COLABORATIVE E-BUSINESS AND SOFTWARE AGENTS

E-BUSINESS COLABORATIVO Y AGENTES DE SOFTWARE

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ABSTRACT

The paper proposes the functions for two new agents in collaboration e-business, since we know that collaborative processes are growing up and we have a large way to work on researches about e-business. The start point is after we identify collaboration among people, processes and systems, we believe that each important process of the organization during its daily routine has two elements like context and content joined to the process. Then, we can understand those processes are important when you look at them as a result for another one and it can resolve a specific problem. We want to get the ability to collaborate and leverage the knowledge. We have been based the analysis on the intangibles assets joined with the technology in order to build a design to understand the collaborative e-business processes. We present the results of the process and collaboration that already exist between themselves each time when a task has been started, in order to obtain new knowledge. To do that, we are based in new DirCCI model for collaboration of intellectual capital, where the business needs and collaboration are defined and then we propose the concepts to design and understand the main elements of the new system. The result is a new way to understand collaboration based on software agents in order to gain significant and sustainable competitive advantage and knowledge management in the organizations and now we should think in how help people, processes and systems to think about virtual decisions through e-business.

Key words.- Collaborative system, Intellectual capital, Agents for collaborative e-business.

RESUMEN

El articulo propone funciones para dos nuevos agentes en un ambiente colaborativo e-business. Sabemos que los procesos de colaboración están creciendo y tenemos un largo camino para trabajar en investigaciones sobre e-business. El punto de inicio es, después de identificar la colaboración entre personas, procesos y sistemas; creemos que cada proceso importante de la organización en su rutina diaria tiene dos elementos, como el contexto y el contenido unido a sí mismo. Entonces podemos entender que esos procesos son importantes cuando los miramos como el resultado de otro proceso y que puede resolver un problema. Deseamos obtener la habilidad de colaborar y apalancar el conocimiento. Hemos basado el análisis en activos intangibles unidos a la tecnología que permiten construir un diseño para entender el proceso de colaboración e-business. Presentamos los resultados del proceso y colaboración que ya existe entre ellos mismos cada vez que una tarea ha sido iniciada para obtener nuevo conocimiento. Para hacer esto nos basamos en el modelo DirCCI de colaboración de capital Intelectual, donde las necesidades del negocio y la colaboración son definidas y entonces proponemos los conceptos para diseñar y entender los elementos principales del nuevo sistema. El resultado es una nueva forma de entender la colaboración basada en agentes de software para obtener ganancia, ventaja competitiva sostenible y gestión del conocimiento en las organizaciones. Ahora deberemos pensar en cómo las personas, procesos y sistemas piensan acerca de sus decisiones virtuales a través del e-business.

Palabras clave.- Sistema colaborativo, Capital intelectual, Agentes para la colaboración e-business.

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INTRODUCTION

We know that traditional collaboration is good, and with technology we can help organizations to improve their work. We can look the past in this way: "Collaboration is a behavior, and not a new behavior at that!. Humans have used tools to collaborate since the dawn of time (smoke signals, carrier pigeon, telegraph, telephone), so what is different new?" [6]. The first answer is the Internet, infrastructure and tools. But previous researches show that there currently exist some limitations in collaborative tools, because they enable groups to communicate and coordinate but do not target critical processes. In other hand the traditional c-business is designed for actors send and receive information of the systems when they want, we think that is not enough. We believe in a new theory which the system must identify the moment when the process needs collaboration and information without it waits for a specific request. We propose it may happen when the process starts if we can analyze the workflow and previous rules of the business in each situation.

We think that business processes are a part of a major system, this system is called Intellectual Capital (IC). IC identifies human capital and the transformation processes towards others resources like structural capital and relational capital. The research presents a new collaboration system, in order to understand the concept of Intellectual Capital (IC), into a model that joins the approach of information systems and e-business concepts. The initial point is that e-business usually has high information systems in use like CRM, ERP o SCM. Our approach is to identify the collaboration needs inside the processes and others tasks of the daily routine. To identify collaboration needs we propose use software agents. The first agent can be designed to obtain the process needs just in the moment when they are happening; to do that, we need the previous support of workflow process and information systems. Then for the second part, in order to give an action to the system or some advices for a decision, the research propose another agent which must do the analysis of environment and it will obtain the development actions for each process.

The main advantage of the research is the analysis and development of the new DirCCI model (Management and Collaboration in Intellectual Capital, in Spanish is "Dirección y Colaboración del Capital Intelectual - DirCCI") [2]. The model shows the concept design of the collaboration system under the approach of information systems joined to the elements and the transformation processes of the resources of intellectual capital.

COLLABORATIVE PROCESSES

We present three basics concepts: (a) How to look at e-business in the present and future; (b) the user requirements and the collaboration in organizations.

How to look at e-business?

For researchers at Collaborative Strategies, the interactions are augment since, we as humans, have established a context for our relationship and a level of trust, it is much easier to carry on that relationship electronically. Also we know that collaboration is critical when there needs to be an ongoing exchange of complex information between two or more people [6]. In other hand we know that the organization obtains the business intelligence when it can understand the role of each element in the global performance:

1) Integration B2B;
2) Personalized software;
3) Information management;
4) Security;
5) Quality service, etc.

For many years organizations have had trouble to work together, that's why the most viable way for the organizations work together was the acquisition of one for another. Now we have a new opportunity to work in harmony [12]:

Delivery through independent business.- *E*each one with the own users and systems.

Deals with spanning independent businesses.- Each with its own set of applications and users, each one interoperates with heterogeneous systems without being tied to one specific system technology.

The best examples of integration are in a family business, where the leader of the family supplies the activities and always he (or she) helps to resolve the problems, processes and also gives different ways of collaboration, it is getting very

good results. A strong culture is needed to do that and the business itself identifies as a part of the market and specific supply. We know that the value chains B2B is the process of moving goods from customer order through the raw materials, supply, production, and the distribution of products to the customer. The new A2Z approach connects all the links of value chain via partnership, the link would be turned from physical connections to digital ones. You can obtain clear visibility of each stage of business process [1 y 11]. The link involves all activities from the requirements to register needs of functional areas, problems and solutions, until the end of the processes.

Users requirements

We show some selected factors from two viewpoints common to many organizations. The factors have seen from both end users and vendors of technology. These factors are critical to the successful adoption of collaborative technology [7]. The selected factors are:

From the end users

Collaboration technology projects.- Need to be tied to specific and important business needs by the actual users of the technology.

Clear business processes exist.- Are well defined, and are compatible with the technology. Then from the vendors.

Usage is growing.- But key decision-makers are not convinced of the effectiveness of the technology.

Although tied to a clear business needs and a metric showing success where it is used.- People who otherwise would use it are instead claiming they do not have time to learn how.

We have others problems called cultural factors. For the propose of this research we agree with the authors when they say that these factors "are usually hidden, difficult to address, and boil down to not only changing the technology, but also creating changes in the organizational culture simultaneously with the introduction of collaborative technology" [7].

Collaboration in organization

"Collaboration is a term that is often misused as a technology and marketing 'buzz word'. And the most of tools do not support either collaboration or coordination but often only different types of communication or only the ability to access specific data" [6]. We need understand the three aspects of collaboration: content, context and process [9]. For us the definition is:

We have a problem.- That needs one or more process to resolve.

Theses processes have activities.- As a context and the information which will be transformed is the content. See Figure 1.

If we think that in the business world the collaborative processes are often highly negotiated, geographically distributed, and highly sensitive, and they are more vulnerable to error in execution, then the results consume more time, effort and resources; now we are ready to think in a new way of collaboration. In otherwise we know that not all things have been identified and the researchers know that there exists a collaboration that they have not found.

So due collaboration was forgotten for a long time, and some papers have appeared, we need a model to understand it.
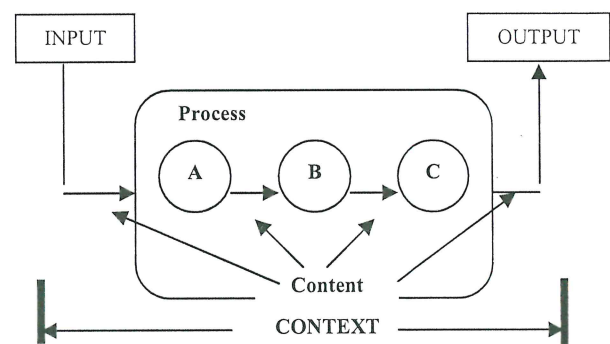

Fig. 1 Collaboration aspects. Source: Own.

A new system is defined for give collaboration to the processes in order to obtain the performance for intellectual capital system, and then we are ready to developed news e-commerce applications for the news activities. The collaborative system is a new way to use the technology software.

The model has three main parts (Figure 2): the top, the middle and the low part, based on Intellect model [3 and 5].
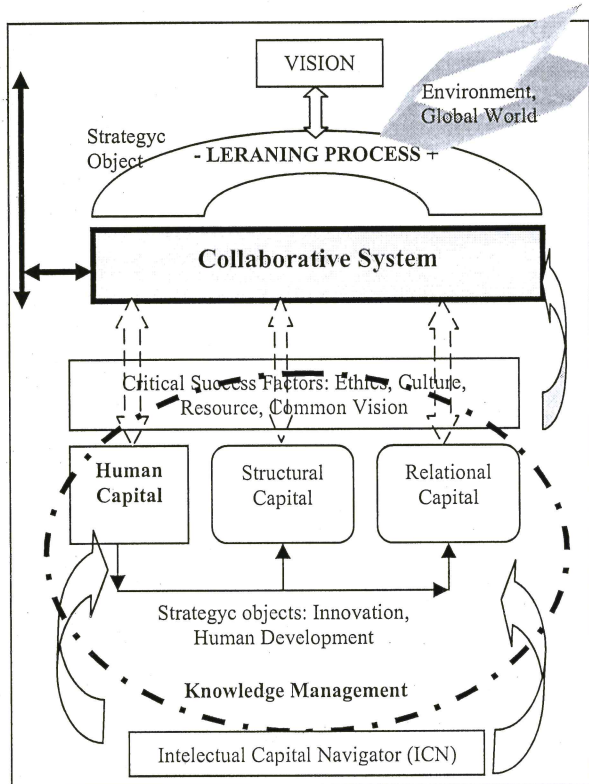

Fig. 2 DirCCI Model. *Source: Own.*

In the top we see:

1) The management as an entity;
2) The intellectual capital as a result of learning;
3) The environment which always gives different changes or rules.

In the middle we look the collaborative system as the main component gives instructions, actions and help the decision. This new system is based on software agents. One agent is designed to look the environment and internal processes; it will identify when a task start. Then the agent may resolve the critical factor for success in order to deploy the solution to one specific process.

A second agent is designed to resolve a process task, its work is evaluates the best way to make each task in order to decide which information is needed from the processes rules. In the low part we

can identify the intellectual capital based on transformation processes from human resources to structural capital and relational capital.

It's here when organization creates knowledge and the most important elements are the innovation, the competitive skills and development of people. The transformation processes are studied in another research called intellectual capital navigator [10].

We can say that this transformation is based on rules that we call "workflow".

COLLABORATIVE SYSTEM

We have some collaborative tools like FileNet, eRoom, and Collabrix, they were developed to solve a very targeted problem: in the case of eRoom, an easy-to-use virtual team solution, for FileNet, an EIM (Enterprise Instants Messaging) and conference calling services to support application sharing, but now we need to create a value into a virtual space team or across a transaction-based business systems [9].

Also "Effective collaboration represents the most value, top-line gain for organizations today. It can unlock the potential of the collective knowledge and intellectual capital of a given organization, as well as its value network" [6].

The new system is based on information system and agents concepts like transaction-based business systems. We have two agents:

The main agent.- Is designed in order to look the environment and identifies when a task is started. Then the agent may resolve the critical factors for success in order to deploy the best solution for each process.

The second agent.- Is designed to complete the process, its work is evaluates the best way for each task in order to analyze the information from the previous expertise and process rules (Figure 3).

With these agents we can identify an explicit business process around a specific context, and then there is a new process to collaborate looking for coordination and interaction. The new processes are based in repositories where content and context like workflow rules are stored.
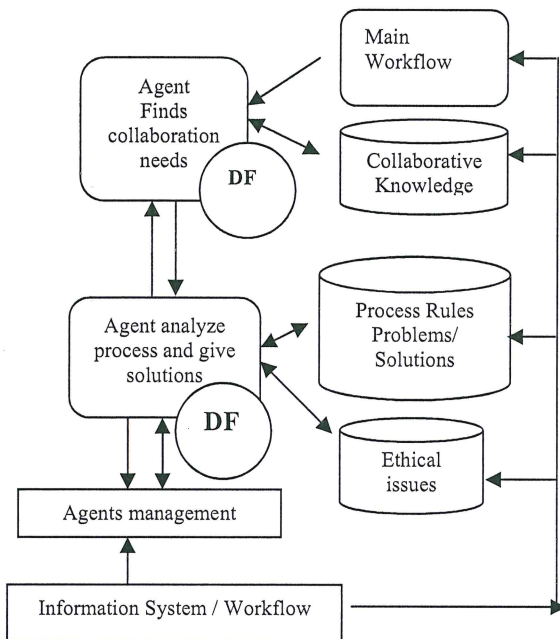
***Fig. 3** Collaborative processes. Source: Own.*

With these functions we want to give an answer to traditional problems that have identified such as: "...is usually not a single simple solution that can easily be identified" [7]. After identifying collaboration into the system, we can define the relation between intellectual capital and knowledge management:

1) Human capital is the source of knowledge;
2) An action over transformation process gives the performance and new knowledge towards all the system;
3) The new knowledge is ready for be registered and used. The knowledge is shared in organization and in order to obtain a successful goal.

Due to changes are so quickly in daily routine, we do not have enough time to analyze new situations, but the system has old and new experience in order to begin again. The relation is started with human activity, in any place where the needs have been created. Each activity may be registered in previous step, and the processes rules may be designed in workflow system. We have an important result in the transformation process between different parts of intellectual capital, this transformation process produce new knowledge [4].

The agents are defined for:

1) To identify status of the process, look for starting and ending processes points;
2) Analyze previous and similar processes;
3) Analyze problems in previous processes;
4) Analyze new problems with available information;
5) Preparing recommendations and send to executor;
6) Registering the results of the process.

For example, now the functions of the each agent are:

1) Agent which find task and process needs.

    a) Search and find when a task starts, inside a specific context;
    b) Identifying who starts task
    c) Obtaining information about process
    d) Obtaining information about main objectives
    e) Match with the rules of workflow and to obtain next sequence;
    f) Delivery to second agent, based on previous experiences and rules;

2) Agent who analyzes process and give the best solution

    g) Just receive the previous results from the first agent and evaluate the alternatives in order to give the best solutions:
        (g.1.) attention process,
        (g.2.) common problems
        (g.3.) complex problems,
        (g.4.) recommended solutions;
    h) For example it evaluates if exist new problems for resolve or the action needs more information. When the response is positive, the agent analyzes:
        (h.1.) other recommended solution,
        (h.2.) formal reports,
        (h.3.) changes in the environment,
        (h.4.) other main information;
    i) Prepare actions
    j) Delivery actions
    k) Prepare a final report;
    l) Learning process for agent.

The benefits are in the way and performance when each process is executed. Some of the particular results are in Table 1.

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Table 1. *Options for each process without collaboration.*

Receptor	Executor
Initial activity, may delivery	Must be solve
If need collaboration, but not to ask for	May or not to need collaboration
Resolved	Resolved
Possible mistake	Possible mistake

The result is a new model for collaborative e-business keeps the main elements when the organization needs important processes like SCM, CRM an ERP, but now we have a new approach. We introduce a collaborative system which it has an intermediate function before makes the decision. This new system has two entire points, first the requirements of human capital and the rules of the processes. After do that, the results are new transformations over the structural capital and relational capital (Figure 4).

We know that a possible mistake is always a bad situation, because experience shows that more than 50% of possible mistakes ending in problems, and then people must start again with new resources and new time, and the worse situation is loses the credibility and loyalty from the users and the customs.
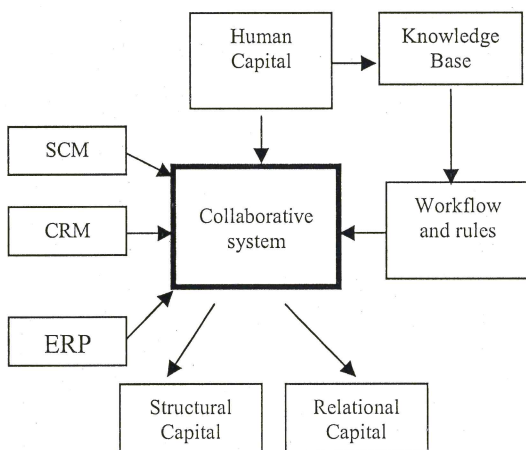

Fig. 4 *Collaborative concepts for e-business. Source: Own.*

Now with the collaboration system we can to resolve any situation, common or complex, without

lose time and improvement performance. We are analyzing all different situations, those will be improving with the new system, but previous results are in Table 2.

Table 2. *Performance around collaborative system.*

	Common problems	Complex problems
Alone	Must be solve	Must be solve
Alone	May or not to askfor help	Must ask forhelp
Alone	Resolve without help	Resolve without help
Alone	It can or not to haserrors	With errors
Collaborative system	Resolve with help, without errors	Resolve withhelp, withouterrors

This example of performance will have a better measurement with the development of e-business activities, like supply chain management (SCM), customer relationship management (CRM) or enterprise resource planning (ERP).

EXPECTING RESULTS

We are having answers to some requirements called collaborative problems, like:

1) *Tracking down content;*
2) *It Help people in critical information;*
3) *Ensuring that task are being completed properly.*

That's why we need a robust application based on modules that allow organizations to manage critical business interaction. Now, we need that the members of their value chain can interact with information and processes of their day to day business but with rapid speed and very high efficiency, then we are looking for the trend in order to obtain previous results like:

1) Real time process and synchronous work between actors of the value chain;
2) Create a learning curve for rapid productivity;
3) A holistic approach to challenges of collaboration, between people, processes and systems. We think this is the point to create intelligence in collaborative e-business.

In other hand in looking for the value of collaboration within an organization, we have to look at artifacts, like time and money, which are better with a new collaboration process. We propose to translate some human behavior to systems, and we think we have better results across the organization. It is possible when we are able to produce rich information for decision making and capture best practices for future situations like the Collaborative Project Portfolio Management [8], but now these functions will have the ability for start to work in automatics ways.

CONCLUSIONS

We need to identify and to share information; also we need to capitalize the value of intellectual capital gained over the history of the client's relationship. We have recognized problems of collaborations in some activities inside the processes, like spending an inordinate amount of time looking for information, or documents, or contents or people expertise. But now theses activities can be improved with the technology of information systems and software agents. Since researchers worked for more than 20 years, each time is better the understanding of the knowledge management and use of the intangibles concepts like intellectual capital. From the approach of systems engineering we have the opportunity of design technological models in order to improve our processes each time doing new ways to get better results than now in our daily activities.

At the same time we know that knowledge management is present in each activity of people, organizations, processes and systems, and its value is in to obtain itself, to register itself, to analyze itself and finally to give to others users. People need to share knowledge, but in the most of the cases they aren't prepared for do that, because they feel that their knowledge is the source to keep their job and their reason to live. This concept will be changed in order to understand that the value of people is in the new skills for learning and development new ways to get a better performance.

In other hand we are working in a new system, first to identify collaboration needs, and second to see new ways for give collaboration based in software agents and information systems.

The system creates value while people put their experiences and knowledge about different problems and solutions, without fears, always having the main goal on the organization. This reflection presents new conditions for the success, like ethic, culture, transcendental motivation, that will be possible interchange with e-business processes. The new concepts will be development in order to improve the competitive advantage in the organization.

Finally, while we can think in new ways to create something, we are working in a major space for creation and innovation in each organization, because the reason for not do it is the complex and urgent activity of the daily routine. Now people can work in creation and R+D solutions.

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