Collaborative Applications in the Knowledge Based Society

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***Abstract**: The paper presents the process of acquiring knowledge. The evolution of the human society is presented from the resource exploitation and industrialization to the information society and the knowledge based society. On the basis of the knowledge society and the information one is the computing and communication technologies evolution. In knowledge-based society manifest many types of trends of which the most important are manifested in the economic, technological and social fields. Social trends are favored by the massive development of communication technologies and lower costs for them. The economy is noted the concern for saving resources and increasing process efficiency. To meet the accelerated pace of development of society technologies must evolve. In the new society, knowledge is the most important resource. Through the implementation of knowledge into products and services these record very high quality increase with low cost. In knowledge society the collaborative applications appear as a new way of solving problems with high efficiency. These are formed by special components that other types of applications don't need to include. There are also many collaborative environment specific features that these applications must possess. The collaborative applications are very important for the automation of tasks and processes within companies.*

***Keywords**: knowledge, society, economic trends, technology, social trends, collaborative applications.*

1. Introduction

Knowledge-based society requires reorientation processes prevalent in natural resources exploitation, human factors and information technology towards the knowledge. Human society arose from labor specialization and trade development. Since ancient times people have exploited natural resources in various forms such as fishing, hunting, agriculture and mining. Natural resources have long been a basis for the development of human society. The emergence of the steam engine led to revolution and industrial development. Internal combustion engine and electricity have opened new doors to the evolution of society.

An important role in this evolution is having microprocessor development. Industry computing equipment and software has seen an explosion, and the resource implications of this are huge. Involvement of computing and communication equipment and software in the branches of world economy has increased productivity, labor optimization, increase product quality and reduce costs. After implementation in all economic processes, it is difficult to obtain further qualitative or quantitative increase without consuming large resources. Further increases are made by new visions of things and processes. Knowledge based society achieved these increases by using knowledge gained while in the performance of existing products and services.

Knowledge is the psychological result of perception, learning and reasoning [1]. Perception is the initial stage of obtaining knowledge. This requires observing the environment and actors. Knowing what the environment offers opportunities to observe and exploit development. Environmental perception was high time a predominant concern of

humankind. Identification of natural resources and their exploitation is stretched in a long history. Exploitation of natural resources has led to the need to observe environmental and players especially in situations where they conflict with the interests of the observer.

Learning involves accumulating information from past experiences and their practical application. Learning to materialize in acquiring new skills or improve existing skills. Improving skills led to the processing resources and refining results to get more and better. Using information from past experiences allow people to be more efficient to operate more resources, to better exploit the resources used to grow on them. Improving skills in the environment that allows players at the same time, to achieve better results quantitatively or qualitatively, or to achieve the same result is reduced the time required.

Judgments based on information accumulated result in knowledge. Knowledge allows us resolve problems using completely innovative approaches. Knowledge led to services on the market. Services are both exploiting the skills and knowledge they provide. After the exploitation of natural resources followed a period of exploitation of the human resources. Human skills are those that make the difference between getting a quality product or a product of inferior quality. Quality is defined as the extent to which a product meets specifications explicitly expressed, so far as is consistent with specified standards and implicit characteristics as it fulfills its nature [2]. Product quality is so given by the extent to which individuals who have achieved the skills necessary to meet product specifications explicitly expressed, know the standards specified for that and also know and are able to provide default characteristics of the product at levels at least accepted.

2. Social trends

Knowledge workers are a new category of labor [3]. They are very good people who can interpret data from a specific area [4]. Being well prepared can come up with good solutions of problems in a very short time. The training of these individuals allows them to adapt easily to new situations and resolve them quickly and efficiently. The one person with knowledge of working longer, it becomes even more efficient and can solve a wide range of issues while lower. Knowledge workers must be in permanent contact with each other to ensure that the transfer made both explicit and tacit knowledge. By making these knowledge transfers they become better and better in the quick resolution of problems. Since these workers solve very important and very difficult tasks for other categories of workers, their value for companies is very high. To maintain them inside, the company must create a suitable environment for them, enable interaction with other knowledge workers, and the time for solving the problems must not be very large. They must be given freedom to solve problems as they see fit. After the frame problem is developed by knowledge workers, team builds a final solution based on skeletal and guidance from the creator. This approach allows the individual to solve several problems at once and have enough time to exchange knowledge with colleagues.

Educating people on the use of green products is another trend that is evident. Organic products, if not used by people have real value. To increase the use of green products and services are made numerous media campaigns. Organic products bring many benefits to both individuals who use them and society as a whole. In the long term the health level grows at the individual level and in whole. Ground and air quality is improved by practicing organic farming. Provide environmental services, while an increase in the quality of the environment by reducing noxious. By using organic products lower user costs because it no longer had to remove as large a quantity of waste. Organic products do not cause nuisance or cause a very

small amount compared to products that perform the same function but are earlier generations.

Educating people for a healthy lifestyle is evident in numerous campaigns on health and lifestyle. Numerous studies in the medical field prove that most diseases are preventable if lifestyle of the individual obeys certain rules. Proper nutrition is one of the main problems of individuals. They are not eating enough or not eating when you should be eating not to be. Insufficiency in food occurs in three forms: caloric failure, impairment of the necessary elements the body, a combination of the two. Insufficient energy implies that the individual consumes fewer calories than burned. This leads over time to weaken the body and thus the potential for disease. The lack of necessary elements for the body assumes that although the individual consumes enough calories, it has a deficit of vitamins, proteins, carbohydrates or other necessary substances. This leads to the emergence of specific diseases for lack of vital elements. The most common disease is scurvy, caused by lack of vitamin C in the body. This occurs most often in winter when consumption of fruit and vegetables is low. Lack critical elements of the body also lead to disorders of the glands. The third case involves a combination of the two above. The individual does not consume enough calories and also does not provide the necessary vitamins, proteins and other elements.

The society acknowledges the seriousness of climate issues facing the planet and tries to take measures to remedy the situation. Courses of action are: preventing undesirable effects caused by existing climate changes and improve the existing situation. Primary method of improving the situation which would be applied is reducing emissions. Countries now know a great industrial development, such as China and India are reluctant to regard such measures as green technologies would require a very high cost and pace of development would decrease. Environmental technologies, although it represents a high initial investment in the future have the benefit of a stable and sustainable.

3. Economic trends

Virtualization business process involves passing the information flow of business processes of traditional forms of physical support in virtual form without physical support. Documents circulating in companies of any transaction that occurs are now automatically handled by computer systems. Automatic document management benefit the speed of operations performed, the degree of documentation, level of detail, easy identification of transmission, cost reduction, increased availability. Interoperability companies is also increased because orders are automatically taken cars out products required in the appropriate amount, then they are packaged and sent to the customer automatically, easy connection to the Internet enables virtualization of data flow between companies. Distributed applications communicate with each other and operators have real-time stock situations, resources, times, progress made, customers, processes, projections. The real situation of stocks at any time allow management to decide the best time to purchase materials or to set up their computer applications to order resources automatically when the stock reaches a critical threshold.

The emergence of global markets is a direct consequence of technological development. The development of global markets is possible because there are no boundaries for access to information. This allows virtual stores to present products in an interactive and users can buy regardless of location, culture or occupation. Limitations imposed by boundaries were often causes of major conflicts in history. When a market becomes saturated, producers are looking for other markets to sell their product. Manufacturers' benefits lowers because of costs incurred by market research, product transport, rent paid for storage facilities, product quality losses incurred during transportation. Virtual markets have these

disadvantages, the manufacturer presents the product line through a web application. Customers access the application and place orders, products are selected from stock company and the customer order is delivered. This way are avoided many of the costs incurred by a new real market access. Access time is also very low for both producer and customer. Lower cost of production also leads to lower final price and thus to greater customer satisfaction.

Energy conservation is a knowledge-based society ongoing concern of equipment manufacturers. Both industrial equipment manufacturers and electronics manufacturers realize the need for energy conservation and renewable energy orientation [5]. Development of hybrid cars, developing technologies to reduce energy consumption in electronics, improved production technologies for renewable energy are areas where you go. Car makers are gradually closing the fuel-intensive models and incorporated into automotive components leading to lower consumption and better performance. The transition from traditional engines to hybrid engines is achieved for both business models and for the top. Hybrid engines use electricity to move the car in normal traffic conditions. If you need high performance engine is in operation and traditional. In normal traffic conditions traditional engine generates electricity to operate the electric motor. The effectiveness of this combination is very high fuel consumption recorded was much lower than cars operating exclusively with traditional engines. Reducing energy consumption in electronic equipment is also an ongoing concern. For computers, the largest energy consumers of the system are processors and video cards.

Reducing harmful emissions shows that the company pursues sustainable development. The global warming is increasingly felt, and mankind is increasingly aware of this problem. To combat it is necessary to reduce emissions. The main gas emitters are power industry, mining industry, other industries, cars. Energy industry orients its' energy production to clean and renewable sources such as wind, hydropower, nuclear energy. Mining is a major producer of noxious gas and solid. Clear rules in this area should lead to a reduction in both types of waste and their proper management. Industries with high emissions of particles are required by new laws to limit emissions by installing filters and toxic emissions reduction technologies. Shift in the car to hybrid engines and then to the purely electric. A world of harm reduction project involves the maximum amount of particulate matter that is issued each year. This amount is divided among the states of the world and they agree on a price per unit of particulate matter emitted. Within each country buys quantities of noxious companies that issue fixed price paid to the State. Funds from the sale of noxious emissions permit are used for development and acquisition of technologies to improve air quality.

Concern for organic products has led to the emergence of organic farming [6]. This is achieved without use of pesticides, insecticides and chemical fertilizers. Quality of products produced by organic farming is very high. User requirements for organic products are very high and therefore this type of farming assumption that the products obtained are of the highest quality, the process cannot continue. The EU encourages organic farming by providing grants to farmers. Product quality is observed as the funding projects must meet quality standards imposed by the European Union. Organic farming leads to soil improvement and its possible long-term operation as supportability limit is not exceeded. Organic farming also allows regeneration of all the resources they use.

Resource intensive process outsourcing is imposed as a cost reduction measure. Companies increasingly rely on outsourcing more resource-intensive processes to other companies, specialized in that type of process. Outsourcing leads to a saving of resources for the company concerned. The principle of specialization is increasingly applied by market players to reduce costs. Companies fail to perform specialized tasks faster and consume fewer resources. Quality of services provided by specialized companies is also higher than the same service in the domestic version. Outsourcing also brings potential advantage concentrate

efforts on key objectives for the company long term, where most trials are outsourced, the company management has more time to analyze data and make decisions on the direction and future goals.

4. Technological trends

Communications infrastructure development has led to the possibility to transmit very large data streams. Video transmissions are services that require high bandwidth. High definition digital TV became a reality and Internet access is possible at any point on the planet at very low costs. Software complexity has increased and also the input files and output files have size and high complexity. Transferring files and applications on the Internet has become a common practice and the number of Internet users increases every year. Continued development of communication technology allows up that fast pace of information transfer. Increasing complexity of software has advantages and disadvantages. The biggest advantage is the ability to present more detailed results, more understandable, clearer and more accurate. The main disadvantage is the difficulty of achieving these products to meet quality standards. The resulting software complexity is higher, the more difficult to manage project implementation and the more there may be problems in implementation. The project manager must have vision, the overview of the final product so that it can guide the team to obtain it. A good project manager guides the team so that resource and time constraints are met and the final product has the necessary quality characteristics and the customer is satisfied.

Developing citizen oriented applications appears as a necessity in society based on knowledge [7]. Development of database technology, multimedia communications and enables development of applications oriented citizen. This new class of applications is central to the citizen, the requirements and needs. These applications are made only after detailed study of the target group. Citizen oriented applications are distributed applications to be available online as permanent and also to enable rapid updates to reflect reality for all users simultaneously. The development of these applications requires changes in the development cycle classic to reflect the needs and demands of users and ensure a high level of quality. Citizens, given their diversity, are considered to be persons without prior training in informatics and so applications must be made so that they may use without problems. Citizen orientation is of high priority for areas in which people use very large applications. E-government, e-vote, pay taxes, are areas where almost all citizens are involved and use the applications made available by the administration.

5. Distributed collaborative applications

The collaborative term is one that appeared after the massive development of the communications technologies. Collaboration between human beings assumes the interchange of information. When a team is assigned a project, the work that will be done is collaborative, but the team members are not spread so they can communicate easily. When the team members are distributed within a huge geographical area, the communication issue tends to be more complex. Tools that automate communication processes have been developed after the wide spread of computer networks and these make the work of team members easier. A collaborative system is formed by the common goal, common resources, communication tools and the team members.

Fig. 1. Collaborative system

Fig. 1 shows the components of a collaborative system. The common goal is one thing that can't lack in the system. If the common goal is lacking we can't talk any more of a collaborative system as each actor acts as an independent entity pursuing its own goals. The common goal is defined as the output of the project. It might take the form of a product, a service, a design, a process. The output of the project must fulfill the customer's specifications and expectations.

Common resources are allocated for the whole project and all team members must share them. In a project there are many types of resources. The human resources of a reengineering process in a collaborative system consist of the team members and project managers. The human resources are not to be shared between team members as they can't directly use other team members to do their activities. The resources that can be shared are materials, prime matter, equipments. These form a common resource pool that is accessed by all actors within the project. The resource manager is the one responsible for giving access to resources on the bases of the needs [8]. The resource pool must be used as efficient as possible to shorten the time everyone gets the resources they need and start producing. If the same resource is needed by more than one actor at the same time, the activities dependencies are taken into account when giving access to resources so that the workflow is optimized in report with execution time. If the dependencies of resources are not taken into account, an interlock of resources can occur as actors lock them in order to fulfill the goal of the activity, but their activity depends of an activity that needs the same resource and can't be finalized as the resource has been locked. The resource manager must be extra-cautious when assigning resources so that such interlocks don't occur.

Communication tools are very important within the team as these shorten the time needed for the information to be distributed among all team members. These tools are used for the exchange of messages, files and data. E-mail is one of the most known and used mean of transmission of information. Instant messaging is another service widely used by individuals to communicate short messages and solve small issues. Telephony is another comfortable mean of communication but the costs are usually higher than for e-mail or instant messaging. Telephony has the advantage of reaching the person more quickly than the other two. Electronic calendars are also good means of communicating deadlines and work in progress. Common calendars for all team members allow synchronization and short times of idleness.

Team members are the actors that share resources, communicate and complete activities in order to reach the common goal. These actors are assigned activities by the resource manager on the bases of their skills and competences [9]. The communication between team members is vital for the ongoing of the project they are all implied in. The lack of the communication between the team members manifests as delays in activities deadlines and dead times waiting for resources to unlock.

The informatics applications used in a collaborative environment have some particularities that are needed in order to fulfill the needs of the users. Regular applications can be used in such an environment after they have been modified to support the following:

- Save and e-mail function that ensures an increase in efficiency as the user no longer has to do two different activities but only one [10]; this also ensures that the user doesn't forget to e-mail the results to the interested persons;
- Communication means with the team members such as the ability to send messages, data files, reminders; this is vital in a collaborative environment as team members must change information very often to ensure a smooth ongoing of the project they are implied in [11];
- Centralized storage of files so that any user accessing a file has the last version of it; the centralized storage area ensures versioning of files and also the last versions for all users but also has the disadvantage of being vulnerable to attacks and malfunctioning; in order to solve this thread, the centralized storage area must be backed-up;
- Document management features are a must as every piece of information within a company must be accompanied by additional documents; the documents and information must be sent to different persons within the company;
- Meta data addition to normal documents and data files ensures the possibility to manage easily the documents and files using different criteria; finding data in the documents is done more easily as only some domains of data defined by a certain criterion must be searched within; also the meta data stores information about the persons that manipulated the document or file in time;
- Result reporting features are important for the evaluation of the project's progress; progress reports are important both in terms of total and partial achievements; the project's progress can be assessed by computing an aggregated indicator based on the partial progress of activities and the estimated time that has been allocated for each of them;
- Planning facilities that help the users stay focused on their work and activities; by planning the work and sticking to the plan, the team member fulfills deadlines and the outcomes have a high quality; sticking to the plan also gets the user accustomed to a certain work style and rhythm; this leads to the possibility of estimating better time needed for the future projects the team is assigned.

The applications that are used in the collaborative environment have some special needs. These needs are given by the multitude of requirements the users have. The requirements aim mostly the infrastructure but not only:

- Computer networks are needed for the transmission of messages and files; the save and e-mail function can't be used unless the computer the user works on has access to a network and a mail server;
- Communication is impossible if the network is not functional or there is no central server; a central server of communication is required within the company to ensure safe and cheap communication between the members of the teams; the voice-over-IP service is supplied for free by some servers; this is a way of ensuring very cheap voice communication within the company; a mail server is also needed as the files sent over e-mail are internal documents and must not be the subject of attacks;
- A central file storage server is needed to fulfill the space needs of users; this server must also have large bandwidth in order to be able to satisfy all the users in pleasing times; a second server for the back-up function is also required;
- A document management dedicated system is a must for large companies with hundreds of thousands of documents each year; the searching abilities of the server must be powerful enough to satisfy all requests; meta-data is a good way of narrowing the searching area;

- A database server for the authentication of users is also required; all resources are assigned and unlocked for users only after their authentication and authorization; in the lack of an authentication mechanism there are no measures of limiting file access and resource allocation.

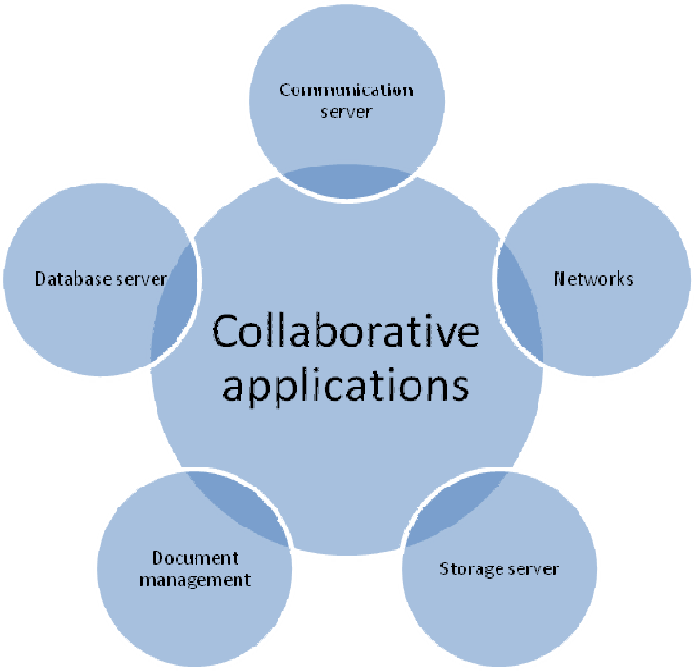

Fig. 2. Requirements of collaborative applications

Fig. 2 gathers all the requirements of the collaborative applications in a graphical form. All these are important for the functioning of the applications and the lack of any of them leads to the malfunctioning of the collaborative environment.

6. Conclusions

Knowledge-based society tends towards sustainable development. Environmental conservation by reducing harmful emissions certifies the need for a sustainable environment. Trends in knowledge-based society are: virtualization process, the occurrence of knowledge workers, the emergence of global markets, huge flows of data, development of multimedia technologies, to the database, energy conservation, reducing harmful emissions, educating the population on the use of organic products, concern for climate change, resources outsourcing process-intensive, organic farming, educating people on healthy lifestyles, eliminating high-risk components, implementation of many data warehousing, application development oriented national, online payments, knowledge based companies, teamwork. Knowledge gains increasing importance for human society. People who work with knowledge are increasingly sought and valued by companies. In knowledge society the collaborative applications appear as a new way of solving problems with high efficiency. These are formed by special components that other types of applications don't need to include. There are also many collaborative environment specific features that these applications must possess. The collaborative applications are very important for the automation of tasks and processes within companies. Future trends in the collaborative environment aim at strengthening the bonds

between applications and the degree of automation. More effective tools and features are to be developed and implemented once their efficiency is proven.

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