide and the effect of competitive pressure from both outside and from SMEs that have adopted ICT. Adoption of ICT helps companies to develop new business opportunities, reduce costs and minimizing the competitive pressure. Therefore, this paper will present the effects of ICT adopting in SMEs and involvement of local and global competition.

Key words: SME, TIC, development, competitive pressure

JEL classification: O16, M10, M21, D83
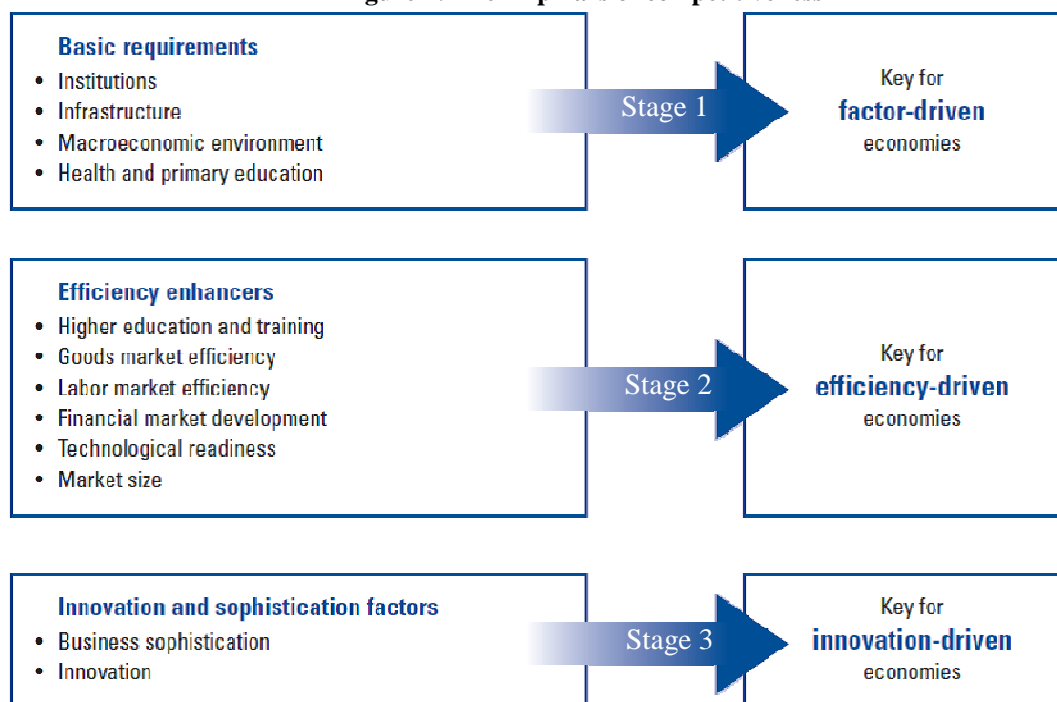
1. Influence of SMEs

SMEs are the most relevant figures in the European economy, due to their high contribution to the growth of employment and in the value added generation. Even in the last 10 years, characterized by two significant slowdowns in the European economy, SMEs have increased the work force, so compensating for the reduction in workforce undertaken by large enterprises. Due to their geographical extent, are considered one of the promoters of innovation and the guarantor of stability and social cohesion.

Eurostat analysis noted that EU businesses invest 20% in information and communication technologies and the sector add 26% of research expenses. More than 60% of basic public services are now available online and more than half of EU population uses the Internet regularly. So, facilitate and increase accessibility to finance, research, innovation and ICT is also the main route to sustainable economic growth. European Union, through cohesion policy, supports the development of SMEs in innovation and research direction.

Currently, the vast majority of countries of the world have adopted proactive policies and priorities for creating an environment conducive to sustainable development of information and communication technologies (ICT), especially that between developed and developing or poor countries have created a digital gap (Digital Divide). Romania, like other emerging countries, is faced with the phenomenon known as the digital divide, the gap that exists in the use of ICT in organizations, between the different layers of society, at the country level to other countries.

The biggest challenge for Romanian SMEs is the increase of competitiveness on the EU market. This makes the need to increase the level of knowledge in SMEs, to become one of their main concerns. SMEs have a differently role in innovation than large companies. As SMEs play an important role in research and innovation, becoming an important pawn in the knowledge based society and developer of competitiveness. Romanian SMEs are focused more on traditional market, but the in making innovations and research. This allows them to react quickly on traditional low level market, but when it comes to online global marketplace, they are brought down by competition. While many factors determine the competitiveness of enterprises, the adoption of ICT by them proves to be the main asset of success and SME development. The impact of information technology market is an important issue for development of SMEs and, more, the economic and social development of Romania, in which SMEs play an important role. Moreover, SMEs have a crucial task for the working of economic systems: they foster competition, ensure a more productive and efficient use of resources, and stimulate the creation and the diffusion of innovation (Baldoni, 2001, p.5). If we talk about competitiveness, let's looks at the 12 pillars presented in Global Competitiveness Report 2010

Figure 1: The 12 pillars of competitiveness

Basic requirements	Stage 1	Key for **factor-driven** economies
• Institutions		
• Infrastructure		
• Macroeconomic environment		
• Health and primary education		

Efficiency enhancers	Stage 2	Key for **efficiency-driven** economies
• Higher education and training		
• Goods market efficiency		
• Labor market efficiency		
• Financial market development		
• Technological readiness		
• Market size		

| Innovation and sophistication factors | Stage 3 | Key for **innovation-driven** economies |
| • Business sophistication | | |
| • Innovation | | |

Source: Klaus Schwab, "The Global Competitiveness Index 2010–2011" pp.9

Romania is positioned in Stage 2 (Schwab, 2010), in the category of efficiency-oriented economies, with Bulgaria, Turkey, China, etc. The classification was made according to GDP per capita. Among the countries placed in Stage 3 include: U.S., Austria, Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Portugal, Slovenia, Spain, Sweden, United Kingdom. As seen, most EU countries are found in this category of innovation-oriented economies.

Even if the Romanian SME sector has evolved in recent years, based on economic and financial uncertainties and a low predictability, importance and its need has not decreased but has increased the competitive gap. Due to business globalization, SMEs meet the market come from ranked countries companies with a major advanced economy (an economy based on innovation), making it essential guidance and support to SMEs in the field of research and innovation.

The problem of unsuitable SMEs, from Romania, to the demands of innovation and research in international markets is reflected in the analysis of import and export levels. According to INS (Chart 2) the deficit of the trade balance is negative, although lately there were fluctuations. Thus, late last year, FOB-CIF balance deficit was -3.43 billion Euros and earlier this year dropped to -0.80 billion Euros (overall ventures in Romania). Regarding only SMEs, in 2008, FOB-CIF balance deficit is 15,961 million Euros and in 2009 reached 9,203 million Euros, but exports fell in the same period from 14,233 million Euros to 10,303 million Euros.

Figure 2: Export (FOB), Import (CIF) , Deficit FOB/CIF
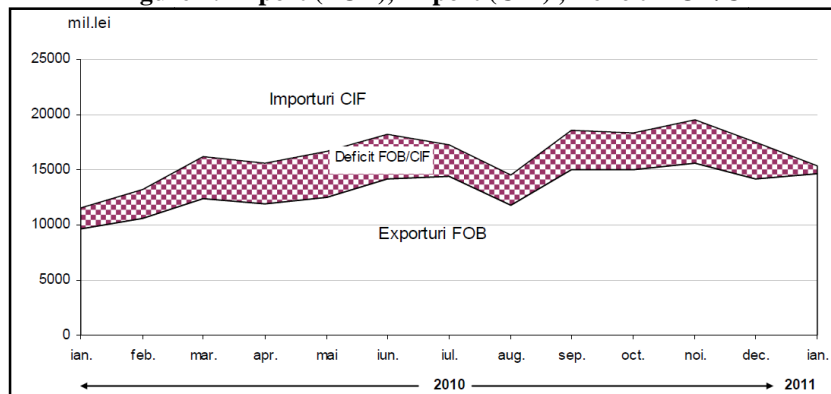
Source: INS, "Comunicat de presa nr.58 din 14 martie 2011"

SMEs in Romania do not have the potential to operate on competitive international markets and to establish the objective of achieving exports. To exploit the business opportunities offered by global markets and strengthen its position in traditional markets, SMEs must be provided with specialized care, especially in ICT and in informing them about the new opportunities arising as a result of realization of foreign trade. At the same time, SMEs need to show more interest in the globalization of business and the decision to try minimizing of the risk associated with access to new markets.

2.   The need for ICT adoption

ICT has revolutionized the development of all industries and can be viewed as a promoter of the economic efficiency and productivity growth, of the improvement of living standards, of the customization of products and services to meet individual needs and desires. So, looking on the development of the new economy, we see an increasingly knowledge development, as raw material of economic activity; currently experiencing a revolution of knowledge. This revolution means the transformation of the business processes and fundamental change in the economy based almost exclusively on natural resources, in a predominantly knowledge-based economy. The basis of this revolution is the crucial role that the propagation's factors of the knowledge have in the economy: increasing economic importance of information technology, business processes, human capital, capabilities and competencies of the organization.

SMEs place a strong emphasis on the types of initiatives and innovations that can increase productivity, reduce costs and short time to increase market share. For SMEs, knowledge has become, in last decade, the most important of their competitive advantage due to rapid expansion of goods and markets. This is supported in forward current of the need for SMEs to maximize the use of knowledge because of the limits of a financial nature.

SME development leads to increased knowledge in the enterprise, attracting increase of the value of employees, industry and production of goods or services. Investing in knowledge allows them to bring innovation in the production process which will provide competitive advantage and revenue growth opportunities. Also, the opportunities offered by the level of enterprise development will help increase of revenue per employee thus creating the possibility of development of new SMEs. This cycle of development based on accumulation of knowledge in the enterprise is presented in the following figure.

Figure 3: Effects of SME development
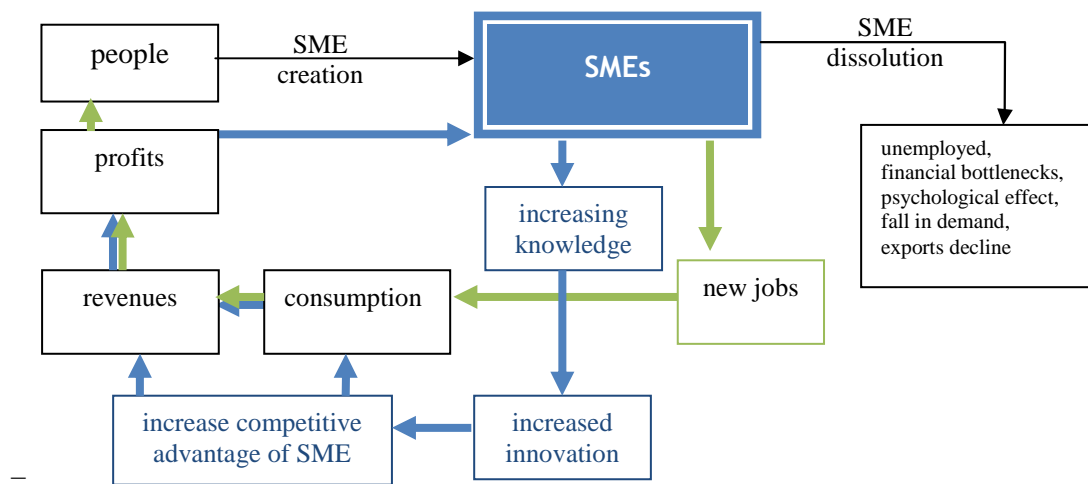
Moving from an industrial economy to a knowledge-based economy has given the competitive advantage and growth of those companies who have developed the ability to create, accumulate and disseminate knowledge. Adoption of ICT has facilitated economic growth, based on knowledge, allowing companies to codify knowledge and transmit them digitally worldwide. These enterprises have become part of the information society, connected in a virtual network designed to develop and distribute new information .

Rapid advancement in knowledge-based economy affects SMEs on the one hand negative because those enterprises that have adopted ICT will have difficulty to survive. The effects of globalization such as increase of competitiveness will undermine the market power of local SMEs. Also the possibilities for partnerships will be reduced or with no effect, given that most of these tend to be conducted online or require the use of ICT by businesses want to be a partner.

For example, an increasing number of SMEs on a local market, primarily due to globalization, will leads an increase of the competition. These are the effect of a decrease in the number of consumers and the selling price, due to the need to combat the pressure of competition (Figure 3). So SMEs profit begins to decrease and with it decreases the level of incentive and ability to create new SMEs.

Figure 4: Effects of competition
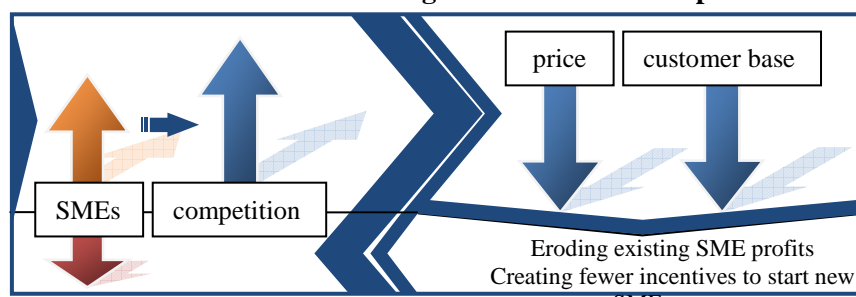
On the other hand, the effect of globalization and knowledge economy development has a positive impact on those businesses that have adopted ICT and were able to capture the opportunities of electronic business. ICT adoption effects are felt, moreover, and within enterprises. It ventures allowing them to communicate more easily, increase productivity, develop new business opportunities and be connected to a global network of knowledge.

SMEs, on the import/export markets, must react quickly in terms of competitive pressures and improve their production processes, supply, distribution channels and promotional campaigns. Delay in reaction leads to the creation of the digital divide between firms in the market at a time. When companies invest in research and innovation, competitors, who have not done the same thing, lose the competition. The same thing happens also at the country or region level. These generate the effect of economic disturbance.

Figure 5: Effects of competition fought by adopting ICT
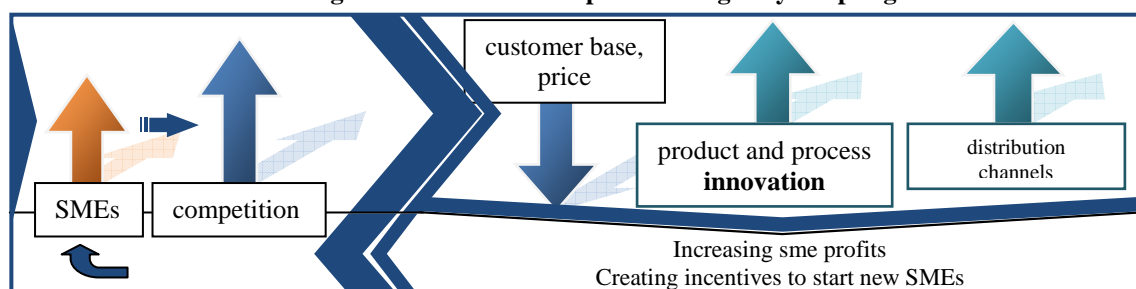
The figure above shows the importance of adopting ICT in SMEs. As shown, the adoption of ICT comes in the control of competitive pressures, creating further opportunities and profits. Adoption of ICT helps the SMEs to minimize costs by improving production processes, communication, marketing and management. ICT can benefit the company through several means, such as (Kotelnikov, 2007):

- Inbound Logistics
- Cheaper and faster communication with suppliers through Supply Chain Management
- Operations/Manufacturing
- Improve Inventory Management systems
- Enterprise Resource Planning software
- Rapid Prototyping and Manufacturing programmes
- Outbound Logistics
- Easier to link to global supply chains and outsourcing opportunities
- Marketing and Sales
- e-Commerce
- e-Marketing through websites
- After-sale Service
- Customer Relationship Management software
- Firm Infrastructure (Finance, Planning)
- Better accounting and financial management practices
- Improved communication between different departments through the intranet
- Better grasp of business trends and market prices through easier access to information

- Use models to enhance business planning capabilities
- Human Resource Management
- e-Learning for employee training
- Technology Development
- Better Knowledge Management within the firm
- Integrate different software platforms through Enterprise Application Integration
- Procurement
- Use e-procurement for cheaper and faster communication with suppliers

3.   Conclusions

The importance of SMEs in the economy is widely acknowledged and incontestable. Therefore, these must be supported in their development efforts in terms of research and innovation. When we want a sustainable economy and trade balance adjustment (imports / exports) governmental actions shall affect, positive, primarily the SMEs.

The need for the ICT adoption is strengthened by the effects of global competition on SMEs, which make them look for a way to continuously improve their competitive ability. In terms of SMEs, it has effect on reducing costs, increase international competitiveness and openness, increase of accessibility of the online market, improving communication with suppliers and customers, improving management and production through innovation and research, increase the knowledge level, profit growth, facilitating marketing processes.

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THE ECONOMIC IMPACT AND OPPORTUNITIES FROM THE LATEST INNOVATIONS IN THE NEW WORLD OF POSSIBILITIES

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Abstract: *It should not seem strange at all to talk about the latest technologies even for Romanian slump economy and those contractions that came with each bad decision of the government. These technologies and the degree they are being absorbed by the market can be a hope for the economic recovery so expected by everybody.*
The aim of the paper is also to highlight the potential of the tickets on the mobile and the augmented reality, used on a large scale to direct and look for objectives within a geographical space, things that are more and more calling for attention.

Key words: m-commerce, e-business, mobile services, mobile communication, augmented reality

JEL classification: L81, L96

1. Introduction

It is 20 years that electronic markets emerged as a field of research. While inter-organizational system, such as Electronic Data Interchange in transportation sector, computer reservation system in tourism and electronic exchanges in banking date back even longer, the well-known "Electronic Markets and Hierarchies" article (Malone 1987) and research projects, such as the Center for Coordination Science and the Competence Center Electronic Markets with the journal „Electronic Markets" have marked important milestones for a more generalized research on electronic markets.Tehnologz is an important force in shaping the field, but needs to be complemented by consideration of the competitive enviroment and the settings of rules in order to ensure efficient and effective plays of the game (Rainer Alt, Stefan Klein 2011).

Unfortunately, the delay registered by our country in the implementation of the electronic commerce has consequences on the commerce for the mobile telephone. The link between the two modern forms of commerce is a very tight one.

2. Features for resourceful m-business and augmented reality

Electronic commerce or e-commerce can be briefly defined as the buying and selling of goods, information and services and the transfer of funds using digital communications. The term "electronic commerce" is now very familiar and most people are used to performing many of their everyday transactions through electronic commerce. The future of electronic commerce looks even brighter according to the following market research (Wen-Chen Hu, 2009):

• Online Publishers Association found that about 25% of Internet activities were related to electronic commerce

• More than 85% of the world's online population, 875 million consumers, have shopped on the World Wide Web.

• Electronic commerce sites are the most frequent users of paid search engine marketing. The top ten paid search advertisers, generating 16% of all sponsored links, were all retail or comparison shopping sites. eBay, the number one spot, achieved 802 million sponsored link exposures (com-Score, Inc., 2009).

Companies and research organizations provide a host of software and methodologies for electronic commerce and mobile commerce implementations. However, given the wide variety of technologies and methodologies available, IT workers often have difficulty selecting the most suitable technology for a specific electronic application. (Wen-Chen Hu, 2009)

E-commerce is fundamentally changing both companies' business processes and the value chains in which they operate. Greater automation speeds up business processes and makes them more efficient, promising productivity gains—and greater prosperity—both now and in the future. In order to enable e-commerce, common format conventions, or standards, are fundamental to the success of e-commerce(Stephen Hawk 2008).

Mobile services (m-services) have become an important part of the e-commerce landscape. Although research has been conducted on which services people use and the benefits they attach to those

services, the values associated with the adoption and use of m-services at the individual level is still unclear. Various theories are used in information systems to determine the patterns of adoption of technologies at an organisational level. However, the reasons for adoption of technologies and services at the individual level are less understood (Craig Standing 2009).

It is argued that the main difference between ecommerce and m-commerce is that m-commerce is associated with wireless technologies (Han 2002). For example, Efraim Turban (2002) have defined m-commerce as the "Conduct of e-commerce via wireless devices." The basic definition of wireless is: "The absence of a physical link between the sending and receiving devices," (Balasubramanian et al., 2002).

Because of the nowadays economic situation it is demonstrated that the electronic commerce and m-commerce have a great potential to help the economy to recover.

Democratic government has been and remains the principal counterbalance to the market. All but the most ideological advocates of "laissez-faire" recognize the necessity of government intervention in the market on many fronts for many purposes. Market forces are enormously powerful today, prices are potent signals, and businesses are constantly seeking to expand markets to new products and new geographic areas. (James Gustave Speth 2008). In this sense we reveal in this paper the importance of adoption the newer technologies for entrepreneurs and governments especially those acting in the developing country.

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A recent study presented by the famous center Juniper Research estimates that more than 1 from 10 subscribers at mobile telephone will have either a ticket delivered on their mobile or will get and pay a ticket with the phone till 2014. this represents a growth of 5 times during the next years.

It is obvious that services are developing mare rapidly within the transports by the introduction of payments through SMS, bare codes and mobiles, by the agencies of railway transport, underground and airlines companies. Unfortunately this system will be delayed in developing regions and this will delay more in attracting foreign investments and hence a normal development.

The potential of the tickets on the mobile for the railway, underground and bus is being demonstrated by those who have previously adopted: Scandinavia, Japan, Austria. The global impulse is given by the rapid growth of the airway companies that offer not only embarking tickets on the mobile as well as reservation ones and payment by the mobile. It is beyond the transport that the ticket on the mobile is seen in economies already developed as a road opening and for a wide array of sport games and entertainment, concerts, films. It is imperative for the entrepreneurs to be aware of the benefits that can result besides the most important, namely the cost reduction. I will take into consideration here a secondary one that comes out of data processing resulting from the use of mobiles. There might be a gain for the client too as it no longer calls for additional attention for the ticket as long as the presence of the mobile in our life is no doubt to be taken into account.

It has been demonstrated that ticket suppliers exploit such apps (applications) to present attractive, innovative offers- not only on the smart mobiles. One of the acceptance keys on a large scale will be the easiness of using the purchased equipment and that preinstalled. An example is Telecom Italy for the new cards SIM for 2010.

If we want to present supplementary motivation to invest in technologies we'll find id in the book named „The Bridge at the Edge of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability", James Gustav confirm that if GDP is going up at 3 percent a year, and if one wants to reduce environmental impacts greatly, then the environmental impacts of each dollar of GDP and each unit of economic output must decline at rates substantially in excess of 3 percent a year. To reduce environmental impacts faster than the economy is growing requires rapid technological change. (James Gustave Speth 2008).

Another forecast must be outlined mostly for those in the ticketing industry which estimates that more than 400 mil subscribers in mobile all over the world will use the mobiles for ticketing until 2014. Nevertheless, the study concluded that the beta and pilot experiments and services are not put into practice fully with the services of selling tickets on the mobile quick enough as they must wait due to several reasons, including problems of lack in infrastructure, code reading for special bars…

Most probable the leading sector in future is that of transport, followed by entertainment and sport events. The Middle East and China hold a leading position on the market in this field and this is determined by adopting the respective system in Japan, mostly with the travellers on the railway. More than this, airline companies have started to offer the buying of the ticket through mobiles and the possibility to have the check

in on these phones. Except the transport segment, there are domains that should be carefully followed such as cinema chains in India that buy 37% of all film tickets sold all over the world. And a number of football teams have started to offer mobile options for purchasing tickets and for their delivery. Nevertheless, there are many places where there is a demand for an extra printed ticket to get the access.

All these data and trends should be a signal for the entrepreneurs and for the operators of mobiles too and can maximize their possibility on the respective market. Some key factors should arise interest such as saving cost and low impact on the environment.

Here are the most important companies that successfully put into practice this technology and will most likely enforce this trend on the market: Nokia, Stockholm, SL, Trenitalia, American Airlines, Telecom Italy, Heathrow Express, Helsinky City Transport, Lufthansa, Malaysian Airlines, Austrian OBB Railways, Quatar Airlines, Red Bull Salzburg, SJ Sweden, and Tickets.com.

And if this trend is not enough to convince the entrepreneurs we will offer some information on another factor that influences the offer, namely the cost. Another study at the beginning of this year, at the University of Wisconsin Madison tells us the number of smart phones is being expected to exceed 170 mil. at a global level until 2015 and as costs is declining continuously. The expected dynamics of these phone costs can be compared with that of computers that have reached a level which could be paid off only by the large companies at a level that had to be accepted by most part of the market. Starting with this pattern and on the studies that exist, the price of the simple smart phones will get down from 150 dollars in 2010 to 60 in 2015 due to competition and availability to get processors at low costs. All these encourage the enlargement of the commerce through the mobiles and offer an advantage for those who bet on this.

Boston Orange and Vodafone 945 manufactured in conformity with OEM agreements by phone suppliers such as Huawei, allows smart phones to have App Store connection and a system of Android operation offered to the subscribers with low prices, usually associated with the smart phone.

The sellers in China and India who have merchandised the MicroMAX phone are being expected to market smart phones that have an Android technology at the basis with competitive prices for the local markets within the coming future.

The strategy in the developing markets becomes important to reduce the changing of the operator and to make the client addicted to the phone brand.

The barriers to enter such a market get down allowing the access for the local actors on the developing markets such as India and China.

Local players such as ZTE and Huawei are trying to enlarge the geographical area even in the USA and further on. But they do not have sophisticated strategies as those of the older producers such as Nokia.

Among the forecasts for this year on the mobile communication and wireless we have the augmented reality, a term that I really enjoy to translate by enriched reality, one with intelligent phones and information that can be useful for the user of this service.

The improved reality is supposed to be invented in 1990 by Thomas Caudell, employee for Boeing Company. The augmented reality, used on a large scale to direct and look for objectives within a geographical space is more and more calling the attention of the dealers.

The augmented reality is a term used to directly view a physical space in the real world which has elements that are being enlarged, improved with information, sensuous inputs generated by the computer such as the sound and the graphic. This is connected with a larger concept named mediate reality where reality is being modified (eventually diminished, more than enriched by a computer). As such, technology works by improving the present perception of the reality. By contrast, the virtual reality replaces the real world with a simulated one.

This improvement is usually put into practice in due time and within a semantic context with environment elements such as sport scores on TV during a game. With the help of advanced technology to improve reality (adding information on image or recognizing the object) the information on the real world around the user become digitally interactive and usable. Artificial information on the environment and its objects can be overlapped on the real world.

Researchers explore the implementation of images generated by the computer in direct video images as a way to improve the perception of the real world. The technology to improve reality can contain a screen to post virtual images in order to view them and to have controlled areas that contain sensors and actors.

One of the leading persons of such a technology in our country is Millennium Bank which has launched an application that can be charged on iPhone or on any smartphone with a system of android operation and which indicates in due time wherever you are, the direction and the distance the subsidiaries of the bank are to be found.

The application Millennium Bank- Life is inspiring us – is an improved type of reality. To use it we must first unload the Layar Reality Browser- Augmented Reality Software, then search with Millennium Bank and unload. Unlike the bad habit banks have when they tax any service even when this comes to help the banking activity, this one is a free service.

The distance you are looking for a Millennium Bank subsidiary is being set, and then the phone can spin in any direction to identify the closest subsidiaries and the most convenient ones. The bank has recently launched the Millennium Bank on your way application for the computer, based on Google Map which makes the best way to move between tow points and posts the subsidiaries of the bank that we find on our way. This example is not the only one another one can be found at the following address:http://www.topgear.ro/ar/bmw and the list remains open.

3. Conclusion

The, success of electronic markets in the broad sense raises fundamental issues of sustainability, market governance and the protection of economic, political and social institutions. Technology is changing the way we are living and working as well as our social, economic and working as well as our social, economic and political system. Electronic markets have become large scale and critical infrastructure, whose failure has massive economic and social effects. The financial crisis is only a reminder of the fact that we have joined a global risk society (Rainer Alt, Stefan Klein 2011).

Taking into account the importance of this service to post products and locations with the brand or the campaign of specific information since the end of 2010 important retail dealers and prestigious brands (eBay, H& M, Carlsberg) have used this service by offering elements to improve reality for the consumers. We do hope that all these arguments foster the entrepreneurs to access as much as possible the technology of the mobile phones.

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HOW CAN IT STIMULATE THE COMPANY'S BUSINESS?

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Abstract: *IT is critical to many organizations' success ensuring quality, effectiveness and efficiency in the business' processes and competitive advantages. Today IT becomes part of the business processes. In a complex and competitive world, characterized in the last years by deep changes, instability and incertitude, the quality of the company strategy and its alignment with IT strategy becomes a milestone. Due to the importance of IT to the overall business, the IT specific risks can induce failure to achieve strategic objectives. Adopting an integrated view of IT risk represents a milestone of the risk management process. The present paper presents the authors' research results regarding the importance of the IT and business strategy alignment, the necessity to built a global IT risk solution and manage all the risks, no matter of their nature, in a holistic approach, underlying the impact of the inadequate IT risk management on the organizations' activity.*

Key words: IT governance, IT risk, risk management

JEL classification: M15, D8

1. Introduction

The globalization brought new business opportunities and the need to think business in new approaches. The globalization has increased the competition, the fight for markets and profits but has also increased the economic and financial interdependence. In the crisis years, like those the global economy is passing though, these interdependences determined the extension of the crisis wave and the increase of the negative impact over the economies. One of the financial crisis conclusion, emphasized by the surveys conducted by important international organizations and professional bodies, as for example OECD, is that there is an imperative and urgent need to better manage risks (OECD, 2009). At a time when the importance of information and technology increased in all the aspects of business, starting with the strategy and affecting business processes and outputs – products and services, the need to manage more appropriate the IT risks has never been so important. More and more organizations are aware that an effective and efficient IT risk management is vital to their success and reputation. In this respect, integrating IT governance in the organizations' overall governance process became crucial. Organizations that succeeded to integrate technology and business strategy have created significant business return. In order to remain in the market, the companies have to promote innovation and quality, efficient usage of the resources and also to prove a profound understanding of the economic and financial environment, being able to properly react at all the changes and "navigate" in uncertainly conditions. In this unstable environment, characteristic for crisis and post-crisis periods, it is crucial to ensure the maximization of the business return. IT has proved to be an important enabler of the business. In this respect, valuing all the advantages and IT potential becomes a milestone.

In their work, the authors opt for a mixed research methodology, including deductive positive research, as well as inductive critical interpretative research. These two approaches ensured a strong interconnection of theory and research work, merging quantitative and qualitative research methods. The methodological approach, followed by the authors, has required the following steps:
- Delimitation of the research area.
- Research area literature review: The main source of information was represented by IT Governance Institute and ISACA documents.
- Delimitation of the conceptual framework boundaries which included the specialists' points of view regarding fundamental concepts and the relationships arising among these concepts. At this level, descriptive, exploratory and evaluative research techniques were used.
- Decisions related to the key areas to be investigated.
- Performing the research: carrying out interviews with IT managers and specialists, documentation on risk management processes implemented in Romanian organizations and conducting analysis on these IT risk management solutions.

- Final conclusions formulation.

2. Business and IT strategy alignement

The complex and dynamic business environment that characterize the crisis and post-crisis periods imposes a new way of running business: clear and realistic strategies, effective and efficient controls over the business processes and support systems (IT being one of them), clear understanding of the existing and potential risks, a proactive approach related to risks. Solid business strategies are essential. Now, more than ever, a realistic and solid business strategy must be defined in connection with the risk strategy, having as core elements the defined risk profile and risk tolerance. In the strategic planning process must be also integrated the IT component. Improving business processes, ensuring competitive advantages and quality are objectives that can't be fulfilled without the IT support. In this respect, there is an imperative need to align business, risk and IT strategies. The IT alignment to the business strategy will ensure effectiveness, important cost reduction, higher quality and product diversification, improved controls over the processes. IT investments create value by ensuring business increase and diversification, customized offer, improved business processes and risk management. In this respect, the IT strategy and plans must be tailored based on the business plans and projects and their schedule must be aligned to the business plans and deadlines.

The risk strategy is based on a complex risk management process that includes databases and dedicated applications in order to offer accurate and complete risk information. IT is providing the necessary instruments to run the risk models, risk scenarios and stress tests. It must be emphasized the fact that, IT risks are also subject of risk management assessment, monitor and reporting. Risk limits must be established for IT risks so that their control to be effective. This IT risk acceptance levels imposes adequate IT solution, security solutions inclusively. As a result, IT strategy will be tailored based on this IT approved risk profile.

The IT strategy developing process is based on the business goals and objectives. In the same time, the IT self assessments and the results of the reviews regarding the IT alignment to the company's expectations represent important inputs for the IT strategic process. In crisis and post-crisis periods the efficient use of the resources is crucial. Having clear and realistic defined strategic business objectives the company can tailor its IT strategy. IT investments enable business developments and improvements and can generate significant returns. Aligning business strategy with IT strategy, the company succeeds to make the most appropriate IT investments decisions and allocate the resources, limited in crisis periods, in the most effective and efficient way.

Strategic decisions are under companies' governance area. In this respect, full integration of IT governance in the overall governance process is extremely important. The correlation between business strategy and IT strategy must be built in both directions. The business objectives will determine IT systems alignment so that the goals to be fulfilled. In the same time, there is an imperious need of increasing IT contribution to innovation, efficiency and effectiveness by informing the top management on the new technologies and the opportunities opened by them to the business. Our research showed that in Romanian companies this approach is not promoted. The "classical" one, IT is aligned to business, is generalized. The authors believe that IT function must create another understanding over its role inside the company. This is also a matter of organizational culture and needs a new understanding, from the top management part, of the fact that IT became an integral component of the business process and management process too. The executives must be aware of how strongly the enterprise relies on IT, the importance of IT in the execution of the business strategy and their responsibility on IT risk management.

At this point, three questions arise:

- Who is accountable for the IT governance in the company?
- Who is accountable for IT investments?
- How much business managers are involved in IT risk management?

A joint survey released by PricewaterhouseCoopers (PWC) & IT Governance Institute (ITGI) emphasized that executive management is accountable for the IT governance and also on IT investment decisions (PWC, 2009). The non-executive management remains accountable for adequate IT operations, this fact being linked, in the authors' opinion, to its responsibility on the internal control effectiveness.

The answer for the third question needs a larger debate on risk management process and the management awareness on the fact, that risk is an integral part of the business and IT risk is part of this universe.

Returning to the idea that IT function must emphasize to the management the potential opportunities provided by the new technology other questions arise:

-   Which is the real position of IT function in the company and how much weight has the CIO's opinion in the company's decision taking process?
-   Are there assessments regarding in what extend IT performs in line with the management expectation?

To give an answer for these questions we must have in view multiple aspects as for example:

-   The level of IT governance integration in the company's governance process;
-   The executive and non-executive managers' implication on IT area meaning: analysis on IT alignment to the company expectation, interest and awareness on IT risk management, periodical debates on IT issues;
-   The organizational culture, and as part of it the risk awareness including IT risk.

Our documentation in Romanian companies revealed that IT issues are not a periodical subject on the management meetings' agenda. Even if the leader of the IT function is part of the leading committee, the debates related to IT are focused mainly on IT investments and developments as a result of business needs. IT committees are established just in big and complex companies. IT remains, in most of the analyzed companies, a technical issue let at the IT specialists' responsibility.

3. IT risk understanding and management

According with IT Governance Institute documents "IT risk is the business risk associated with the use, ownership, operation, involvement, influence and adoption of IT within an enterprise. IT risk consists of IT- related events that could potentially impact the business. It includes both uncertain frequency and magnitude, and it creates challenges in meeting strategic goals and objectives as well as uncertainty in the pursuit of opportunities" (ITGI, 2009b, p.7).

Generally accepted, IT is a component of operational risk. For the banking industry, Basel II documents establish this fact. Being a business risk, IT risk is merged with all the significant risks: strategic risk, credit risk, market risk etc. Analyzing the IT risk as a stand alone risk, without its links to the others significant risks will provide a partial view of the risk area. ISACA recommends that IT risks to be treated as "a business risk, as opposed to a separate type of risk" the recommended approach being considered "comprehensive and cross-functional" (ISACA, 2009).

In the authors' opinion, many managers do not yet understand the full implications of IT risks. IT risk, in many organizations, is still approached as a technical issue and is not approached as imbedded in other specific risks. That is why, IT risks are considered to be just on IT specialists' responsibility and there is no adequate implication of business senior executives.

Risk management should be a continuous and developing process which runs throughout the organization's strategy and the implementation of that strategy (AIRMIC, 2009). Risk management approach must determine the translation of "the strategy into tactical and operational objectives, assigning responsibility throughout the organization with each manager and employee responsible for the management of risk as part of their job description" (AIRMIC, 2009, p. 4).

The interest showed to IT function is the result of a set of the benefits provide by the new information technology:

-   IT became part of the business process. IT can sustain the achievement of the business objectives. IT ensures the diversification of the business – activities and products.
-   IT makes possible the business globalization and increases the company's competitiveness; it provides business opportunities and a customized relation with the clients and providers.
-   IT offers means to develop business by launching new products and delivery channels. By consequence, IT is increasing the company's reputation and keeps the company in the struggle for market shares.
-   IT offers means for improved business controls and business development and by consequence IT improves effectiveness in all activities.
-   IT is changing the organization culture; improves communication inside the company, offers means for knowledge's valuation inside the company and new means of training.

But IT must be understood and managed in a dual approach: risk and opportunities. The problem is how we can better manage IT risk so that the benefits brought by the information technology to be better valuated?

The risk management process must take into consideration the fact that risks action is interrelated and their consequences must be evaluated in a holistic approach. IT risk must be fully integrated in the risk management process. This is a difficult task needing not just deep knowledge on risk field but also new way of thinking risk issues. An ISACA study on UK companies, issued in 2010, emphasize that IT risk is not fully integrated in the risk management process (ISACA, 2010). At the question "How well does your enterprise integrate IT risk management with its overall approach to risk management?" just 22% of the respondents (IT professionals members of ISACA) declare that IT risk is fully integrated in the business risk management, 55% of the respondents declare that "management of IT risks is somewhat addressed" into the business risk management approach**,** 15% of the respondents declared that IT risk management is rarely integrated into the risk management approach and 8% of the respondents recognize that theirs companies have no formal approach to business risk management. These answers tell a lot regarding the way IT risk in understood and imbedded in the companies' overall risk management process. We appreciate as revealing the subjects' answer to the following question: *What do you feel is the most important action your enterprise can take to improve IT risk management*? 30% of the respondents declare "improve coordination between IT risk management and overall enterprise risk management". 21% of the respondents gave a very interesting answer: "Provide executive management with a "single view of risk" as opposed to risk silos" meaning that management needs a holistic image over risks (ISACA, 2010, p.3).

All these answers show the existing gap between the recommendations of the best practice and the existing reality on risk management field on one hand, and on the other hand the gap between the declarations of the management regarding its awareness on the need for an overall risk management process and the existing implementations.

4. Responsibilities on IT risk management

IT being so tide integrated into the business processes requests new approaches regarding risk management. The technical problems will continue to remain in IT specialists' responsibilities but the IT risk must be understood and managed imbedded in the business specific risks. In this respect, the process owners' responsibilities are extended on IT risk area too. According with IT Governance Institute document on IT risk framework the "*responsibility belongs to those who must ensure that the activities are completed successfully. Accountability applies to those who own the required resources and have the authority to approve the execution and/or accept the outcome of an activity within specific risk IT processes*" (ISACA, 2009, pag.18). ISACA established in its *Risk IT Framework document* the recommendations on the accountability and responsibilities related to IT risk management (ISACA, 2009):

- Board has the accountability on common risk view and integrating with Enterprise Risk Management (ERM).
- Chief executive officer will have both responsibilities and accountability on common risk view and integrating with ERM.
- Chief risk officer will have responsibilities and accountability on all ERM areas: risk governance, risk assessment, risk response.
- Chief financial officer will have responsibilities on common risk view.

For big companies, best practices recommend the existence of an IT committee having as responsibilities to direct and monitor the usage of IT in the company, to analyze the IT events and organization's responses and for advising the board on critical IT issues. Being aware of the importance of IT strategy alignment to the business strategy, there are organizations that established an IT strategy committee and an IT alignment committee. It is true that not the number of the committees is important for the successful of the IT function, but the expertise and dedication of their members, their capability to cooperate with the other committees and management bodies so that IT investments to create the expected returns.

5. How well we manage IT risk?

IT is a very dynamic area, characterized by continuous changes and developments. All ITC developments will provide new business opportunities, higher security to the systems, new functionalities to

the systems and interconnectivity. But all these developments can induce new vulnerabilities. In this respect, IT must be approached in its dual plans: risk and opportunities. IT, by all its components, can induce vulnerabilities and expose the organization to adverse events. As a consequence, IT risk identification and monitor is an ongoing process. The periodical assessments, internal or external (independent audits), have the role to emphasize the existing vulnerabilities and to determine the most adequate responses by improving security procedures and controls. Ensuring the systems' security and disponibility is a difficult task the IT specialists must face. The limited resources (financial, technical and human – as number and expertise) make this task harder. In this respect, clear security policies, risk identification and prioritization became imperative objectives.

The IT risk management must take into consideration the security problems the companies are facing with:

- the companies' higher dependence to their information systems that became more and more complex and difficult to manage;
- the extension of the e-business applications;
- the need of remote access to the company's systems;
- the higher systems interconnectivity;
- continuous and sometimes deep technological changes in the IT field that imposes efforts to ensure the company's alignment asking important investments and permanent training for IT staff;
- the evolution of external legal, regulatory or technological development factors.

The authors' practical experience and the surveys made in different Romanian companies emphasized some problems that remain partial solved:

- IT strategies and policies periodical review, and based on this the update of the specific procedures;
- Change management process implementation, being proved the importance to register all the updates in the production systems. There are still numerous companies registering delays in the implementation of an effective change management processes with all the needed procedures and users' trainings;
- Inadequate event reporting processes. Effective event collection and reporting processes are needed in any organization. The company must be able to have appropriate response to the IT events so that their negative impact to be mitigate. In this respect, it is crucial the implementation of an effective event reporting process and periodical assessments in the IT committee over the IT events and response actions;
- Establishment of the IT metrics and their monitor. Periodical assessment regarding the IT alignment to the company expectations;
- The importance of the problems related to the control of the automated data computing is sometimes underestimated. This is the result of the fact that many companies consider that the loss of theirs sensitive information is a threat that will not affect them in a short horizon on time. The pressure induced by productivity and costs determine the management to postpone the strengthening of the control measures, these being considered time consuming.
- Improving IT management projects; remain align to the deadlines and budgets and meet quality standards;
- Insufficient training for the non IT staff regarding the usage of equipments, applications and logical access;
- The staff awareness on risk topic, IT risks inclusively. This is an organizational culture issue. The company's organizational culture is the subject of an ongoing improvement process. The employees, no matter of their position, must understand the importance to remain aligned to the approved procedures and to be able to properly react in case of diverse events. A strong management risk process implies trained employees aware of risk consequences. Being authorized users of the information systems, the company's employees must be also aware of the necessity to use the IT resources in an appropriate manner;
- Preparation, testing and implementation of the business continuity plans and their permanent improvement. On this topic numerous alarm signals were made by Romanian specialists. All the surveys showed that the organizations are registering delays in BCP's finalization, even in the case of the organizations that have imperative requirement in the Romanian regulations (KPMG, 2008). The causes are represented by: the complexity of the project, limited number of specialists in the field, limited resources allocated, inadequate management of the projects. In

crisis years, as the ones Romania is crossing, characterized by limited resources, there is an important risk that BCP projects to freeze or to register higher delays.

6. What can be done?

The core purpose in developing an IT strategy is to ensure that there is a strong relationship between IT investment decisions and the organization's overall strategies and goals. This alignment must be extended with risk strategy goals and objectives, being known that a strong business strategy implies the integration of the risk approach. The alignment of business, IT and risk strategies represents a challenge for any organization. But the IT strategies must be tailored based on the continuous improvement of core operations and information management needs. In the same time IT strategies must be based by the role of new information technologies and determining whether new IT capabilities enable the organization to alter current approaches to its strategies. This strategies' alignment imply improvements in the overall governance, IT governance implicitly.

In this approach the CIO role in the senior management team is increasing. He must ensure that IT will meet the management expectations and IT will offer transparency and understanding of IT costs, benefits and risks.

Because of its the importance, complexity and dynamism, IT is one of the most regulated areas. International and national professional organizations issued standards and best practice guides. The IT specialists are aware of the importance of these standards and of the need to ensure the alignment at their requirements. In order to meet those requirements and being aware of the limited resources they can obtain, the company's IT specialists must establish clear priorities. These priorities are determined by the business and information security requirements. The overall success will be achieved by ensuring the most adequate balance between the effectiveness and efficiency of the IT solutions and the allocated resources.

The ITGI survey issued in 2008 retains the top IT goals. The first one is the alignment of the IT strategy to the business strategy. According with the survey the top 10 IT goals are (ITGI, 2008, pag.9):
- *Align the IT strategy to the business strategy.*
- *Maintain the security (confidentiality, integrity and availability) of information and processing infrastructure.*
- *Make sure that IT services are reliable and secure.*
- *Provide service offerings and service levels in line with business requirements.*
- *Ensure IT compliance with laws and regulations.*
- *Translate business functional and control requirements into effective and efficient automated solutions.*
- *Deliver projects on time and on budget, meeting quality standards.*
- *Drive commitment and support of executive management.*
- *Improve IT's cost-efficiency.*
- *Account for and protect all IT assets.*

Each organization will have its own top 10 business and IT goals. The prioritization will be dictated by the size, position on market, geographical position, and dependency on IT etc. It is important to establish these priorities of the business and IT goals starting from the company's mission. Having established all these goals, the IT function will effectively and efficient achieve its role into the organization. The success will be ensured by identifying and implementing timely the most appropriate solutions for these goals fulfillment meeting the management expectation regarding the return of the IT investments.

7. Conclusion

The operational continuity and the correct functioning of the information systems represent an essential factor for the business activities accomplishment. More than that, many organizations can't perform theirs activity without the support of the information systems. The threats affecting the data and processes represent business threats. In this respect, IT risk must be approached and manage as a business risk. Information systems are vital for the modern companies and, for the business purposes, it is critical that the services provided by these systems to be able to operate effectively. Now, more then ever, the executives understood how strongly the organization relies on IT function and how critical IT is for the achievement of the business objectives. But IT must be understood in its dual approach: risk and opportunities. IT ensures

needed support for the business development but in the same time exposes the company to specific risks emerged from the specific systems, technologies and processes.

IT can improve and support the business increase but in the same time can induce new and specific risks. Every organization has a unique IT risk profile that register changes in time. Any change or development in the IT area can induce new vulnerabilities exposing the company to new threats. In this respect it is necessary to periodically perform the IT risk identification and assessment procedures. The organization security strategy and policies must be tailored on the organization characteristics, complexity and expectations taking into consideration the dynamic character of the IT function. Responsibilities on risk management must be clearly assigned and ensured in day-to day activity, implying all senior managers and process managers. In order to obtain a strong alignment of the IT and business strategy it is important to express IT risk in business terms. As a consequence, top managers will better understand the impact of the IT risks over the company and will have another approach regarding IT investments needs.

Adopting an integrated view of IT risk represents a milestone of the risk management process. All senior managers must be aware of the importance of an adequate IT risk management and allocate the needed resources for the IT function and security solutions in order to keep IT risk at an acceptable level.

The business strategy must be designed in correlation with risk strategy and IT strategy. Without these correlations, the strategic goals can't be accomplished under an adequate risk control.

IT function must create another understanding over its role inside the company. This is also a matter of organizational culture and needs a new understanding, from the top management part, of the fact that IT became an integral component of the business and management process too.

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COLLABORATIVE ENVIRONMENT FOR SERVICES ORIENTED GOVERNMENT. E-GOVERNMENT SOLUTION THAT MATTER ALL CITIZENS

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Abstract: e-*Government can transform and improve the entire scope of administrative action and the political processes. Under current economic conditions government must provide better services, but with limited resources. Therefore, companies can operate more easily, and citizens will be easier to study, work, set to receive medical services or retire in any EU Member States. An action plan for e-Government solutions can solve some of the economic problems we facing. Economic growth and productivity depend crucially on the harmonization of technical dimensions, economic and social.*

Key words: e-Government, e-Citizens, public services, G2C, G2B, G2G, electronic systems, computing environments, knowledge enhanced government.

JEL classification: O38, R28, Q58, M15

1. Introduction

Electronic governance or e-Government states becoming more like a major feature of the new information and knowledge-based society. The phenomenon is complex and refers to the multiple connections that exist between individuals and legal authorities and the society. Government is now strongly influenced by the use of modern information and communication technologies. Using these technologies offer the possibility of changing the quality of government services citizens and social and organizational entities. Since the elimination of paper and followed by reducing the access time to public resources, e-Government applications gaining public confidence and efficient public services and contributed greatly to the democratization of society.

Both physical and legal persons need throughout the life of government services. The chart in Figure 1, demonstrates symbiosis citizen-economics-government throughout the life cycle. Starting from the idea that the computer system is subordinate to the decision process, whose role is to ensure optimal and normal functioning of all activities and to minimize losses in case of abnormal operation, we believe that the objective of any system should be subordinated to the objective actual social and economic unit and then it follows that e-Government systems are subordinated to and dependent on local and central government as with any computer system its objectives are the people, our case potential e-Citizens, plus local and central government and private economic environment.
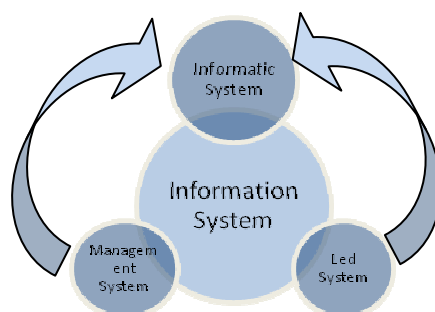

Figure 1: Symbiosis between citizen-economics-government

The final stages assumes that horizontal connections (between government agencies) as well as vertical connections (among central and local government agencies) are in place, that a supporting infrastructure is in place, with full interoperability, that there are G2C (Government to citizen connections) as well as G2G and G2B elements, with connections among various stakeholders (including government, private sector, academia, NGOs and civil society). (Gupta, 2011)

2. e-Government solutions

What was different about this particular expert session was that it took into account several important factors:

- The latest trends and technologies (open data, cloud computing, social media)
- The importance of a citizen-centric government
- Inclusion and accessibility
- User take-up and training
- Accessibility of Internet or mobile connectivity to all
- Multi-channel service provision
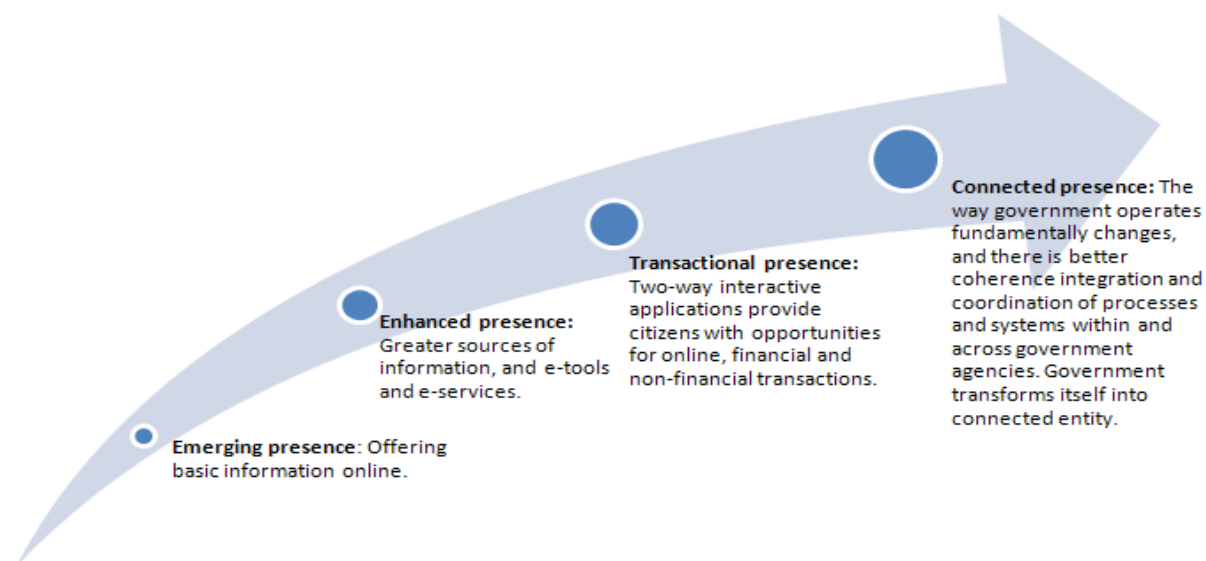- Whole-of-government (WOG) and one-stop service provision
- The environment

Connected presence: The way government operates fundamentally changes, and there is better coherence integration and coordination of processes and systems within and across government agencies. Government transforms itself into connected entity.

Transactional presence: Two-way interactive applications provide citizens with opportunities for online, financial and non-financial transactions.

Enhanced presence: Greater sources of information, and e-tools and e-services.

Emerging presence: Offering basic information online.

Figure 2: Stages of e-Government

In many cases the above stages of e-Government solutions used to implement the translation of paper in electronic formats, but for today, where information technology is developing rapidly with these solutions seem very rudimentary. Now go to a fourth phase in which solutions are being revised to make full use of technology and opportunities to be simplified, especially in terms of people calling interface to facilitate e-Government systems. Competitiveness in Romania will increase with the development of e-Governance, especially at local government level. This means support for the implementation of various applications, which will be used by different users, especially those in business at first instance. Significant discrepancies in the electronic public services must be reduced, but this requires large investments from public institutions in Romania. The population is receptive to e-Government applications, but the level of interaction is low due to low number of applications available and especially the lack of programs to train people. In my opinion the outlook is optimistic, the Ministry of Communications, said we will invest 12.2 million euro structural funds, of which the grant is 5.08 euro million in the implementation of an online service portal of the National Office of the Register of Commerce. The project will allow citizens access 34 online public services, public services of which 24 will be newly created in the project. Government has committed to allocate in the 2010-2013 period, the amount of approximately 500 million euro for implementation of the National Strategy for e-Romania, which aims at computerization of relations between the government and taxpayers, citizens and businesses. Also the Romanian government through the voice of the Ministry of Communications said that the models of e-Government in Austria, Germany and Britain, is the source of inspiration for e-Romania.

Evolution of e-Government allows the main inventory in the world offering services to citizens and companies. In the European Union have been defined basic public services whose implementation is defining progress in this area. In the present it is envisaged that services would not be insular, that each member of the European Union with its e-Government solutions and services and these services will be integrated in the EU27. Target to modernize e-Government solution in the European Union and Romania are citizens and companies. Public services for citizens are: Health related services (scheduling the consultations, results of blood tests can be found from home through a secure interface for example), personal documents (ID cards,

passports, driving licenses), on-line citizens pay taxes, unemployment benefit, social help, request and obtain certificates (birth, marriage, death), enrolment in universities, notification of change of residence address, requests and complaints to police, registrations of passenger cars (new, old imported), access to public libraries (online catalogues and search tools), and the list goes on. Public services for legal entities are: Payment of social security contributions, customs declarations, environmental permits, including reports, providing data for statistics, statements and VAT, registrations of new companies.

In Romania, the first was made by centralization of services, Public Following Government Decision no. 1439 of 18 November 2009, the responsibilities of ASSI - regulation, implementation, operation and management of the electronic systems providing e-Government services - have been dispatched between the two centres. The National Centre for the Management of Information Society (CNMSI) in Romania has been handed over the operation of the following systems: The National Electronic System and e-Government portal http://www.e-guvernare.ro, the e-Procurement System http://www.e-licitatie.ro, the Virtual Payment Office http://www.ghiseul.ro, the Electronic delivery system for international transport licenses http://www.autorizatiiauto.ro. The National Centre 'Digital Romania' will have as its main tasks the management of the information systems through which these public services are provided, as well as the implementation, operation and management of the Electronic 'Point of single contact' provided for in the EU Services Directives (Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market). (e-Practice editorial team, 2010).

In the United Nations study, from 2010, unfortunately our country does not occupy a honourably place regarding e-Government services as you can see in Figure 3 and Table 1.

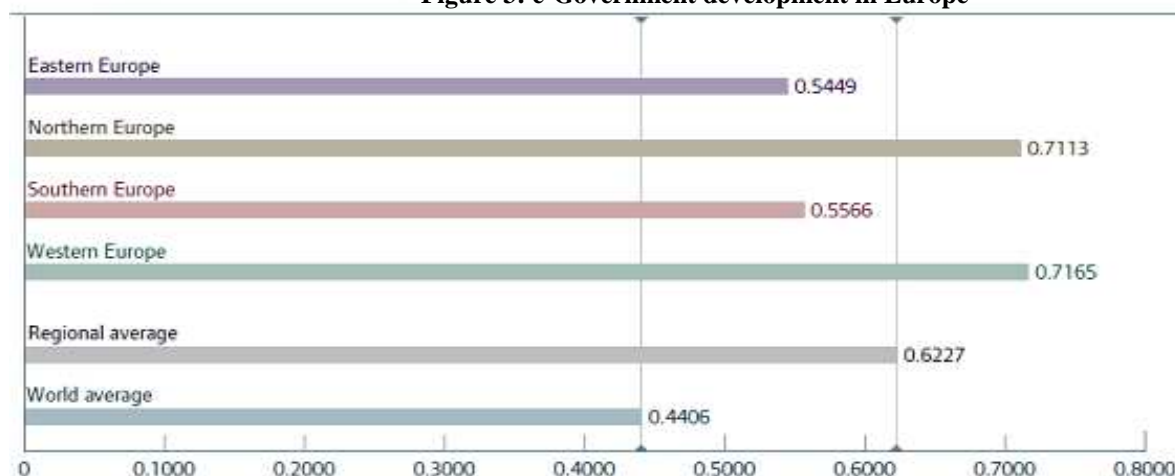**Figure 3: e-Government development in Europe**

Table 1: E-government development in Eastern Europe

Country	E-government development index value		World e-government development ranking	
	2010	2008	2010	2008
Hungary	0.6315	0.6494	27	30
Czech Republic	0.6060	0.6696	33	25
Slovakia	0.5639	0.5889	43	38
Bulgaria	0.5590	0.5719	44	43
Poland	0.5582	0.6134	45	33
Romania	0.5479	0.5383	47	51
Ukraine	0.5181	0.5728	54	41
Russian Federation	0.5136	0.5120	59	60
Belarus	0.4900	0.5213	64	56
Republic of Moldova	0.4611	0.4510	80	93
Sub-regional average	0.5449	0.5689		
World average	0.4406	0.4514		

Source: United Nations e-Government Survey 2010, Chapter Four, World e-Government rankings

3. Requirements of the development of e-Government

e-Government systems cannot be developed without fulfilling some basic criteria.

- *Development and continuous growth of broadband services in report with market requirements* (In this matter there is a legal framework in Romania through, the government development strategy of broadband electronic communications in Romania for the period 2009 - 2015).

- *Educating citizens regarding culture technology* (Here I see a very delicate issue in terms of using technical resources, because digital literacy is relatively poor, reticence vis-à-vis the use of new technologies, especially in older peoples. This problem will be solved but only with the involvement of authorities, especially by training provided free to the civil servants who should be the first to know how to use these modern computing environments. (eg type programs enrolling them to the ECDL and e-Citizens) From a financial perspective is especially difficult situation because of "crisis" where we are, but with the help of EU structural funds, by calling the operational programs sector, for example POS DRU, Key Area of Intervention 3.2 - Developing and increasing the efficiency of modern public services (e-Government, e-Education, e-Health).

- *Ensuring security of information systems through certification and mutual recognition of certificates* (In Romania starting with the duties of January 2011, declaring the income tax and social contributions will be achieved through a unique statement to be submitted to territorial tax units in the ANAF. Since the draft normative act will be approved referred the statement to be submitted starting July 1, 2011 in electronic system (online) is required to obtain income taxpayers qualified digital certificate for electronic signature).

- *Use of public and private key infrastructure and encryption technology to ensure essential services.* (There are several types of cryptographic systems which differentiate, symmetric (secret key) using the same key to both encrypt and decoding messages and asymmetric (public key) using encryption and decryption keys separate (but related to each another). One of the keys is kept secret and is known only by its owner. A second key (pair it) is made public, where the name, public key cryptography).

- *Protecting the identity of the citizen in regarding personal data.* (in this sense we have no law. 677/2001 on the protection of individuals regarding the processing of personal data and free movement of those date which apply to the processing by personal data carried out, in whole or in part by automated means, and processing through means other than automated personal data which are part of a record system or are intended to be included in such a system).

4. Conclusions

I believe that e-Government mean for our lives change, the better. We all want to evolve (spiritual, professional, etc.). Behind this evolution is development. I believe that change and development is a bridge, a bridge from the "classic government" to e-Government. Needs and cost effective communication with state institutions are vital. e-Government is an important key to the successful continuation of the reform and modernization of public administration as helping to achieve the desire of the existence of an administration that provides qualitative and quantitative optimal, effective, efficient and less costly.

From a financial perspective, the Romanian state, cannot alone cope with new technologies, develop and promote e-Government without resort to the European Structural Funds, with which to supplement the budgets of funding for programs that take place and will run in this direction. Very important is that professional training programs to be conducted both in urban and in rural areas because in the virtual world, there is not limited work space and time. It is absolutely necessary a framework law for e-Government by which all things would be legally regulated, in fact we cannot build e-Government system otherwise.

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DEVELOPING COLLABORATIVE APPLICATIONS USING UBL AND XML STANDARDS

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Abstract: *This survey describes the implementation process for a collaborative application based on W3C standards and Universal Business Language (UBL), a standard designed for business document exchange. The prototype will use XForms instead of the classical HTML forms and XQuery as the server side alternative. This paper emphasizes on the importance of using the XML stack of languages for developing a web application in order to improve flexibility and on the importance of using standards for content exchange.*

Key words: UBL, XML, XQuery, XForms

JEL classification: L86 - Information and Internet Services; Computer Software

1. Introduction

Nowadays almost all web applications are based on scripting languages like PHP, Python or Perl combined with a relational database, but these languages are not always suitable to develop complex web applications. For developing complex web applications we have to use frameworks like Java Enterprise Edition (J2EE) or Microsoft .NET, which are based on object oriented programming languages like Java and C#, but these frameworks require very much training for developers.

A new idea for developing web applications is based on the W3C standards which include data formats (XML, HTML, XHTML), programming languages (XQuery, XPath, XSLT), schema language (XML schema) and protocols (HTTP, Representational State Transfer - REST).

The main idea of this paper is to demonstrate that a web application can be developed with W3C standards using the XQuery programming language. If the XML data is stored in the browser using XForms and also in a native XML database, the software development environment became incredibly agile, by using the "Zero Translation" McCreary(2010) architecture called XForms-REST-XQuery (XRX).

In section 2 we will present the XML family and the main languages used, and in section 3 we will provide a brief overview on UBL. Section 4 presents the prototype and some design issues, and section 5 will present concluding remarks and future work.

2. XML Family

The eXtensible Markup Language (XML) has been developed with the characteristic speed of the century we live in and got the attention of the programmers by its simplicity and flexibility. XML`s origins are in Standard Generalized Markup Language (SGML) like HyperText Markup Language (HTML), and became a recommendation of World Wide Web Consortium (W3C) in 1998. It is used for the description of data and information, in order to make a distinction between content and presentation.

SGML is composed of the following languages shown in Figure 1.

Figure 1: XML Family
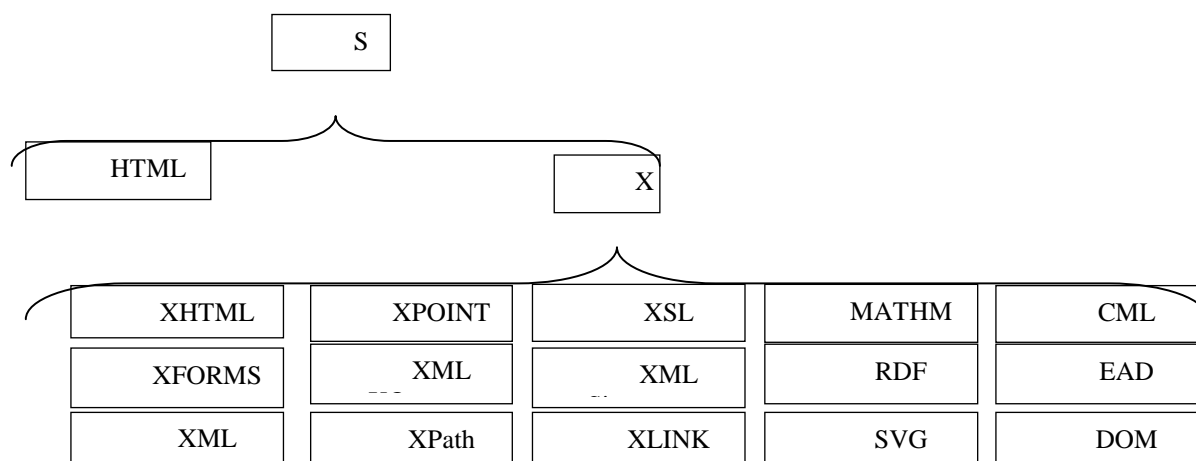
Source: Oracle

In our application we use XML through the medium of UBL, XForms instead of the classical HTML forms, XQuery and XPath. In the prototype we have used XML instead of HTML because UBL is based on XML. Even if both languages have a tag based syntax, XML offers the possibility to make new tags so it is infinitely extensible while HTML is a closed and limited technology. XML is compatible with SGML, but the number of rules is smaller, and is more flexible then HTML. XML is not as complex as SGML but is much more complex than HTML. It does not replace HTML because XML is used for describing the data and its structure, in comparison with HTML which is used for presenting the data. "XML describes data in a way that is both hardware and software independent" Abrevaya(2003). XML is the standard used for data exchange in information technology. Moreover according to Ekelhart(2007) "XML established itself as the standard for data exchange in distributed networks".

In XML documents the elements must have matching start and end tag, be properly nested and also all the attributes values must be enclosed in quotes in order to be a well formed XML document. A XML document can be validated against a DTD or a XML Schema document which defines the structure of the document. So XML documents can be validated against an UBL schema document in order to be a valid UBL document.

XQuery is a query language designed by W3C, an extension of XPath (it is used for selecting the nodes), which allows selecting information based on one or more criteria, joining data from multiple documents, mathematical operations on numbers and dates, etc. Moreover XQuery extends the XPath language by FLWOR expressions (the clauses of the FLWOR expressions are: for, let, where, order by and return), functions and also by user defined functions.

HTML Forms has made the web interactive by the medium of the client- server communication, but nowadays these forms are no longer suitable for the current web applications. W3C has developed a successor to HTML forms, called XForms, which removes the need for scripts and offers the possibility to make validations, calculations and data-typing. Moreover all this new characteristics of XForms can be made without any line of JavaScript or AJAX. XForms is an XML application, which separates presentation from content. "XForms is not a free-standing document type " Boyer(2007), it can be used with different markup languages like XHTML or SVG. XForms defines itself as "the next generation of forms technology for the World Wide Web" Turner (2010).

3. UBL

The main reason for choosing UBL is due to the fact that it is a standard library of electronic business documents and with ebXML "enables the next generation of EDI" Bosak (2002). Moreover "UBL is intended to become a de jure standard for global electronic commerce" Bosak (2002) and is considered the "HTML of web commerce" McGrath(2007).

There are many XML business to business (B2B) languages like cXML, xCBL, RosettaNet, OAG used in different domains: electronic trade, administration and transport (purchase order, invoice, price catalog, shipping notice). Figure 2 presents the evolution of B2B document standards.

**Figure 2: Evolution of B2B document standards**
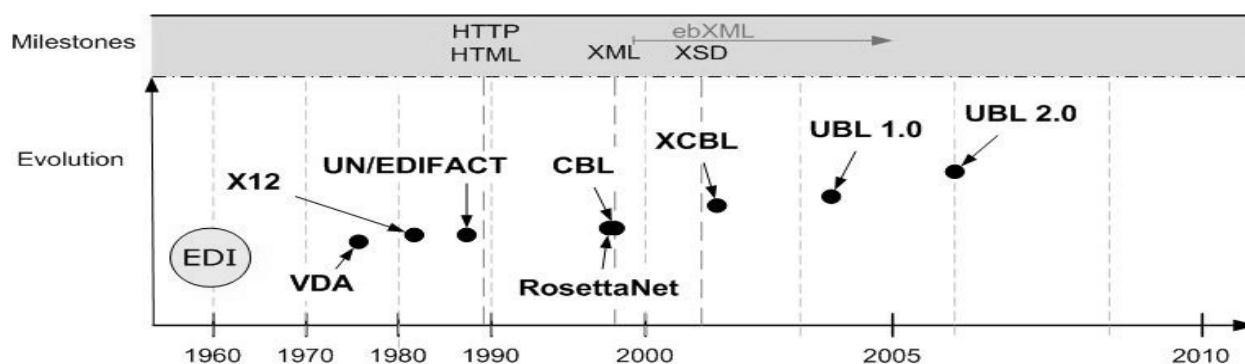
Source: Tolle(2008)

Often XML is considered the "lingua franca" Mangesh(2007) of e-commerce. XML can be used to create orders, invoices, catalogs or other business documents, but if there is no standard these documents are being understood only by the business that creates them. The Organization for the Advancement of Structured Information Standards (OASIS) is an international standard body specialized on XML standards.

Oasis Universal Business Language (UBL) had defined a XML format for business documents. According to Cournane(2004) "UBL will be promoted to the level of international standard". UBL offers document schemas meant to standardize electronic business documents which are very fast adopted by the public and private companies. It is important to adopt common standards because the exchange of data will be easier to implement and also will improve the performance and the relations between partners.

World Wide Web based on information publication is considered the most important advance in information exchange. The objective of UBL (Figure 3) is to be adopted for the exchange of commercial information. So we need the equivalent for HTTP which is used to transport web pages and for HTML designed for making the presentation. OASIS and UN/CEFACT developed the ebXML standard for commercial document exchange on the Internet using XML syntax and later another consortium produced "Web Service" with similar functionality. Both "provide the document transportation infrastructure needed to conduct web commerce" McGrath(2007). But ebXML did not offer the standards for documents.

**Figure 3: The UBL objective**
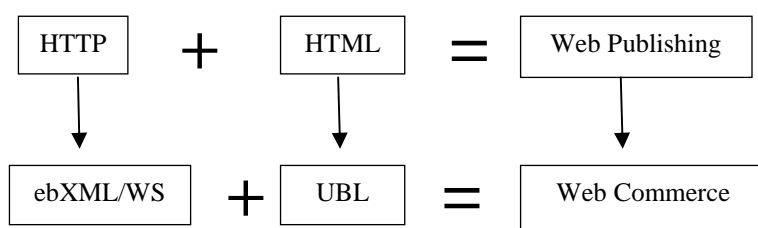
Source**:** McGrath(2006)

UBL provides XML Schemas for describing business information, so that documents can be validated against the UBL schema in order to be a valid UBL document.

At that time there were two standards for EDI: UN/EDIFACT and ANSI X12. Commerce Business Language (CBL) from CommerceOne was one of the most popular standards for business documents. Along with SAP they developed a new standard called xCBL. UBL did not start from scratch because xCBL was donated to OASIS UBL Technical Committee in order to develop a "free XML language to exploit the ebXML infrastructure" McGrath(2007).

UBL is a standard because it has:

- sanction(de jure) - has been approved by OASIS standard and by MoU/MG for eBusiness standardization, and also because it is based on ebXML Core Components
- traction(de facto) - it is widely adopted in different context like international trade, government e-procurement. Also people who use it can contribute to its development

Figure 4: UBL and ebXML
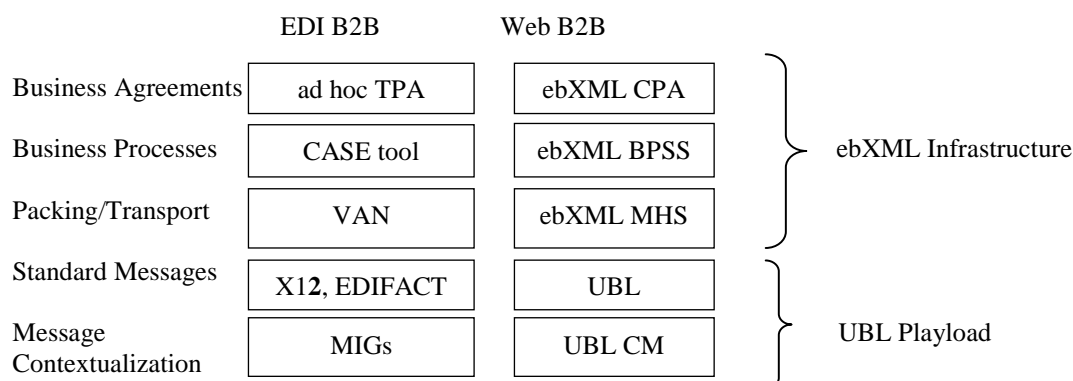
Source: Bosak (2002)

Figure 5: UBL and the ebWS stack
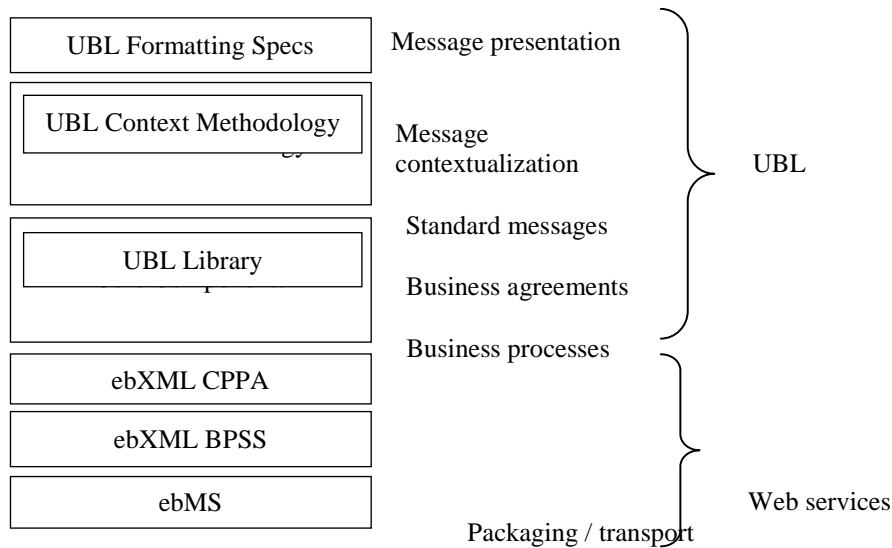
Source: McGrath T. (2005)

According to Mihai(2007) UBL disadvantages are:
- Components name don't describe all the process to which they refer
- XML is not self-describing
- Modelers will often choose different names for the same component
- Different document samples can lead to incompatible models
- All model expressions have technological limitations

According to Bosak (2002) there are some liaisons regarding UBL like the following: RosettaNet (information technology), XBRL (accounting), ACORD (insurance industry), EIDX (electronics industry), ARTS (retail sales), X12 (EDI), UN/EDIFACT (EDI). The size of XML documents is higher compared to X12 or EDIFACT documents. When RosettaNet was created the schema documents did not exist so it is validated against a DTD. Figure 6 presents the exchange of business documents between companies with different type of activities.

**Figure 6: UBL documents exchange**
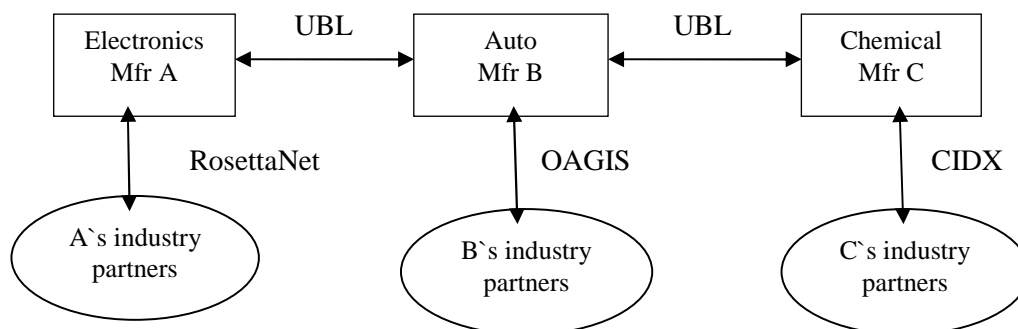
Source: Bosak (2002)

All the companies in the world understand the terms invoice, order, etc. and make the exchange of information via paper. Collaboration is a process in which entities share information, resources and responsibilities to jointly plan, implement, and evaluate a program of activities to achieve a common goal Camarinha-Matos(2008). In order to be able to collaborate, organizations need a common language that will allow them to implement the required processes with a small amount of effort. UBL is designed to make the exchange of business documents in an electronic format. Denmark adopted this standard and by law all the companies have to work with electronic invoices. Also some of the north European countries have adopted some elements from the UBL standard.

4. Prototype & implementation

In the last years virtual shops have developed very much. In order to buy a product or service from the Internet the buyer have to choose it, but he also have to choose the delivery address and the payment mean. The order is sent to the seller and the seller has to complete the invoice in order to send it to the buyer; if the buyer is a company it has the possibility to transfer the invoice into the application.

The architecture of the application is based on the three tier architecture with W3C standards presented in the Figure 7.

Figure 7: Three tier architecture
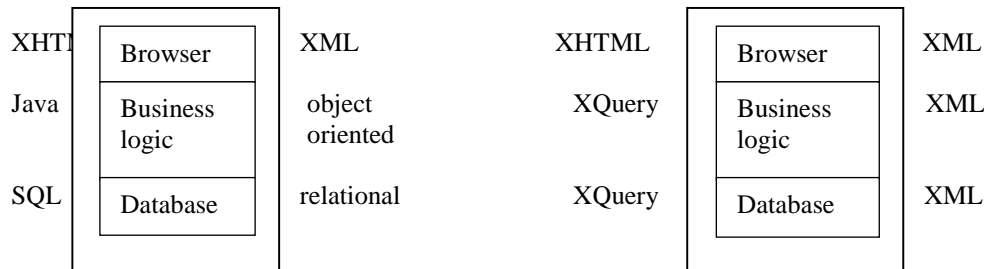
Souce: Kaufmann (2009)

This application can be implemented using different types of programming languages for each tier, but using the same programming languages for all the tiers brings some advantages like flexibility, simplicity and efficiency. It is more flexible because it allows moving parts of code from one tier to another, and this is possible due to the same programming language used at all tiers. Simplicity is achieved by using the same framework and programming language to all levels.

A traditional three tier architecture is composed of HTML, Java or .NET and a relational database like SQL. According to McCreary(2010) in case of using this type of architecture to make a CRUDS application (Create, Read, Update, Delete, Search) there are necessary four types of translations:

- HTML to objects
- objects to SQL
- SQL to objects
- objects to HTML

This traditional architecture is considered a "Translation Count" McCreary(2010) of four because of the four types of the translations; XRX instead is considered a "Zero Translation" McCreary(2010) because XForms stores all the data in XML format and there are no translations. Using XRX there is no compilation, no modifications in SQL and no objects to modify.

For the implementation of the prototype we used betterForm which includes the eXist XML database and the new XForms REST XQuery architecture to build web applications. eXist is an native XML database designed especially for stocking XML documents. betterForm is a XForms toolkit which contains the Dojo framework used to create web applications with a very rich interface, and eXist database for implementing a XRX architecture. The main reasons for choosing betterForm are the following:

- ✓ based on open standards like XML, XPath, XQuery, XSLT, XForms, CSS, JavaScript
- ✓ can be combined with REST services or with XRX
- ✓ open source

A comparison between a relational database and a native XML database is shown in Table 1.

Table 1: Comparison between relational database and native XML database

Relational database	A native XML database
A relational database contains tables.	A XML database contains collections.
A relational database contains records with the same schema.	A collection contains XML documents with the same schema.
A relational record is an unordered list of named values.	A XML document is a tree of nodes.
A SQL query returns un unordered set of records.	A XQuery returns an ordered sequence of nodes.

Source: Elliotte (2005)

All collections form the database, like all the tables form the relational database, a collection is the equivalent for tables in a relational database, elements correspond to tuples and sub-elements to fields of tuples.

Also we used <oXygen/> XML Editor for editing the XML/XHTML documents which is a very complex platform which offers support for the following technologies: XML editing, XML conversion, XML Schema development, XSLT/ XQuery/ XPath execution and debugging, native XML and relational database support. Also the software offers tag completion, syntax coloring and automatic indenting.

In this software we have configured the eXist database from the betterForm software and added a collection named UBL which includes the XML documents (with .xml extension) and also the XQuery documents (with .xql extension). The module.xql contains a module composed of functions. The functions return data from the XML documents in order to make the structure of the UBL order. The information is presented in a wizard according to XForms standards. This module is imported in form.xql where are called only two functions modul:header and modul:body. If we run the query form.xql the result of the query is a .xhtml document.

The application represents a wizard made of 6 steps:
- show the selected products for a buyer
- show the buyer details
- the buyer selects the shipping address between the existing address, or can add a new one
- the buyer has to select the payment mean
- the buyer has to select the delivery time
- the final step shows the products and the amount of money that the buyer has to pay

XQuery can do the same things like SQL and even more. With XQuery it is possible to sort, group, select, make joins and to limit result set. In XQuery the variables are read only because their value can`t be changed.

The diagram in Figure 8 presents the flow of the documents from making the order until the items and the invoice had been sent. The buyer selects the products for placing an order. After the order arrives to the seller, he sends an order response (order confirmation) to the buyer and start preparing the shipment. Until the shipment is not ready the buyer can change or cancel his order. If the seller did not make the payment, the buyer sends him a reminder; but if he did not pay after a period of time the order will be dropped. After the payment the items and the invoice are sent to the buyer.

Figure 8: Activity diagram
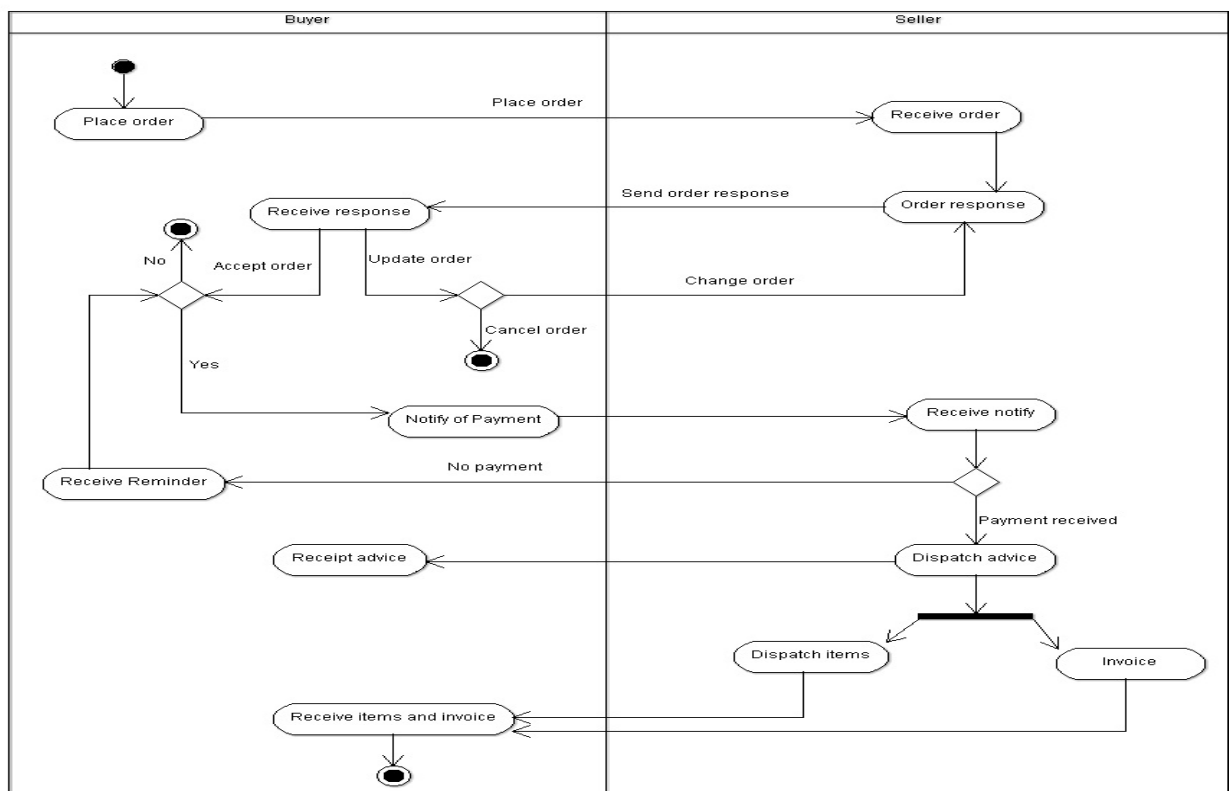
The flow of business documents in these type of applications is almost the same, but it can be implemented with different types of technologies. Our prototype is implemented using UBL and XML standards with softwares like <oXygen/> XML Editor and betterForm.

5. Conclusion

The paper presents the fact that it is possible to develop an application only with W3C standards because W3C is very well suited with standard recommendations (XML, XPath, XQuery, XForms, REST, HTTP, etc). Using W3C standards and especially XQuery is possible to develop an application without mixing different technologies like in the classical three tier architecture. The application becomes more flexible, efficient and simple due to the fact of using the same technology at all three tiers.

This work is a first step in order to develop collaborative applications using W3C standards and especially XQuery. One important avenue for future work is to develop and explore the benefits of XQuery in applications.

6. Acknowledgements

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BUSINESS PROCESS DEVELOPMENT USING AGILE METHODOLOGY

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Abstract: *Agile methodology offers a complex and complete solution for business process management in IT companies. The goal of this paper is to present a business model for SCRUM development. We present a comparison between USE CASE and business process approach, functionalities and characteristics of the process. Our case study was focused on Ambler considerations for agile development and we use IT companies as a model for implement a BPMN solution. We establish SCRUM workflow, process inputs and outputs, and process activities and responsibilities.*

Key words: business process, BPMN, activities

JEL classification: L21

5. Introduction

In crisis context a lot of companies try to satisfy needs of clients and align business process management (BPM) in two major directions: business effectiveness and efficiency. Business process management was defined as a "process optimization process" which attempts to continuously improve processes, for innovation, flexibility and integration with technology. A business model "is a framework for creating economic, social, and/or other forms of value". As a constant aim in Business Process Management Institute (BPMI), researchers use different ways a business process can be modelled, main difference between these is the amount of detail present in the model, which depends on the context where in the process is modelled (Musschoot, 2009).

Literature has delimited tree levels of business modelling: *descriptive modelling, analytical modelling* and *executable modelling*. At high level, *descriptive modelling* contain the fundamental concepts such as pools and lanes, tasks and sequence and often simplified and easy to communicate models. *Analytical modelling* detailed modelling containing all tasks and exception paths and focused on all relevant aspects to the business process. *Executable modelling* is deal with detailed modelling, where the model can be executed directly by an automated system (Silver, 2008). The amount of details provided in an analytical model will be higher than the amount of detail in a descriptive model and executable models contain necessary and enough information in order to be executed by an automated process engine. Modelling process will be mainly oriented towards execution by several systems (Musschoot, 2009).

The most important components of a business process are: tasks, type information on tasks, roles, information, control flow and data flow, business rules and timer. Tasks are actions performed by one of the parties in the process. Type information on tasks shows whether or not the task is executed with the help of an automated system. Roles are the components which show the roles of the different parties in the process, and their grouping, depending on business process requirements. Information is certain activities will result in a clearly identifiable information artefact; it shown in the business process (as the input or output of a task) by means of an annotation.

Control flow shows the sequence of the executed tasks and data flow can visualize the data exchanged between different roles in the process. Business Rules are annotations that demonstrate the use of specific business rules or logic in a decision making process (a condition for an order, a restriction for customer). Timer has a well defined place in the process, linked with a trigger for starting or continuing the process (maximum delay when no confirmation from the remote party is received) (Muschoot, 2010).

This paper is structured as follows: after an introduction about business modelling, Section 2 focused on business process development in IT companies, using agile methodology, started with business process requirements, followed with a comparison between business process and use case. In Section 3 we present business project management approach in virtual IT organization. We concern on SCRUM strategy in project management and development, based on principle for managing people and processes in organizations. We start with Business Process Management model for strategies, inputs and outputs model, functionalities, than we point several features of managing the process and managing the people in collaborative context. Section 4 contains conclusions about main benefits and the future work.

2. Business process development in IT companies

2.1. Business Process and Requirements

For a proper building or configuration a software solution based on business needs, requirements definition is required. This definition is in fact a clear and complete description of the business needs, often called the user and contain information about: *functional* and *non-functional requirements, screen requirements* and *integration requirements* (Silver, 2008, Zachmann, 2005). *Functional requirements* consist on what the system needs to do and what functionality it needs to offer. *Non-functional requirements* are focused on the quality requirements towards the solution (performance, response times, security, scalability, maintainability, aso). *Screen requirements* point human computer interaction, how the communication between the user and the system needs to be build. *Integration requirements* present how many other systems are involved in integration system and how the solution needs to integrate and communicate with other systems.

These requirements are used to arrange in manageable and logical grouped parts, based on several techniques: Use Cases, scenario's, user stories, according to the method used to identify. The relevant information can be: input information, rules that need to be applied (validations, calculations, the output information of a specific task, the way interaction with the system needs to be done, the errors catch and treatment (Muschoot, 2010).

The analytical model is more detailed than the descriptive model. The presence of role information and type information on task level is the most important information to be able to link business model to software requirements. Many authors grouped in three types of relevant tasks: manual tasks, semi-automated tasks and automated tasks. *Manual tasks* are executed without involvement of any automation system (filing a form or an invoice). *Semi-automated tasks* imply the role will execute the task by means of an automated system (registering an order in an order-entry system). *Automated tasks* can be executed without the involvement of a user, and involve all validations for instance, which contains several automatically business rules which must be passed. This assignment depends on assigning type information to a task, requirements from business side, providing the detailed requirements towards the solution for the automation. This activity is performed by a business analyst, who has writing several Use Cases, scenario's or user stories (Porter, 2004), (Muschoot, 2009).

2.2. Business process vs. Use Cases

Use Cases describe from a user point of view, how the interaction with the system needs to be implemented, and what the requirements of the system starting from that user interaction are. The scope of a Use Case is limited to a part of the total requirements, *atomic action* represent a specific sequence of actions a user can do with as system within an uninterrupted time space. The forms can be developed from simple to complex as a collection of all Use Cases will describe the total set of requirements towards the system.

Use Case is also annotated with: *actors, default/ exception path, business rules, input and output information* and *quality constraints*. *Actors* are the parties involved in the Use Case, the *default path* are formed by the combination of steps that will result in the achieved objective, the *exception path* show the steps to follow when an error/problem occurs in the default path. *Business rules* are specific rules or conditions to apply (calculations, validation rules, correlations rules), and *input* and *output information* needs to be present before the default path is executed, and the output information are delivered by the default or exception paths. *Quality constraints* represent several quality criteria related to specific steps (delay, response times, rounding). Several major characteristics and a comparison between business process and Use Case can be observed from Table 1.

The information from the business process model can be taken over in the detailed requirements definition. It assures traceability in the requirements management process. (Robertson, 2006). So the next step towards automation is working out the detailed requirements for the steps in the process where automation is wanted.

Table 1. Business Process and Use Case features

Business Process	Use Case
Role	Actor
Business Rule	Business Rule
Data flow	Input / Output data
Task description	Use Case description
Information	Information, input and output data
Timings and constraints	Quality requirements

Independent of the technique used, it is safe to state for ever step in the business process where automation is requested, a number of Use Cases (or scenario's or user stories) will describe the detailed requirements towards the automation for that step. This implies for each Use Case, a subset of the information in the business process will be relevant (part of the business rules, information, and aso).

Nowadays, in crises context a many companies to survive or maintain market position and customers based on suitable management and proper solution, which involves short term collaboration. Collaboration involves flexible relationships between business partners and offer joint work; usually based projects are carried out on the short or medium term. New relationships are created almost ad hoc, and are abandoned as quickly as organizations that are distributed after the purposes and responsibilities involved in business operations have disappeared.

3. Using SCRUM Methodology in IT BPM

The Enterprise Architecture defines the enterprise architecture of an organization and consists of models, reference architectures, prototypes and working models which demonstrate how it works, and frameworks for usability. An enterprise architecture model is "a representation of the structures and processes of an organization; a good one depicts the organization both as it is today and as it is envisioned in the future, and maps the various views representing the architecture to one another". Every view includes business-oriented perspective or technical perspective. Enterprise architecture models link senior business stakeholders and senior IT professionals.

The Enterprise Business Modelling extends business modelling to enable organization to explicitly realize the benefits of doing so outside the context of a project. The goal of the Enterprise Business Modelling is to enable to understand and communicate the business in an organization. It often referred as enterprise requirements modelling, because it explores the business process from an organization and overarching business requirements for the software applications for supporting it.

Scott W. Ambler defined Agile Modelling (AM) as a "practices-based software process whose scope is to describe how to model and document in an effective and agile manner". This agile manner can be used in software process such as eXtreme Programming (XP), the Microsoft Solutions Framework (MSF) for Agile, the Rational Unified Process (RUP), the OpenUp, the Agile Unified Process (AUP), and the Enterprise Unified Process (EUP). First three cases cover the development process and AUP cover full software process, including development and production. All of these processes include modelling and documentation activities, in the case of XP and MSF the modelling processes should be better defined, and in the case of both the RUP and the EUP the modelling processes could definitely stand to be made more agile (Ambler, 2005)

The AUP is a subset of the RUP and the EUP a superset of it. In the RUP there are three disciplines for modelling activities in a single project: Business Modelling, Requirements, and Analysis & Design. EUP adds Enterprise Business Modelling and Architecture. The AUP is in fact a subset of the RUP, which combines the three modelling disciplines into a single Model.

Modeling activities include the development of: a *context model*, (a data flow diagram) which showing how system mix into overall environment, a high-level *business requirements model* (an essential use case model), a *glossary* which define critical business terms and a domain *model* (a class diagram or data diagram) depicting major business classes or entities (Ambler, 2007a).

Agile unified process (AUP) methods involve same phases as RUP methodology, started with Inception, followed by elaboration, than construction and finished with transition. But in lifecycle we meet several particularities because we have an iterative approach and day-to-day we try to follow several activities started with business modelling or enterprise modelling, followed with implementation, testing, deployment, configuration management, project management and environment management. All of these can be done by AUP team members and during construction or elaboration phase we can meet several activities like: testing, deployment, configuration management, project management (Figure 1).

Figure 1: The lifecycle of the Agile Unified Process (AUP)
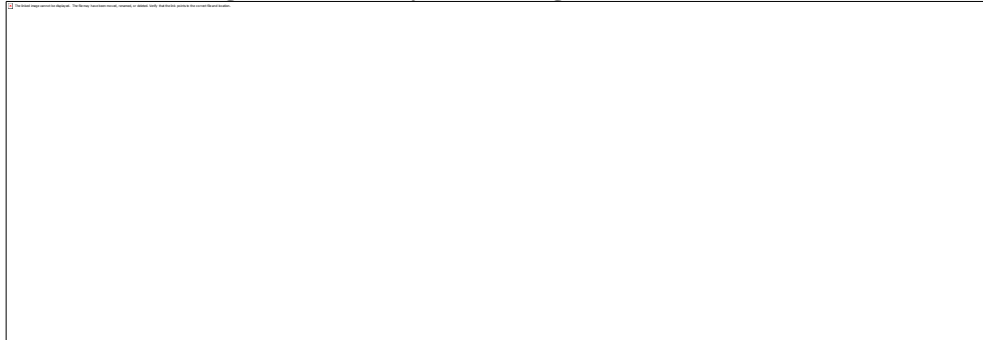
Source: Ambler, 2005

We usually select this methodology when we deal with time and materials projects. Another situation when this methodology is recommended is when our capabilities are not solid in a certain area or when the customer cannot finalize

The pros of this model are as follows:
- Highest flexibility offered to the customer;
- Completely transparent to the customer;
- Less demanding in regards with administrative effort and documents;

The cons of this model are as follows:
- The project end date cannot be known in the beginning of the project (or the requirements are not fully detailed);
- Relies highly on team discipline and skills;
- The overall progress may be not be easily perceived by the end customers;
- Tends to be perceived as overly bureaucratic.

The process inputs are mainly a subset of the Acquisition activity (Table 2).
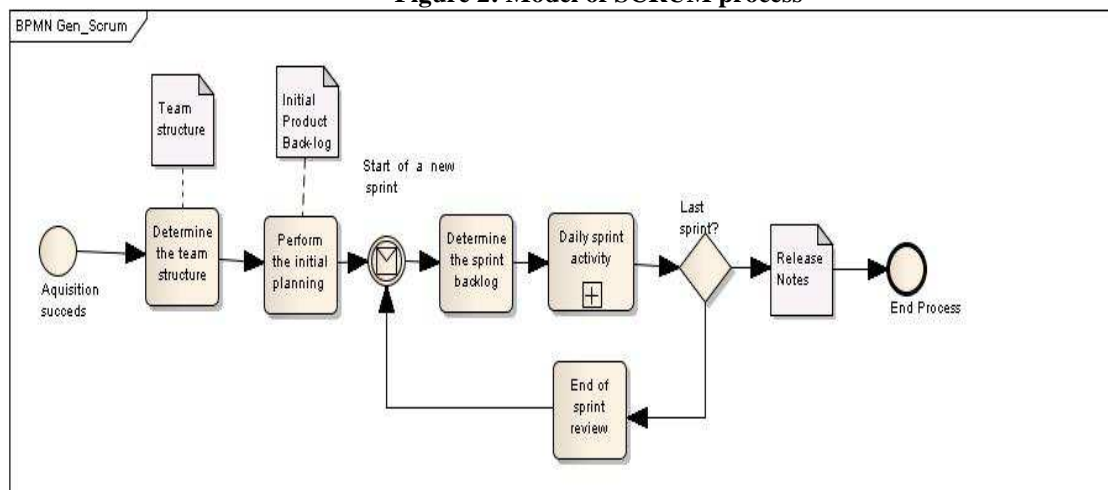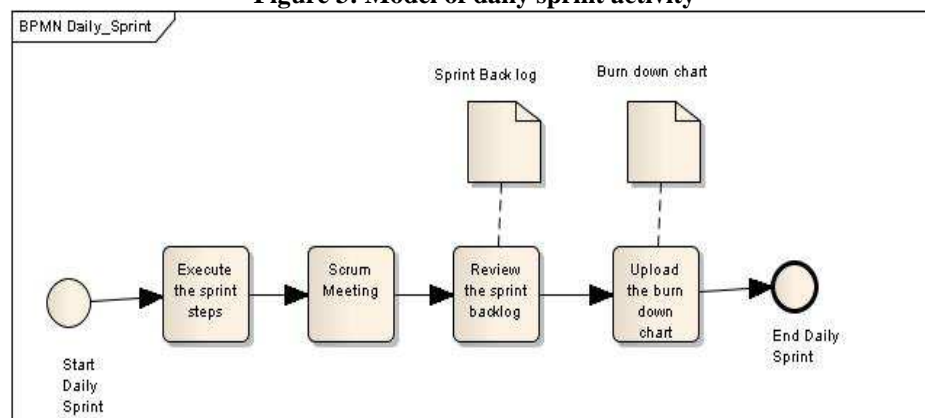
Table 2: Process Inputs

Input	Responsible
Software Requirements Document	Customer Business Analyst
High Level Design Document	Architect Business Analyst
Preliminary Project Plan	Project Manager

Process activities are detailed in Table 3. It is started with determine the team structure, in which is involved Business Development Manager or SCRUM Master, second phase is to perform the initial planning and establish product back-log. When project manager or SCRUM Master determines the sprint backlog usually according with customer and developers, they must re-prioritize the items open on the backlog. When execute the sprint steps every member try to achieve the own goals but during daily scrum meetings every member present the results and next steps for the future. As a result project manager or SCRUM Master update the burn-down chart and can change back-log items (if is necessary).

A BPMN model for SCRUM process in IT company can be followed in Figure 2 and Figure 3.

Agile methodologies promote an incremental, iterative approach to development of functionality (including method signatures), with visibility of the impact of change given through test coverage. Basically, working on the premise that, change is cheap if supported correctly and Experiencing agile methods is proven to be worthy because it is more responsive towards the improvement

Process outputs as we pointed in Figure 2 and Figure 3 started with TeamStructureTemplate.xls which contains members, roles and responsibilities. Another document is sprint back-logs, which is permanent, updated, according to daily sprint, as well as Burn down chart and final document is the release notes (Table 4).

Figure 2: Model of SCRUM process

Figure 3: Model of daily sprint activity

Table 3 : Process Activities

Activity	Responsible	Description
Determine the team structure	Business Development Manager Project Manager / SCRUM Master HR Manager	This activity is focused on determining the initial team structure for the project. The output of this activity is the team structure document.
Perform the initial planning	Project Manager / SCRUM Master Customer Developers	This activity focuses on the preliminary planning for the project. At this stage, the product back-log is created along with an initial overview of the sprint cycles that are needed for the project.
Determine the sprint backlog	Project Manager / SCRUM Master Customer Developers	This activity is performed at the beginning of each sprint. It is focused on creating the overall picture of the items that are to be addressed on the current sprint. Usually this is done by re-prioritizing the items open on the backlog.
Execute the sprint steps	Developers	This activity is focused on executing the sprint steps. The team usually organizes itself in order to achieve the team goals.
Scrum meeting (daily basis)	Project Manager / SCRUM Master Developers	During this meeting, all the team members are expected to present their progress, the issues and the plan for the next day. The meeting should be very brief (no more that 20 minutes).
Update the burn-down chart (daily basis)	Project Manager / SCRUM Master	This activity focuses on registering the remaining work on the project on daily basis. It also compares the actual work progress versus an ideal work progress – so any departures from the schedule can be detected early. The input for this update consists on the remaining work hours report provided by the team members.

Activity	Responsible	Description
Review the sprint back-log	Project Manager / SCRUM Master	This activity ensures that the back-log items are deleted or re-prioritized as needed. Once the backlog items are completed, they would be deleted (or at least marked completed). Sometimes the back-log items become obsolete or they get a lesser priority – all these changes need to be marked in the back-log.

Agile methods offer the advantage of a real time communication, preferably face-to-face, over written documents. Most agile teams are located in different locations as a collaborative approach but they include all the members which are necessary to develop the software. If the have different places often used collaborative tools for daily meeting: chat, videoconference, and forum. The team includes programmers, developers, testers and the people who define the product: SCRUM master, project managers, business analysts, or customers (Table 3 and Table 4).

Table 4: Process outputs

Output	Responsible	Description
Team structure	Business Development Manager Project Manager/ SCRUM Master HR Manager	This document outlines the structure of the team, the team members, roles and responsibilities, TeamStructureTemplate.xls.
Initial product back-log	Project Manager/ SCRUM Master Customer	This document specifies all the items that need to be performed in order to complete the project. The items from the product back-log will be extracted into the sprint back-logs.
Sprint back-log	Project Manager/ SCRUM Master Customer	This document captures all the items that are to be performed during a certain sprint. The entire scope of work for a sprint should be reflected into the sprint back-log.
Burn down chart	Project Manager/ SCRUM Master	This document captures all the progress that is made toward releasing the product. It needs to be updated daily as it will show any potential departures from the ideal schedule.
Release notes	Team Lead	This output is generated at the end of project development. It should contain the build number, known issues and a small troubleshooting section if there is the case.

4. Conclusions

Agile methodology defines a method for software development which minimizes the cost of change, especially in a context of several factors of risk management: late in a project or where we are obliged to adapt to several uncontrolled factors. AUP methodologies can be more than programming methodologies for increasing speed in software development.

We started with a comparison between business process and USE CASE features, and we show several differences between these development solutions.

Enterprise architecture and enterprise business modelling is a challenge for IT companies, which want to offer an efficient solutions for customers in crisis context. We pointed several advantages of agile methodology and analysed several solution for business process development in a company oriented to software development. Our business model was focused on SCRUM methodology as an agile solution. We establish inputs and outputs process, activities and we modelling SCRUM methodology as a business process using BPMN. For each we describe the inputs or outputs, responsibilities and descriptions. Daily sprint activity is an iterative process in development and we Ambler lifecycle approach for our model.

This methodology is often used in development IT products, as a flexible bridge between customers' demands or requirements changes and the final costs and delay in development process.

5. Acknowledgment

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CONSIDERATION ON THE DESIGN AND CONTENT MANAGEMENT OF AN ONLINE SCIENTIFIC JOURNAL

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Abstract: *Given the increasing number of online journals, in Romania and worldwide, this article aims at emphasizing the author's experience in designing, developing and maintaining the electronic version of the "Journal of Applied Computer Science & Mathematics". We try to underline the main features that the software application supporting such publications is expected to provide both to the readers, authors and editorial board.*

Keywords: online journals, electronic publications, CMS

JEL classification: I23, C61, M30

1. Introduction

The online scientific journals represent a valuable and effective alternative to the regular printed version from many points of view. Considering only the balance between advantages and drawbacks, the first advantage, for the editors, is related to the costs, which are significantly lower even if for some reasons the printed version may coexists in parallel. Actually, this may be the main reason why nowadays the electronic content is gaining ground in relation to the traditional publications such as books, newspapers or magazines.

Other benefits, also for the editors, could be that they can grant individual access to an article, for a fee (in the case of paid journals), the subscriptions are more easily managed and there is strict control of the online income. A full featured electronic platform also facilitates the communication with the authors and the editorial board, including the reviewers. Of course, one such platform involves a significant initial cost for the equipment and applications, that nonprofit organization can not afford in the absence of an external funding source.

As for the readers, they also benefit from some advantages: the availability of the publication, which may be accessed anytime from anywhere, the possibility to pay per article instead of per issue, to search for related articles or for some authors within the journal website and so on.

The aim of this paper is to share the author's experience in designing and maintaining the electronic version of a scientific journal, emphasizing the most important issues to be solved when we decide to implement an online version of a journal.

2. Possible approaches

The first issue to be solved is where to host the online publication. We may choose between a third party hosting service and having our own platform.

External hosting may be attractive at first sight, because no technical skills are required and the monthly fees are reasonable [1], [2]. However, besides the monthly fee, many additional costs may occur: setting up of the service and the customization of the website, which starts from 750$ and goes over 2500$. Low cost hosting packages limit the monthly bandwidth to quite restrictive values (from 1GB), which may be inappropriate if the online journal provides papers download. In addition, some providers may charge the hosting of a custom domain name. Last but not least, it may be a little bit frustrating to yield the full content of the journal and all its administrative stuff to a third party.

If we opt for our own platform, we have to make some decisions about how this will look. If in terms of hardware it is, practically, only one solution – a professional server machine, for the software there are some possibilities that may be considered. Depending on the budget, the operating system may be a commercial one or a free one. However, before deciding what operation system will be used, reading the server specification and the Operating systems section, is highly recommended.

The application software issue can not be separate from the operating system because they may not be compatible. If the application is written in ASP.NET, for example, it may not run on other operating systems without additional complication and costs [□].

The entire process of choosing the suitable platform, from the server to the programming language in which the application is written may be represented as in figure 1.
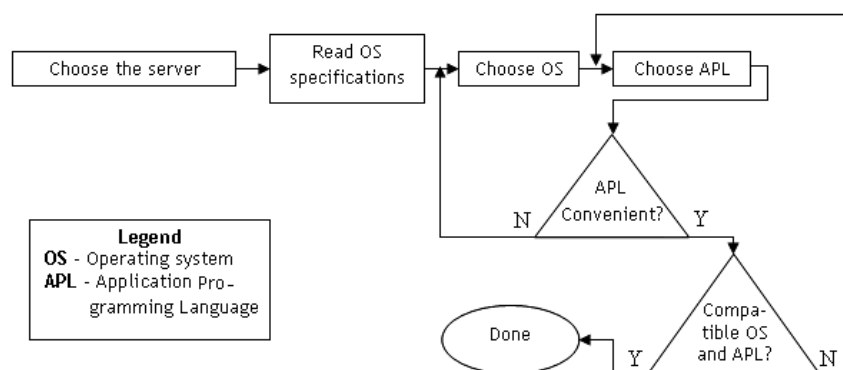
Figure 1. The flowchart for choosing the suitable platform

Regarding the application itself, we also have some possibilities: buy one, use a free one (open source) or write your own application.

Buying a customized application, tailored on the publisher needs is very expensive and isn't worth to considering for a non-profit publication.

Free software is a reliable solution and very convenient since we don't have to pay for it. Each application has specific requirements regarding the services provided by the host (usually a specific web server, a server-side scripting language and a database server) that must be taken into consideration. Some software developers offer hosting services for their products [□], but it is paid.

Wishing to cover as many needs, open-source software very often provides a lot of features from which many will never be used. These features make the software usage complicated and lumpish. After all, getting a custom layout of the website may be a very complicated task when using free software applications. On the other hand, possible software bugs are easily exploited since the program sources are open.

Designing and writing a personalized application is a good choice if you have programming skills and knowledge. The task is complex because it requires expertise in various fields such as Web design, Databases, programming and Systems' Administration.

3. Our solution

Based on the above considerations, we choose to design our own application for LAMP (Linux, Apache, MySQL and PHP) platform, for all its advantages, that will not be discussed here. The complete journal is hosted by the Internet server of the Faculty of Economics and Public Administration, as a virtual server.

The application consists in two main parts, the public website with dynamic content and the administrative part, based on CMS concept. The journal offers open access to the published papers, thus the website component is quite simple, as authentication is not required. As it can be seen in figure 2 a, from the home page the visitor may access the content of the current (last published) issue, browse the archive of previous published issues and search the content using a local search engine. At any moment, from the navigation menu he (she) can get much information about the journal such as editorial board, instruction for authors, the reviewing process and a subscription form for those who apply to be a reviewer, figure 3. For each issue selected the visitor may see the paper title, the abstract, the keywords and even download individual papers in pdf format. Authors having published papers in a certain issue may also download the covers, the table of content and index of authors, figure 4.

The website relies on a two MySQL tables, "articole" (articles) and "authors" with the definitions in table 1. The name of the columns are clear, only three columns require some explanations: *paperId* field is obtained by concatenating the number of the issue and the sequence number of the paper in the respective issue, *authors* keeps a string containing the authors name and surname, in the order of their contribution.
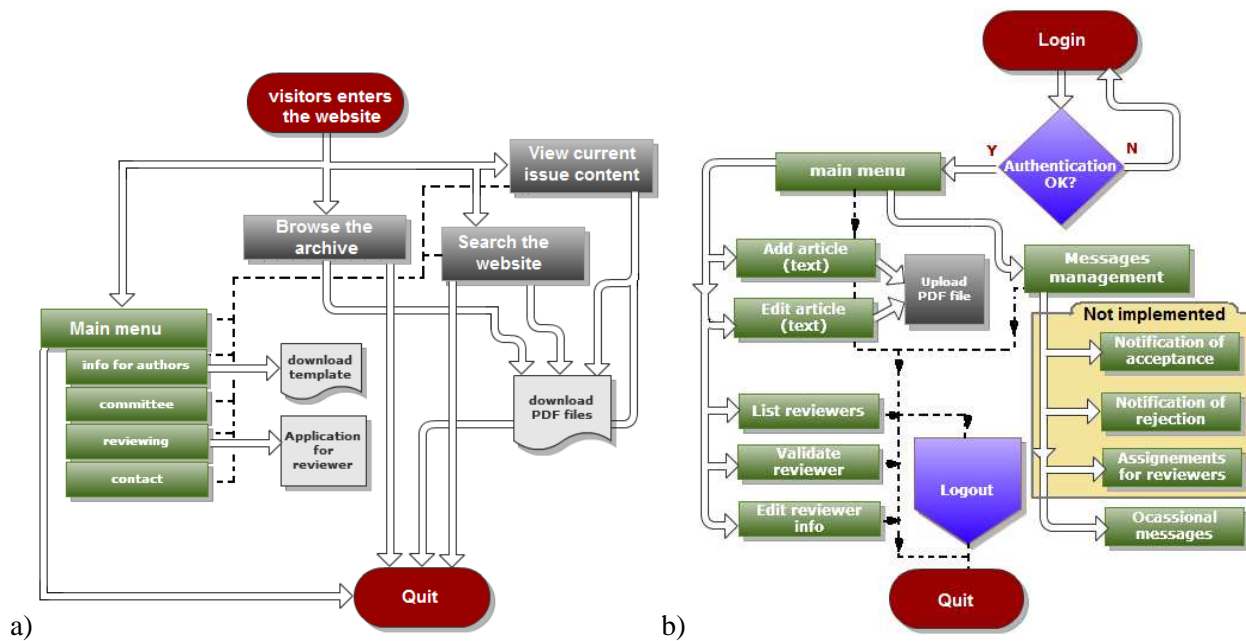
a)   b)

Figure 2. The main activities for the two parts of the application: a) website b) administrative

Figure 3. Layout of the journal website, application form for prospective reviewers selected
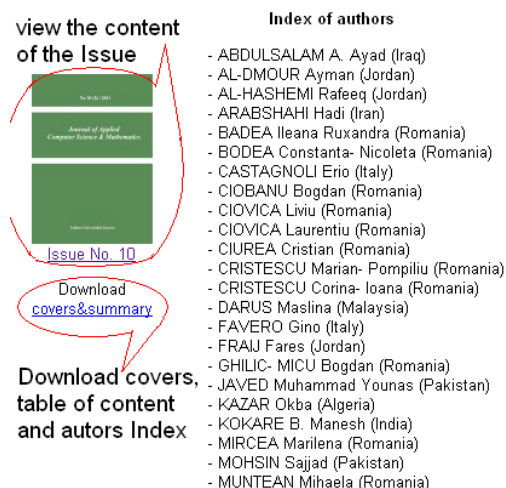

Figure 4. Besides the access to individual papers, visitors may download the covers, table of content and index of authors

Table 1. Structure of table "articole"

```
"year" year(4) unsigned NOT NULL default '0',
"issue" smallint(4) unsigned default NULL,
"paperId" int(5) unsigned NOT NULL default '0',
"title" text,
"abstract" text,
"keywords" text,
"authors" text,
"acc" char(1) default '0',
 PRIMARY KEY  ("paperId")
```

This is a deliberate exemption from the database normalization because it was found to be the most convenient solution to preserve the authors order on authors update. The column acc contains one of the two values, 0 and 1. The default value is 0, which prevent displaying the paper in the content of the issue. It helps when setting up a new issue paper by paper. Only when all papers are uploaded the values of the fields in column acc are set to 1 and then they may be visible on the website. The second table, "authors", has a simpler structure, shown in table 2.

Table 2. Structure of table "authors"

```
"recID" int(10) unsigned NOT NULL auto_increment,
"author_surname" char(30) default NULL,
"author_name" char(30) default NULL,
"paperID" char(5) NOT NULL default '',
"country" text,
 PRIMARY KEY  ("recID"),
 KEY "paperID" ("paperID")
```

The table "authors" is used when the order of authors doesn't matter (creating the index of authors and when searching the website by author name or author surname).

The table "ed_spec" is used rarely, when a special edition of the Journal is issued. It contains only two columns, issueID and comment. The first column keeps the issue number of the special edition and the second column keeps some comments about that edition.

The administrative module of the application relies on many tables:

"committee" – stores data on scientific committee;

"users" – stores userID and password of users having administrative privileges;

"reviewers" – stores all reviewer requests and their identification data;

"competences" – stores a list of competences used for tracking the competences of scientific committee members as well as of reviewers;

"assoc_rev" – keeps the correlation between reviewers and their competences declared in the application form;

"assoc_committee" – keeps the correlation between the members of scientific committee and their competences;

"testit" – stores a list of questions and the corresponding answers, used to prevent robots from sending data from user forms.

For each journal issue already published or to be published, there is a table "authors_in_issue_n", where *n* is the issue number. The table contains information about authors whose paper were accepted for publication, such as full name, paper title, e-mail address, status of the publication, fee payment.

As it may be seen in figure 2 b, an authorized user (it must exist in the table "users") is allowed to append information about papers, modify existing information, upload papers and manage the reviewers. Also it is possible to send occasional e-mails to the members of the Editorial Board, reviewers, authors in tables "authors_in_issue_n", such as notification on issue release, payment reminders.

3.1 Future developments

For completing the minimum set of features that make the module fully functional, the management of received papers (including assignation to reviewers) must be released. Currently, the activities related to this aspect are done manually. Also, it is extremely useful to provide a user interface for uploading papers and

copyright statements. Since the Journal website is hosted on the same machine that hosts the Faculty website, for security reasons we are delaying the decision to grant public access to this module.

Another useful module, which is worth being added to the administration section of the application, is intended to simplify the procedure of inclusion in the Editorial board of most active and valuable reviewers. The table "reviewers" currently contains two columns, *approved* and *prev* with default value set to 0. If the value of field *approved* is set to 1, the reviewer in that row is automatically displayed in the Editorial board section of the website. Column *prev* (paper reviewed) keeps the number of papers reviewed by the reviewer. At present, the contents of those two fields are set manually and should be done automatically.

3.2 Linking external databases

Many major database archives that index journals, such as DOAJ (Directory of Open Access Journals), keep their own records about the papers in the journals they cover. Keeping records up to date is the responsibility of publishers and may be done either by adding one paper at a time, using a form provided by the administrator of the database, or by using an XML file with metadata for all papers content in a journal issue. Usually the XML file has a particular scheme, which differs from one database to another. We currently update the records using the forms, but the XML solution may be more convenient as long as the XML file can be generated automatically. The difficulty derives from the variety of schemas required by various databases which index us.

4. Conclusions

In this paper we have tried to identify the options available for a journal owner who also wants an online version of it. For each solution we have enumerated some benefits and drawbacks so that the choice could be made knowingly. We have also presented our solution which consists in a software application designed and achieved by ourselves. For this solution we described the minimum number of functionalities required and how they were implemented in order to achieve ease of use and maintenance. Since we have been working with this application for about four years, with very slight changes, we grew confident that our choice was the right one.

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WIRELESS INTRUSION DETECTION WITH OPEN SOURCE TOOLS

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Abstract: *This paper analyses the specific threats derived from using 802.11 wireless networks and cover the role of the wireless intrusion detection and prevention systems and the possibility of using open source tools to secure an organization.*

Key words: WLAN Security; Intrusion Detection; 802.11, Open Source

JEL classification: C88, L86

1. Introduction

Many organizations deploy and use WLAN networks, given their advantages. However, from a security perspective, a wireless network is more vulnerable to security breaches, since the attacker does not need to be physically connected to the network, like in the traditional wired networks. Even more, the security tools used to protect the wired network, like intrusion detection and prevention systems have to be adapted to cope with the new challenges. This paper focuses on the specific wireless networks security threats and the possibility to address them by the use of open source intrusion detection and prevention tools.

2. Overview of 802.11 Networks

Wi-Fi networks are based on the IEEE 802.11 family of standards. An 802.11 wireless network consist of **stations** (which can be workstations, laptops, mobile phones or PDAs etc) and **access points** (AP), which logically connect the stations with a distribution system (DS), typically the organization's wired infrastructure. A WLAN can run in **ad-hoc** mode, without the use of APs, and involving a direct communication between stations or in **infrastructure** mode, in which case the station connects to a DS via the access point. The identification of stations and APs is made by the use of 48-bit MAC addresses.

To secure the communication between stations and access points, several security protocols have been defined. The initial protocol, Wired Equivalent Privacy, or shortly WEP, is well-known for its security problems, and was followed by newer and more secure protocols, like WPA/WPA2. But even if using a secure communication protocol, there are still some specific threats, which will be discussed below.

3. Wi-FI Specific Threats

Rogue Access Points

A **Rogue Access Point** is an unauthorized AP which has been deployed in the wireless network. They can be internal or external.

The internal rogue AP is connected to the wired network by an unauthorized user (such as a regular employee), outside the control of the network administrators. This can be the case of a member of the organization who would like to have a more facile access to the network through his mobile device, so he connects an own access point to the network. If the AP is not properly secured, it could allow easy network access for anyone within that AP's range. But the internal rogue access point can be as well deployed by a malicious employee who intents to create a backdoor. In any case, the internal rogue access point can behave as a gateway for an attacker who could gain access to the network without being physically inside the organization's perimeter. Therefore the detection and the removal of such rogue access points must be considered a critical issue for any organization, including those which do not use wireless networks.

The external rogue access point is not connected to the wired organization's intranet, but emulates a legitimate access point of the network. The rogue access point's settings can be adjusted by the attacker, so that they share the same SSID. After that, the signal of the rogue AP is significantly increased, so that it would trick the wireless clients to connect to this rogue AP, since the clients try to connect to the available AP with the strongest signal. Further the attacker can launch other attacks, by spoofing web pages or providing fake network services in order to obtain user credentials etc.

Wrong Station Association

If the wireless corporate client devices are not properly configured, there is a risk that the client will associate with external access points from the neighborhood. In this way a malicious person can bypass the corporate policies and transfer sensitive data outside the organization's network. Other attacks, such as Man-In-the-Middle, can be used by the attackers to obtain user credentials. Such attacks can be easily mounted, with freely available tools such as Ettercap (Ettercap Web).

Denial-of-Service attacks

Denial of Service (DoS) attacks are present also on the wired networks, but there are some specific issues regarding wireless networks. A DoS attack occurs when a system cannot provide the service to the authorized clients due to resource exhaustion (at any point: network, servers etc) generated by unauthorized users. On a wireless network, a DoS attack can be launched using *jamming* (generating random signals on the used radio frequencies). This attack can be easily performed using a transmitter and effectively blocks every communication in the frequency ranges it operates. A second possibility for a Denial of Service is to use the technique called *flooding with associations*. The association table maintained by each access point has a maximum value; when this value has been reached, the AP cannot accept further client association requests, therefore denying access to the network for any clients, including authorized users.

Another technique, called *forged disassociation*, involves the attacker sending spoofed disassociation frames with the source MAC address of the AP. The stations are still authenticated, but they have to re-associate, by sending re-association requests. By continuously sending forged disassociation requests, such a DoS attack can be performed.

A similar attack, called *forged de-authentication*, uses de-authentication frames instead.

MAC Address Spoofing

To increase the security, an access point can be configured to allow the access only to the legitimate stations, whose MAC addresses are kept in an internal list. However, since MAC addresses can be easily spoofed, an attacker can change the MAC address of his device and appear as being legitimate. There are freely available tools for changing the MAC address of the network card.

Sniffing and breaking the encryption keys

By using a wireless device in receive-only mode an attacker can capture the traffic data without being detected. Tools like *Aircrack-ng* (Aircrack-ng Web) can be easily downloaded from the Internet and set up to crack the WEP protocols in minutes. Although the initial protocol for securing the WLAN, WEP is well-known for its security flaws and not used in the corporate world, an internal rogue access point could be configured to use it. WPA protocols, introduced in IEEE 802.11i, offer a notable increase in security to address the problems of the WEP mechanism.

4. Freely Available Attack Tools

We will briefly present some open source tools, available on the Internet, which can be used by an attacker to mount the type of attacks described above. An extensive list of tools, grouped into categories, can be found at *wirelessdefence.org*. Such tools can be used by the organizations to perform penetration tests.

Aircrack-ng

Aircrack-ng is a suite of tools which can recover WEP and WSA-PSK keys, based on captured traffic data. While the WEP cracking algorithm is fast, using statistical methods, the cracking of WPA pre-shared keys is based on brute force techniques, and is effective only against passwords consisting of dictionary words or short in length. According to the documentation, a normal computer can test up to 300 keys per second, depending on CPU capabilities, so the cracking process could take days to go through a large dictionary. However, cracking keys which are not based on dictionary words or are long in size is not feasible. For example, at 300 keys per second, a 6-digit key containing only letters and digits could take up to 7 years!

Raw Wireless Tools

A series of free tools made available as "*proof-of-concept*", originally developed to test wireless intrusion detection systems (RawWTools Web).

- *rfakeap* – Raw Fake AP – emulates IEEE 802.11 access points using wireless raw injection. According to the author, the *rfakeap* tool is able to 'fool' both passive and active scanners.
- *rglueap*, Raw Glue AP, is designed to 'catch' clients that are actively scanning for any ESSID.
- *Raw Covert*, or *rcovert*, can create a covert channel over a IEEE 802.11 network using raw injection. The covert channel is encoded in valid ACK frames in the RA address field.
- *The WiFi Advanced Stealth Patches*, available for download on the same website, can be used to modify the *madwifi-ng* drivers in order to create a 'stealth' communication, so that only patched stations and access points can 'understand' each other. One of the purposes would be to protect the

network from attacks and war-drivers. On the other hand, such a patched rogue access point could remain undetected by wireless intrusion detection tools.

5. Wireless Intrusion Detection

To protect the organization from wireless threats, in addition to the existing security tools, like firewalls and wired intrusion detection/prevention systems, a new category of tools has been developed. The wireless intrusion detection/prevention systems have specific functions, enabling them to detect and even react to wireless attacks. We will use as a starting point the definitions for intrusion detection and intrusion prevention given by NIST (NIST 2007): "*Intrusion detection is the process of monitoring the events occurring in a computer system or network and analyzing them for signs of possible incidents, which are violations or imminent threats of violation of computer security policies, acceptable use policies, or standard security practices. Intrusion prevention is the process of performing intrusion detection and attempting to stop detected possible incidents. Intrusion detection and prevention systems (IDPS)1 are primarily focused on identifying possible incidents, logging information about them, attempting to stop them, and reporting them to security administrators. „*

There are several types of intrusion detection/prevention systems: *network-based*, *wireless*, *Network Behavior Analysis* and *Host-based*.

A typical wireless intrusion prevention system consist of:

- *wireless sensors* – used to monitor and analyze the traffic;
- *management server* – receives information from the sensors and perform analysis;
- *database server* – used to store event information generated by sensors and management servers;
- *console* – represents the interface for the users and administrators.

In a wireless intrusion prevention system, a normal sensor cannot monitor all the traffic on a band (which consists of more channels) simultaneously and can monitor only a single channel at a time; to cover multiple channels, it uses a technique called channel scanning, which involves monitoring each channel a few times per second. To reduce or avoid this limitation, there are specialized sensors that use several radio modules and can monitor several channels at the same time.

The intrusion prevention systems can detect incidents using mainly three methodologies: signature-based, anomaly-based and stateful protocol analysis. Most systems use multiple detection methodologies, either separately or integrated, for a more accurate detection.

Signature-based detection involves comparing signatures against observed events in order to identify possible incidents; this method is very effective in the detection of known threats but does not provide good results in detecting previously unknown threats.

Anomaly-based detection involves creating 'normal' activity patterns and comparing the observed events against these patterns. The intrusion detection/prevention system has an initial training phase, in which the system learns the normal behavior and creates profiles, which are used as a base for comparison. A static profile is determined in the training phase and remains unchanged, whereas a dynamic profile is constantly adjusted as additional events are observed.

Stateful protocol analysis is the process of comparing predetermined profiles of generally accepted definitions of benign protocol activity for each protocol state against observed events to identify deviations.

The main types of events which can be detected by wireless intrusion prevention systems are:

- *unauthorized WLANs and WLAN devices* (rogue APs, unauthorized stations, unauthorized WLANs);
- *poorly secured WLAN devices* (mis-configurations, use of weak WLAN protocols and implementations);
- *unusual usage patterns* (using anomaly-based detection);
- *the use of wireless network scanners* – obviously only active scanners can be detected;
- *Denial of Service (DoS) attacks* (flooding, jamming);
- *Impersonation* and *man-in-the-middle attacks*.

The prevention capabilities refer to *wireless actions* (such as terminating the connections between a rogue or mis-configured station and an authorized AP by sendinq disassociation messages to the endpoints) and *wired actions* (such as blocking a switch port on which a particular station or AP is connected).

Another feature contained in some wireless intrusion prevention systems is *tracking the location* of the threat – by using triangulation (estimation of the approximate distance from multiple sensors by the strengths of the threat's signal received by each sensor and calculation of the physical location based on this information)

6. Open Source Tools

Given the importance of wireless networks security, many commercial wireless intrusion detection/prevention systems are available on the market. One of the well-known WIPS is *AirDefense* (AirDefense Web), which uses context-aware detection, correlation and multi-dimensional detection engines, and it claims to have a very low rate of false positives. The system can detect ad-hoc stations, rogue access points, as well as open or misconfigured access points, masquerade attacks (like MAC spoofing), man-in-the-middle attacks, denial-of-service attacks. The system can be configured to play an active role and respond automatically to wireless threats by stopping the corresponding device before it is able to cause damage to the network. For the rogue internal APs, the AirDefense system can identify the switch port to which the AP is connected and turn it off, thus preventing the rogue device from accessing the network. In addition, the system can help system administrators to troubleshoot wireless network performance, has location tracking capabilities and can generate standard or customized reports.

But are there such open source alternatives which can be used by small or medium-sized organizations?

Currently there are tools such as *Snort-Wireless* or *Kismet*, which have mainly intrusion detection capabilities.

Kismet (Kismet Web) is an 802.11 layer 2 wireless network detector, sniffer and intrusion detection system, working with any card which supports raw monitoring. Its functionality can be extended using plug-ins. Kismet can detect standard named networks as well as hidden networks. The intrusion detection capabilities can be used to detect wireless attacks on layer 2 and 3. The wireless traffic can be exported so that Kismet can be integrated with other tools such as Snort. Using the Kismet 'Drones' a wireless distributed intrusion detection system can be built. The drones can forward the captured traffic to a central server.

Murray J (Murray J. 2009) proposes a system which integrates Kismet with the Linksys WRT54G router. The result is a Wireless intrusion detection system, created with open source software and using the cheap Linksys routers (at price below 100 USD/unit). In order to install the kismet drone, the Linksys router must be patched with the OpenWRT image, a detailed howto being presented in the paper. The Kismet server collects data from the kismet drones and send possible alerts to the system log. Further open source tools such as Multilog and SWATCH are used to filter and refine the logs, so that the administrator can be notified of events like DoS, rogue Aps etc.

In our opinion the solution has some serious limitations. The channel locking and hopping can't be controlled remotely on the WRT54G, and the router can scan only one channel at a time; the author proposes a cron-controlled script to change the scanned channel each second, with a full scan of the 11 channels taking 11 seconds. This limits the ability to detect the attacks.

Another limitation is that the solution lacks prevention capabilities. Such features could be added through further tools like NetStumbler or INSSIDer or scripts. The customizability of the system is very limited, and it can detect only some attacks and only on 802.11b/g networks. Also, to configure and run such a system, good knowledge of Linux/Unix is needed. Our recommendation is that such a system can be used as a starting point, but a commercial solution is a better alternative in terms of detection capabilities, prevention features and manageability.

7. Conclusions

As we detailed above, 802.11 wireless networks come not only with advantages, but also with specific security threats, which have to be addressed by the organizations using wireless networks. A real-time wireless intrusion detection tool for the detection and removal of rogue access points is a must for almost any organization. The open source tools presented in this paper can bridge the gap to a commercial intrusion detection and prevention systems, but the set of features is rather limited.

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BLENDED LEARNING IN BUSINESS EDUCATION BY USING BLOGS

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Abstract: *In the new Information Society educators must find and use new methods and technologies to improve teaching. Everyday new challenges arise both for educators and students in the context of a new information era where cooperation and collaboration are often seen as fundamental. The new applications and technologies of Web 2.0 are increasingly used in blended learning as tools for improving the quality of the educational act. In this paper we emphasize the importance of blogs and other Web 2.0 tools for use in business (and not only) education.*

Key words: Web 2.0, E-learning, Blended learning, Blogs, Technology-enhanced learning

JEL classification: D83

1. Introduction

In present years our society is rapidly changing and the need for new approaches and technologies for education is becoming obvious in all fields of education. The new applications of Web 2.0 and eLearning 2.0 have transformed the way people learn and communicate. The students of the new "Internet generation" get the information more quickly and in many different forms (like images, video, text and sound) and from multiple sources in the same time. The relatively new technologies and tools that belong to Web 2.0 (here we may include blogs, wikis, podcasts, forums and not only) are growing more and more every day for use in an educational context. The blogs have emerged as a form of web publishing (personal online diary) in the late 1990's, but recently the educators have found that using this Web 2.0 tool in class can provide learners a medium of communication, collaboration and reflection. Moreover, it can offer great value opportunities for exploratory learning and discovery, facilitating high-quality learning experiences (Fessakis, 2008).

The teaching professionals in our days, the educators, try to answer the question "what tools should we teach?" and the answer to this question is not an easy one, as more and more students are very well informed and they want to be familiar permanently with the new web technologies. It seems that the educators must follow a great quote from Donald Clark (well-known eLearning expert) that says that one have to "prepare young people for the tests of life, rather than a life of tests." Also, the educators must shift towards learner-centered pedagogy (Duffy, 2008). These new phenomena present a number of challenges that instructors must be able to identify and overcome if e-Learning 2.0 is to accommodate completely the benefits that is intended to deliver (Piki, 2009). In this direction we will emphasize here the role of Web 2.0 tools like blog and wiki may have in improving existing educational processes.

Before that, we will present briefly the main characteristics of Web 2.0 (so called the "read/write web") and eLearning 2.0. First of all, let's say that it is very hard to give a short and concise definition of the term Web 2.0. This is a term that denotes a lot of interactive aspects of the WWW since 2004-2005. So Web 2.0 is not a new version of software or of a Web technique.

Practically a lot of new web applications have transformed the "old WWW" into Web 2.0; among these, the famous wikipedia site and the rise of blogging are probably the most well-known. Another thing that has made the difference is the RSS (Software Garden Inc., 2004) technology. RSS represents the most significant advance in the fundamental architecture of the web since early hackers realized that CGI could be used to create database-backed websites. RSS allows one to link not to just a web page, but to subscribe to it and receive notifications every time that web page changes. There are also a lot of applications for the Web 2.0: here we may include Google Maps, Flickr, Napster, BitTorrent, YouTube, Facebook, etc.

As an early conclusion, eLearning 2.0 have some new characteristics: small pieces of content delivered closer to time/place of work and likely delivered in pieces over time as part of a larger program. Another important characteristic is collaboration, which became a key factor of a modern eLearning system. *Collaboration*, despite *cooperation*, means that the students of a team may participate together to all the parts

of the same project in order to fulfill the assignments/results. Cooperation, on the other hand, assumes that the students of a team contribute to different parts of a project and in the end they put together the pieces to form the desired result.

2. Using blogs in education

Derived from the term "web log", a blog is a special website (or part of a website) where an author (or a group of authors) share information over the WWW and it was seen (and it is still seen as) as a new form of a personal diary and daily opinion column (an online diary). A blog is similar to a wiki in the sense that users may create and post content that can be viewed by others. The blog are, in general, the creation of a single person (but not necessarily) and the owner of the blog has full control over its content.

Some blogs enable users to post comments and to offer feedback to the author, still others are more restrictive. There are a lot of free websites for blog hosting on the web; for example, see: www.blogger.com, blog.com, myblog.ro, www.weebly.com, wordpress.com. Recently, a lot of free blog websites designed for educational purposes have arised: www.21classes.com, edublogs.org or www.freetech4teachers.com. In the context of using blogs in education, there are a lot of opinions that blogs enable students to rapidly achieve a wide range of social and cognitive learning outcomes, and to develop reflective learning strategies (Birch and Volkov, 2007). Blogging can also positively influence learners' willingness to communicate by providing them with a personal space where they feel safe to express themselves and to interact with others (Shih, 2010).

2.1 The advantages of blogs

There are a lot of advantages or benefits for both students and educators. By using a mixture of individual and peer perspectives, blogs enable students to develop critical, analytical and creative thinking, becoming a lot more creative in organization and presentation of the information. The main benefit of using a blog is that helps students to collaborate, stimulating their participation to a common project. By the educational point of view, a blog may be maintained by a group of students or by the instructor (professor). In the first case it is expected that the students will negotiate and reach a mutual understanding before posting something online (Piki, 2009); this approach has also the advantage that stimulate students to develop interpersonal, social skills in order to collaborate for the project, this fact leading to a better and easier way of learning. The latter case impose a more strictly way of conducting the blog, imposing perhaps a better management of content.

For the students, the openness of the blog application represents a perfect way to freely distribute their ideas, the blog representing in this a way the "online form of brainstorming." The uses of blogs also can deep the interaction and relationship between students and professor. The professor has the chance to offer more frequent feedback and support to the students while monitoring the blog and this activity can act as a form of pleasure and also as a trigger that help students to participate in the class, projects and seminars.

Using the new education technologies including blog is not still an easy task; in the very beginning the use of blogs integrated in education appears to be very fascinating but it is not an easy task to apply it properly. In this sense, the educator must maintain a good balance between communication, technology use and guidance throughout the implementation of using blogs as an education tool. The use of technology must be balanced accordingly to the different background of the students, their expectations and inclination of participating in learning communities or follow traditional course structures (Loureiro, 2008). The communication between professor and students and between students and professor's guidance are essential for a successful implementation of Web 2.0 applications and technologies.

2.2 Using blogs in a master degree course

In the last academic year we have integrated the blog usage in the first semester of a master degree course entitled "Online communication" that have been designed for students involved in Business Education at the Academy of Economic Studies, Bucharest. In order to benefit from the advantages of using new e-learning technologies, we had to notice from the beginning that the main difference between a normal bachelor degree and a master degree is the fact that the latter one may tend to bring together students from different universities, faculties, with different background and even from different countries with diverse cultural behaviour. In a master degree course it is not unusual to be enrolled students with first degree licences in economics, management, marketing, finance, computer science, engineering, law, etc. Consequently, it become obvious that the strength of the instructor is to equally focus on the theory and

practice of the specific course accordingly to all students enrolled, no matter their primarily educational background.

The master course syllabus incorporates, among other subjects, the definition and use of the main tools for online collaboration, as IRC, IM, wikis and blogs. During the first presentation about wikis and blogs we have recognized a better attention and interest from the students for that subject, this fact leading us to the conclusion that we may use these tools successfully to help students in a better understanding of the information contained in the course.

In that sense, the students were encouraged to make a personal project creating their own blog and trying to collaborate with the use of it. There were presented some of the best and well known free sites for blog creation and development, like www.blogger.com, myblog.ro, blog.com, blogspot.com, wordpress.com. The students have created and maintained their own blogs, being very interested in this activity. This project allowed them to publish their personal opinions and reflections that have resulted from collaboration with the other colleagues during the weekly seminars. The students were asked to publish a short summary (300 words approximately) containing their own opinions about the group blogs they have created using the free blog website wordpress.com (Fig. 1).

Figure 1: The web page for creating a new account on wordpress.com

Source: http://wordpress.com
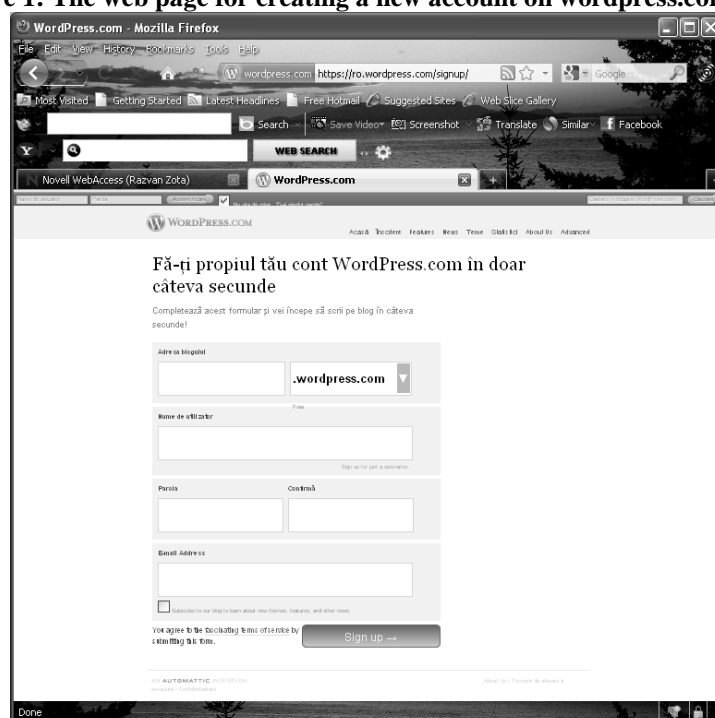
3. Conclusions

Using Web 2.0 tools in education can open up new frontiers for blended learning. As a plus to the group work and the presence of open discussions in the class, learners' participation to common products like blogs and wikis will improve knowledge quality (Boulakfouf, 2008). From our own experience in the case of master students involved in business education we can say that modern e-learning tools like blogs and wikis have offered a great support to the students' comprehension and learning, facilitating not only individual assignments but also strong collaboration with other peers. The reflective thinking is also developed; according to the students' opinions, the motivation to participate in a blog was driven not only by their personal aims but also by the professor's feedback and active role. Collaborative way of learning brought by blogging enabled students to share different opinions, experiences, comments, enabling them to communicate more efficiently with others that have different backgrounds and, as a result, they have enhanced their own understanding and learning. Also, by experience, we may see that we have noticed a better motivation for the students involved in blogging than the students not involved in such an experience.

We may conclude that modern e-learning 2.0 technologies can successfully support and enhance individual learning, connected also with specific methods like group work and assessment. Blogging, for example, have offered support to individual assessment but their content was shared among individuals and

groups, thus promoted collaborative learning. Our "blogging teaching experience" has demonstrated that students are willing to involve effort into their blogs, provided that the effort is reflected in their assessments, for example. As a result, by combining individual and collaborative learning practices it can be achieved good results in teaching (and learning, on the other side), leading to a successful blended learning experience.

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