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Procedia Computer Science 83 (2016) 1207 – 1212

Procedia Computer Science

Second International Workshop on Mobile Cloud Computing systems, Management, and Security (MCSMS-2016)

The Use of Cloud Computing in SMEs

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Abstract

Small and medium sized enterprises (SMEs) assure economic growth in Europe. Generally, many SMEs are struggling to survive in an ongoing global recession and are often reluctant to release or pay for staff training. Cloud Computing offers many opportunities and could help companies to improve their business and use technology more efficiently In this chapter, learning methods particularly E-Learning in European SMEs is described in part 1. In this paper a short presentation of Cloud Computing and advantages for SMEs (part 1), the objectives of the European project IN-CLOUD (part 2) and the work in progress within this project are presented.

Peer-review under responsibility of the Conference Program Chairs

Keywords: SME; Cloud Computing; European Cloud Computing Strategy; ICT

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Peer-review under responsibility of the Conference Program Chairs
doi:10.1016/j.procs.2016.04.250

1. Introduction

Small and medium sized enterprises (SMEs) assure economic growth in Europe. In the European Union 28 (EU28), in 2013 some 21.6 million SMEs employed 88.8 million people and generated 3.666 trillion in values added[1]. The last financial crisis and the economic recession have hit SMEs hard in the EU28 and the economic conditions remain difficult.

Cloud Computing offers many opportunities and can help companies improve their business and use technology more efficiently. Marston et al[2] define Cloud Computing as "an information technology service model where computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location". Agility, elastic scalability, low costs are some benefits of using Cloud Computing; data can be moved smoothly without boundaries.

Recent studies emphasise the potential cloud computing prides on in terms of boosting SMEs' growth and encouraging entrepreneurial practices at all levels. Still, market trends indicate European SMEs are not making the best of the cost-effective solutions cloud computing has to offer. Smaller businesses can avoid large investments into hardware and software, entering the market more easily due to the cost-efficient, integrated cloud computing services. Universities themselves can greatly benefit from cloud computing, as its storage capacity and economic viability ensure more efficient research management techniques in all fields (business, medical, scientific etc.). Cloud computing is thus an optimal solution for the innovation-driven alliance between universities and companies.

While cloud computing arises a great interest in the corporate sector, several researches evidence a lack of professionals able to work in this field. According to the analyst firm IDC[3], in 2012 more than 1.7 million cloud computing jobs have remained unoccupied and the trend should lead to more than seven million cloud-related vacancies worldwide in 2015.

The European Commission has started several initiatives supporting the investment in entrepreneurship-boosting Information and Communication Technologies (ICT) and, more specifically, in September 2012 has adopted a strategy for "Unleashing the Potential of Cloud Computing in Europe". The European Cloud Computing Strategy[4] includes three key actions; the most relevant is the creation of a "European Cloud Partnership" providing strategic options to turn cloud computing into an engine for sustainable economic growth, innovation and cost-efficient public and private services.

The main aim of this paper is to analyze the survey results obtained from different stakeholders of 7 european countries to identify a set of topics where there is a relevant lack of knowledge and there is a need to improve skills or opportunity to create new competences.

In this paper after a short presentation of Cloud Computing and advantages for SMEs (part 1) the objectives of the European project IN-CLOUD (part 2) and the work in progress within this project are described.

2. State of the Art

The NIST (National Institute of Standards and Technology) definition of Cloud Computing is as follows[5]: "Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction".

Useful characteristics of Cloud Computing[5, 6] for SMEs are: On-demand self-service, broad network access, resource pooling, rapid elasticity and measured service. Cloud can have any of the four types of access: Public, Private, Hybrid, and Community.

Service Models are the reference models on which the Cloud Computing is based. These can be categorized into three basic service models as listed below[5]:

- Cloud Software as a service (SaaS). Cloud Service Providers (CSP) applications running on a Cloud infrastructure are accessible from various client devices through a thin client interface such as a web browser.
- Cloud Platform as a service (PaaS). The user develops on the Cloud infrastructure or acquires applications created using programming languages and tools supported by the provider.

- Cloud Infrastructure as a service (IaaS). The CSP provide the user with storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications.

By using Cloud services SMEs can avail of opportunities that allow them to compete in an innovative ICT environment, and give a level playing field required to succeed in business[6].

In the discussion with SMEs, the following advantages of Cloud Computing emerged[7, 8]: Up-to-date low-cost software solutions, unlimited data storage, access to data from anywhere and anytime means portability and flexibility (giving more time and effort to be placed on business strategies and solutions), high levels of security protocol that ensures business and data protection, improved business performance and simplified data management.

As with any technology, there are also a number of limitations or issues with Cloud Computing. One of the main issues is the reliability and security of data and the accessibility of this on a 24/7 basis, particularly when the Cloud service provider has an outage. Many companies will have problems about the lack of control over their ICT systems and the impact of a CSP on these[9].

These issues may inhibit an SME's decision to migrate to a Cloud Computing environment. In addition, there are other factors, which may influence the decision[10]:

- The lack of understanding of the infrastructure, cost, and appropriateness to the needs and scenarios of different companies from different business environments.
- The ICT skill levels of users, managers, and entrepreneurs.
- The readiness of SMEs to adopt Cloud Computing from a business perspective.
- Less time.

Some of these issues can be addressed by educating employees on the concept of Cloud Computing and developing business-based ICT skills in SMEs[11]. This will allow them to make informed decisions about the appropriateness of Cloud Computing to their business strategy and what aspects can benefit them the most.

3. Objectives

The general objective of the IN-CLOUD project is to foster a partnership between Higher Education and the corporate sector in order to qualify new professionals able to boost the competitiveness and growth of European Companies and Universities, thanks to the advantages offered by the cloud computing technology. The objective of the project is reached by pursuing the specific objectives of:

- raising awareness among European Companies, Public Administrations and Universities regarding how cloud computing can boost economic growth and innovation,
- creating VET qualifications, based on analysis of the use of cloud computing in companies, for professionals inside European Companies and Public Administrations,
- training staff to introduce and manage cloud computing technologies and services inside their organizations.

The first output of the project IN-CLOUD consists of a report that is the basis for the development of the other project activities. It includes a description of the Cloud Computing, an analysis of the awareness of the existing cloud computing technologies and services in the private and public sectors, a needs' analysis of technologies and services connected to Cloud Computing in the public and private sectors, an analysis of the professional skills required in the area of Cloud Computing and an analysis of the labour market actual situation and prospective of employability. The first design of didactic units that can satisfy the identified didactic needs will be also proposed as a result of this output.

The realization of this output will be achieved through three activities:

- Design of assessment instruments: questionnaires submitted by Survey Monkey, interviews of stakeholders and existing sector studies, publications and reports at national and international levels.
- Needs' analysis and labor market analysis
- The activity includes two tasks, an investigation of the Cloud Computing needs among companies and public administration and an analysis of the professional required by the labour market.
- Didactic units design

On the basis of the results of the needs' analysis and labor market analysis, the consortium has identified a set of topics where there is a relevant lack of knowledge, the need to improve skills or opportunity to create new competences. Then, the consortium will design a collection of didactic units addressing to the identified topics for different targets (companies, public bodies, students and people in general).

4. Research Methodology and Results

The questionnaire contains questions about general company information, software usage and cloud computing. Tables 1 to 9 present the questions and the results of the questionnaire sent in all partner countries, following the questions:

- What is your job role?
- How does your business/organization use IT on a daily basis?
- Do you use cloud computing services in your business/organization?
- Why don't you use cloud computing services in your business/organization?
- Which cloud computing services do you use within your business/organization?
- What benefits does the cloud offer to your business/organization?
- Which cloud services do you aspire in the future to use in your business/organization?
- Please rank your primary concerns regarding the adoption of cloud computing into your organization
- Which of these skills and competences, required for successful implementation of cloud computing, does your business/organization have?

in Italy, Spain, Germany, UK, Greece and Portugal, the countries where we have the IN-CLOUD project partners.

Table 1. Question 1: What is your job role?

Q1: What is your job role?						
	Italy	Spain	Germany	UK	Greece	Portugal
Owner/Director/Manager	10%	31%	21%	71%	36%	80%
Employee	58%	46%	46%	29%	27%	13%
IT Support Staff	16%	4 %	25%	0%	36%	7%

Table 2. Question 3: How does your business/organization use IT on a daily basis?

Q3: How does your business/organization use IT on a daily basis?						
	Italy	Spain	Germany	UK	Greece	Portugal
Word processing / MS Office	82%	92%	100%	100%	100%	79%
Enterprise resource planning (ERP)	31%	42%	32%	7%	18%	43%
Customer relationship management (CRM)	47%	50%	57%	43%	18%	50%
Social media	37%	73%	82%	64%	45%	71%
CAD/CAM	21%	19%	14%	14%	64%	14%
Numerical computing	27%	27%	7%	36%	55%	14%
Software development	38%	58%	61%	7%	45%	64%
Accessibility software	18%	4%	14%	0%	27%	7%

Table 3. Question 4: Do you use cloud computing services in your business/organization?

Q4: Do you use cloud computing services in your business/organization?						
	Italy	Spain	Germany	UK	Greece	Portugal
Yes	49%	77%	75%	93%	82%	73%
No	29%	19%	18%	7%	18%	27%
No, but in future	7%	4%	4%	0%	0%	0%
Unsure	15%	0%	3%	0%	0%	0%

Table 4. Question 5: Why don't you use cloud computing services in your business/organization?

Q5: Why don't you use cloud computing services in your business/organization?						
	Italy	Spain	Germany	UK	Greece	Portugal
I'm not familiar with cloud computing services	33%	7%	43%	0%	0%	14%
I'm not aware of cloud computing benefits	15%	0%	29%	33%	50%	29%

Cloud computing services bring no benefits for my business/organisation	10%	7%	14%	0%	50%	43%
Migration to cloud computing services is too complex	5%	27%	0%	0%	50%	14%
Financial reasons	10%	20%	57%	0%	25%	29%
Security concerns	23%	33%	57%	0%	50%	14%
Doesn't apply to me	28%	40%	0%	67%	0%	29%

Table 5. Question 6: Which cloud computing services do you use within your business/organization?

Q6: Which cloud computing services do you use within your business/organization?						
	Italy	Spain	Germany	UK	Greece	Portugal
Word processing	30%	54%	81%	21%	25%	42%
Data storage	72%	79%	76%	86%	75%	75%
Web mapping	22%	13%	14%	0%	50%	0%
Numeric computing	11%	4%	5%	0%	0%	0%
Social media	33%	54%	76%	29%	25%	17%
Virtual machines and infrastructure	54%	50%	43%	0%	25%	58%
Extension of applications through Cloud APIs	20%	13%	19%	7%	0%	17%
Software development	26%	21%	76%	14%	0%	42%
Extension of computer resources (e.g. CPU, RAM, …)	35%	17%	5%	0%	13%	8%

Table 6. Question 7: What benefits does the cloud offer to your business/organization?

Q7: What benefits does the cloud offer to your business/organization?						
	Italy	Spain	Germany	UK	Greece	Portugal
Cost efficiency	58%	61%	81%	71%	11%	75%
Scalability & flexibility	47%	65%	67%	36%	67%	75%
Sustainability	27%	22%	10%	21%	22%	25%
Maintenance by cloud provider	31%	48%	48%	29%	33%	67%
Security	33%	17%	24%	29%	56%	42%
Improved service delivery	55%	43%	90%	21%	11%	42%

Table 7. Question 8: Which cloud services do you aspire in the future to use in your business/organization?

Q8: Which cloud services do you aspire in the future to use in your business/organization?						
	Italy	Spain	Germany	UK	Greece	Portugal
Word processing	35%	29%	91%	25%	0%	11%
Data storage	55%	43%	68%	42%	40%	56%
Web mapping	14%	14%	23%	0%	20%	33%
Numeric computing	19%	19%	5%	17%	0%	11%
Social media	28%	24%	91%	42%	20%	44%
Virtual machines and infrastructure	30%	48%	86%	25%	80%	33%
Extension of applications through Cloud APIs	25%	43%	36%	8%	20%	22%
Software development	23%	38%	77%	8%	40%	44%
Extension of computer resources (e.g. CPU, RAM, …)	30%	43%	18%	33%	20%	22%

Table 8. Question 9: Please rank your primary concerns regarding the adoption of cloud computing into your business/organization

Q9: Please rank your primary concerns regarding the adoption of cloud computing into your business/organization (1 - lowest, 5 - highest concerns) (average results in the columns)						
	Italy	Spain	Germany	UK	Greece	Portugal
Environmental security	2.17	2.39	1.52	2.67	3.00	2.60
Data privacy and security	4.06	5.13	3.58	4.92	3.17	5.30
Data availability and business continuity	3.10	4.45	3.76	5.15	3.50	5.00
Reliability	3.57	4.22	3.84	4.25	1.80	4.43
Legislative requirements	3.16	3.82	4.50	3.25	4.60	2.10
Contracting conditions	3.00	3.08	4.87	2.82	3.33	2.82

Table 9. Question 10: Which of these skills and competences, required for successful implementation of cloud computing, does your business/organization have?

Q10: Which of these skills and competences, required for successful implementation of cloud computing, does your business/organization have? (1 - Not at all, 5 - Very high) (average results in the columns)						
	Italy	Spain	Germany	UK	Greece	Portugal
Business and financial skills	3.24	2.75	3.31	3.93	3.14	3.50
Technical skills	3.58	3.88	3.96	3.36	3.33	3.92
Business needs analysis	3.40	3.38	3.27	3.43	3.00	3.67
Project management skills	3.44	3.21	4.23	4.00	3.50	3.75
Contract and vendor negotiation	3.46	3.21	4.12	3.29	3.17	3.33
Understanding of security protocols	3.55	3.84	3.15	2.86	3.17	3.42
Data integration skills	3.43	3.83	2.88	2.86	2.83	3.58
Mobile app development and management	3.12	3.25	4.15	2.21	2.17	3.17

Authors have designed some didactic units to cover the new skills needed for proper cloud computing development: Business and financial skills, technical skills, project management skills, contract and vendor negotiation, security and compliance, data integration and analysis skills, and mobile app development and management.

4. Conclusions

It is evident that small and medium sized companies remain vital to the European economy but many of them fail in the first five years; so it is important to ensure the survival of these companies and encourage them to grow. In today's business world, SMEs are competing with a larger number of companies, many of these are multinationals; they have a greater number of staff and a wider pool of skills. So, it is important for SMEs to acquire the relevant strategic skills as quickly as possible to remain ahead of the competition by using latest technologies such as Cloud Computing.

Acknowledgements

This paper describes progress work within the ongoing Erasmus+ project **IN-CLOUD**, Innovation in Universities and Businesses - Erasmus+ Strategic Partnership nº 2015-1-IT01-KA202-00473, and is developed under the support of the Erasmus+ Program of the European Union.

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