Crises Solutions for SMEs
Case Study: ERP Cloud vs Classic Solution

Gabriela GHEORGHE
gabriela.gheorghe@ugal.ro
Ioana LUPAŞC
ioana.lupasc@ugal.ro
Dunărea de Jos University of Galati, Romania

Information Technology has responded to the crisis by change and innovation. The phenomenon of cloud computing represents a huge chance for a country like Romania, as a technologically low economy has, from the start, a handicap. Cloud technologies redefine concepts such as saving time and money, flexibility, scalability and global access, transforming them into business advantages. This case study wishes to argument the software provider's decision to change his strategy, choosing an "all inclusive" solution.

Key words: cloud computing, ERP, information and communication technology, SaaS

JEL Codes: L21, O33, D78

1. Introduction
1.1 Settings
Both the explosive growth in the amount of information inside companies, and the rapid evolution of IT equipments, determine more and more companies to resort to IT infrastructure outsourcing services. Due to the diversification of the type of data to be stored, companies need a new way to manage unitarily both their applications and data files, thus adapting themselves easier to the market dynamics.

The phenomenon of cloud computing is now beginning to grow in developing countries as well. Worldwide, 'cloud' software, accessible through the Internet make a business of tens of billions of Euros. [Gens, 2010]

In Romania, there is still reluctance in adopting this technology, even in a dynamic field like that of the ICT, which justifies the growth rate so far. There is need of a process of educating the market, the companies, especially the IT professionals and executives in order to show them the potential offered by cloud, as so far they do not know why they should prefer the cloud, and use the old solutions out of inertia, supporting their cost.

Centralized hosting of business application dates back to the 1960's. Starting at that decade, IBM and other mainframe providers conducted a service bureau business, often referred to as time-sharing or utility computing. Such services included offering computing power and database storage to large organizations from their worldwide data centers.

In Romania in the 1980's, as a characteristic of the centralized economy, the IT infrastructure was concentrated in Territorial Computing Centers which supplied IT services for the main regional industries.

Outsourcing the IT infrastructure to data centers leads to increases in the staff productivity in a company, allows rapid resumption of critical operations and reduces and eliminates potentially devastating costs in case of major disruptions.

Colocation Data Centers offer a wide range of services specific to a data center, such as hosting, installation and cloud computing services, but also additional ones, such as those of business continuity, backup and data recovery in case of disasters.

"Data centers create a responsible environment, while reducing energy costs both by addressing the physical space, and by the IT infrastructure", argues Michael Petrov, Global Technology Services Data Center Operations Manager at IBM. "In recent years, the electricity required both by the hardware infrastructure and by the cooling system is growing significantly, creating a strong greenhouse effect and increasing the gas emissions", he adds. The disadvantages of the storage systems include, among others, the purchase price and the difficult adaptability to the unpredictable business requirements. [Petrov, 2011]

We can compare classic and cloud solution to driving private automobiles versus riding on public transportation.

A recent study from Microsoft, "Cloud Computing and Sustainability", assessed the environmental footprint of server, networking and storage infrastructure for three different deployment sizes: small deployments of 100 users, mid-sized deployments of 1,000 users, and large deployments of 10,000 users. The study showed that, compared to running their own applications, by outsourcing, companies reduced energy consumption and carbon emissions when they deployed their applications in the cloud. Small businesses saw the most dramatic reduction in emissions of computing – up to 90 percent. Large corporations can save at least 30-60 percent in carbon emissions using cloud apps, and mid-size businesses can save 60-90 percent.

Since 2010 we assist at the emergence of "enterprise technology", the technology is no longer confined to offices and office workers, but is embedded throughout the enterprise with a combination of wireless networking, sensor technologies and big data, becoming "The next wave of IT transformation and the shift to ET". ET is bringing computing and networking to the roughly 60% of employees who aren't typical knowledge workers and equally important to the nonhuman systems that represent the core business functions of the organization. [Till Johnson, 2012]

IT has become a commodity, like electricity, is no longer a competitive advantage, as argued in Nicholas Carr's article called "IT Doesn't Matter". [Carr, 2003]

In the current context of economic crisis with major influence on small and medium-sized businesses should not neglect the importance of leasing, which can provide support for rapid development. Like leasing a car, rental information services solution requires a detailed analysis so that the risk associated with the loan to be minimal. We can not deny that we can prosper in risk condition, but we believe that this risk has to be a controlled, allowing us to "survive" in an unstable economic environment, adverse economic events disrupted, causing damage on all levels (economic, social, and so on).

1.2 Literature Review

Utility computing eliminates the need to acquire and manage your own compute resources, eliminates the start up costs in acquiring capital, configuring machines, performing the basic systems management and systems administration, provides access, security, authentication and allows you to focus your efforts on simply running your application.

Grid computing is an idea which started with a vision of making compute resources sharable and broadly accessible, ultimately providing a form of utility computing as described above. [Huizenga, 2008]

Ian Foster and Carl Kesselman defined in 1998 in their book "The Grid: Blueprint for a New Computing Infrastructure", a computational grid as "a hardware and software infrastructure that provides dependable, consistent, pervasive, and inexpensive access to high-end computational capabilities". [Foster and Kesselman, 2003]

A white paper of The Software & Information Industry Association (SIIA, 2001) introduced the "Software as a Service" concept, in order to explain the new SaaS industry, that including software services in the offering products.

SaaS stands for 'Software as a Service' and is essentially the 'rental' of software. SaaS applications are almost always web-based since all software installation and maintenance is outsourced. Therefore all SaaS applications can be accessed from anywhere through a simple browser and also with a smartphone cell making possible to use application and services of information system. Cloud technology allows running applications more efficiently.

Now, however, innovations are making the technology more useful and cost-effective. The software can be hosted remotely ('in the cloud') and used on mobile phones. It can help manufacturers cut costs and streamline their operations for much less than what ERP systems used to cost. [Waxer, 2011]

CRM and ERP: These two offer sizable if not significant opportunities. "While some customers are reluctant to move mission-critical applications to the cloud, others see obvious cost benefits." CRM is one of the easier applications to move to the cloud. And since hosted CRM models have been popular for long, a customer has no issues in accepting cloud-based CRM solutions. With ERP, hosting applications have been tried for some time but the domain has met with muted success. [Ramdas and Desai, 2011]

Although it is a matter of interest nowadays, the European Conference on Service-Oriented and Cloud Computing ESOCC 2012 has already focused on 'cloud computing', it is not a new idea, being, in fact, based on notions such as utility computing and grid computing.

According to Nemertes Research 2012 over 90% of IT organizations use some form of managed, hosted, or cloud services.
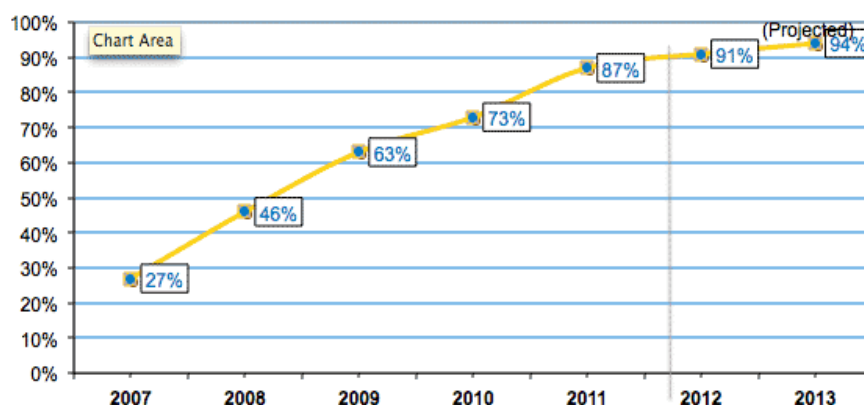
Fig. 1 Managed/hosted adoption 2007-2013
[Source: NEMERTES RESEARCH, 2012]

Table 1. Cloud hosted solutions

Dedicated Servers	Virtual servers	Colocated Servers
Dedicated server including operating system and security solution at choice	virtual part of a dedicated server with resources(RAM, processor cores, storage space) guaranteed	long-term solution that leads to lower costs by reference to the alternative server rental
Start from 60 € / month	Start from 20 € / month	Start from 45 € / month

[Source: http://www.webcomm.ro, Galati, 2012]

The subscription-based models facilitate development, testing and QA on your business applications. The current pricing pattern and other factors of the cloud make it highly suitable for small and medium enterprises. [Misra; Mondal, 2010]

1.3 The Business Model

Cloud computing is a solution of using external information resources, configured and used as needed and paid only according to consumption levels. More exactly, a company can use only a suite of applications in cloud and only for a certain number of employees, thus optimizing its IT costs.

In a broader sense, the term expresses a new business model through which the technology is offered as an online service, so that the users can access the web-based software applications from anywhere via the Internet without a license on their own, in exchange for a monthly fee.

For the final consumer, the method may not seem very useful compared to purchasing a single software license. But for the companies, the access to cloud computing applications means first of all lower costs, and secondly, a more efficient use of resources and their adaptation strictly to the currently connected employees.

The IT giants UC&C (Unified Communications and Collaboration) expertise focused on Business Value has become a Business model for all the emergent IT firms.

Let's now drill down on supplier "Online" services: the Online services include a set of enterprise class software delivered as subscription services hosted by supplier. The greatest benefit offered by online services is the flexibility in business management, by providing many functionalities and options for developing new facilities.

Cloud ERP is just another potential opportunity and deployment option available to customers. Just as ERP was considered the panacea for all business automation pains, Cloud ERP is positioned as a revolutionary approach to deploying an ERP solution. Cloud ERP provides a solution that is flexible, adaptable, scalable, efficient, and affordable. Customers can enjoy painless upgrades, rapid deployment, and easy customization along with availability "anywhere at anytime". As a conclusion, as with every deployment model, there are advantages and disadvantages to consider. „But it is important to remember that Cloud ERP is not a shortcut to success", noted Beaubouef. [Beaubouef, 2009]

The two areas of consideration for the Cloud ERP deployment model are customizations and integrations. The key element is whether the customer has a dedicated software instance or a shared software instance. With a dedicated instance, the customer will have a greater flexibility with integrations and customizations to the situation where multiple customers are using on a shared instance, when the software changes have an impact to all the customers. Following are the most common cloud models:
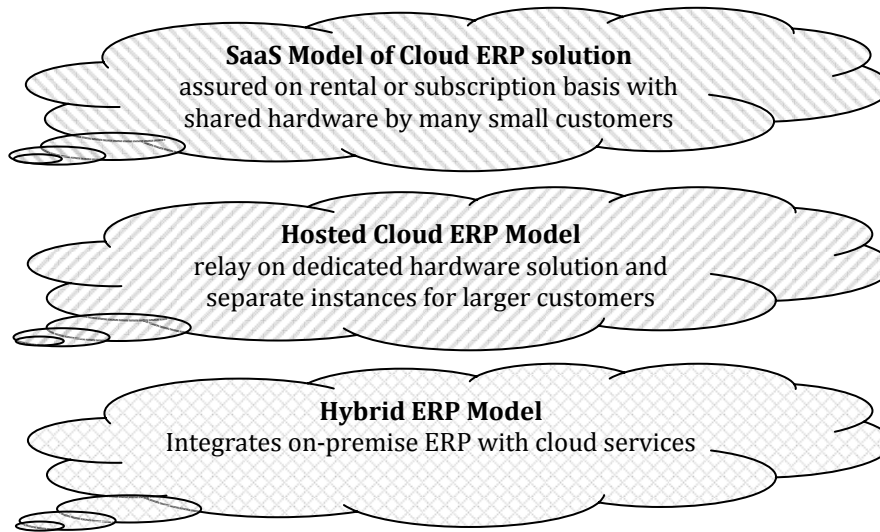
Fig 2. ERP Cloud Models
[Source: Adapted after Beaubouef, 2011]

2. Identifying the decision problem

In a major Romanian company of IT services occurred a decision moment. Wizrom Software is a provider of business management software solutions. After a 17 percent drop in business in 2009, which was accompanied by a doubling of profit, in 2010 Wizrom Software recorded a turnover increase of 33 percent, up to 5.9 million Euros. The trend continued in the first semester of 2011, when the company business grew by 7.6 percent corresponding to an increase of over 50 percent of the Wizrom's new customers over the same period of 2010.

Wizrom group's positive evolution was due largely to the spectacular return of vertical manufacturing activity and to the beneficiaries' increased orders.

The situation it was facing was to analyze and decide which strategy would be the one to support the increased number of clients and projects every year, as it became harder and harder for the companies to invest, acquire and pay for a full solution price, be it the software, or the infrastructure.

Also, many client companies restructured their business and are looking for solutions to improve the efficiency of existing resources and automation processes.

The growth of the industrial production since last year allowed the companies in the manufacturing sector to recover from the shock of the economic crisis, one of the effects being the resumption of investment in information technology, bringing about a rapid decrease in operating costs. The Romanian car industry is now experiencing a significant increase, which consequently leads to a demand for specialized solutions.

In recent years the focus of ERP vendors has shifted towards small and medium sized companies. However Small and Medium Size Business often don't have the IT infrastructure or budget needed to run and maintain, update, secure and administer their servers on an ongoing basis and find themselves stuck using out of date or rudimentary planning systems which often underperform and hinder productivity.

Acquiring, deploying, and administering servers' takes time and capital expense – both of which Small and Medium sized businesses are very sensitive to.

3. Decision making process

Formulating a vision for promoting technical progress is done in three main phases: analysis and diagnosis, design and implementation. We present the steps of the decision-making process according to the scheme proposed by Brim et.al. (1962) and developed by Hershey and Blanchard (1977):

3.1 Obtaining the necessary information

In order to succed in a market in which the client companies reduced and carefully monitored their expenses due to shrinking budgets, solutions have been searched and examined both for keeping the current customers and for attracting new ones.

The company has spent time asking his customers and partners about what challenges they face in managing their IIS infrastructure. From an IT standpoint, the common challenges can be summarized as follows:

- We need our IT costs to be lower, more predictable and to realize value from our existing investments;

- We would like to empower our users with the capabilities and features available with the latest technology, but we don't have the resources to upgrade our systems right now;

- It is difficult to maintain compliance with ever-changing regulations and security threats;

- With all the cost cutting going on, our IT budget doesn't assure the advanced security and redundancy needed.

In its analysis, the company took into account the IT requirements vs. the Business standpoint for the implementation of an IIS ERP type:

IT needs to:
- Simplify and reduce the cost of implementation
- Maintain compliance and prevent information leakage
- Support many users with various needs
- Extend existing investments

The business needs to:
- Manage communications and collaboration overload
- Interoperate with globally distributed customers and partners
- Maximize productivity and innovation
- Attract and retain talent

These objectives where common across customers of all sizes and industry verticals and became challenges for stating alternative solutions to our company case study.

3.2. Developing possible solutions

The existing IC Technologies and the need for high quality services standards facilitate searching for new solutions:

- Rental of software solutions through a system similar to operational leasing;
- Providing integrated solutions for database hosting and rental applications;

Also, they were targeted those clients who have already implemented a number of applications and want their integration into a unitary system, and here the company has come up with solutions that automate existing applications and make them work better together.

Adapting the product to new market requirements was the first step made by the company to respond to clients who want to spend as little as possible.

As purchasing a solution was perhaps too much investment for some companies, the software provider decided to focus more on the rentals, which work on the same principle as operational leasing and are in the customer's benefit. He does not have to capitalize on an investment and to pay the entire cost from the beginning and it is much easier from a financial standpoint. On the other hand, some activities may be reduced and the implementation processes start much faster.

Wizrom Software has identified the emerging business area for all-inclusive solution, and has then invested heavily in the area of Software as a Service (SaaS), of cloud-computing, and it has prepared cloud-computing solutions ready, has brought on the market alternative products, thus creating new types of solutions for the customers' businesses. The company is ready to support with specialized services the existing customers who want to extend the solution and migrate to the online.

Another focus is on improving own IT specialists in fields of activity and not the last is organizing workshops and information sessions for IT managers of potential clients on the benefits of the rental solution.

As for maintenance prices, one of the components of software investment, the company has not made any concessions, neither increased the prices according to the global trend.

3.3. Solutions evaluation: on-premises, in Cloud or hosted by partners

A comparative analysis was made for the necessary time and costs of a traditional ERP solution and, respectively, an under cloud one for an average of 40 users.

The transaction costs of using an ERP on premises (the application running on client servers) are divided into two categories: implementation costs (one time costs) and maintenance costs (on going ones). Both can be segmented according to four criteria: software, hardware, external assistance and own personnel costs. For the variant in leasing, the costs were assessed for each of the three models of cloud, Fig.2:

- Cloud ERP solution with datacenter rental services, designed for small customers who want to minimize costs.
- Cloud Hosted Solution with dedicated servers or colocation servers in the datacenter for large customers or customers with national network;
- Hybrid ERP solution, for customers who have already purchased a number of licenses and wish to extend the implementation or to ensure mobility for some of their users.

The objective of this analysis is to accelerate the implementation process in order to reduce costs and time. The first step to scheduling the project is to determine the tasks that the project requires and the order in which they must be completed. Time is a critical element for the successful finalization of the project. The time required to execute the task can be reduced for an additional cost.

Analysing the Critical Path

The critical path is the longest path of planned activities to the end of the project. Using the CPM technique to determine the path times, we add the task durations (T_E - expected time) for all available paths drown in Fig. 3 and calculate the path that takes the longest to complete.

According to our case study findings, the Gantt chart for implementing an IIS is detailed bellow:

Table 2. Project Task T_E determination: ERP Classic solution comparative to Cloud solution

Stage	Task	Prede-cessors	Type	Classic ERP solution T_E (wks)	Cloud ERP solution T_E (wks)
I.	High Level Analysis		Sequential	1 wk	1 wk
II.	Hardware -Acquisition -Installation	I	Parallel	3 wks	0
III.	Core Modules Analysis	I	Sequential	2 wks	2 wks
IV.	Design and Developing Core Modules	III	Sequential	3 wks	3 wks
V.	Configuration and Functional Testing	II, IV	Sequential	1 wk	1 wk
VI.	Integration and Customization	III, V	Sequential	1 wk	1 wk
VII.	Training and Formation	III	Parallel	2 wks	2 wks
VIII.	Data migration	IV	Parallel	2 wks	2 wks
IX.	Operational testing	VI,VII	Sequential	2 wks	1 wk
X.	Pilot support	IX	Sequential	3 wks	1 wk
TOTAL Assistance				**20 wks**	**14 wks**
XI.	Technical support and Warranty		Sequential	2 years	2 years
XII.	Post-warranty	XI	Sequential	contractual	contractual

The duration of an activity can range from normal duration D_a (duration of program planning) and the accelerated duration d_a :

(1) $$d_a \leq t_a \leq D_a$$

We can assimilate the task duration in the case of classic solution to normal duration and the accelerated duration in the cloud case. We can observe that there are task with $d_a = D_a$, indicating that the activity can not be accelerated.
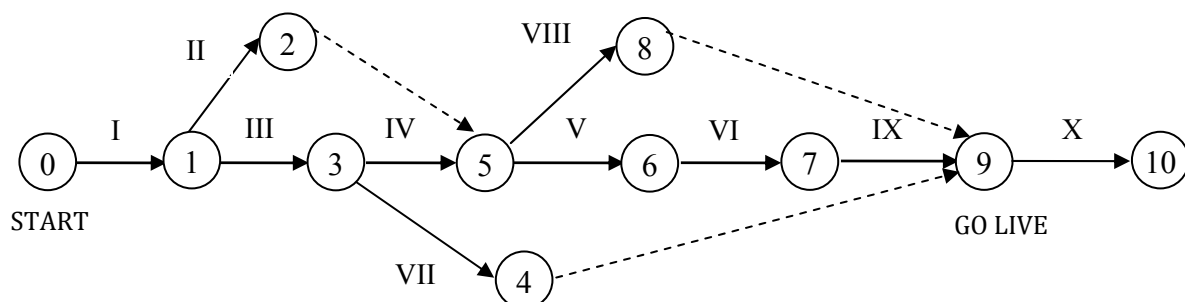

Fig 3. PERT Diagram of the IIS Project
[Source: own]

The critical path from Start to Go Live is represented by the activities 0-1-3-5-6-7-9 and the duration of this pathway is equal to 50 work days, i.e. two months and a half is similar in both variant.
But the total implementation cost for the assistance stage, i.e. the total task duration, can be reduced from 20 weeks in the classic variant to only 14 weeks in the cloud one.

According to the project time-cost relation, reducing the execution time of a task in the case of classic implementation project is achieved by increasing the costs of activities and thus increases project costs. The results of our analyse show that in the cloud ERP case, the reduced of total assistence by accelerating some task duration conduce to a lower costs.

In the cloud implementation the hardware acquisition duration between 3-4 weeks is eliminate, no installation required, just the configuration of a new instance is necessary.
The key factor for reducing the elapsed time for the operational testing and the Pilot stage assistance was the decision of bringing the project team members working together in a collaborative environment.

In the classic implementation there are two areas that need to be accelerated, was the conclusion of the decision-making process based on the analyses of the PERT (Program Evaluation and Review Technique) diagram of the project. The IInd and X^{th} activities were identified as time-consuming and potentially critical for overcome the project deadline.

In the implementation of the ERP classic version, the costs to be incurred in the first year are quite high and must be paid from the beginning to acquire licenses and infrastructure. In addition, there is the need to arrange a personal datacenter for servers and network equipment and to provide it with fire extinguishing system, air conditioning, UPS and generator, which can add by about 70% of the infrastructure value.

Although the hardware and software investments will pay off in time, they constitute an important financial effort, to which are added the recurrent costs of energy and the own IT staff. In the next few years are added the maintenance costs both of the hardware infrastructure and of the software maintenance services. If we compare the 3-year cumulative costs in implementing cloud with rental costs for a shared hardware resources required for 40 users, they are about half of those of the classical solution based on the purchase of licenses and servers. Given that the research shows that on-premise implementations usually tend to cost 30 - to 40 percent more than the original budgeted projections, it follows that the requirement that 'Implementation costs to be lower and more predictable' is achieved in the Cloud ERP solution. In addition, between 15 and 20%, it decreases the implementation period.

Cloud Hosted ERP solution, although comparable as price for the first three years with the on-premise, but more expensive than the shared hardware based solution, provides more security to the business, benefiting of technical support 7/7 and 24/24 continuity, and ensuring the upgrade and update requirements of the solution without additional costs.

The hybrid solution that extends the existing on-premise implementation with a cloud solution for mobile users will not be analyzed in this case study, as it is more complex and doesn't fit in the decided range of 40 users. For a necessary of 150-200 licenses, renting is no longer quite so economical compared to buying, a mixed solution being recommended. This solution works successfully in the case of a customer with national network covering, whose main activity is car service.

The IT company goal is providing clients businesses with the power to choose how they provision those services whether on their own premises, as cloud services, or in a hybrid fashion.
The necessary solution was to develop its own datacenter in order to meet the demands of the customers who required a ready-made integrated solution of hardware and software services. On the other hand, the advantages of this solution were identified also in terms of provided services, managing the customer application servers in a centralized manner, thus diminishing the response time and intervention for a request. Close monitoring and analysis of project progress was the method for cutting off the delays.

The rental of software through a system similar to operational leasing and specializing IT consultants into activity fields, are two of the ways in which the software provider Wizrom has managed to grow its business.

4. Conclusions

To reduce enterprise costs, it is important that managers understand that Virtualization, Web 2.0, Unified Communication & Collaboration, Business Intelligence, Mobility technologies are the top technology priorities and implement, inside the organization, advanced services such as Cloud Computing and Software as a Service (SaaS). [Consoli,2011]

In the current economic situation a company needs to reduce costs and improve economic and financial results. What becomes clear, however, is the new SaaS/Cloud ERP offerings are less expensive than the traditional on-premise systems when businesses lack existing infrastructure and information

technology resources and also reduces time and cost of start-up. The main goal is to create a service option for every one of the business software products.

Following the identification of the integrated all-inclusive solution benefits, the software supplier who is the subject of this case-study has decided as appropriate to introduce it in the portfolio of solutions offered to its customers. The solution brings increased business value that helps to better address business needs, and increase Individual and Business Productivity. The greatest benefit of selecting a colocation provider is making a more effective use of capital and having higher quality facilities for the mission-critical applications through power redundancy, cooling, and scalability/growth.

On the other hand, with the ERP Cloud solution in the portfolio even a medium sized IT company can race with the big competitors.

For 2012, the company continues to expect a rising demand for computer solutions which generate benefits as quickly as possible for its customers, given that operating cost efficiency remains the basic challenge for all companies, in addition to that of finding new customers.

References
[1]   BEAUBOUEF, G.B. *Maxize Your Investment: 10 Key Strategies for Effective Packaged Software Implementation.* Packt Publishing, 2009. 290 p. ISBN 1849680027.
[2]   BEAUBOUEF, G.B. *Cloud ERP – New Dog, Same Fleas, Wordpress,* May 22, 2011. [Online] http://gbeaubouef.wordpress.com/2011/05/22/cloud-erp/
[3]   Carr, N. *IT doesn't matter, Harvard Business Review,* May, 2003
[4]   CONSOLI, D. *University of Urbino ICT Investments In Small And Medium Enterprises That Operate In A Local Context.* In: The International Conference Hradec Economic Days 2011, Peer-Reviewed Conference Proceedings, Part II, pp. 45-49.
[5]   FOSTER, I., KESSELMAN, C. *The Grid: Blueprint for a New Computing Infrastructure,* (2nd Edition). Morgan Kaufmann, 2003. ISBN 1558609334.
[6]   GENS, F., *IDC's Public IT Cloud Services Forecast, IDC Survey,* July 1st, 2010. [Online] http://blogs.idc.com/ie/?p210
[7]   HERSEY, P., BLANCHARD, K. H *Management of Organizational Behavior,* (3rd Edition)– Utilizing Human Resources. New Jersey/Prentice Hall, 1977.
[8]   HUIZENGA, G. *IBM Corporation Cloud Computing: Coming out of the fog, Proceedings of the Linux Symposium,* Ottawa, 2008, Volume I, pp. 197-211.
[9]   Misra, S.C., Mondal, A. *Identification of a company's suitability for the adoption of cloud computing and modelling its corresponding Return on Investment, Mathematical and Computer Modelling, Elsevier,* 2010
[10]   PETROV, M., *IBM Romania Managed Data Center services.* In: Data Centers and IT Infrastructure Management Conference, 27 may 2011, Bucharest.
[11]   RAMDAS, S., DESAI, S. *The Cloud Landscape, Computer Reseller News,* July 7, 2011. [Online] http://www.crn.in/Software-007Jul011-The-Cloud-Landscape.aspx
[12]   Till Johnson, J. *From IT to ET: Cloud, consumerization, and the next wave of IT transformation , Network World,* April 23, 2012
[13]   WAXER, C. *ERP Software Gets a Second Life in the Cloud, Technology Review, MIT,* July 14, 2011. [Online] http://www.technologyreview.com/business/37947/
[14]   htp://www.webcomm.ro [Online]