TABLE OF CONTENTS

USING SOA FOR E-COMMERCE SYSTEMS DEVELOPMENT

RALUCA ARBA[1], ROBERT ANDREI BUCHMANN[2]

ABSTRACT. E-Commerce represents a new and complex phenomenon at the intersection of various fields: economy, computer science, sociology, law etc, as it will be specified in the introduction of this paper. The aim of this paper is to propose an E-commerce model that takes into consideration the technological and informational changes and implies a flexible architecture based on Web Services and XML documents, in order to maintain the interoperability with other systems, the flexibility and extensibility imposed by future technological changes.

1. INTRODUCTION

Nowadays companies all over the world are facing important changes due to globalization and the knowledge society. The advantages offered by the new economical context like: taking part in new markets, as a condition of reducing the access costs, of eliminating the legal barriers and disappearing of totalitarian regimes; access to a larger areal of resources (capital, knowledge, work force), available nowadays at an international level or taking part in global production networks [4] impose companies a quick answer to the market changes and a flexible structure.

Companies acting in the virtual space have to face also the technological changes, due to the fact that E-commerce has evolved and it is currently in a maturity phase, characterized by complex Web applications that use different operating systems and technologies and have to face the constant changes imposed by the technological environment [1].

In this context a flexible architecture that can adapt the future changes is the key to obtain the future competitive advantage in the virtual space. As Thomas Erl stated "…business and data models may change over time … a flexible structure that can be extended to accommodate these changes will pay off in the future" [5].

2. INSTRUMENTATION

SOA (Service Oriented Architecture – software architecture based on services) is an architecture type that involves the distribution of application functionalities in smaller and distinctive units – called services – that can be distributed in a network and can be used together in order to create business applications [4]. The large possibility of reusing these services in different applications is a feature of service oriented software architectures. These services communicate among them by sending information from one service to another, making SOA the next step of distributed programming.

SOA is a flexible and standardized architecture that allows a better connection among various applications and facilitates the exchange of information among them [7]. SOA unifies the business processes structuring the big applications in a vast collection of smaller units called services. These applications can be used by

different groups of people from a company or from outside.

Developing an E-commerce system based on SOA is justified by the advantages offered by this type of architecture: interoperability, extensibility, flexibility etc. E-commerce has evolved and is currently in a maturity phase characterized by complex applications that run on different platforms and using various technologies. In this situation, the necessity of building a flexible and robust system that will adapt to organizational and technological changes that can appear in such a system, due to the fast rhythm of the virtual environment development.

In this case a classical architecture based on dependent operating systems or technologies are no longer justifying their liability.

3. SOLUTION

The model proposed in this paper takes into consideration all these required characteristics of the new technological and informational framework and proposes a flexible architecture based on Web Services that will allow the interoperability with other systems, the flexibility and extensibility imposed by future technological trends.

The model proposes a new development framework for a B2C E-commerce system, taking into consideration the relationship with suppliers of products and services and customer, as shown in figure 1. The use of Web Services allows the separation of the system in independent components, each with its own functionality and acting simultaneously in order to realize the main functionality of the system.
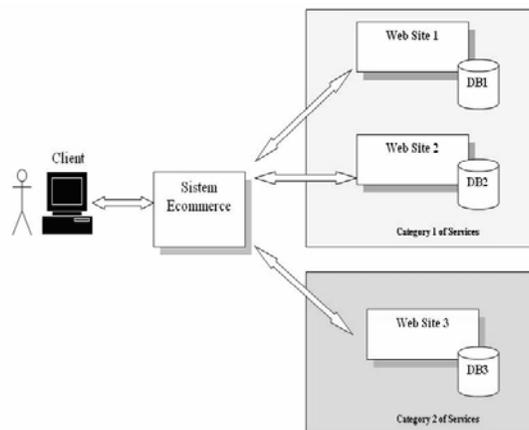
FIGURE 1. Service Oriented E-commerce System Model

From the technical point of view the proposed E-commerce system is described in figure 2. The user connects from a client device to the E-commerce site. In order to find the products or services needed, he sends a request to the system. We will take as an example an online tourism agency that allows users to choose a hotel and a plane ticket for a chosen destination. This situation inquires a request of

complementary products that can be found on the offer of many suppliers of this kind of services. The system will send the request further to the suppliers and will return a list containing the services requested.
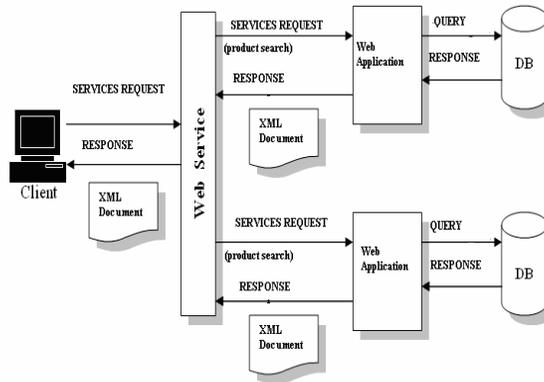
FIGURE 2. Request – Response Process

The use of this kind of architecture allows splitting the application into independent tiers that can be developed simultaneous. The figure bellow presents the operational requirements of the system.
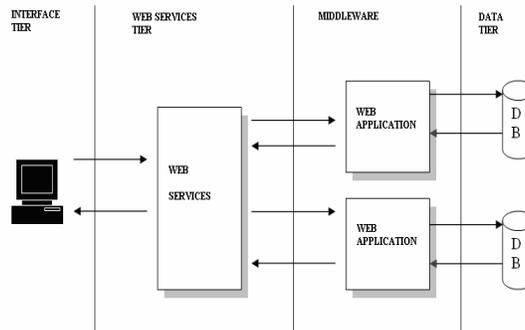
FIGURE 3. E-commerce System Scheme

The main functionality is given by the use of Web Services in order to connect to the suppliers Web applications. Web Services give the flexible functionality of the system, allowing the application to generate the offer dynamically and in real time. Users enter the site and search for a specific product or service, formulating a request that will be handled by a Web Service. The querying of the database will create an answer and send it to the client by using XML documents as a data transport format.

Using SOA implies building Web Services that will take into consideration the business functionalities of the system and not the technical ones. The difference involves creating a flexible and re-usable structure, very easy to understand in

case of a new use of that service [7].

4. Conclusions

This paper presents a general E-commerce model based on SOA, the advantages of using a business functionality approach, like obtaining the level of flexibility and interoperability necessary for the systems to adapt to future technological changes. The model takes into consideration the relationship of the company with its suppliers and customers and involves a Service Oriented Architecture that takes into consideration the business functionalities of the system.

E-commerce is an essential condition for future development of the companies all over the world. The latest technological changes and the process of globalization turns the economical environment into a collaborative field, where flexible and adaptable informational structures like SOA based models will offer the competitive advantage.

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WIFI TECHNOLOGIES FOR VIDEO SURVEILLANCE

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ABSTRACT. A surveillance and video monitoring system is a good tool that offers secure targets or premises or to monitor the activity of a perimeter. These systems have attracted the interest of both researchers and industrial area. The purpose of these systems is to increase security in all areas, from business supervision to traffic monitoring and national security. In this paper, an efficient model of implementation of a video surveillance and monitoring system is proposed. The system allows authorized administrators to view real time images through the Internet or to access or extract recordings for later use. These systems were well received and the companies that have implemented them have been pleased with the results showed.

1. INTRODUCTION

Security in wireless video transmission has provided great challenges in security industry. Compared with wired networks using wireless technologies can provide a significant cost reduction and increased video coverage. Wireless technologies will replace cabled technologies; wireless technologies increased density of electronic circuits that have resulted in smaller equipment with more capabilities. Wireless networks are a more convenient way to interconnect devices, in comparison with the classic cable networks. Transfer speeds have reached satisfactory parameters so as to ensure smooth operation of the network.

As organizations expand geographically, the dependence on employees who work from home or on the road is continuously increasing, forcing organizations to seek alternative solutions to support communication, coordination, and control across a dispersed workforce. Standard software applications are not designed having in mind a flexible multi-user remote access model, concentrating more on a centralized corporate environment where strictly standardized operating procedures can be implemented. This approach involves initial significant capital investment and continuous operating and maintenance effort and costs. [4]

Software as a Service (SaaS) is an alternative to standard software models representing more of a delivery method that provides access to software and functionality using the internet and web-services. All functionality resides "in the cloud" allowing organizations to access business functionality at lower costs by paying monthly fees, providing thus an increased efficiency over licensed applications. This approach allows clients to reduce additional hardware investments since the software is hosted by the provider, removing thus also the need for maintenance. [4]

Managed Video as a Service (MVaaS,) is an example of the Software as a Service (SAS) model of software deployment. In the case of MVaaS, video management software is hosted as a service provided to customers across the Internet. Like other SaaS applications, MVaaS eliminates the need to install and run software on the customer's own computers. MVaaS is often used to address the challenges of managing distributed network video recording and streaming systems across multiple locations. MVaaS providers reduce the user's burden of software maintenance, ongoing operation, and support. [3]

2. VIDEO SURVEILLANCE AND MONITORING SYSTEM

The model presented has been implemented in a service company included in the percentage of firms that use wireless technologies and surveillance and video monitoring systems. It offers a lot of solutions in terms of security. They are a great solution to protect buildings and personal property as well as monitoring activities in companies. These systems are used successfully to detect unwanted intruders or to monitor the activity of a perimeter. Surveillance systems and video monitoring can be configured to detect movements and to notify persons responsible for the appearance of an intruder and trigger the alarm. The images are saved and stored on a HDD, records can be accessed later. Both, the surveillance system and the playback system, can be accessed from a remote location through the TCP/IP protocol. The system is accessed via IP; the IP address must be saved in the router configuration and forwarded to accept connections via the Internet.

Another essential difference between multimedia communication applications is whether the content is encoded online, as in the case of real-time communication or live broadcast applications, or is encoded off-line, as in the case of streaming media on demand. The advantage of online encoding is that the communication channel can be monitored and the source and channel coding strategies can be adapted correspondingly. [2]

2.1. A MODEL OF IMPLEMENTATION

The protection of personnel and assets is a management function. Three key factors governing the planning of an assets protection program are: (1) an adequate plan designed to prevent losses from occurring, (2) adequate countermeasures to limit unpreventable losses, and (3) support of the protection plan by top management. [1]

The most common system is with 4 or 16 cameras. The cameras are connected to a DVR, connection can be wireless or with coaxial cable. These are cameras with infrared, which can be 12 IR Led, IR 24 Led or 36 IR Led and have an angle of 45, 60 or 90 degrees and can beat a distance of 8-10m, 15-20m, 25-30m. IR cameras should also be fixed in a support and connected to current.

FIGURE 1. Video surveillance/monitoring system

There are used 12V current transformer and metal catchment systems that allows cameras to monitor the optimal angle of the perimeter. The DVR is also powered using a 12V transformer and is provided with a UTP network card. Inside the DVR is mounted a HDD that connects through an IDE or SATA cable and is

powered inside the DVR. HDD capacity will influence the duration of recording, if the HDD is bigger it will register more data. The DVR supports all types of HDDs on the market, from a capacity of 80 GB up to 500GB. In case there are types of HDDs not supported they will be listed in the DVR's technical manual. Through the network card the DVR will connect to the wireless router. The wireless router is properly set, will connect to the Internet and will do all the security settings. The DVR will have a local IP to be forward and will also set a port for access to surveillance and video monitoring system. Access to the system will be done through a web browser accessing the IP and the port. Access is secured, will be granted only with a user and password previously predefined. Access is different, can come from a mobile phone which can have access directly to the Internet or with WLAN support to connect to the wireless router and then can access the system. From a desktop system connected to the Internet we can access the system using a web browser or from a laptop we will be able to connect wireless to the router that can access the video surveillance and monitoring system (figure 1).

2.2. LIVE VIEW

Using a web browser, accessing the system IP and the port we will be able to access the video surveillance and monitoring system. Access will be allowed only after a user authentication using a password. In this way we can view live images. It is very important the Internet connection, connections using fiber optics are recommended.

2.3. MOTION DETECT AND RECORD SCHEDULE

The DVR also incorporates features such as video motion detection and the ability to have multi-users view the recorded video. The DVR is well suited to perform video motion detection and can also activate alarms. Motion detect option should be configured so that the system should not register if there is no activity but it must register activity and even some time after termination of activity. The system can record only at motion detect. In this way we avoid to have useless recording with no activity and we risk saving useless data on HDD. When there is no activity the system will register nothing but where there is activity the system will start recording and optional an alarm can ring. After the activity will stop the system will continue recording for a few moments for security reasons.

2.4. PLAYBACK SYSTEM

The playback system can also be accessed via IP. Using this system we can access and view recordings and we can save recordings in our computer. All the recordings are stored on DVR's HDD. It is very important that data to be saved and stored in a more convenient way; the memory for storage should not be loaded with unnecessary data.

2.5. LOG DETAILS

To check the access to the system we can consult the Logs section which will save the user who connected, date, time and IP address. System Log is a great way to view who access the system and the location of viewer. The system was installed inside a company to monitor and supervise activities of employees. IR cameras are connected to a DVR. The DVR is provided with a HDD to save and store data and with a network card that connects to a router. The router is configured to allow access from the Internet to the surveillance system. View live and recording can be done via the Internet from any computer; using a web browser, the IP address and the forwarded port must be accessed. Access to the surveillance is granted after a user and password authentication.

3. Case study

Case study was performed on 176 small and medium enterprises from different fields of activity. Our structure of analyze was elaborated in four parts: General Questions, Security and Network, Wireless solutions and Conclusions. From this group, 59.09% means services companies, 24.43% means productions and the other 16.48% adopted both ways, production and services (figure 2).
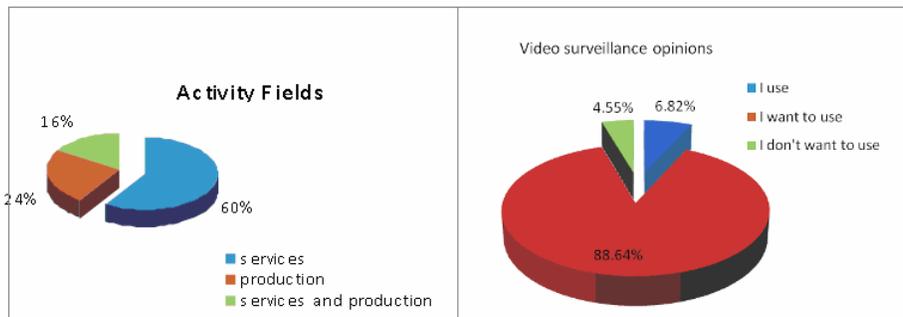

Figure 2. Activity fields and video surveillance opinions

4. Conclusions

Video surveillance serves as the remote eyes for management and the security force. It provides security personnel with advance notice of breeches in security, hostile, and terrorist acts, and is a part of the plan to protect personnel and assets. It is a critical subsystem for any comprehensive security plan. Lighting plays an important role in determining whether a satisfactory video picture will be obtained with monochrome and color cameras. Thermal IR cameras are insensitive to light and only require temperature differences between the target and the background. Regarding the security in a wireless network, administrators have an important role for the network, they have the task of configuring the best and the most detailed part of both software and the hardware side. In the case of wireless networks, as well as with other networks, one thing is sure: there is no perfectly safe network. The standards require clear requirements in terms of achieving competitive wireless networks. Any problem must be treated and released, according to the standards, will choose the best option.

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TESTING AS A LEARNING TOOL IN THE PROJECT MANAGEMENT COMPETENCE DEVELOPMENT ENVIRONMENTS

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ABSTRACT. The paper proposes a computer adaptive testing (CAT) model for project management competences assessment, where competences are represented using concept space graphs. The proposed model increases the tests configurability by considering several knowledge constraints when an item is selected. The proposed model is also seen as a self-directed-learning-tool, useful in the preparation process for project management certifications. The model is validated by comparison with an existing e-testing tool for simulation purposes: statistic results are presented and analyzed.

Assessment is a powerful educational tool. It influences the judgments of students and teachers about what is of most importance in the curriculum, because, on the educational interactions, we must have a clear idea of what we want students to be able to do at the end of a unit of study, and communicate these intended learning outcomes to students so they can at least share in the responsibility of achieving them. It is important, therefore, to pay attention to the assessment methods.

1. PROJECT MANAGEMENT COMPETENCES

Project management requires specific project management competencies, this fact being revealed by studies made in various international companies [7].The project management competencies can be grouped in three components (knowledge, skills, and personal attitude) and three main categories (technical, contextual and behavioural competencies). IPMA chose to define four levels of competence. The levels provide a suitable framework for developing career paths and organizational maturity models as well as for personnel development programmes of individuals or companies. Each project has its own specific needs. Any gap between required and available competencies (in both internal and external resources) is a risk factor for the project's success.

2. COMPUTER ADAPTIVE TESTING AS A SELF-DIRECTED-LEARNING TOOL

A form of computer based testing which increases flexibility and offers more information about the examinees competences is Computer Adaptive Testing (CAT). The principle behind CAT is to adjust the test items characteristics to the examinee's ability level ([3]). Each of the five CAT components discovered by Weiss & Kingsbury [9], item pool, starting point of the test, item selection algorithm, scoring procedure and termination criterion, have been optimized to different areas of knowledge evaluation.

3. CAT MODEL IN A COMPETENCE BASED ENVIRONMENT

Computer Adaptive Testing is based on Item Response Theory, but it can be

adapted and optimized according to each situation or field of activity. For example, using the domain ontology proposed by SinPers system [2], the classic CAT mechanism is personalized for evaluating project management competences. SinPers is an e-learning platform which models digital content with learning objects, according to predefined domain ontology and metadata for describing the properties of these learning objects. Learning objects are explained or assessed by concepts defined in domain ontology. Relationships between concepts can be of three types: *Has_part* (for hierarchical relationships), *Requires* (for logical constrains) and *Suggested_Order* (optionally).

The target of creating tests on the project management knowledge base described above is not only to adapt the questions to user level of ability, but also to obtain tests suitable for certification exams of level A, B, C or D in project management [4], tests which should verify certain competences. The area of concepts is different from level to level, for the same competence. To find it, concept space graphs are used [1]. Some components from CAT are adjusted to project management competences structure and these enhancements are further presented.

The CAT for project management knowledge uses a parameterized item pool: the parameters used to select certain questions from database are the concept lists, obtained from concept space graphs linearization. These concept space graphs are extracted from course ontology. Each competence from the course ontology has attached, as a parameter, an interval of values (threshold interval). According to it, the competence defines a set of concepts or projects a concept space graph. For this purpose, the path weight is used, as it is described by Hardas [5].
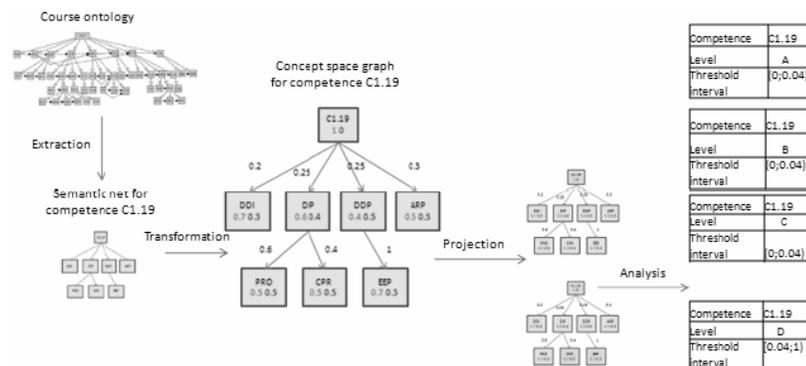
FIGURE 1. Knowledge Structures in the Project Management Automatic Assessment, for C1.19 - „Start-up" Competence

In order to define relationships between competences, levels of difficulty and threshold intervals four types of operations are required:

- *extraction* of the semantic net for a certain element of competence (e.g. C1.19 – Start up) from the ontology; the semantic nets are networks which represents semantic relations (edges) between concepts (nodes);
- *transformation* of the newly created semantic net into a concept space graph, using self-weighted values of the concept nodes (the left-side numbers from graph nodes in the Figure 1), prerequisites weights (the right-side numbers from graph nodes), link weights (link labels); a concept space graph $T(C, L)$ is

a projection of a semantic net with vertices C and links L where each vertex represents a concept and each link with weight $l(i, j)$ represents the semantics that concept c_j is a prerequisite for learning c_i, where $(c_i, c_j) \in C$ and the relative importance of learning c_j for learning c_i is given by the weight; each vertex in T is further labeled with W_s (self-weight value, which represents the relative semantic importance of the root topic itself with respect to all other prerequisites) and W_p (prerequisite-weight value, which represents the cumulative, relative semantic importance of the prerequisite topics to the root node) [5]; for example, for node DDI in Figure 1, self-weight value is 0,3 and prerequisite-weight value is 0,7.

- projection of concept space graph to sub-graphs of different semantic dimension, according to the relationship between nodes path weights (η) and the threshold coefficient (λ) ; the following formula can be used:

$$\eta(x_0, x_t) = W_s(x_t) \prod_{m=t}^{1} l(x_{m-1}, x_m) * W_p(x_{m-1}).$$

where nodes x_0 and x_t are connected to a path given by the set

$[x_o, ..., x_m, x_{m+1}, ..., x_t]$;

- *analysis* of the different projection sub-graphs, according to the desired coverage of the initial projection graph, in order to obtain the relationship: competence element, level and threshold interval; e.g. "Start up project" competence element, IPMA level D certification requires a coverage threshold of maximum 0.04 (meaning, examinee should know ARP, DDP, DIP, DDO, PRO concepts) and the other levels require a coverage threshold of minim 0.04 (meaning that the examinee should know ARP, DDP, DIP, DDO, PRO, CPR, EEP concepts);

The selection algorithm is the core of the CAT mechanism, which is shown by Figure 2.
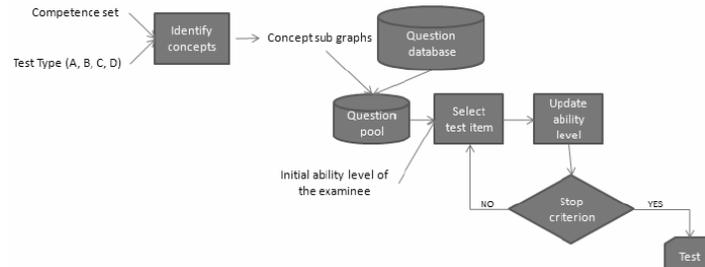
FIGURE 2. CAT Mechanism for Project Management Assessment

We define the following function, which represents the questions set:

$$qs : \Omega \rightarrow \Omega, qs(Q_1, Q_2, ..., Q_n; Q) = \{Q_1, Q_2, ..., Q_n, Q_{n+1}\}.$$

Concepts needed to answer question q and concepts needed to successfully complete assessment T are described below:

$$C^q = [C_1^q, C_2^q, ... C_n^q]. \qquad C^T = [C_1^T, C_2^T, ... C_m^T].$$

The stop criteria is fired when all the concepts needed to be assimilated are among the already tested ones or when ability level (or the score) of the examinee is lower than 50/100. We should mention that the initial level of ability (start criteria) is 80. The stop criterion is modeled in formula:

$$(C^T \subset \bigcup_{i=1}^{|qs|} C^{q_i}) \vee (Score \leq 50), \forall i = \overline{1, |qs|}$$

4. CONCLUSIONS

CAT offers a quick, user oriented, secured solution for item selection issue. Testing in a computerized environment requires a framework to facilitate resource extraction in order to satisfy certain needs of evaluators. This framework should relay on a well-structured knowledge base. Ontology course, transformed in concept space graphs, then projected to sub graphs, according to the desire level of semantic significance, refines the CAT algorithms used by other systems [8]. But Computer Adaptive Testing isn't just an instrument which measures knowledge: it is also an instrument which multiplies knowledge. Theoretical competences of project management can be easily developed by taking adaptive e-tests.

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ON SOME STANDARDS FOR BUSINESS PROCESS MODELLING. BPMN, BPEL, XPDL AND THEIR INTERACTION IN BUSINESS PROCESS MANAGEMENT AS PART OF ENTERPRISE BUSINESS ARCHITECTURE

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ABSTRACT. To establish enterprise architecture for the public sector enterprises there is an urge to define the Business Process Management in an understandable, easy readable way that can be used by the business analyst to design the business processes and the result of his work to be ready to use as an input for the IT analyst. For this reason, it is important to define in the enterprise architecture the standards to be used in order to achieve this goal.

1. INTRODUCTION

Our research was concentrated on the study of architectures for public institutions such as decentralized public enterprises eventually subordinated to ministries that present important similarities in the organization and functioning.

The research in designing the enterprise architecture for Labor Inspection, led us to study the system of Territorial Inspectorates subordinated to mentioned centralized institution [4]. From this study resulted the necessity of defining a strict set of rules through a document containing all the necessary elements for the proper functioning of the enterprise. For this purpose we consider necessary to review the way in which informatics is seen at the county level institutions (decentralized).

The problem that arises is that of defining a method to approach the Enterprise Architecture in a coherent way which will ensure not only the right distribution of software products but also unique ways of working in accordance with the desired strategic management of the enterprise [3].

2. ENTERPRISE ARCHITECTURES AND STANDARDS FOR BUSINESS PROCESS MANAGEMENT

Within the Enterprise Architecture, an important part of business planning rests to the analysts who provide a business model able to serve the IT architecture design consisting in software and technology architecture. It is then necessary for Business Process Management to be more understandable so the design language for business processes to be useful and easy to understand for both designers from business department and IT [1].

One of the most popular models for the development of Enterprise Architecture is the Zachman Framework. In essence, the Zachman Framework is organized so that the top rows are closer to the business analyst and the bottom rows closer to the IT analyst [7].

The Model-Driven Architecture (MDA) [5] is a suitable approach for Enterprise Architecture that focuses on building systems with different levels of abstraction.

The MDA, developed by the Object Management Group (OMG), provides three levels of abstract architectural modeling: A Computation Independent Model (CIM); A Platform independent model (PIM); A Platform Specific Model (PSM);

A BPMS (Business Process Management System) can be hosted on a variety of platforms [8] (WebSphere, WebLogic, .NET), so that, for some applications, PSM can be represented by an infrastructure based on an application server in which the requests are made while in other, PIM applications can be represented by detailed design models for PSM, which may be as example J2EE platform or .Net.

The problem that arises in MDA is the mapping of models to code generators. In this context it is possible a loss of the abstract semantic of the model at the translation into code, so, it is better to use notation languages for Business Process Management such as Business Process Modeling Notation (BPMN) and Unified Modeling Language (UML), which can be used to represent certain aspects of CIM.

CIM focuses on business use cases and business processes used to obtain results independent of software implementations. In PIM, the aim is to provide as many details about the storage platform independence. Execution languages such as Business Process Execution Language (BPEL) can be used to catch the orchestration execution for Web Services in a business process underlying the management system. PIM details the business analysis; therefore there is a stronger need for standards [6]. PSM provides detailed specifications regarding implementation platforms. This level contains specific extensions and capabilities offered by several different suppliers [5].

To implement a MDA there is necessary a set of standards to ensure the continuity of an abstract semantic model to a more detailed level. These standards should include sets of rules, methods and organizational models of integration.

BPEL (Business Process Execution Language)

Business Process Execution Language was originally developed by IBM and Microsoft by combining different features of their own standards (WSFL and XLANG. In 2003 WS-BPEL has been submitted to the OASIS consortium shortly after a lot of other companies to support and to promote as WS-BPEL standard processes based on web services.

WS-BPEL uses WSDL to extensively deploy orchestrated services. Service interface is defined by the WSDL for invoking such service by processing engine that executes WS-BPEL process. When services are calling each other, the invocation of operations defined in WSDL and orchestration is done with WS-BPEL so that the latter extends WSDL to facilitate the connection between the invocations of partner services.

BPMN (Business Process Modeling Notation)

BPMN, BPEL, XPDL AND THEIR INTERACTION IN BUSINESS PROCESS
MANAGEMENT AS PART OF ENTERPRISE BUSINESS ARCHITECTURE

BPMN is the standard note for Business Process Modeling. BPMN is a modeling language that allows the design of various aspects of business process and introduces some constructions that are specific modeling processes such as correlation, compensation and human interaction with user issues that are not so clearly defined in other modeling languages such as UML. UML tools are more geared towards IT user while BPMN addresses rather experts in business processes.

BPMN does not replace BPEL but is rather complementary. BPMN defines the modeling while established core BPEL execution environment. In BPMN 2.0 which is under development at OMG will be defined a semantic of execution that will allow execution of native processes creating in that way an overlap with BPEL 2.0.

XML Process Definition Language (XPDL)

One of the ways to eliminate problems of transformation of models to import into other tools than the native is to define a unified language for modeling and execution. An example of such language is XML Process Definition Language (XPDL). XPDL is a format for the persistence diagrams of the process when the format is BPEL execution model of the process thus creating a value chain BPMN-XPDL-BPEL.

In order to address an Enterprise Architecture for a public institution by the MDA approach it is required to use some tools that support a common language of communication between analysts who have the same or different roles in the company (such as the communication between business and IT analysts) [2].

The Labor Inspection designs business processes using BPMN. The resulting model can be converted through XPDL in BPEL directly executable (for example in a WebSphere server).

We illustrate the use of BPMN notation by drawing simplified scheme which capture the registration of labor contracts at the Territorial Labor Inspectorates. BPMN model can be converted using tools such as Enterprise Architect product from Sparx Systems or additional tools for Microsoft Visio like Process Modeler standard features that add to Visio a BPMN facilities. The example of a BPMN diagram is shown in Figure 1.
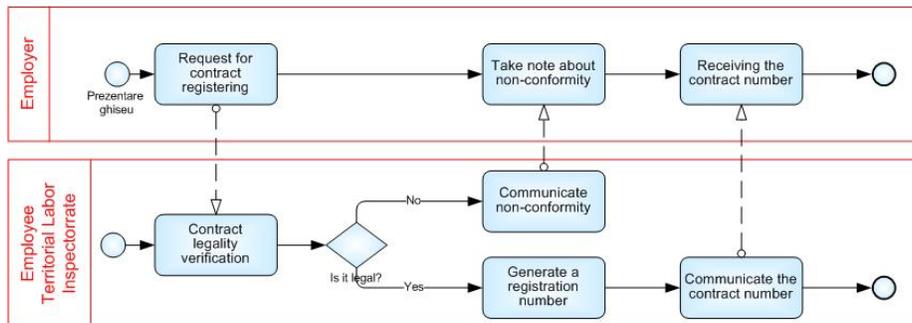

FIGURE 1. Using BPMN to represent a business workflow

3. CONCLUSION

Generally speaking Enterprise Architecture is composed at least of four secondary parts: business architecture, information architecture, software architecture, technology architecture. Each of these elements must be based on clearly defined and widely accepted standards.

Business Architecture can be defined by means of Business Process Management, which in its turn can be designed using a process execution language, a model interchange language and a notation language. These are defined in BPEL, XPDL and BPMN. BPMN uses graphic symbols to describe the process. This description could be passed to XPDL for transformation and transport between different MDA stages trough the process execution (using BPEL).

The knowledge of the three languages is a necessity for business analyst, the more so as BPMN address even these analysts unlike UML, which is rather intended for IT users. Learning BPMN by the business analyst is also recommended because of the perspective that a notation is to get elements of execution, so that, in time, we believe that BPEL and XPDL are found in a measure increasingly higher in BPMN.

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BLACK BOX SOFTWARE TESTING CONSOLE IMPLEMENTED WITH AUTOIT

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ABSTRACT. The paper proposes an AutoIt application for black box software testing automation and presents quantified improvements in efficiency and effectiveness based on a study involving two similarly structured teams of entry-level testers engaged in manual testing versus automated testing using our application. AutoIt is an emerging macro scripting language for Windows, with strong features, supported by the AutoIt community and provided as a freeware tool by its creators.

1. INTRODUCTION

Software testing is an essential process integrated with all software development models, subordinated to quality assurance; thus, testing can be considered an economical measure against nonconformity cost propagation. Efficiency and effectiveness are the two generic indicators strongly related to the need and success of testing efforts. Considering here the generic and informal definitions such as...

- Efficiency = doing things right (with the least possible effort and an emphasis on the process rather than the results);
- Effectiveness = doing the right things (with emphasis on the results rather than the process);

...it is obvious that these indicators are related to testing:

- Testing efficiency is improved by decreasing the consumption of resources such as time and human involvement (or increasing productivity);
- Testing effectiveness is improved by producing results that may escape human testing (especially in random testing, stress and overload testing); also, automated testing applies where manual testing would be unfeasible.

2. INSTRUMENTATION

AutoIt is a freeware scripting language for Windows automation, developed by Jonathan Bennett's "AutoIt Team", presently supported and continuously extended by the AutoIt community, in which the paper's authors also participate[1]. Some of its more important features are [2]:

- Simulation of the user's actions through keyboard and mouse, both programmatically and by macro recording;
- BASIC-like syntax for structural programming with support for Regular Expressions and a comprehensive, open-source library of user-defined functions;
- Interaction with windows (by window title or class), GUI controls and process manipulation;
- Tools for GUI programming and form management;
- Access to COM objects, DLL, API functions and Windows registry;

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[1]The community forum and the AutoIt tools are accesible at http://www.autoitscript.com

With such features, AutoIt becomes an essential tool for system administration batch jobs and software testing automation [6]. The efforts on which this paper is based consist in the development of a black box testing automation tool in order to increase both efficiency and effectiveness of software testing activities.

AutoIt Window Info Tool (AWIT) is a utility included in the AutoIt package. As Figure 1 shows, the utility provides current window information (including status bar, visible and hidden text), current control information and current mouse position information. The relevant information for the proposed application is stored in a text

FIGURE 1. The AutoIt Window Info Tool reading data from a control.

database for each tested feature, in order to be passed as a parameter to the functions that provide black box access to various feature functionality.

3. SOLUTION

The AutoIt application was developed in a simple 3-tier engineering methodology, starting from the layout of the **user interface** (Figure 2). AutoIt provides two mechanisms for implementing GUI functionality:

- MessageLoop, detailed as follows:
  - Each event generates a message;
  - The script contains an infinite loop for message listening (using the GUIGetMsg function);
  - The infinite loop contains a CASE structure handling each expected message and one of the CASE branches must contain the loop breaking instruction;
  - The script execution is never interrupted (so the method is ideal when the primary goal of the form is to wait for user-GUI interaction).
- OnEvent, similar to traditional event handling (but inactive in the default configuration of the interpreter): each event implicitly calls an event handler;

Since our application contains a single form with all tasks directly triggered by user (the tester), we used the MessageLoop mechanism (which is active by default).

The data tier consists in a text database accessible with file management functions (FileRead, FileWrite – both functions accept an argument referring the number of characters to be read or written, FileReadLine, FileWriteLine - both functions access an entire line from a text file). The following fields are extracted

from the text database by using string processing functions:

- Function name - this stores the name of the user defined function that executes the application or feature targeted by the test;
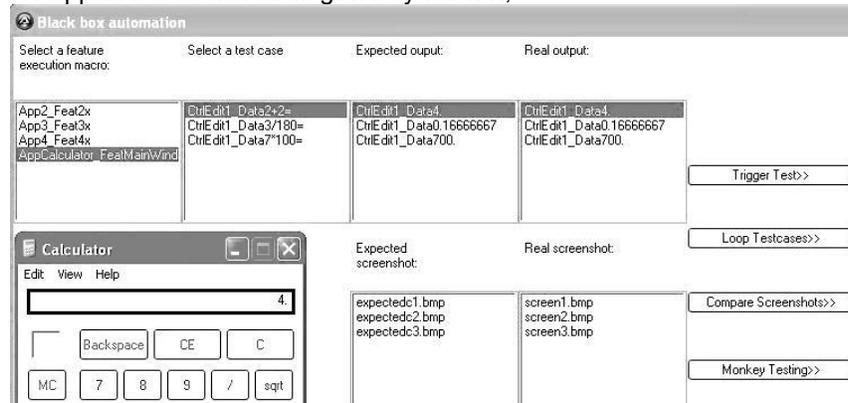

FIGURE 2. The test console executing a Windows Calculator test case

- Testcase input - each black box test case can be represented as the succession of user actions (keystrokes), which can be expressed in AutoIt as strings;
- Expected output/Expected screenshot - each black box test has an expected output provided by the product specification. The output may be the value of a Windows standard control or it may be a certain state of the tested application, which can be stored as an image file, by simulating an Alt-PrintScreen keystroke; the field stores strings using an improvised namespace, the Control ID (read with the AWIT utility) followed by its expected value and a file path for a screenshot of the expected state;
- Real output/Real Screenshot - this is filled by the AutoIt application as each test case is executed; it stores the value displayed in a standard control or the filepath where the state of the application was saved as a screenshot.

The logic tier has the following components:

- *Access to the text database*, extraction and processing of strings representing the test case input, expected output, real output and the name of the function containing the feature execution macro;
- *Access to the tested application* in several steps:
  - Automated execution of the desired feature, by passing the Function name string as an argument to the AutoIt Call function (which converts strings in function calls and their parameters); each function definition is stored in a user defined library, created programmatically or by macro recording by the testers in the preliminary testing phase;
  - Automated passing of data to the targeted input controls through functions that simulate keystrokes targeted to a window or a control (Send, ControlSend)
  - Automated reading of data as the "real output" - either the value of certain controls (identified based on information provided by the AWIT utility) or as a screenshot (saved by a macro executing Paint and the image saving procedure);
- *In order to avoid synchronizing issues*, the AutoIt application needs to be suspended at certain key moments:

o   the Sleep() function is needed to suspend AutoIt at the moment between passing the input data to a control on the tested application and reading the data from a control. Even simple programs such as Windows Calculator raise synchronizing issues between the automated process (computing the output) and the automation driver (the sequence of Write/Read operations from AutoIt to the automated application);

In order to estimate the efficiency and effectiveness improvement induced by automation, the proposed application was used in several tests developed by entry-level black box testers. The test teams were built based on recommendations made by [1] and [7], and the results confirmed both testing axioms [5] and previous results [3] and [4]. A detailed presentation of the test console code and test results will be available in the extended, final version of the paper.

4. Conclusions

Black box testing is the core and the priority of any testing effort, since it emulates the user perspective without being concerned with the internal architecture of the tested application. Automated black box software testing is essential in improving both efficiency and effectiveness of testing activities and AutoIt provides an ideal platform for developing such tools on Windows systems, as long as tested applications use standard Windows controls. We are concerned with testing Web applications but this is still limited as the AWIT utility does not read data from HTML forms. One of our future priorities is to extend the application presented in this paper for Web black box testing - the main challenge is the difficult exchange of data between AutoIt and HTML controls where GUI functions cannot be used.

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DISTRIBUTED COLLABORATIVE SYSTEMS SECURITY

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ABSTRACT. This paper describes key concepts of collaborative systems and presents the main properties and quality characteristics for the collaborative banking systems. The article analyzes different ways to increase the efficiency and the performance level in collaborative banking systems.

1. COLLABORATIVE BANKING SYSTEMS

Collaborative systems are an important subject of knowledge-based society and an important part of the human activities is involved in this field. Science has great impact on the development of different types of collaborative systems from various activity fields [4]. After the criterion type of application, collaborative systems are: collaborative systems in education; collaborative systems of defense; collaborative systems in production; collaborative banking systems. A collaborative banking system differs from a classical banking system due to the following advantages: full transparency; perfect communication between employees; fostering teamwork; increased quality of services; rapid progress. In a collaborative banking system are the following components: the material, which includes buildings, equipment and other property; the energy, consists of ows of electricity, internet and intranet connections, alternative channels of communication; the information, comprising all software and hardware resources available to the bank to conduct its business; the human, including human resources of the bank, the categories of personnel and the qualification levels of them. Regarding the collaborative banking system, an indicator for increasing the efficiency is the level of staff training. Considering the qualifications period of five years, an employee has a minimum number of one qualification in five years and a maximum of one per year. The maximum number of training sessions that the bank will finance, over a period of five years, is calculated according to the relationship:

$$NT = 5 * NP,$$

where:
- NT - the total number of training or qualifications supported by the bank;
- NP - the number of people employed in the bank and are eligible for training.

We are considering the case study of a banking business process regarding the activation of electronic banking services. In this business process, which is a collaborative work, we found two partners: customer and bank. The bank is represented by four entities or departments, like branch, technical assistance, adminstration and intervention. Regarding the technical assistance department, this is made by five employees which need to be trained. If we take into account the duration of trainings, in the formulas for calculation of the indicators will appear another two variables: Dmin = minimum duration of training, expressed in calendaristic months; Dmax = maximum duration of training, expressed in calendaristic months. In this case, the total number of training sessions supported

by the bank within five years, expressed in calendaristic months, is given by the relationship:

$$NT = 5 * NP * Dmax$$

The degree of increasing the level of staff training will be determined with the same formula, with the difference that the number of persons qualified in five years is weighted with the duration of qualifications for each person [5]. The collaborative banking systems should work better than other types of systems, because these systems creates a collaborative environment where people can work better together, can share information without the constraints of time and space.

2. ARCHITECTURES OF DISTRIBUTED APPLICATIONS IN THE BANKING SYSTEM

Distributed architecture is a n-tier application architecture wherein application components may be distributed across multiple computer systems. There are three types of distributed systems architecture: 2-tier architecture, 3-tier architecture and Client/server architecture. Because the banking applications are very complex, it was realized that the 2-tier architecture is not enough and for this reason the banking systems implement for their applications the 3-tier architecture which has a presentation layer (tier), an application layer (middle tier) and a data layer as presented in [1]. Regulations like cxEuropean Union Payment Services, Basel II and EU Credit for Consumers lead to new changes in the way payments are made. To resist banks must standardize business processes made possible by service-oriented architecture (SOA). SOA is a software architectural concept that defines the use of services to support the requirements of software users. It is a system for linking resources on demand. In an SOA, resources are made available to other participants in the network as independent services that are accessed in a standardized way. This provides for more exible loose coupling of resources than in traditional systems architectures. [3] If there are a typical set of core banking systems for instance trade finance, bill pay, loan, treasury, and external payment systems and more others, will result an appreciable number of unique network connections and message types (accept out-payment instruction, retrieve in-payment profile). This number can be reduced implementing SOA, which provides a way to employ reusable services to achieve the different payment transaction types. A primary aim of using SOA to simplify payments is to enable banks to reconfigure existing IT assets, not to built or purchase a new application, when new regulations or customer demands appear. It may be said that SOA services allows more exibility for change and a better way of distribute the products, because the channel applications and channel support applications are no longer tightly linked to core banking systems. We define GA, an accessibility degree of a user into a distributed application:

$$GA = \frac{AN}{TN}$$

where:
- AN - number of accessed nodes by a user through a work session;
- TN - total number of application nodes.

The accessibility degree take values into the interval [0; 1]. This indicator measure how many options was accessed by a particular user during a work session, divided by the total number of options for the distributed application.

3. SECURITY OF QUALITY CHARACTERISTICS

Banking systems are totally dependent on distributed software applications, and Internet resources. The fact that this area of communication is highly vulnerable, the importance of quality characteristics in collaborative banking systems has increased and client orientation is one of the top priorities due to the competitive level on the market. The most important characteristics of distributed collaborative systems are:

- reliability - the characteristic which defines the capability of a banking system to maintain its services provisions under defined conditions, as they are presented when the bank officially launched the system, for defined periods of time, assuring the strategic objective of the institution; one aspect of this characteristic is fault tolerance described as the capacity of systems to withstand component failure, recovering and continue functioning to its optimal parameters;
- the characteristic that reveals the distributed collaborative system ability to be transferred from one environment to another with minimum costs of adaptability is called portability;
- banking systems complexity is given by the operations involved in transactions and by the collaborative aspects of the subsystems which defines them;
- scalability is the collaborative system characteristic which is found between a commercial bank and its branches; the each and every collaborative system defined at branch level which must be integrated into the central bank unit collaborative system, involves costs which reported to the total value of the system gives the capacity of integration;
- maintainability refers to the process of maintaining in operational limits the entire informational system; bank persistence on the market is dependent on the reliability and maintainability characteristics.

Assuring these characteristics for distributed collaborative systems involves using security methods and techniques starting at physical layer, protecting the equipments on which collaborative systems are running and the area in which they are stored, up to data layer, protecting the sensitive information using encryption techniques.

4. CONCLUSIONS

The field of collaborative systems is a domain that has many published papers and that has acquired in the last period a great volume of theoretical knowledge. The quality characteristics have a great impact on the number of factors and as result on the scale of the model. In the end, equilibrium must be reached, between the model dimension and its capability to give significant results. The knowledge-based society evolves only through the high quality of citizen-oriented collaborative systems. [4]

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WEB ANALYTICS TOOLS AS SUPPORT FOR OPTIMIZING WEBSITE NAVIGATION AND CONTENT QUALITY

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ABSTRACT. Collecting and analyzing website traffic is essential for improving website navigation and content quality because knowing what visitors are doing we can adapt the content to their expectations. Using web analytics we can see how well a website is performing and better understand the users. Finally, the measurement of website traffic is very important because we cannot manage what we do not measure.

1. INTRODUCTION

The unprecedented development of the Internet through the appearance of web sites created by specialists and amateurs led to the development of instruments for web sites analysis such as Google Analytics. These tools offer a large range of reports and statistics about the visitors to a subscriber website: how they did get here, where did they landed, where are they from, what software and hardware characteristics their machines have, etc.

Being supported by such tools and also using data mining, we are able to determine the most popular pages and sections of the site and to draw the pattern of the visitor which is interested in us. We can make stronger our existing channels in order to capture more visitors having this pattern and develop new ones to get new visitor types, but compatible with our educational purpose. This research will be expanded by developing a prototype for quick access to the most popular content of the site.

2. GOOGLE ANALYTICS FEATURES

Web Analytics Association (WAA), defines web analytics as the measurement, collection, analysis and reporting of Internet data for the purposes of understanding and optimizing Web usage [4].

Released in November 2005, Google Analytics dominates the website statistics market, 32.2% of the first 500 websites in the world using it [5]. Google Analytics has many advantages and the greatest advantage is that it offers immense statistical analysis for free. The installation process is simple and it tracks the visitors of a website from start to finish. Google Analytics offers various statistics in a friendly and easy-to-use interface.

The charts provided are very intuitive, some of them being enriched with video capabilities (e.g. Motion Charts). Also, the exports in few wide-range formats are available, too. The user may customize the output – time periods (summarized or detailed), chart types, visualization, metrics, dimensions – the custom reports being a helpful tool. But, generally GA provides statistics as they are, user-defined ones being hard to be developed due to the lack of multi-criteria data exports facilities.Only a limited set of these capabilities are explored for our site, and other ones like Ecommerce Tracking are not applicable.

3. FEBA TRAFFIC ANALYSIS

FEBA website (www.econ.ubbcluj.ro) is affiliated to Google Analytics from March 3, 2008. In the first stage we have taken data on a single year and examined the evolution of the following classic indicators measuring the success of a site: number of visitors per day, number of pages viewed, time, etc. We noticed that during the sessions of exams and holidays the faculty site is less visited than during the semester. Therefore, it is necessary to introduce information necessary to students during the holiday as well.

The Unique Visitors number represents the number of individual people, within a designated reporting timeframe, with activity consisting of one or more visits to a site. Each individual is counted only once in the unique visitor measure for the reporting period. Analyzing this indicator we discovered that the most visited sections
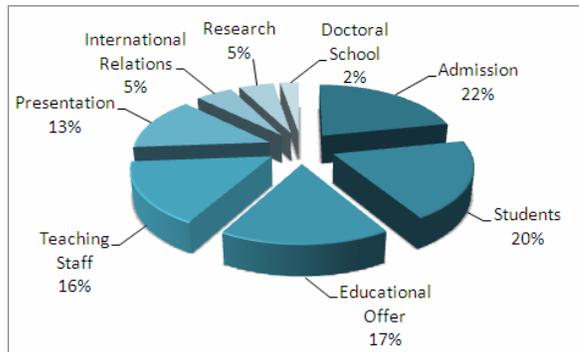

FIGURE 1. Unique Visitors for main sections of the FEBA website

of the website are Admission, Students, Educational Offer and Teaching Staff (Figure 1).

The most basic measure of how effectively a website is promoted is the number of visits that site receives. In the analyzed period, FEBA website received visits from 116 countries, but 96% from these were from Romania. The rest were mainly from United States, Germany, Italy, Spain, Modova, United Kingdom, Hungary, France and in a smaller proportion from other countries (Figure 2). Knowing where the visitors are coming from and what language they speak we can determine the languages in which the website and the keywords should be translated, for FEBA website we can recommend the development of English, German, Italian, Spanish and Hungarian versions.
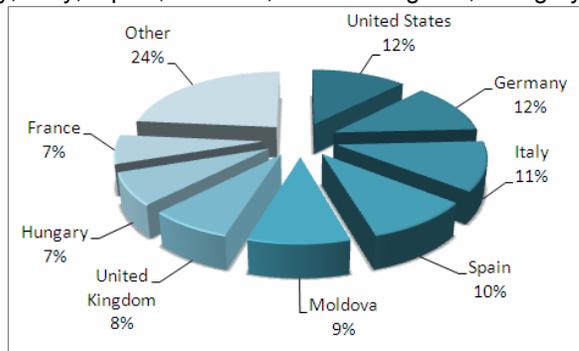
FIGURE 2. Visits recived by FEBA website (excluding Romania)

The bounce rate represents the single page view visits divided by entry pages [1] and is a measure of a page relevancy for the visitors. If a visitor enters a page and leaves without going further into the website means that he "bounced" in and out of our site. A high bounce rate could be a bad signal for a website because it might mean that the visitors aren't interested in that website, the design is poor or the content is not offering enough reasons to learn more [3]. The top Landing Pages report shows the most popular entrance pages and is useful for improving the bounce rate because these pages are the first thing that visitors see.

The average bounce rate for FEBA website is 25.43% which is a relatively good value. However in the sections FEBA Presentation and Educational Offer there are pages having bounce rates that exceed 70% which is a sign that those pages might need improvements, or the triggering links are confusing. New headings containing top keywords, new text and prominent buttons are among the possible solutions and Google Website Optimizer should be used to test those changes.

4. WEB ANALYTICS AS SUPPORT FOR OPTIMIZING WEBSITE NAVIGATION

Effective navigation is essential for a website because it helps visitors to find what they are looking for. After analyzing the FEBA website and the statistical data provided by Google Analytics, we drew out the top of the most visited pages. We chose fifteen pages that represent the most significant services for FEBA and expelled some pages which appeared temporary and are not to be found in the site map anymore. The excluded pages have represented effective events and information that have been deleted at the end of that event. After analyzing each page, we took the percentage of the first pages that visitors turn to. These pages have been extracted from the "Navigation Summary" report since they are to be found on top of it.
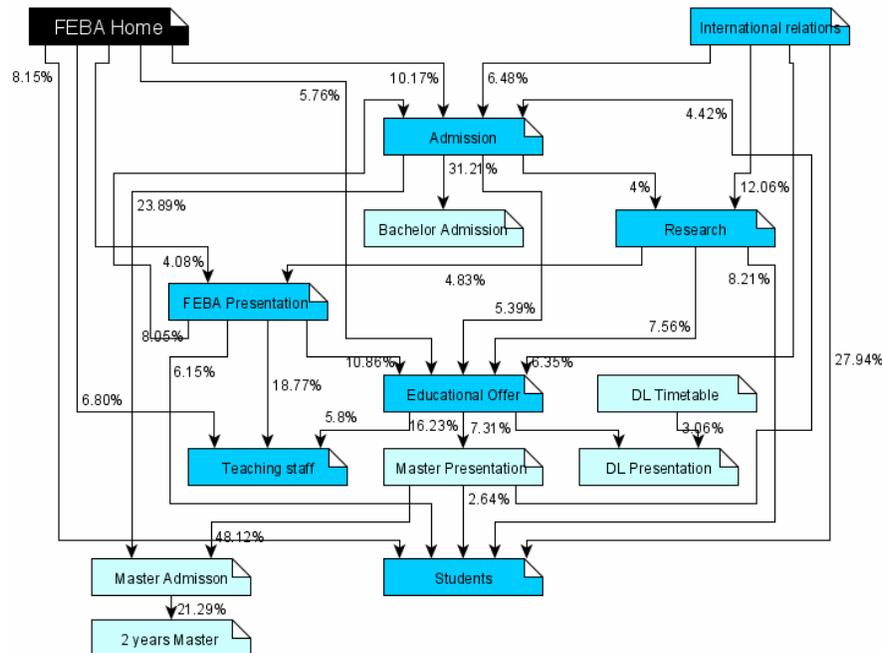
FIGURE 3. FEBA Navigation Summary

By virtue of these data we drew up a diagram (Figure 3) in which the relationships between pages are being represented by the percentage of the visitors to these pages. Adding the percentage of the visitors that come from the FEBA index (home page) to the pages that have been taken into consideration, we cumulate a value of 30.88%. We also want to draw attention to the fact that a great number of the visitors that leave from the index page do not run into the first pages that Google report provides.

5. CONCLUSIONS AND FUTURE WORK

Taking into consideration the information presented above, a quick-access menu can be created to the pages of general interest on the site, that are to be found on the inferior levels of the sites hierarchy. The aim of the toolbar is to determine the growth of the usability and the delivery of the links to the representative pages of the site on the index page. The subject of the present paper could be extended and analyzed from different points of view, taking into consideration the great number of relationships that can be established among them and not only.

In the future we want to define goals for FEBA website because that enables defining the success of a website. Goals are measurable actions completed by the visitors before leaving the website from the completion of a feedback form, a subscription request, leaving a comment, viewing a certain page, or downloading a file [2].

We consider that is necessary to further develop a questionnaire in order to obtain feedback from users so as to change both the information and the design of the site. We also intend to do a comparative analysis of data obtained from a minimum of two academic years to see how classic indicators that measure the success of a website evolve. We will use Markov chains to determine the rate of visitor loyalty towards FEBA site and the Google Benchmarking tool. Based on the data thus obtained we can determine if there are similarities between the actions of users of the FEBA site and those who use sites of other faculties in Romania and abroad. On the basis of such a statistical study, we can make a user profile of the Romanian and foreign users of such sites. Based on statistical results obtained the site can be adapted to the needs of all users regardless of geographic location and affiliation to a unit of education, thus enlarging the sphere of FEBA site users.

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DISCHARGE IN ERP SYSTEMS – PERFORMANCE CONSIDERATIONS

HORIA DEMIAN [1]

ABSTRACT. This paper presents performance consideration regarding FIFO discharging in ERP Systems. In the first part there is a little presentation regarding the four types of inputs and outputs and the side effect to the system. I choose FIFO and LIFO methods because these methods can be used in traceability and because, are time consuming. This article treats different methods for links creation to find the best method, and to see if using a SELECT command can be faster than using cursors. In the second part I measure the performance for different situation and I presented an analysis of this data.

In inventories management systems, we need to calculate inventories value for any product, at any particular moment in time. This means that we have to calculate the value for inputs and the value for the outputs based on FIFO or LIFO methods. The difference between these two values is the value of inventory for one product. In some specific cases like foods industry, there is situation in which, we have to know, for every output which is recorded in the system, the corresponding inputs. To have this information, we need to create links between outputs and inputs. Because, we can have for a product a few inputs at different acquisition prices and quantity, and a few outputs, we need to create these links between the outputs and inputs, to know for a specific output which is the specific inputs. These links are also very important, for making this process reversible. Not all ERP systems are using links between inputs and outputs. These systems use methods for inventories consolidation, and cannot manage the traceability for a product. I choose these specific methods with links creation, because these methods are very time consuming, but are used for product traceability.

There are a few methods for creating these links in SQL Server, which will be treated in this article, regarding performance [3, 4]. There is a myth then using a SELECT command is faster that using a cursor. I am interested to know if in this particular case using SELECT command is faster than using cursor, and to find the best method for this particular case. The tests were made for a database with approximately 1 million of records.

My own contributions are:

- the modeling of a database used for inputs and outputs registration
- the modeling of an INSERT command, which create only so many links as needed, with the amounts automatically calculated
- creation of one stored procedure used for links creation with four types of cursor
- collecting the data regarding performance in different situation
- analyzing the data which I have obtained

1. INPUTS AND OUTPUTS REGISTRATION

In any inventories management systems inputs and outputs will be stored inside a database, in my case a relational database. We have four types of movements:

Acquisitions, Buy Back, Sales and Sales Back.

Any time a new output is recorded to the system, if we use FIFO or LIFO methods it is necessary to records this links between outputs and inputs. As we can see, one output can discharge one or more inputs, and also from one input more outputs can discharge. In relational databases this means a many to many relation between inputs and outputs. Many to many relation is implemented through a different table which will have references to parents tables. The Link table in this case is the child table for inputs and the child table for outputs.

Because there is different type of inputs, outputs and links, for simplicity, inputs and outputs are stored in the same table named Miscari. Links are stored in a table named Legatura. Because of performance issues I have an additional table named ExMiscari which store the remaining quantity for a specific input.

The database model which I used is presented in figure 1.
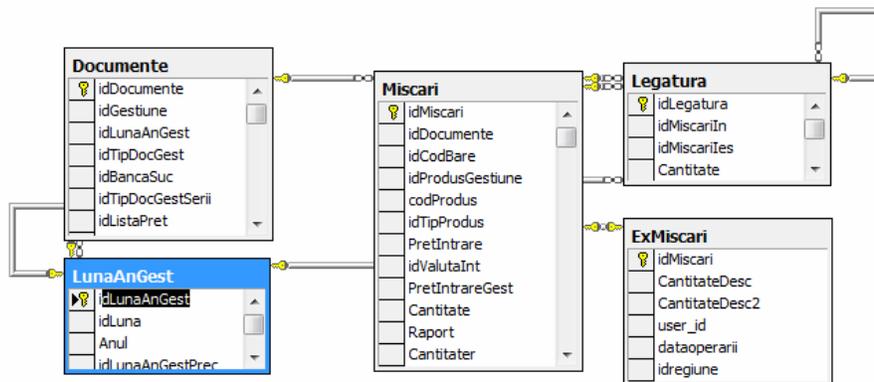
FIGURE 1. A part of database model which present inputs and outputs and the link table

For simplicity I will present, links creation process, implemented with different methods, between Sales and Acquisitions, the main type of outputs and inputs.

First method is using a Select command for obtaining the necessary links.

First method is based on a SELECT command presented by Plamen Ratchev on msdn forum [1], when the records have the id fields of int type, and we assume that values from id field indicates the order of operations recorded in databases. Based on his idea because I do not use int for id's but I have a datetime field in Miscari table, named dataoperarii, I adapt this command to my case:

```
SELECT  T.idMiscari
        ,T.CantitateDesc
        ,case when T.running_total   <@cantitateDesc then T.cantitatedesc else @cantitatedesc -
(running_total-t.Cantitatedesc) end
        as cantitate
FROM (
      SELECT
                M.IDMISCARI
                ,ISNULL(EM.CANTITATEDESC,0) AS CANTITATEDESC
                ,(SELECT
                        isnull(sum(ISNULL(EM2.CANTITATEDESC,0)),0) AS CANTITATEDESC
                FROM
                        MISCARI M2 WITH (TABLOCKX,HOLDLOCK)
                        INNER JOIN EXMISCARI EM2 WITH (TABLOCKX,HOLDLOCK)
```

```
            ON                  M2.IDMISCARI = EM2.IDMISCARI
            AND       M2.IDPRODUSGESTIUNE = @IDPRODUSGESTIUNE
                                        AND    EM2.CANTITATEDESC>0
            AND    M2.ANULATA = 0 --NU ESTE ANULATA
            AND       M2.TIP = 1  --ESTE MISCARE DE INTRARE
            AND       M2.STORNARE    = 0       -- NU ESTE STORNARE
            AND       M2.GESTIUNE    = 1       --INCARCA GESTIUNEA
            INNER JOIN DOCUMENTE DOC2
            ON M2.IDDOCUMENTE=DOC2.IDDOCUMENTE
            INNER JOIN LUNAANGEST LAG2
            ON DOC2.IDLUNAANGEST=LAG2.IDLUNAANGEST      --  SE  POATE
DESCARCA SI DIN CANTITATI AFLATE PE
            -- ALTE LUNI PRECEDENTE
            WHERE     (lag2.anul*100+lag2.idluna < lag.anul*100+lag.idluna)
                 or     ( lag2.anul*100+lag2.idluna = lag.anul*100+lag.idluna
                        and Doc2.Dataemiterii < Doc.Dataemiterii)
                 or     ( lag2.anul*100+lag2.idluna = lag.anul*100+lag.idluna
                        and Doc2.Dataemiterii = Doc.Dataemiterii
                        and cast(M2.idMiscari as char(36))<= cast(M.idMiscari as char(36))
                        )
            ) as running_total
      FROM
            MISCARI M
            INNER JOIN EXMISCARI EM
                 ON               M.IDMISCARI = EM.IDMISCARI
                 AND       M.IDPRODUSGESTIUNE = @IDPRODUSGESTIUNE
                                              AND    EM.CANTITATEDESC>0
                 AND    M.ANULATA = 0 --NU ESTE ANULATA
                 AND       M.TIP = 1  --ESTE MISCARE DE INTRARE
                 AND       M.STORNARE     = 0       -- NU ESTE STORNARE
                 AND       M.GESTIUNE     = 1       --INCARCA GESTIUNEA
            INNER JOIN DOCUMENTE DOC
                 ON M.IDDOCUMENTE=DOC.IDDOCUMENTE
            INNER JOIN LUNAANGEST LAG
                 ON    DOC.IDLUNAANGEST=LAG.IDLUNAANGEST    --   SE    POATE
DESCARCA SI DIN CANTITATI AFLATE PE ALTE LUNI
                        --PRECEDENTE
) as T
WHERE T.Running_total - T.CantitateDesc <@cantitateDesc --cat timp nu depaseste cantitatea
GROUP BY T.idMiscari,T.CantitateDesc,T.running_total
```

The second method is based on using a procedure with cursors.

2. PERFORMANCE TEST

In SQL Server there is different type of cursors: Dynamic, Static, Forward Only and Keyset [3, 4]. In this example I will test the difference between them. Also a cursor can be defined Local or Global according to books online. In my cases I work with local cursor so this option is not important for my test. In figure 5 I presented a few information regarding, the space used for storing data, indexes and the number of records in each table involved in test. I have 940587 records of inputs and outputs.

First of all I have counted the number of cases, when for a product I have between 1 to 10 inputs, 11 to 50, 51 to 99, 100 to 149, and more than 150 of inputs. I have measured the time at beginning of the execution, and at the end of statement execution, and I calculated an average of the time. Duration of discharging was measured in milliseconds like in the following code, inspired from an article of Hugo Kornelis [2].

```
Declare @starttime datetime
Select @starttime = current_timestamp
....
```

Select DATEDIFF(ms,@starttime,current_timestamp)

I have made repeated tests for measuring performance, and I calculate an average of the time which I obtained. The test was made when no one was working, on a server with Windows 2003 operating system and SQL Server 2000.

There are 13 817 products with stock in the system.

In figure 2 I presented an analysis in all these five situations, when I used build procedures and SELECT command. The best method was for static cursor.

	Criteriu	Criteriu	Criteriu	Criteriu	Criteriu	Criteriu	Criteriu	Rezultat
Coeficienti	1	10	8	6	4	2	1	
Minim/Maxim	Minim ▼	Minim ▼	Minim ▼	Minim ▼	Minim ▼	Minim ▼	Mini ▼	
Variante\Criterii	C1	C2	C3	C4	C5	C6	C7	
Dynamic	1	492	546	530	525	500	1	23.9540
Static	1	483	530	483	500	505	1	29.9922
Forward_only	1	500	530	483	510	510	1	26.5036
Keyset	1	530	533	500	530	507	1	19.3300
Select command	1	533	580	673	996	1783	1	0.0000

FIGURE 2. Global utility method used with performance data for difference type of cursor and select command

CONCLUSION

1. There is a possibility to write a Select command for bringing only the records with the needed quantity.

2. Using static cursor I gain better performance in the cases which have been tested included the cases when I use only one select command. In this case using a SELECT command is not faster than using cursor.

3. Using static cursor SQL Server creates a temporary copy of data needed in tempdb database, which means that a single select command is executed on the database, instead in the other situations when other types of cursor is used, at each iteration, SQL Server executes another select command on databases to bring the necessary record.

4. After that test I can say that conclusion of Hugo Kornelis that he cannot gain better performance In his tests for other type of cursor than static it is verified also in my cases.

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THE E-LEARNING CHOICE. A DATA MINING BASED SURVEY

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ABSTRACT. The paper focuses on the presentation at the convergence of the two concepts mentioned in the title, e-Learning and data mining. The objective of our study was to analyze the information collected from a survey and evaluate the students' behavior and preferences for an e-Learning environment, and present a summary of relevant findings.

1. INTRODUCTION

At a national level, the specialists involved in the "education" phenomenon claim that the system needs to be reformed and modernized, not only in general, but also the relationships, including the feed-back among its various elements: teachers; students; basic qualifications; integration of the communication and information technologies; investment efficiency; learning foreign languages; lifelong professional orientation/counseling; system flexibility, so that to be accessible for everyone; mobility; education in the spirit of active European citizenship [8].

e-Learning has been enrolled as one of the main subjects in the agenda of the European and national institutions in the last years. This initiative tries to mobilize all the actors to hasten the changes from the education and training systems so that the EU should advance towards a knowledge-based society. Many things have been said and written about the potential of e-Learning in education, in general, and in higher education, in particular. First of all, the issue of devising the most effective strategies, to implement e-Learning policies in higher education, has to be addressed [10]. Another important issue is finding ways to measure the students' preferences and behavior in a digital environment.

The paper focuses on illustrating the convergence between the two concepts mentioned in the title, and presents the data mining study founded on data collected from the students of The Faculty of Economics and Business Administration (FSEGA) Cluj-Napoca.

2. RELATED RESEARCH

More than a new type of distance education and training, e-Learning represents also a business solution, a successful option for the institutions which offer training courses. The need of e-Learning and its benefits are clear, but the main problem is how this kind of education may be integrated in the existing structures of the institution. e-Learning is further than a technical system, it is a socio-technological one, which functions best when the innovating capacities of the technology collaborate harmoniously with the talent and creative energies of the members of the educational and training institutions and the trainees.

We have to take into consideration several questions in order to assure that the system would be correctly implemented, would be functional and efficient. Some of the questions that need a constructive answer, could be: "Are the trainees prepared for this kind of education?" "What should be done so that they can cope

with this kind of education?" "How can we evaluate the students' behavior and preferences in a digital environment?" etc. The things that lacked in the development of e-Learning systems have been some ample estimations of these questions ("how", "why", "what" ,"who").

During the last years, the explosion of the types of information and their volume stored on a certain support made their processing and obtaining of some useful results to be a very difficult process from a practical point of view. Paraphrasing Professor Nitchi [5], this true "yearning" after data is not specific only to the socio-economic and medical fields, but also to the educational field, as the Internet has led to an exponential increase in information. From the multitude of data mining approaches, we regard those presented in [7]: "Intersection area among machine learning, statistics and data bases (Holsheimer)" or "The selection, exploitation and modeling process of large data sets, in order to discover unknown patterns, useful in the business development (SAS Institute)".

Latest workshops dedicated to data mining applications in education and particularly e-Learning [6], provided a focused international forum for researchers to present, discuss and explore the state of the art of data mining in e-Learning and of evaluating the usefulness of discovered patterns. Some attention-grabbing papers in the field refer to [6]: association rules applied to the data obtained from an intelligent tutoring system to look for mistakes often made together while solving an exercise; providing learners with a real-time adaptive feedback on the nature and patterns of their on-line communication while learning collaboratively; use of adaptive machine learning algorithms to learn about a student's preferences over time; case studies of the behavior of online learners by developing a visualization tool allowing a graphical examination of data hidden in the log files etc.

3. THE OBJECTIVES AND METHODOLOGY OF THE STUDY

The objective of our study was to analyze and evaluate the information collected from a survey on specific issues related to education and particularly e-Learning, apply data mining techniques and present a summary of relevant findings. FSEGA has the necessary infrastructure to achieve an e-Learning education to a high-quality level, as it is applied in the European universities. We tried to define the target public for an on-line education form, and wanted to observe whether the students wish for and have the necessary means for the participation in this kind of training.

We collected data from 346 questionnaires of the students enrolled in the 1st year, distance learning. From the questions included in the questionnaire, we tried to identify the student – teacher, respectively student – student, interaction capacity, defined by: the student's profile (age, sex, high school and / or faculty graduated etc.); the information the student has about e-Learning ; ability to use the computer, and implicitly the Internet – the questions grouped in sub-categories: general information on IT usage, knowledge related to the use of computers (basic notions, OS, text processing, spreadsheets, presentations, searching, web pages) etc.

In order to determine the motivations behind the students' preference for e-Learning, we chose Weka's J48 method (based on the C4.5 algorithm from the machine learning), for the reason that it is a classification algorithm offering an

advanced equilibrium between precision, speed and interpretability of results. For the J48 classification learning based on the training set, we obtained a 87,82% success rate (the correctly classified instances), and a 76,52% success rate for the cross-validation experiment .

One of the resulted classification models is a decisional tree (Figure 1) both in textual and graphic form, founded on the de_ce_eLearn attribute (students' reasons for choosing e-Learning for their studies). As presented in the next figure, the first ramification appears at angajat attribute (employment/unemployment); for the second level, the ramification is based on the timp_calc attribute (hours spent at the computer each day); for the third level the ramification is founded on cunosc_eLearn (knowledge about the e-Learning technology) and aflat_eLearn (ways of finding out about e-Learning) attributes; the last ramification appears at util_calc attribute (computer utility).
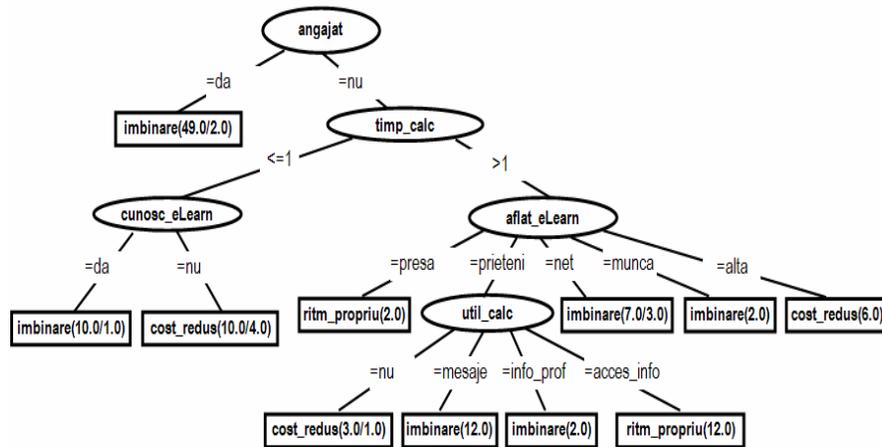

FIGURE 1. Decision tree for determining students' reasons for choosing e-Learning

Here are some examples of interpretation of the decision tree's branches:

"If the students are employed, then they would choose e-Learning because they can combine work with continuing education."

"If the students are unemployed, spend less than 1 hour using the computer each day, and have no knowledge about the e-Learning technology, then they would choose e-Learning believing it has reduced costs."

"If the students are unemployed, spend more than 1 hour using the computer each day, found out about the e-Learning technology from the press, then they would choose e-Learning because they can have their own tempo of studying."

4. CONCLUSIONS

It is important to get a better understanding of the key issues related to the development and use of e-Learning in the higher education. To our knowledge, this is a first study in Romania which evaluates the knowledge, attitudes and beliefs of the students on the broad concept of e-Learning based on data mining techniques, in particular. We found that the majority of survey participants were knowledgeable

about the pathway of e-Learning.

Data mining may provide useful instruments for e-Learning analysis and evaluation, as it may supply the information that allows the implementation of personal and optimized programs, adapted to the characteristics of each student. This leads to the decrease of the study period, increase of the possibilities to obtain superior results and in the end, decrease in the training costs. We conclude that the marketing and management activities performed by universities, especially in the present crisis conditions, (in which it is determined a decrease in the number of students but also the increase of university competition at a national and international level) have an important responsibility to inform the public and to generate interest for such alternative educational opportunities.

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WEB 2.0 AS A NEW VISION OF WEB-BASED APPLICATIONS

DANIEL MICAN[(1)], NICOLAE TOMAI[(2)]

ABSTRACT. The concept of Web 2.0 has often been featured in recent publications and we frequently ask whether Web 2.0 is the follower of Web 1.0 and what the difference is between the two. The aim of the present paper is to examine the user's behavior in "Web 2.0" through the analysis of some elements which cause the users to focus on new types of web applications based on online communities. We will simultaneously compare statistical data from a Web 1.0 site and an online community from Web 2.0 in order to emphasize the difference between the two concepts.

A new generation of web applications has appeared recently, which improve not only the models of communication and online collaboration but also the way in which information is created, published and transferred. Examples of such online applications which have online communities at their core are: MySpace, Facebook, Flickr, Wikipedia, YouTube, del.icio.us, Wikipedia.

The communities of the new Web 2.0 era have gained a leading place in the top sites on a global scale, dethroning the classic web portals and affecting the new business models. The different generations of users have changed their view of internet, and have started to actively participate in the new communities which have been created. For many of us, they have become a platform for socializing, a way of storing our own personal journals online, as well as an encyclopedia that is constantly increasing and extending. For others, they have become a way to communicate and collaborate, both a discussion forum as well as a business platform that enables the promotion and extension of business models.

1. WEB 2.0

The concept of Web 2.0 was used for the first time during a conference between O'Reilly and MediaLive International [4] and cannot be defined exactly. During this conference, a distinction was made between the classic websites, gathered under the term Web 1.0, and those from the new generation of web applications, which constitute Web 2.0.

Web 2.0 cannot be considered one form of technology: Web 2.0 is a mixture of technologies such as CSS, Ajax and XML, all integrated within the context of a new philosophy of publication and partition of content. All these are combined with the user's ability to create online content and new applications, or 'mashups', based on the integration of different sources. Therefore, as claimed by [2], Web 2.0 means personalized content generated in a dynamic way, using new technologies and standardized interfaces. In [1], Web 2.0 is defined as the philosophy that maximizes both the collective intelligence as well as the value added by each participant in a dynamic and formalized system of creation, where information is exchanged.

According to [3], Web 2.0 brings with it a new vision that changes the way in which web applications develop and the way the processes within the applications are automatized.

Future generations of web applications will be developed on the basis of Web 2.0 technologies and will be designed to be accessed using web services on a global scale. All new web applications will be developed so that they could benefit from the force of the internet and revalue the collective intelligence. In this way, a new generation of instruments will be developed in order to collect and analyse user information in real time.

The collective intelligence comprises the knowledge of all participants that is distributed within a group, which is at the same time a dynamic result that adapts to the continuous changes of medium [1]. The collective intelligence also requires the collection of data, the combination and the analysis of it, from a group or even distinct groups of users. The collection and analysis of the answers within a group allows statistical conclusions to be reached, which reflect the collective ideas, the behavior and the preferences of the community [5].

The term Web 2.0 is used, in general, in order to place emphasis on the differences between the emergent communities and the initial forms of online communities, including not only various aspects such as the technologies used, but also the attitudes and philosophies that form the basis of it.

Hence, in [1], the following categories of online communities have been identified: social networking communities, folksonomies, collaborative / social tagging, online collaborative encyclopedias and the most wide-spread social phenomenon: the blogosphere, which consists of the entirity of the personal blogs on a global scale.

2. CASE STUDY

In order to emphasize the differences between the web applications of the Web 1.0 generation and those of the Web 2.0 generation, we have done a study based on two sites, each site belonging to one of the two generations. We will point out the differences between the two of them on the basis of a multicriteria analysis, taking into consideration the following: new and returning visitors, visitor loyalty, the length as well as the deep of the visit. Finally, we will analyse the profiles of the users for the site that has at its core the online community, namely that of the Web 2.0 generation.

The first aspect we will take into consideration is that of the new visitors vs. the returning visitors. Fig.1 shows the difference between the visitors' behavior regarding a Web 2.0 site and a Web 1.0 site respectively.

We can observe that in the case of the Web 2.0 community, more than 42.9% of those who visited the site returned to it, compared to 11.8% in the case of the Web 1.0 site. The proportions of the results clearly show that the popularity of Web 2.0 site is of about 3.6 higher compared to the other one.
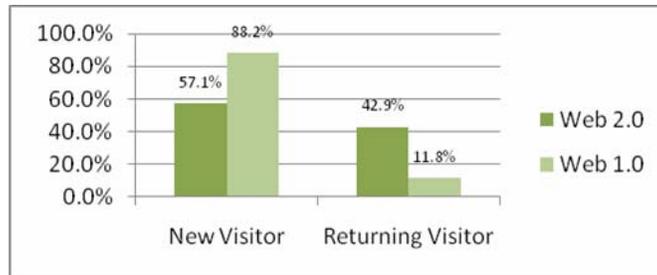

FIGURE 1. New vs. Returning visitors

Another important aspect is the loyalty of the site visitors. Fig 2. indicates the loyalty to both of the sites analysed. We can observe that in the case of the Web 2.0 site, the visitors develop an increasing loyalty, the data from Fig. 1 being observable in Fig.2 as well. Therefore, in the case of Web 2.0 we can see that more than 12.9% of the visitors return to the site more than 7 times compared to just 2.7% for Web 1.0. Moreover, a difference of about 4.94 in favor of Web 2.0 is evident regarding the percentage of the visitors that return more than three times a day, namely 28.15% for Web 2.0 and 5.67% for Web 1.0 respectively.
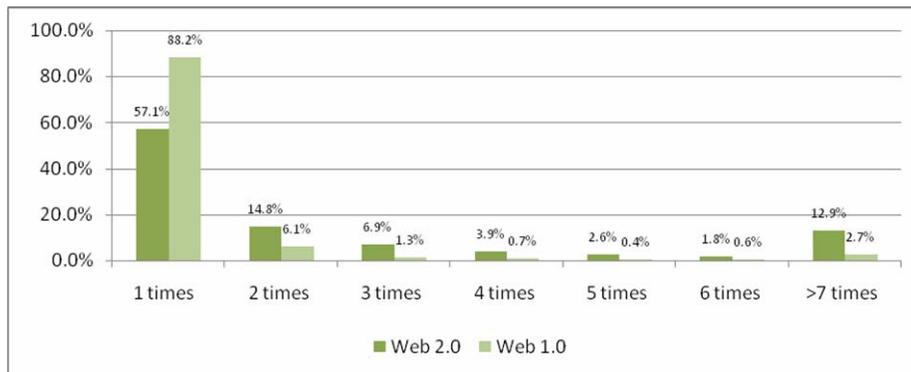

FIGURE 2. Visitor Loyalty

In the extended version of this article, we will analyse the two sites and their associated generation in detail by comparing them based on different criteria, as well as the length and the deep of the visit to the site. Finally, we will analyse the profile of the users for the site from the Web 2.0 generation and we will draw out conclusions regarding their behavior and preferences.

3. CONCLUSION

The phrase 'Web 2.0' has become so widespread recently that if we search for it using the keyword 'Web 2.0' in Google, a spectacular number of hits / citations are

obtained, namely 353 thousand million. Due to the great popularity that Web 2.0 has acquired, and the significant increase in this from year to year, we consider that the effort put into studying this phenomenon and the time allocated to it are justified.

In our opinion Web 2.0 is more than a label on the progressive scale of the internet that is assigned to the current generation of web applications. Web 2.0 consists of a series of recommendations that each web applications developer has to take into account, which should also compete successfully with those already existent on the market. A web application built on the principles of Web 2.0 must empower the users with the ability to generate content, allowing them to create and publish information, including personal materials.

The process of transferring information must be as easy as possible and should enable the classification of the information according to users' own preferences and by means of tags. The users should feel free to express their own opinions regarding the information and content published by other members and communities, not only via rating, but also by posting comments.

The applications developed, based on the philosophy of Web 2.0 remodel the classic models of communication and collaboration, bringing with them a new era of communities, where the need for online socialization is taken to a whole new level.

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THEORETICAL ASPECTS OF DIFFUSION OF INNOVATION IN IT DOMAIN

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ABSTRACT. A key element that affects an innovation / new technology diffusion at the organizational level is its acceptance at individual level. This article presents the main aspects of innovation diffusion in IT domain, from the individual perspective. Also the main requirements for obtaining scientific results in studying innovation diffusion using case study research are presented.

1. INTRODUCTION

Innovation Diffusion Theory (IDT) was first described by Everett M. Rogers in 1962 and it refers to the way in which new technologies or ideas (innovation) are spreading through a social system. Innovation is defined as "the process in which an innovation is communicated through certain channels over time among the member of a social system" [1].

According to Rogers, innovation spreads in the form of a S-curve, as it is shown in Figure 1.
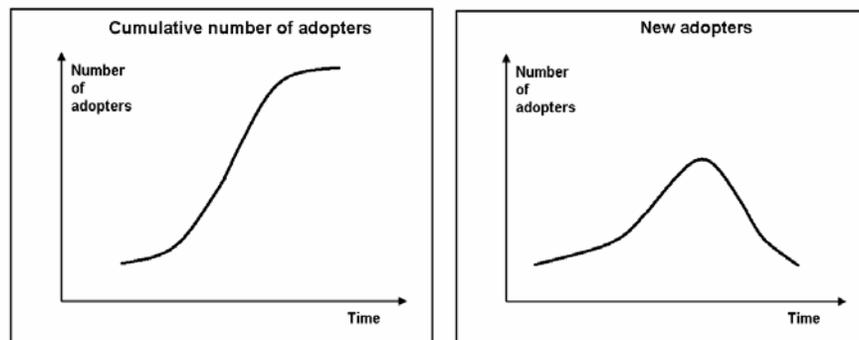

FIGURE 1. The diffusion process
Source: Adapted from Rogers, Everett M. (2003), *Diffusion of Innovations.*

Analysis of diffusion of innovation is based on abstract and intuitive concepts, called constructs, obtained from practical and intuitive activity. The constructs that underlie this theory are: relative advantage, compatibility, complexity, observability and trialability.
The steps of Innovation Diffusion Theory are presented in [2]:

- Knowledge: occurs when a subject is the object of innovation;
- Persuasion: occurs when a subject forms a conviction (favorable or not) about the subject of innovation;
- Decision: occurs when a subject engages in activities that will lead to the choice to adopt or reject the subject of innovation;
- Implementation: occurs when a subject begins to use the subject of innovation;
- Confirmation: occurs when a subject re-evaluate their decisions on which it has already taken on the subject of innovation.

Innovation Diffusion Theory explains the acceptance of innovations / new technologies at the individual (personal) level.

Class of Technology	Type 2 (high knowledge or high user interdependencies)	III	IV
	Type 1 (low knowledge, low interdependencies)	I Classic Innovation Diffusion Theory	II
		Individual level	**Organizational level**

TABLE 1. IDT Research

Source: adapted from Fichman, R.G. (1992) *Information Technology Diffusion: A review of Emipirical Research* [3].

2. RELATED WORK

Diffusion of innovation theory has been adapted in IT in the form of new theories, which retain some existing IDT constructs, but adds some new ones or modifies the old constructs.

The most important theories that examine how the diffusion of innovation in IT are:

1. Technology Acceptance Model (TAM);
2. Perceived characteristics of innovating model (PCIM);
3. Unified Theory of Acceptance and Use of Technology (UTAUT).

The common concepts of these theories are [4]:

- Constructs: which are concepts derived from experience. For a specific domain, they are the critical factors of the domain and are used for evaluation of diffusion of innovation;
- Moderators (moderating variable) such as: age, gender, experience.

	IDT	TAM	PCIM	UTAUT
Constructs	relative advantage, compatibility, complexity, observability and trialability	perceived usefulness, perceived ease of use	relative advantage, compatibility, image, results demonstrability, trialability	performance, expectancy, effort expectancy, social influence, facilitating conditions
Moderators				age, experience, gender

TABLE 2. Constructs used in explaining diffusion in IT domain

3. CASE STUDY AS A RESEARCH METHOD

Case studies give the possibility of in-depth examining a case or an event for the purposes of collecting data, analyzing data and reporting results.

Case studies give the possibility of generalization (from a particular case), testing of hypotheses and observation of a phenomenon in its particular environment. Result of a case study may be an extension of a scientific theory or a confirmation of that theory.

Also, the case studies give the possibility of obtaining empirical knowledge directly from those, which are involved.

There are researchers who considered that case studies are useful only as explanatory tools. Arguments against the research based on case studies are presented below [5]:

- General theoretical knowledge (independent of context) is more valuable than practical knowledge (context-dependent);
- The generalization could not be made based on a single case, therefore case studies can not contribute to scientific development;
- Case studies are useful only in generating hypotheses, which is the first step of the process of research. For next steps (testing and theory building) other methods are more adequate;
- Case study contains a predilection for verification, which is a tendency to confirm preconceived hypothesis of the investigator;
- Most often it is difficult to obtain and develop general theories and statements based on specific case studies.

In order to use case studies as research methods and to obtain validated results, it is necessary to use these methods in a systematically and rigorously way. The importance of case studies is given by the richness of information and knowledge obtained.

The accuracy and the confidence of case study research are variable. A possibility for verifying them is to compare the results obtained by different researchers in different studies. Also it is considered that a higher level of detail of the results of a study, improves accuracy and confidence of the study.

Confidence can be demonstrated by repeating the operations of a study (such as procedures for data collection) with the same results [6].

Research methods must be evaluated based on three criteria: generalization, realism and accuracy.

In case studies, the realism is high, only if the participants are interviewed in their domain of activity. Because data are obtained in various conditions (from different people in different situations and locations), the difficulty of analyzing their accuracy is increasing. The degree of generality of the results is influenced by the selection of population sample. A random selection increases the degree of generality of results. Also a multidisciplinary approach increases the value of research results.

4. THE STRUCTURE OF CASE STUDIES

In order to obtain better results, the selection of cases will be made by having in mind the amount of information that could be provided by the case. Following rules have to be taken into account:

1. Random selection provides additional confidence in the results of the study, because random selection eliminates human subjectivity;
2. Usually, the common case is not the richest case in information;
3. Extreme or atypical cases are considered the richest cases in information, because they revealed the basic operating mechanisms of the studied entity;
4. In most situations is more important to identify the causes and mechanisms of studied entity.

Cases considered rich in information are: extreme cases, deviant cases (cases which deviate from common case), critical cases (cases that has a strategic importance for the subject of research), example cases (or models) and counter-examples.

To ensure validity of the results of case studies, it is recommended that the case

studies used in research projects should contain the following sections [7]:

1. Overview of the project that contains the case study: objectives, results, topics that are investigated;
2. Procedures: which sources of information will be used, how are data collected;
3. Case study questions: specific questions that the investigator must consider during the period of data collection;
4. A guide for analyzing case study results.

There are five components of research that are important for case studies [6]:

- Study questions: how, why;
- Hypothesis of the study: used for focusing on goals of the study;
- Units of analysis: refers to the entity that is studying (research subject);
- Existing connections: logical link between data and claims;
- Criteria used for interpreting the results.

5. CONCLUSIONS

Theories of diffusion of innovation aimed at explaining how the technology is adopted at the individual level, in a social system. Explanations are based on case studies, interviews, questionnaires and constructs evaluation.

The originality of this paper consists in identifying the requirements that are necessary for using case studies as scientific tools in order to study innovation, using theories of diffusion presented above.

In the next period, in order to validate the diffusion of innovation in IT domain, a case study will be conducted, based on requirements presented in this article.

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AN INTELLIGENT AGENT – BASED FRAMEWORK FOR CONSUMER-TO-BUSINESS E-COMMERCE USING EBXML SPECIFICATIONS FOR E-BUSINESS

RADU IOAN MOGOŞ [1]

ABSTRACT. In this paper, an intelligent agent - based approach is presented that is using ebXML (electronic business XML) specifications for C2B e-commerce. The intelligent agents are used to support E-commerce because they can handle dedicated processes of clients. The agents' technology can provide a high degree of flexibility by distributing the complex problem on intelligent and cooperative entities called "intelligent agents" [5]. In addition, using the ebXML specifications with intelligent agents, a higher degree of communication compatibility may be obtained. The C2B E-commerce model is not so often found on the internet. A reason for this phenomenon is the transaction cost. Another reason may be the fact that is not easy to unite a group of candidate buyers' common needs and preferences to buy a product or service [3]. Some of difficulties that appear for C2B are how to select the most important individual's preferences and synthesize them into a group's accord, how to communicate with each other within the group, and how to negotiate with a seller.

1. INTRODUCTION

In this paper, a model for buyer collective purchasing behavior is proposed. This model consists of number of steps, each for a specific task (description of the product, buyer request, negotiation process, etc). A multi-agent architecture is projected to realize these jobs. Each intelligent agent has a specific role. The agents are collaborating between them having the goal to support the processes. The proposed multi agent system has the following agents: standardization agent, product classification agent, negotiator agent, initiator agent, coordinator agent, search agent. The architecture has in the middle two elements of the ebXML specifications: the ebXML repository and registry. The eXtensible Markup Language, XML [7] published by W3C is a standard for data interchange over the web. XML did not have all of the tools needed to make it ready for the all types of electronic business. That is why a powerful framework was needed to achieve the interoperability across different industries functions and vocabularies. A solid universal specification was created to allow companies to exchange business data more easy.

The electronic business XML (Electronic Business using eXtensible Markup Language), is a modular suite of specifications that enables enterprises of any size and in any geographical location to conduct business over the Internet. Using ebXML, companies now have a standard method to exchange business messages, conduct trading relationships, communicate data in common terms, define, and register business processes ebXML was started as an initiative of OASIS and the United Nations/ECE agency CEFACT [8][10]. The ebXML specifications cover most of C2B collaboration process: collaboration protocol Profile (CPP), collaboration protocol Agreement, messaging registry/repository [4]. This paper tries to propose an agent-based approach to implement an ebXML – based platform. The motivation for using agents in support of C2B e-ecommerce is to perform dedicated processes.

2. C2B BUSINESS MODEL – THE BUYER COLLECTIVE PURCHASING MODEL

A buyer coalition model in which multiple buyers cooperate to get a better offer for a specific product (or service) may be interpreted sometimes as a collective purchasing formation model. In the C2B model, buyers specify multiple products and their valuation on them, and a group of leader is elected to divide the group into coalitions and calculates the surplus division among the buyers [1]. The goal is to group buyers together to get a special discount from a supplier, there are collective purchasing behaviors. In the presented behavior, it is proposed a buyer collective purchasing for cases where a group of people has flexible requirements related to a product and is willing to compromise with others in order to gain the most benefit for the group. For the buyer collective purchasing model (BM), it is defined a flexible behavior as it is shown in the Fig.1.

FIGURE 1. BM model

The behavior has five elements, each of them representing a phase within actions of the buyer. The first phase is "product details", the second "participant invitation", the third "selecting buyers' needs", the fourth "negotiation process" and the last one "buying and purchasing the product". Product details – in the beginning of the collective purchasing process, there must be someone who has an intention to buy something and whishes to invite others to join. Therefore, he is the one to collect the product details and describe it in a specific format so that others may have choices to express their interests to it. Based on acquired information he can prepare the production description and send it to invite others to join. Participation invitation – people interested by the product, are invited to buy the proposed product. Associated with the invitation, interested persons need to fill out their preferences and possible constraints based on the product description. An agent is assigned to whom he completed the participation process. Select buyer's need – this is a very important phase in collective purchasing: there must be take into account the preferences of all group members for a product or service and to select (unify) them. The clients recognize the needs for some products (for this it is necessary an identification). There are cases in which, the requirements might not be very same initially. The selecting process needs to collect and unify them based on the similarities in the buyer preference profiles. There are many approaches to solve this problem. The one that it is proposed tries to unify the selected preferences into an analytic hierarchy process (AHP) tree. AHP is a popular multi-criteria decision support method.Negotiation process – includes some function of merchant brokering. In general, many agents try to find the lowest price, but the price is only one characteristic to be considered.

3. THE MULTI – AGENT SYSTEM ARCHITECTURE

The agent's roles. Software agent technologies have been proposed and employed in different transaction stages of e-commerce to automate most of the time-consuming stages of buying process [2]. The agent technology is particular

important to the proposed model fro C2B e-commerce since collective purchasing by nature has higher transaction and communication cost than normal case. To realize the model, a multi-agent system is developed for supporting the group purchasing process. Figure 2 figures the multi-agent based architecture. The architecture follows the FIPA standard where agents talk to each other with ACL commands [9]. It is used the SOAP technology (is a protocol for exchanging ebXML-based messages over a computer network, normally using HTTP. Is an acronym for Simple Object Access Protocol) and embed a dialog message within an ebXML "envelop". An HTTP, called ACC (Agent Communication Channel) server is established which provides necessary "web services" to agents so that they can communicate to each other asynchronously with the help of this server.
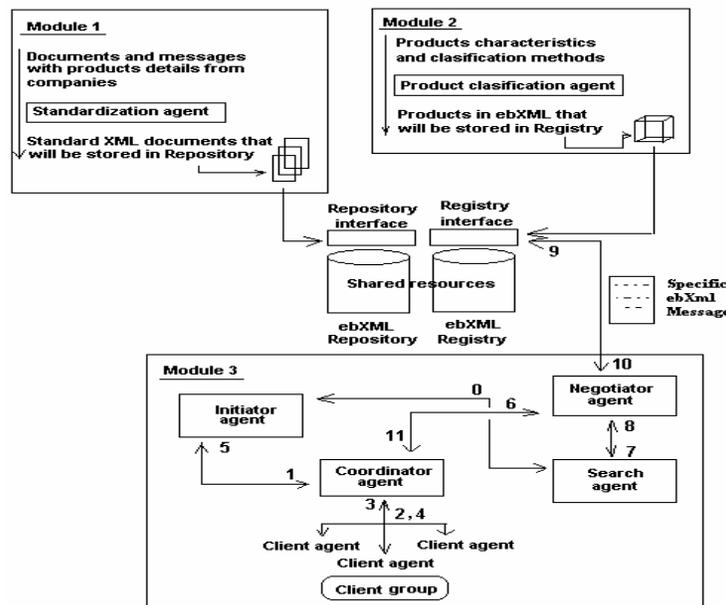

FIGURE 2. The multi-agent system framework for collective purchasing

It has the following agents: standardization agent (a stationary entity; it receives messages and documents from companies; according to ebXML, these processes are modeled in UML using UMM method (UN/CEFACT's Modeling Methodology)); the models are mapped in the XML format, that in order to store them in the ebXML repository), collaboration protocol profile agent (its role is to record profiles about companies and products; the companies and products are stored in ebXML registry), initiator agent, coordinator agent, negotiator agent, search agent and client agent.

Preferences selection and products score. The analytic hierarchical process (AHP) is designed to select an optimal choice from a number of alternatives according to a set of competing criteria [6]. The three most important steps of this method are decomposition, comparative judgment and selecting (synthesis).

In Figure 3 is an example of an AHP hierarchy. The left nods represent the objective, the right nods are alternatives Ai. Between them are the criteria nodes Ci and Ci.j.
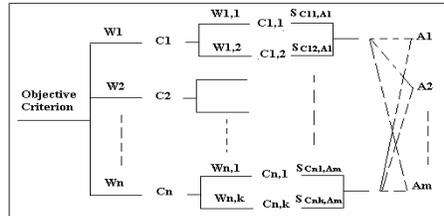
FIGURE 3. A usual hierarchy of AHP method

Negotiation strategy. Our model has two opposite parties work that can seen as two negotiators jointly searching to find a point of agreement. Figure 5 illustrates the negotiation agent framework of our model. The negotiator agent plays the active role. It continuously contacts the ebXML registry where are the candidate sellers and make suggestion for them to consider. The negotiation process ends when there is no new offer proposed within a certain time period.
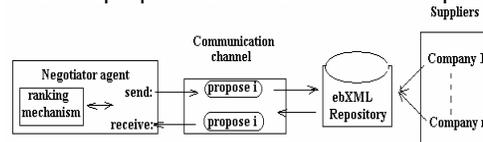

FIGURE 4. The framework for negotiation process

4. CONCLUSIONS

In this paper, we have proposed to use agents' technology to implement an ebXML – based platform and setting up C2B transactions by using the collective purchasing model. The ebXML permits to achieve interoperability across the different individual and industries functions and vocabularies that would enable companies and customers to exchange business data. The agents' technology can provide a high degree of flexibility by distributing the complex problem on intelligent and cooperative agents. We choused to used the collective purchasing model in this paper because is the model becomes more and more used in electronic commerce market. Despite of that, the model is not often used over the internet.

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KNOWLEDGE MANAGEMENT IN LARGE DECISION SUPPORT PROJECTS

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ABSTRACT. The globalization, the Internet, the WWW or the wireless technologies generated the geographic distribution, creating virtual and collaborative organizations. These organizations have specific large decision support systems and require specific projects. This note would present some aspects of the knowledge management problems in these projects.

1.INTRODUCTION

In some papers, the authors approached different aspects of the large collaborative decision support projects, like framework [7] or collaboration and virtualization [8]. As case study we used the Students Register Project, a project used for a students' management system in Romania. This is a large decision support system project used by the Romanian Ministry of Education in decisions concerning the financing of the system or to approve the diplomas of different universities. This system is also used by the National Institute of Statistics for different multi dimensional analysis. In this note we will present the knowledge management of this kind of projects.

2. KNOWLEDGE MANAGEMENT AND LARGE DECISION SUPPORT PROJECTS

There are many different definitions and researches in knowledge management (KM). An interesting overview of these is presented in [2].

We consider KM as the organizational memory where are captured the best practices that reflect the organizational culture and it is used in organizational learning [10, 5].

It is used generally in the repetitive projects and also by the large consulting companies. The large decision support (DSS) projects, generally, are not repetitive, many times are applied on virtual, collaborative or distributed organizations, like the project presented in our case study. The main questions are why and how KM is used in this case?

To answer at this question we consider our case study. In Romania are over 70 universities. Each of them has its proper management system. For different decisions, at the central level, some data and information oriented for these goals are needed. In this respect, a simplified approach can be considered the following:

- at the universities level we have the operational databases;
- for these databases gateways or interfaces will be created in order to collect, aggregate and summarize the data stored at university level;
- these information will be collected in the central Data Warehouse;
- from central Data Warehouse Data Marts, multi dimensional analysis, or reports for different decision makers in the education system will be created.

In our example we have different reasons to use a KM system that can be synthesized in the followings:

- large DSS projects contain different knowledge pieces that need to be aggregated;

- the knowledge are heterogeneous and a homogeneous information structure its needed in order to generate a meta-structure;
- a huge part of the information is not structured;
- the human resource is heterogeneous from different secretaries until IS specialists, administrators, different managers from the central institutions or even the ministry etc;
- the system contains tacit knowledge that need to be transform in explicit ones as basis of their representation.

3. THE KNOWLEDGE PIECES IN OUR MODEL

In some precedent papers we studied the knowledge representation by heterogeneous structures or modal logics [9]. Now we insist on knowledge definition and structure.

In [10] "knowledge is information that is contextual and actionable … The implication is that knowledge has strong experimental and reflexive elements that distinguish it from information in a give context".

In this context for the knowledge pieces we need to study the data and information. More exactly we elaborate a model based on structured (data) and unstructured information, aggregated and summarized data that means information.

In this respect we have, at the different levels, the following structures:

3.1. At universities basic levels we have two types of knowledge pieces:

- structured information pieces (data pieces) that are contained in relational databases like SQL. These pieces are generally normalized and contain data referring students like: id, name, address, marks etc. These information pieces are managed by MS SQL Server, Access or even Visual FoxPro.
- unstructured information that contain the textual information reflecting the personal tacit knowledge, like different rules to manage student information. In this case we have two kind of methods to solve the problem:
  - o First by using a rule based expert system like Exsys Corvid [11]. The advantage of these systems is the simplicity. The main disadvantage is that it is not a natural representation for our problems because we have different aggregations and summarizations that are not very usual in rule based expert systems.
  - o Consequently for the unstructured information we use the frame based expert systems [6], namely the facetted frames. The main advantage in our case is that in frames we can capture the images of the tacit knowledge in text or fuzzy forms. We can also use methods and demons (When Changed or When Need) to calculate different summarized values or to collect new data. In this case we can use a shell like Leve5 Object developed by Rule Machines Corporation [12].

3.2. At the universities second level the data pieces are formed by cubes based on star or snowflake schemas in data stores [3, 4] and the information pieces are based on filtered frames used by frame based expert systems.

3.3. These parallel structures are repeated in the central data warehouse and also in the Data Marts.

A simplified Knowledge piece model is represented in Figure 1.
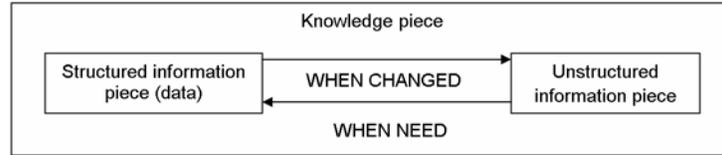
FIGURE 1. The simplified knowledge model

4. AN EMPIRICAL MODEL FOR THE KM DEVELOPMENT

To develop a KM system we have two categories of actors: contributor and seekers. In our model we will assume the following hypotheses system [2]:

- H1a. Actor' contribution intention has significant impact on KMS development for knowledge contribution.
- H1b. Actors' seeking intention has significant impact on KMS development for knowledge seeking.
- H2a. Facilitating conditions have significant impact on KMS development for knowledge contribution.
- H2b. Facilitating conditions have significant impact on KMS development for knowledge seeking.
- H3a. The influence of contribution intention on KMS development for knowledge contribution is moderated by actor habit.
- H3b. The influence of seeking intention on KMS development for knowledge seeking is moderated by actor habit.

Thus the simplified empirical development model step can be represented as in Figure 2:
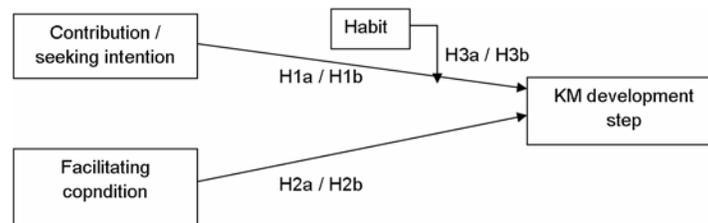
FIGURE 2. A step in the empirical model of the KM development

It is clear that the development is made iteratively applying the above presented steps.

5. THE DEVELOPMENT METHODOLOGY

The classical system development methodologies (SDM) comprise structured modeling-based and workflow development methodologies like methodologies based on arrows (like water flow) or spirals. In our case study we proposed initially a water flow methodology based on 3 work groups but we realize that this classical SDM is not working and need a new agile methodology.

The agile methodologies are in the state of art and are not very well known in organization. There are iterative methodologies and include the main classical SDMs. It is worthwhile to mention what are the significant differences between the classical SDM and agile technologies. One of the main differences is the human factor. In this respect it needs underline:

- in agile development both the developers and the users have important roles;
- the developers and the clients (users) work together as team members;
- in classical SDM users participate mainly in specification phases and they are not involved in other activities.

Concluding, the agile methodologies are collaborative involving the organization (real or virtual) of the developers and also the customers. In this case the developers and the customers learn together about the problems which will be very efficient.

Without developing the theory of agile development of decision support systems, problem being extensively studied in literature [1], we consider that this kind of methodology is essential in the KM for large decision support systems.

6. CONCLUDING REMARKS

The KM is an important issue in the large decision support systems because these are developed by large teams, contains heterogeneous knowledge and are developed in a large time perspective. In these systems the knowledge are based on structured but also on unstructured information pieces. These knowledge pieces need some specific representation. The KM development has a specific model that need to be based on agile methodologies.

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FUNDAMENTALS OF ENGINEERING ORGANIZATIONS IN COLLABORATIVE WORKING ENVIRONMENTS: MANAGEMENT AND CONTROL STRUCTURES

DUMITRU OPREAN[1], MIHAI AVORNICULUI[2]

ABSTRACT. Designing and redesigning of an organization require the definition and adoption of structures adapted to the evolution of business environment. In case of management and control structures, the stress is on regulating and auto regulating of the economic financial mechanism so that the organisations performance would get better and better. The proposed methods are based on the practice of organizing company and also on the task of harmonising results.

1. INTRODUCTION

In the context of managing a business, engineering organizations can be defined as a creative method of designing and redesigning organizational structures according to the tasks of the dynamic business environment. In collaborative working environments, based on modern technologies of communication, managers and employees can become the triggers of changes. In essence the stages of an organization can be:

a. dimensioning new structures[1];

b. critical analysis from the point of view of integrating organizations in the market environment;

c. reflection and creation above possible structures;

d. making the decision taking into consideration the alternative of organizational structure.

The functioning of a productive economical system is realized on circuits[2] :

- first of all (exterior) of fixing objectives (Y*), of stabilizing politics of leading (T*), as well as of the realization of regulating processes that take place after the exercised control by comparing results (Y) with objectives (Y*) at the strategic, tactic level of leadership;

- secondary (interior) of execution and auto regulating of organizational subunits functioning (factories, sections, workshops, offices, services etc.) for missing objectives that belong to the attributes of operative leading.

2. MANAGERIAL STRUCTURES AND METHODS

For companies adopted strategies and tactics have to take in consideration the objectives of the organization. According to the tasks of management through objectives, every objective has to be assigned its responsible and his authority.

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The effectiveness of the authority- responsibility- competence triangles constitutes the basics of the companies management through purpose and realization of entities on the way of actions-information- decisions. Detailing objectives to the level of employees requires adequate rules under the form of calendars and working time tables as well as instructions. Also, management through objectives requires applying standard cost methods for calculating costs of final products in a way that it is possible to determine opportune consumption and abnormal spending (the credit of spending accounts contain the standards of direct spending and normative for indirect spending).

Knowing the differences between objectives and realizations makes possible the management through exceptions. Every manager has got his own level of responsibility until which he can take actions for correcting errors in his sector. For auto regulation of small amplitude differences operative management is responsible, meanwhile for important decisions strategic- tactical management is responsible. This method of management requires the existence of a rational communication system, capable of delivering information about exceptional situations, determining factors and proposed remedies.

As effective adaptation to the markets environment is a major target of every company, management through product or/ and client (geographical areas) is a method of creating homogenized centers of responsibility for creating rational connections between producers and clients.

Because in a final stage every company has to base its activity following criteria of efficiency, scientific management implies management through costs/budgets/centers of profit and results which decide upon consumption and spending of an economic unit.

Project management is applied at companies for large, long term programs, in which a number of projects are developed and administered during all fazes of their existence. This strategy is useful in case of unique projects, when tasks are unfamiliar and complex. Also in case of planning, coordinating, research of high risk, developing and in cases when there is an important difference between planning and executing. Project activities take place in functional teams led by leaders of departments. The general manager coordinates all activities. In this case of organizations there is no central authority, this way adopting decisions will be made in the favor of the most powerful functional group and not in the interest of the project. The time while a decision is adopted increases because coordinating and agreement of every functional group is necessary. All people involved in the project, respond directly to the manager, giving him a great control above each project. This fact permits reduction of supplementary time and a shorter reaction time. People involved in the project tend to be loyal, for this is their only purpose in a certain time. This type of aggregate management has got its disadvantages as well: involved personnel are interested in the technology of building a project, but these don't develop a technology of finalizing the project; because managers work on a single project at a time, they can't keep all of the productions elements working in every moment; elements of production don't overlap with other projects and this leads to ambiguity in functional activities and projects; it can get to a lack of continuity in carriers, anxiety can grow during a project, because the personnel doesn't know when will they be chosen for a new project etc.

Matrix organization combines concepts of functional organization with the one of aggregate. Functions are defined by departments and divide authority among functional leaders and project managers. Some people from the functional domain are designated by the project manager meanwhile they are also implicated in the solution of other problems of the company. So the worker has got two bosses. Reaction time is short. Matrix organization seams to be welcome by outsiders and doesn't slow down technical development; it helps exchange of technology among projects and it guaranties the continuity of carriers, by the keeping of attributes in the functional domain of the unit. Conflicts can appear between project managers and functional managers. Workers have double responsibility which can become confusing.

In another type of structural organization, the project manager can monitor the project, but he can only give advice to the general manager. Project managers control with their influence; they have responsibility but no authority. Workers answer only to one boss, the general manager.

Management through projects offers some advantages, like: it concentrates on results; offers good control above the project, it's got a short period of development, increase in quality and reduced program costs; high profit rates are obtained as well as good relationships with clients. Management through projects facilitates the coordination of functional domains and evolves the abilities of managers.

3. CONCLUSION

On the base of our observations we can appreciate that scientific management of companies and organization needs: adapting management through objectives for exercising managerial functions of organizing and forecasting; applying management through products and projects for commanding technological processes; using management through exceptions for exercising control; adopting management through clients or areas for coordinating internal processes with those experimented on the market etc.

The key of integrated application of modern management methods is management through IT systems of management and decision support. The main components of these are:

- Data bases and their management (Data Base Management System - DBMS);
- Model bases and their management, program libraries and procedures of informational problem solving – mathematics and decision theory;
- Knowledge and action bases, like complex information structures, components of expert systems for managing bases and mining explicit solution;
- Interface between components and components – users, like generating system and dialogs management.

While organizing activities it is necessary for the manager to permanently ensure the balance between the employee's interests, the objectives and the results of the company.

Although from the point of view of resources (financial, technological, human) small and middle sized companies dominate the economy at a national level, organizational flexibility represents an important point in conquering the market.

For the successful application of an organizational model it is necessary to pay great attention to social and economic aspects for creating a proper working environment for the company's employees. Selection of employees should be made according to the complexity of specific activities and the companies image should contribute to forming a corporate culture, in order to obtain attachment and responsible work for realizing performance.

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VIRTUAL TIME – SOLUTION TO THE OPTIMIZATION OF DISTRIBUTED SYSTEMS?

IOANA ALEXANDRA PANDELE [(1)], ALINA MIHAELA PATRICIU [(2)]

ABSTRACT. The fusion of Artificial Intelligence and Real Time areas has proven to be quite a clever movement, similar to the movement associated to check in chess (lets not go that far as checkmate, considering that the area of informatics is quite slippery when it comes to updates). The Artificial Intelligence provides new possibilities to the Real-Time systems.

1. INTRODUCTION

The measure of time is a very important issue in distributed systems. The same issue (i.e. time) is an important characteristic in centralized systems too, but it is not considered a critical one because of the fact that there is no problem not getting to synchronize all the processes, meaning there is not a must have the existence of a unique reference: a shared clock. Instead, in the case of distributed systems each computer has its own clock and it is not an easy process the synchronization of each and every clock of the computers that arrange the entire system.

As we have mentioned in the beginning the issue of time is very important, so it results very important to know the precise hour an event happens for each component computer. The required precision, in what concerns the time component, varies from case to case, being the real time systems the ones that would admonish a major precision. Nevertheless, it is imposed to make arrangements so that the time synchronization exists, in general decision systems as well.

Considering the fact that the measure of time is an important factor in our way of thinking, and the effect of not having synchronized clocks could be a dramatic one, we would introduce several methods of clocks synchronization of all the components of the distributed system (i.e. computers), or, which is kind of the same thing, that makes that all the computers have the same hour simultaneously. This is known as the synchronization of physical clocks.

2. CLOCKS AND SYNCHRONIZATION

Each computer has its own physical clock. This clock it is an electronic device based on a quartz crystal, that oscillates at a certain frequency, and, further more, can organize itself so that it could generate interruptions on certain points of time (very certain number of oscillations). Knowing the precise time these interruption happen (called clock interruptions), it could make use of them so that the time could be called well administrate. In this purpose, the operative systems use a counter that increases with the clock interruptions.

The most precise clocks are based on atomic oscillators, whose precision reach 10^{14} (a second in 1.400.000 years). Certain laboratories (with atomic clock) from

all over the world periodically indicate the number of ticks (clock interruptions) to the Bureau Internationale de l'Heure (BIH) that calculates the medium value producing The International Atomic Time (IAT).

Regarding the Distributed Systems, it is impetuously necessary to synchronize the different teams that compose the main project, than the synchronization with the Universal Coordinated Time.

Two of the most important algorithms that are used in the synchronization process are: Cristian's Algorithm and Berkeley's Algorithm.

But, as we have mentioned before, in distributed systems the main role, in what concerns the synchronization, is played by the succession of events. Thus, it is more suitable to choose virtual time instead of real time. The main difference between virtual time and real time seems to be that virtual time is only identifiable by the succession of events.

The concept of virtual time for distributed systems was tackled for the first time by Lamport in 1978. Lamport signalized that the synchronization doesn't have to be absolute. First, if two processes interact, it is not necessary that their clocks be synchronized with a certain precise hour, because the lack of synchronization won't be observed and won't create any problems. But they have to agree with the order imposed by the logical succession of events.

For certain environments, where the precise synchronization with a certain referential hour (UCT) is not a must, instead of working with physical clocks it is chosen to work with logical clocks, whose main characteristic is given by the order of events, and not by the measure of the exact moment when the precise event happens.

It is very difficult to perfectly synchronize multiple distributed clocks; many times it is not necessary to synchronize them (i.e. distributed clocks) with a UCT hour, or, furthermore, two processes that do not interact mustn't be synchronized. Therefore, in the end, it is necessary that the processes agree with the order the events happen/proceed, in order to solve the processes.

So, instead of working with physical clocks, it has been chosen to work with the logical ones.

To synchronize logical clocks, Lamport defined the relationship "**happened before**" (preceded), that implies that the expression $a_1 \rightarrow a_2$ means "a_1 ensued before a_2", and it means that all the processes coincide in the fact that as a first step took place a_1, and subsequently took place a_2. This relation can directly be observed in two situations:

1. If two events happen during the same process, the order of thy happening it is indicated by the common clock;
2. When two processes communicate through a message, the event that corresponds to sending the precise message always happens before the event of receiving (i.e. the message) had happened.
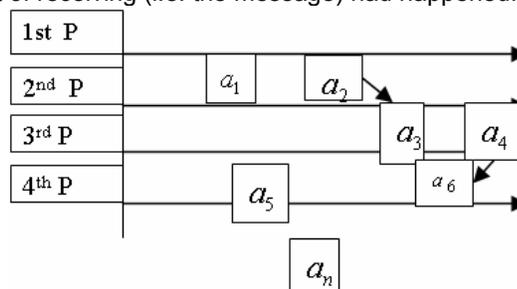
We must find a way of assigning values for the logical clocks C so that:

- If $a_1 \rightarrow a_2 \Rightarrow C(a_1) < C(a_2)$
- The clock C must always go ahead and never backward

And at this point we would resort to intelligent agents.

3. ARE INTELLIGENT AGENTS A SOLUTION?

The aim of this paper is to bring in together particular elements in domains like Artificial Intelligence, Physics and Mathematics, in order to optimize distributed systems. Distributed Artificial Intelligence represents a real challenge in what concerns interdisciplinary research. The development of Multi Agent Systems represents the main subject of Distributed Artificial Intelligence.

Therefore, we opt for intelligent agents to perform the events that compose each process. A schema of these intelligent agents, that perform those events, it is going to be "depicted" as it follows, attending that in the near future, in a sequel of this article, a real implementation of thy script to be revealed.

In accordance with Katia Sycara a multiagent system represents a network of united agents, which interact in order to solve problems that surpass the capacities of individual agents.

In what we like to think as a future project, we tend for micro-social organization of the agents combined with the organization based on groups of agents, knowing the fact that the main characteristic of micro-social organization is based on the establishment of a clear agent's hierarchy, and in those based on groups of agents, agents with different tasks are grouped in autonomous informatics entities. We would like to join those two organizations because there has to be a MASTER that coordinates, from shadow sometimes, the main project (its presence would be distinguishable just in key moments) but we still have to synchronize the events, which means there has to be a certain communication among the agents. The authority is given by a single agent that is, symbolically, situated on the top level; this agent would be considered the root of an arborescent structure; but the stages of the process are provided by groups of agents, respectively by the relations of communication between them.

Thus, we would deal with a ZERO AGENT and several groups of agents. Such a group is composed by several agents, each and one of these agents accomplishing a certain role in the process of synchronization.
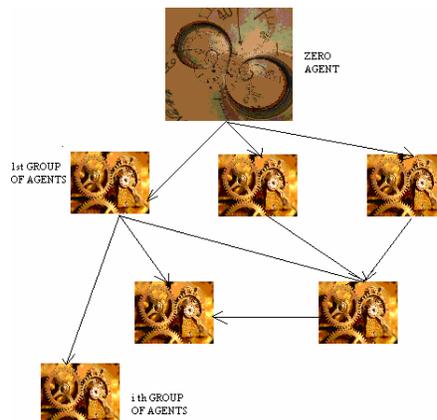
A crucial role in the entire process of interrelation among the groups of agents is played by the negotiation between agents. The negotiation appears when agents might have different goals and each agent/group of agents tends to maximize its own good, seconding the global "wellness".

As far as the role of mathematics in the involvement of the optimization of distributed systems, we might appeal to Minkowski's relativistic space-time model. The use of this tool represents a fineness problem (it would be the final part of the ENTIRE process (i.e. optimization problem/process)). Because of the finite speed of light, Minkowski's well-known relativistic space-time model may reflect reality more accurately than the standard model of time. [1]

4. Conclusions

A fair and straight answer to the question: "Are Intelligent Agents a Solution?" would be given once a characteristic algorithm had been implemented and tested.

One thing is certain for sure: mathematics, physics and computer science become magnificent tools in the hands of a proper master.

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POLICIES AND IDENTITY IN FUTURE INTERNET

IOAN PETRI [1]

ABSTRACT. To be able to understand nowadays collaboration pattern's changeability it is necessary to start from a very familiar concept with all its particular generations. Architectures have been evolved from a granular idea of programming to an object oriented concept, recent architectures splitting efficiency between service oriented and Web oriented. Our approach is focused on recently systems deployed from the prospective of three main indicators. Any powerful system is predictable, secured, and scalable. The following architecture philosophy will increase resources priority instead using services as a central idea of architecture. In the same time, we tackled on identity interactions and fast accessed resources inside a decentralized trust model as a new evolutionary concept of future architecture abstract.

1. APPROACH AND METHODOLOGY

Traditional service oriented architecture was focused on controlling distributed model with a measurable interaction output of process. It supposes an organizational integration of services, unifying internal application and mixing services in different context approach. The new direction of the internet is to become service aware because services are moving to become automatic, autonomous and self-managed as in the following taxonomy:

- *Internet of People* allows people to change experiences and to interact. Users can be replaced with people. The trust policies can be replaced with the confidence patterns. A good design is an adaptable design.
- *Internet of Things* refers to the possibility of discovering information about a tagged object by browsing an Internet address or database. It deducts new "Always on communication" concept using RFID technologies and smart computing for permanent devices interconnectivity and networking facilitating user accessibility to different content and information.
- *Internet of Services* is based on the concept of a service that is using another service. It uses different entities in a close approach of services: system as a service, information as a service, process as a service, communication as a service, and resource as a service software as a service. It drops few levels of interest as: scalable set of services, federation of services, universal discovery of services, interoperable services, resilient services, dependable services, and interactive user-centric services.

2. EVALUATION OF FUTURE INTERNET POLICIES

Policies are expressed as being particular tasks that basically need to express identities of parties involved, task descriptions and usage policies (retention and distribution policies). Policies are related with a variety of procedures as written laws, regulation, common sense, standardization and many others. Policies are deducted from particular computation scenarios which reveal a set of rules that might be applied in a specific context. Information policy defines mediation over the information that is surrounding the system. Provisioning policy uses information's availability through the system as being a matter of provider authenticity.

Information has to be published by an authorized source and retrieve by a set of interested parties, who can verify the authenticity of the provided data.

Trust is a matter of business and individual sides. For businesses it defines legal environment characterized with measurability. For individuals it defines social rights and privacy as elements of security requirements. Trust as an internal future design procedure is can not be left outside. It is an intrinsic value of transaction, relationships and contexts. Every entity should decide about the level of trust it should offer.

Lemma: An entity A is considered to trust another entity B when entity A believes that entity B will behave exactly as expected and required. [1]

But trusting in certain entities it has to be accepted and defined the identity of such an entity. Identity enables access and reachability across domains as well as it integrates people, services, things, software modules as a part of the future Internet architecture. All the conflicting policies can be solved using identity as recognition mechanisms. Gathering all the above concepts it should be emphasize the identity is a central communication accomplishment for the technology deployment efficiency.

3. EVALUATION OF IDENTITY FEDERATION POLICY

Identity becomes a matter of allowing access through different security domains using sharing information as an instrument of passing data about security identities and policies. Identity federation is replacing identity centralization model with federated environments inside at, clients are using credential and identity information with specific security domain, in order to access resources from a different security domain. Best practiced analogy is with documents as passports, driver licenses or credit cards which interact with central security institutions.

Because of multiple services instances that are requested by multiple clients that need credentials with different representation, it has been introduces a mechanism of separating these two processes (authentication and services dependences) building a separate service called Security Token Service (STS). This new STS function is to authenticate applications which will receive security tokens sets. Tokens will be used further as proof of entity identity in order to communicate with services. As on its basic function STS behaves as an identity provider (IP) it will also set costumer's identity with a set of Claims (ClaimSet) as Name, Age, E-mail, Address, information that can help in managing future security tasks.

Process: The central problem is how consumers will access services from different trusted domains inside this federate scenario. Every consumer will have to get authentication from Service Token service in order to pass from a trusted domain to another. This process is the basic acquirement of identity that a consumer needs to access a resource or a service. [4]
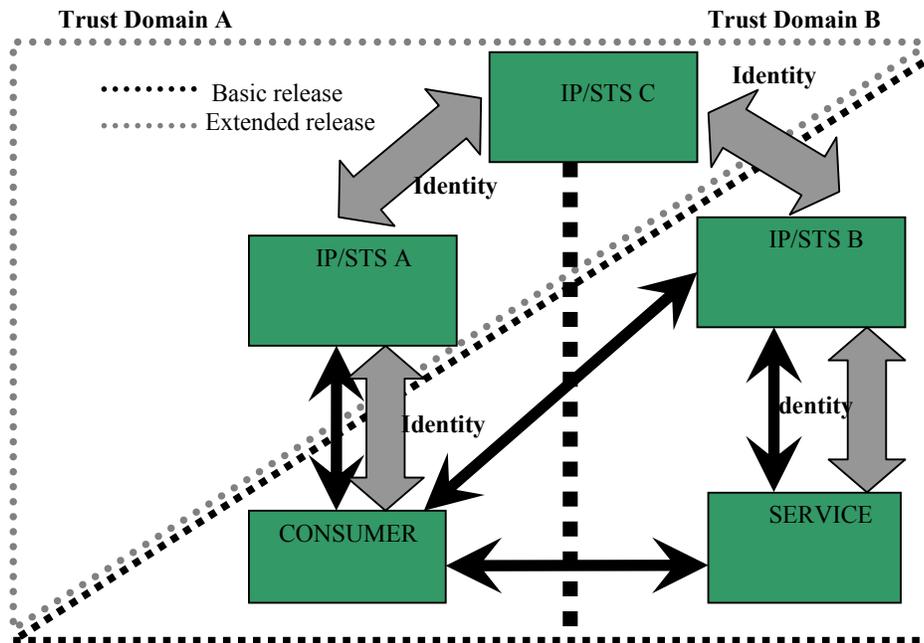
FIGURE 1. Identity federation process [04]

On its extended release any consumer requests tokens (in order to access a service from another trusted domains), expects IP/STS-A to contact IP/STS-C and to issue a universal security token recognized by IP/STS-B.

All this identity claims and security tokens will follow the format template of IP/STS-A and this will contain all necessary data that guarantee its use on another trust domain.

Result: When the token is received by IP/STS-B it will contact IP/STS-C for the confirmation.

Identity is considered as a future end point communication because reduces the danger of conflicting policies and mechanisms. Identity is practiced to access a device or service, when the user needs to provide any identity that can be authenticated and authorized. It also has to provide all the user friendly facilities and it supports all the identity exchange forms without affecting the privacy of the user. Identity should provide scalable and efficient methods to protect the user and to be able to assure the anonymity and pseudonimity of systems. For the discussion of identity we identify few issues that also assure terms of security [7]:

1. The nature of an object: how can one provide confidence that an object as accessed by a "user" is in fact what the "provider" intended to preserve the integrity of an object.

2. The identity of the provider: can the provider's identity be authenticated

3. The object's provenance: checking the object trajectory

4. The identity or other validity of the user: controlling and authenticate the object access

5. Verification of the attributes and interests of a user

For identity it should be distinguished between identifiers and identities. To integrate these identifiers as a category of identity it should be emphasize the basic functions they satisfy: equality, access and nature.

4. REMARKS AND OBSERVATIONS

When arguing on identity, it has to be exactly established what needs identification and expression reflected on the system's architecture. It has to be analyzed which from the information entities (sources, brokers, aggregators and consumers) need levels of identification. We tried to find how different entities can pass through different trust domains and which are the rules related to identification respect. Thus, identity represents a concept of system adaptability related to dependency and cultural difference, a reflection of organizational and individual concerns in the provisioning of an identity solution.

Models of identity and authority should be built in order to offer trust and secured collaboration and to make the future internet a trustworthy space. Such models should be applied on the communication, storage and computing parameters.

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PERVASIVE CONTEXT-AWARE MIDDLEWARE

SEBASTIAN PRESECAN [1]

ABSTRACT. The user applications implemented within a pervasive environment need to observe and adapt themselves to the environment in order to gain an efficient usage of the available information. This paper presents a new architectural approach in building a distributed context-aware acquisition middleware which supports application adaptation to the environment changes. The architecture is based on the possibility to integrate different context providers in a way that is transparent for the end-user. The complexity of the context providers is hidden to the client application. The middleware provides both a transparent mechanism which is used to monitor the environment changes and a simple query language to interrogate the system for given target context values. Comparing our proposed middleware against the requirements of a pervasive context-aware application, it proves to be a feasible solution for building context-aware pervasive applications.

Context awareness means that the applications sense the environment in which they are running. Thus, the system exploits information such as the activities in which the user is engaged, proximity to other devices and services, location, time of day and weather conditions.[7] Context awareness is also required to enable adaptation to the changes of environmental conditions, such as the change in bandwidth or geographical position. Context awareness is a mandatory characteristic for intelligent environments. Through this characteristic the system perceives environmental changes. Implementing perception introduces signicant complexity: location monitoring, uncertain modelling, real-time information processing and merging data from multiple and possibly disagreeing sensors.[1]

The purpose of this work is to design the architecture for a middleware which can be used for collecting context awareness information in a transparent manner and which provides a fexible mechanism in describing the reactions to the context changes. The existing context-aware middlewares [4, 3, 8, 2] does not consider the dynamics of the pervasive system or the availability of data providers which could affect the application performances. Thus, the proposed middleware comes to overcome these problems by providing a generic architecture which considers different types of distributed context providers and which can be replaced at runtime when they do not function normally.

1. GENERAL ARCHITECTURE

A smart device can get context information by using a large variety of sensors, cameras and microphones, which can be embedded in the device or in the surrounding environment. In practice, this is a very challenging task, if we take into consideration the need of integration of different type of small devices and technologies, the user mobility and the scarce computational power of smart devices.

The following challenges can thus be considered important for a context awareness middleware:

- discovery of the source of the context providers.
- query for getting the context information.
- processing of the context information without disturbing the normal system features.
- the system adaptability to the change of context values.
- the integration of different types of context providers and communication channels.

Considering the above challenges, the following architecture is proposed in order to support the context awareness of the pervasive e-learning system.
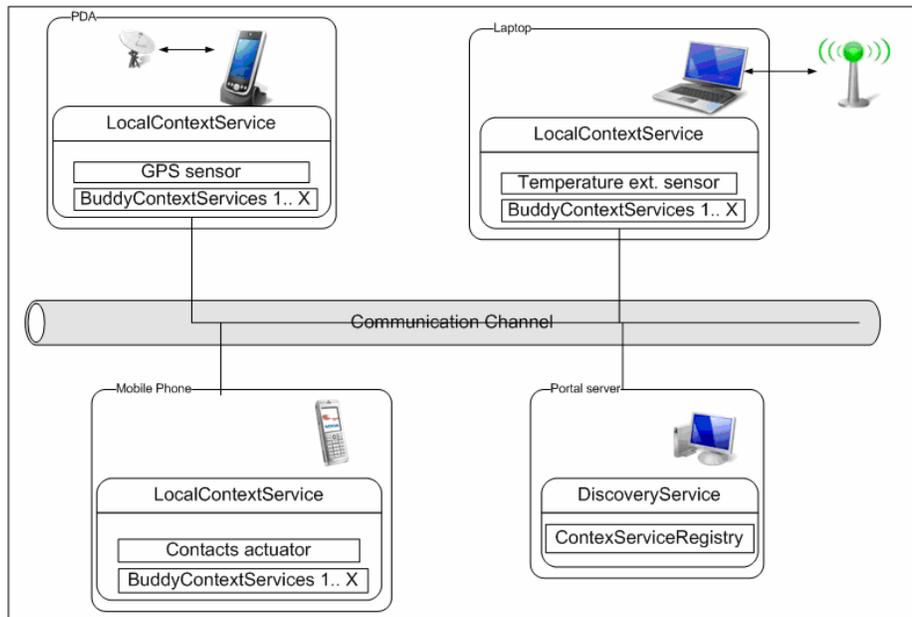
FIGURE 1. Architecture overview

The key-component is the ContextService. It is responsible for getting all the context information that an application running inside the embedded device might need. It retrieves the context information from the sensors/actuator directly connected to it or it gets them from the buddy ContextService. The buddies ContextServices consist of a collection of services distributed on different machines which collaborate in order to retrieve all the context information needed by the embedded applications. The buddies can be defined statically or dynamically. For the static confguration, we can define a list of QoS parameters which need to be used when the buddies are retrieved from the DiscoveryService. The dynamic configuration means that the buddies start working together once there is any request of accessing information about the context from another target.

The buddy ContextService is a smart proxy which is retrieved from the

DiscoveryService. The DiscoveryService analyses the QoS parameters transmitted by the buddy ContextService during the requests for a new ContextService and gives the client the ContextService which is most appropriate for his/her needs. The proxy is considered to be smart because it can be replaced by the DiscoveryService in case it does not provide the expected functionality.

Each ContextService can be directly connected to one or multiple sensors and actuators. It retrieves context information from them on demand and also monitors their QoS parameters. The sensor contains the speciffc implementation of connecting and retrieving information from the physical sensor. Actuators are used to push the context information into the system on users demand. The actuators do not really sense the environment, but they provide information that can help the users intention.

The retrieval of the context information is an important feature for a context aware middleware. The retrieval is done using a standard solution and should facilitate both the retrieval of very specific information and of global values when the filter is not very specific.

Having in mind the REST [5] architectural style, the query engine is defined to answer to queries like:

ctx://[target]/[retrieve_type]/[filters]

The allowed values for these parameters are:

target := any_context_service_name

retrieve_type := qos|qos_value|ctx_value|ctx

filters := retrieve_type|concrete_value

2. CONCLUSIONS

The current work proposes a middleware architecture which addresses two of the most important pervasive challenges: context awareness and invisibility (adaptability).[6] The addressed problems are not new, but the solution proposes some innovative aspects which make it better compared with the existing solutions.

The proposed middleware is based on the idea of considering the distribution of the context providers and the possibility to integrate them in a system which is able to monitor their QoS parameters. If the middleware observes that certain provider does not function normally, it replaces the provider with an equivalent one, without interrupting the user activities. The context data can be retrieved from the buddy context services which can be located into the near network and not only embedded into the device, as previous middleware had considered. By letting the ContextService instances to be hot-replaced by the DiscoveryService the middleware supports the local scalability. The middleware enables transparent context provisioning, thus the client can ask for a given context value without knowing from where that context needs to be retrieved.

The context values can be retrieved by using a simple flexible query mechanism (REST like). By this, the middleware let the users to interrogate the system to get the context values without knowing which the internal structure of sensors or actuators is.

The middleware unifies the context observation and system adaptability by using a simple ECA engine. It supports both static and dynamic configuration of the reactions to the context changes.

In the near future, this middleware needs to be extended in order to address challenges like: service discovery, application mobility, security in order that a viable system should be built. The proposed middleware will be used to build a new age pervasive learning system which is meant to be used by students and their teachers in order to improve the collaboration between them, as well as to use a wide range of resources in order to help the educational process.

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PRINCIPLES OF KNOWLEDGE MANAGEMENT IN COLLABORATIVE SYSTEMS - KNOWLEDGE ORGANIZATION

ANDA-MINA SIMON [(1)], ILONA MARIANA NAGY [(2)]

ABSTRACT. Nowadays, knowledge is the key difference in productivity and economic growth among various organizations. Information technology provides the means for codifying and exchanging knowledge. In order to remain competitive in the ever changing environment, organizations must find a way to benefit from the inherent knowledge by developing means of creating, sharing and disseminating it. Our main objective in this article is to present a brief survey of the literature concerning knowledge management describing the way collaborative systems provide support for leveraging knowledge and thus adding value to an organization.

1. INTRODUCTION

The term "knowledge-based economy" is frequently mentioned when talking about the new dynamic economic environment. Competitive advantage is gained by leveraging knowledge. The knowledge-based economy is by definition an economy focused on adding value to products and services through the extensive use of knowledge. In this context a much needed emphasis is set on the collaboration between the actors involved in exchanging codified and tacit knowledge, which is the main focus of our paper. A shift was made towards "information-society", the community whose collective existence focuses on intensive use of information and communication technologies, also known as "knowledge-society"[1]. In the next section we present the basic concepts needed for a better understanding of where knowledge management and collaborative systems combine to provide for the needs of an organization.

2. BASIC KNOWLEDGE MANAGEMENT CONCEPTS

Knowledge is defined as information that is contextual, relevant and actionable; whereas information represents processed data.[2] Knowledge has some advantages over information: while information ages over time, knowledge evolves. Knowledge is dynamic. Knowledge is always valuable as a resource. There is a vast amount of literature covering the definition of knowledge and knowledge management in domains like social sciences, philosophy or psychology. Our approach concerns the more pragmatic perspective of the latter in business and economic organizations.

Most commonly knowledge is known as being either explicit or tacit.[3] It can be found in the form of data, procedures and documents, usually stored in databases, books and manuals. Tacit knowledge has a more personal aspect, being also known as informal, soft knowledge. It is hard to formalize, capture and transform into explicit knowledge, and difficult to communicate to other people. Tacit knowledge consists of experiences, insights, expertise, beliefs that reside in the human capital and the organizational culture. It can be socially constructed, but is more generally acquired through praxis. Explicit knowledge, also known as formal, hard knowledge, is the type of knowledge that can be easily expressed, captured,

formalized, stored and reused.

The purpose of collecting and formalizing knowledge is to form an internal culture, referred to as organizational culture that can create a competitive advantage for the organization.[4] This corporate culture describes the psychology, attitudes, experiences, beliefs and values of an organization that makes the company unique or distinguishes the company from others. In order for the organizational culture to be formed, some of the tacit knowledge must be converted into explicit knowledge and all of the explicit knowledge must be collected and stored for reuse. The process of converting knowledge consists of four stages according to Nonaka's spiral of knowledge[3]:

- *socialization* - tacit knowledge is transferred between individuals
- *externalization* - tacit knowledge is translated into procedures and documents
- *combination* - explicit knowledge is processed and shared within the organization
- *internalization* - explicit knowledge is translated into tacit knowledge
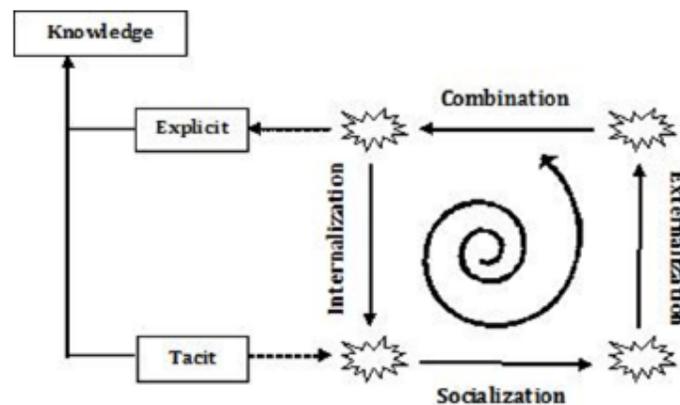
FIGURE 1. Nonaka's spiral of knowledge

Having explained the transformation processes concerning knowledge, we must focus our attention towards two other concepts, one of which is related to one of the sources of knowledge, the *knowledge worker*, and another related to valuating knowledge, the *knowledge organization*. We concentrate our attention on these two concepts. An organization that supports practices of knowledge creation, development and sharing is referred to as knowledge organization. In the knowledge-based economy the emphasis lays on the person, the worker that possesses the knowledge, the knowledge worker. His strength consists of his expertise and high level specialization, but also of his communication and collaboration skills. In this new approach to economy, the most important asset of an organization is knowledge, expressed through the organizational culture and the intellectual assets inherent to the people who work in the organization. It is very important for an organization to try to capture the knowledge from its employees, so that when and if they leave, this valuable asset is not entirely lost.

3.KNOWLEDGE MANAGEMENT AND COLLABORATION

Knowledge management delivers adequate support for knowledge manipulation's five phases: capture, storage, interpretation, dissemination and evaluation, all of which can be supported by various information technologies. Not all knowledge can be manipulated; success is not achievable only by trying to package knowledge as an object.[8] Since the individual and human interaction play a decisive role in leveraging knowledge, information technologies aim to facilitate communication and team work by building collaborative workspaces. Having set leveraging knowledge as our goal, the next objective is to present the way in which collaboration and thus collaborative systems, being based on collaborative interaction between different participants that work towards achieving a common goal or purpose, provide essential support. The most important aspect of collaboration is the human factor therefore it is necessary to ensure that interaction is not altered by inadequate use of information technologies.[7] In true sense, collaboration technologies should serve as means for facilitating the contribution of members to the common deliverable, may it be shared goal, design processes, development of an idea. Collaboration is achieved based on collaborative platforms which support synchronous and asynchronous interaction and communication through various devices and channels. Collaborative tools designed to ensure communication across organizational boundaries, according to area of interest can be divided into: collaborative project management tools (CPMT), information sharing tools, knowledge management tools and knowledge creation tools.

Distribution of work can be either physical or temporal. Physical distribution refers to work taking place in different locations, whereas temporal distribution implies work carried out at different times, both being forms of distributed work. Distributed collaborative work involves group activity with physical and/or temporal distribution of work. The main goal of collaborative systems is to create the environment for dispersed team work, which in turn is adding value to the organization through knowledge sharing. We can distinguish two types of distributed collaborative work based on knowledge management and collaboration, according to C. Kimble: hot DCW and cold DCW.[9]
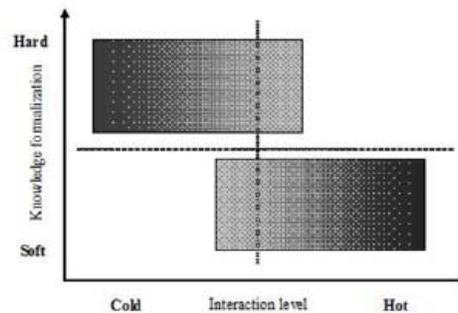

FIGURE 2. Relationship between KM & DCW

Hot (on-line) Distributed Collaborative Work is interactive work in association with others, requiring active participation, but still distributed as groups will not

share location. Cold (o-line) Distributed Collaborative Work is part of some collective activity but work is performed individually without requiring active participation.

While Hot Distributed Collaborative Work provides the best environment for transferring tacit knowledge, Cold Distributed Collaborative Work is best suited for the transfer of explicit knowledge. These two approaches combined support knowledge growth and dissemination.

4. CONCLUSIONS

In this article, we provided a step by step presentation of the essential knowledge related concepts and mechanisms. We focused our attention on the value added by the use of knowledge management in conjunction with collaboration. The intensive use of knowledge management systems is the key factor of competitive advantage for an organization in today's economic environment. Knowledge management is inherently collaborative, success for such a system involves "knowing what you know" - based on an effective knowledge management system that ensures the five phases of knowledge manipulation (capture, storage, interpretation, dissemination and evaluation) and "who knows what" - based on building a strong social network (communities of practice, virtual teams, etc) using collaborative tools.

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WEBSITE ADAPTABILITY AND PERSONALIZATION

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ABSTRACT. The Internet has become a place where millions of people around the globe access a vast amount of information. In the last years, a new technological revolution took place through the development of the mobile technology - including mobile phones, personal digital assistants (PDAs), and handheld computers. This modern revolution provides an innovative medium of communication and internet access. Consumers and organizations have benefited and are supposed to benefit even more in the future, from the features of m-commerce technologies through these mobile applications, such as mobile websites, advertising, portal access points, information and news services, entertainment and games, education and training etc. Beside these different devices through which we have internet access, each of those users has his own preferences and needs. The purpose of this article is to develop a deeper understanding of adaptability and personalization of the information that a person access over the internet. The companies, in their competition for consumers' dollars are more and more aware that it is no longer sufficient to just place the products or services offers onto the Internet and expect the sales to rise. The e-commerce website designing is undergoing a significant revolution. It has become an important strategy to design websites that are able to generate contents that are matched to the customer's technology, needs or preference.

Providing personalized information becomes very challenging in today's web development. The high and increasing number of web users with an increasing variety of mobile devices requires the creation and publication of content adapted for different user preferences and platforms.
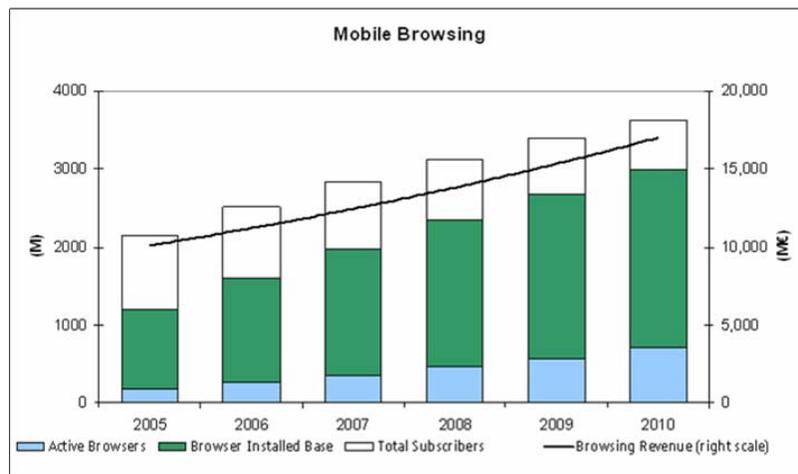

As shown in the above figure, around 1.7 billion of the 2.7 billion mobile phone subscribers worldwide have some form of browsing capability. This represents about 25% of a world population of 6.7 billion people. (Source: Nokia internal

market study) [8]

1. ADAPTABILITY

Taking in account the user's platform will not only be an adaptation but it will provide an optimized utilization of the available presentation area. Major problems are the lack of sufficient presentation space, a high difference between devices performances, devices processing speed and the diversity of interaction techniques.

In the passed years only a few select niche of websites brought value by having a mobile version. But now, more and more site owners are being aware of the disadvantages of not having a mobile version of their site. Many of them, when they create the mobile version, they choose to have a separate URL dedicated to mobiles, like *m.cnn.com, m.antena3.ro, m.hi5.com*. Others that take in account that not all users know that their website has a mobile version, so they provide separate versions by checking the device that user uses to view the site. We implemented this idea, and by a simply check over the user's device information: Request.UserAgent; How works UserAgent? When Internet users visit a web site, a text string is generally sent to identify the user agent to the server. This forms part of the HTTP request, prefixed with **User-Agent:** (case does not matter) and typically includes information such as the application name, version, host operating system, and language .When you request a Web page, your browser sends a number of headers to the server hosting the site that you are visiting. Each header contains details that help the server determine the best way to provide the information that you requested. The user-agent header identifies the application requesting the information from the server. Typically user-agent header includes information such as the application name, version, host operating system, and language.[6] The user-agent string can contain optional details called tokens, which must be enclosed in parentheses and vary among programs.
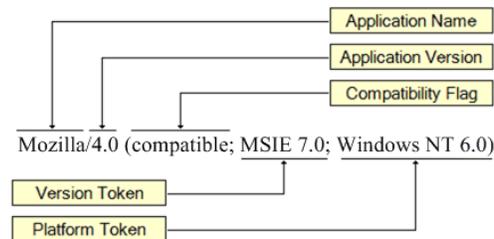
[7]

Developers now need to build what are called adaptable applications: applications that work well and look great on all devices - personal computers, PDAs, mobiles.

2. PERSONALIZATION

The personalization component of the system adapts to consumer preferences: it selects items to present to consumer according to their respective

individual characteristics, and also adapts simultaneously with covariance of consumers and items. To achieve web personalization, we need algorithms that respond to the user actions in real-time and they can perform analysis on data stored in the data base.[1] The web pages that present the personalization content and the algorithms that work behind should be able to function adaptively with respect to dynamically changing consumer behavior.

In our implementation, first of all we collect individual data about the user's ratings on products together with the user profile data available from registration and stored in the data base. Then, when a web page is requested the algorithms enter in action. We perform analysis of the collected data and present accurate recommendations that are in harmony with user's interests.[2]

To do this, there were implemented more functions: Influence of sphere, Euclidean distance, object's coefficient based on similar interests user's rates. [3][4] We defined the Sphere of influence as an area over which a person has significant influence.
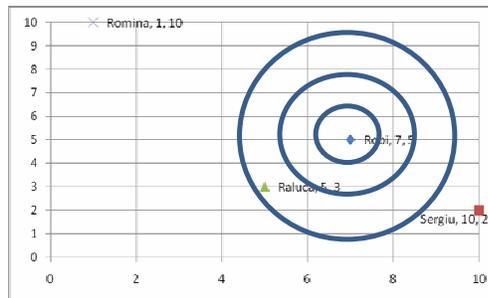
To calculate this sphere of influence we have as inputs:

- the target person
- the number of persons most close to the target person (because we don't want to emit recommendations based on all persons)
- An array list that contains the users and their opinions on different products

In the sphere of influence calculus we will use the Euclidean distance to discover the most similar preferences.

The Euclidean distance is the "ordinary" distance between two points. We defined the Euclidean distance between 2 persons a and b, for 2 objects x and y as $D(a,b) = \sqrt{(x_a - x_b)^2 + (y_a - y_b)^2}$

And the general case, Euclidean distance between 2 persons and n common objects: $D(a,b) = \sqrt{(ob1_a - ob1_b)^2 + (ob2_a - ob2_b)^2 + ... + (obn_a - obn_b)^2}$

The Euclidean distance function will return a similarity coefficient *coefsim*. After we calculate the sphere of influence we know the persons that have the similarity closest to the target person. We have to see now the score for each object, which will be shown to our target person depending on how the each

person - from the influence sphere - rate that object (*calif*). It will be taken in consideration only the persons that rated that object. So for each object will be calculate only one coefficient *score*:

$$score = \frac{\sum (calif * coefsim)}{\sum coefsim}$$

We can now show the recommendations through another function that use the influence sphere results and pairs of objects and scores. These pairs are what the user will see on the screen.

3. CONCLUSIONS AND FURTHER STUDIES

Further studies:

- Learning to make reasonable recommendations based on limited data, when we have to deal with a new user or new items
- Continuously improving the recommendations
- Adapting the content to changes in situations like complemented products and enter cross-sell opportunities

By implementing these algorithms we enable site users to quickly find relevant content, increase the conversion from occasional visitor to constant visitor.

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