Turkish Online Journal of Distance Education- TOJDE January 2000 ISSN 1302-6488 Volume: 1 Number: 1 Article No: 4

Business Processes for a Distributed Learning Environment

Hanns-Christian HANEBECK
Director Enterprise
Applications GlobeRanger.com
DALLAS, TEXAS-USA

INTRODUCTION

The corporate environment has been changing drastically in recent years. New and more sophisticated manufacturing strategies, higher levels of quality demand or the appearance of small and medium sized companies on a global stage are some indications of the changes currently taking place. How can these changes, which sometimes seem to be very surprising, be explained?

Figure: 1
Four global trends

There are four major trends, which are currently influencing the global professional community, and the way business is carried out. These trends are affecting every company in one way or the other. They are leading to the necessity to change the process organization in order to gain efficiency and to increase the internal as well as external flexibility.

The first major trend is the *Mass Customization,* which will necessitate an increased flexibility in the areas of manufacturing as well as marketing. In manufacturing it will become visible through the reduction of lot sizes towards smaller lots for reaching the break-even point between cost and revenue of a given product or variant. In marketing it will lead to the much more efficient utilization of new data gathering technologies like data warehouses, flexible customer response or individualized advertising. Both, the manufacturing and marketing technologies must go hand in hand if success is to be achieved.

The second trend, *Globalization*, can be observed across all industries and national boundaries. It leads to a necessity of increased flexibility in terms of geographic outreach and of managerial scope. Concerning the geographic outreach there are no longer single

national markets. One automobile company for example can produce its cars in South, Middle and North America, China, Eastern and Western European countries. It can sell to all major economies in the world and have design facilities reaching from Los Angeles (USA) to Milan (Italy). It truly is a global player in all steps of the value chain. The globalization in terms of managerial scope is based on the necessity to open up your own enterprise towards suppliers, customers and even erstwhile rivals. This phenomenon has recently been called virtual corporation, boundary less company or Continuous Acquisition and Life-cycle Support (CALS). Eventually it will force managers into adapting to this new and jet uncommon attitude to share skills as well as profits with their partners and rivals.

The rapid pace of *IT Innovations* is the third major trend. It has been accelerating in the last few years in a macro and micro perspective. The macro perspective relates to hard and software and the micro perspective to information itself. For the first Moor's Law (of a twofold increase in the number of transistors on a computer chip within every eighteen months) has proven true until today. It is almost impossible for a single individual to keep track of all the changes taking place in hard- as well as software development. Even to have a detailed knowledge of an ERP package such as *Baan IV Triton* or *SAP R/3* is impossible today. The complexity of information technology has become overwhelming and uncontrollable. Businesses will be affected by this trend in several ways. They will find it more and more difficult to allocate strategic chances resulting from new technologies such as parallel computing, intelligent agents or biochemical hard-disks. Furthermore it will be exceedingly difficult to find and maintain a sufficient staff of highly educated, professional IT personnel. Concerning the micro perspective the role of information as an economic good is becoming more and more important and at the same time it is more and more difficult to acquire. This will lead to the necessity to find intelligent and efficient ways to allocate and utilize information.

The changing *Corporate Environment* is the fourth major trend. Supported and partly forced by all of the above trends, it is concerned with the coping of the individual in changing conditions. For the past decade discontinuity has been one of the few things that stayed at a fairly high level. This trend affects every decision-maker in the business world for it increasingly requires to cope with faster changing conditions of the outside world in strategic and operational terms. The increased necessity to adopt to a different environment will lead to a new type of manager who will be more concerned about soft facts and weak signals than today. Team play and motivation of employees will become much more important in the future. The same holds true for the ability to decide and execute in minimum time. Also, this trend will lead to a shift of power from top to bottom giving most individuals in the company more responsibility.

The four global trends all lead to several generic implications. First, businesses today are forced to change towards a much higher customer-orientation concerning the way they produce goods and services. Second, these companies must change the way every individual (from top to bottom level) thinks, which has to result in a corporate culture that is open-minded and eager to change and to learn new things. Third, the overall process organization has to become much more flexible allowing changes of detailed level processes in all core business areas within hours time and not weeks as it is today. Fourth every enterprise has to open up its borders towards suppliers, customers and even rivals if they want to survive in the long run.

This could well be the horror scenario of executives in the near future. Management science and business world alike have been developing different concepts in recent years to adjust to the new market and technology driven situation. Early examples are Total Quality Management, Lean Management or Business Re-engineering. All of these concepts have in common that they are an effort to control complexity and to regain power. The fast moving outside world will force many corporations into focusing on their core competencies and into adopting much more flexible organizational structures. In

now calm industries the strategic opportunity to create motion and unrest will lead others into reorganizing towards a higher level of agility. As Wolfgang Tietze put it: „the corporation of the twenty-first century will be virtual ... it will be somebody who is sitting at home with six computers around and who is controlling different partners with ten billion dollars in material flows.

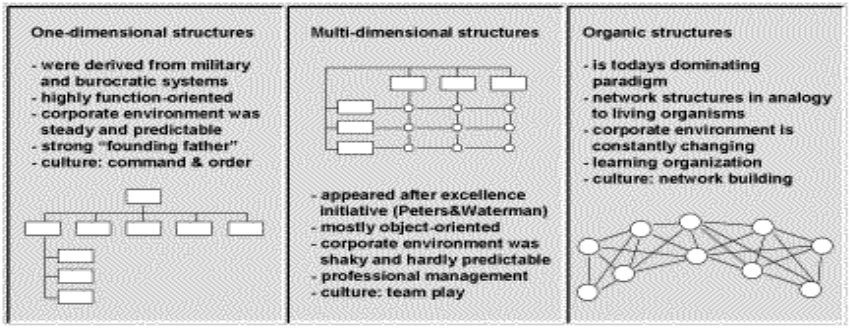

Figure: 2
Evolution of organizational structures

As figure 2 shows the gradual build-up of a company's environmental complexity have let to drastic changes in the organizational structure over time. From static and stable environments in the 1950's to the highly volatile ones today, the structures have followed by adjusting and thus, by creating more internal flexibility.

The current paradigm of organic structures has lead to an intensified build-up of internal and external corporate networks. These in turn will be dominated by two generic success factors: integration and communication.

The phenomenon of integration is mainly caused by the rise in external complexity. The external environment in many industries is becoming more and more volatile thus, any company operating in one of these industries must adjust by increasing its internal flexibility. On the one hand, the information technologies, which are supporting the increase in flexibility are highly integrated, e.g. storing every set of data just once on the system. On the other hand the interdependencies between different functional departments are gaining more importance. Both lead to information systems in which a change of data in one functional area directly affects several other functional areas.

The term communication in our context refers to the linking of enterprises which causes the need to communicate more and more intense. Here we have already seen the emergence of e-mail, voice-mail or video-conferencing recently. The need to communicate is also pressured by another development - the more autonomous workplace for many employees. With the need to gain flexibility, each participating human will gain in freedom to make her or his own decisions and to act as an agent to the company. The most dominant symbol of today's intensifying communication is certainly the Internet. It is growing in a breath-taking pace and is slowly becoming a vital part of our everyday business life. The slide above shows some of the implications the Internet forces upon us.

Following this brief introduction the next three parts of this paper will be concerned with the concept of organizational intelligence, with distributed business processes and with the enabling information systems.

First, organizational intelligence will be introduced by defining and detailing the concept. As was said earlier, the need to access, filter and evaluate the right information at the right time is one of the most important success factors to corporate survival in the future.

Second, distributed business processes will be defined and explained in order to develop and implement a "framework" for organizational intelligence. The business process structure can be utilized by teams working in different countries or on different continents as well as by networks of companies.

Third, an architecture for distributed information systems will be developed to show how the concepts of organizational intelligence and distributed business processes can be realized. This part will also provide an insight into the latest developments in information technologies.

ORGANIZATIONAL INTELLIGENCE

Consider the following scenario: Organizations are "distributed" knowledge systems - distributed not just in the sense that knowledge exists in various places throughout the organization, but in the sense that the knowledge is essentially indeterminate: Firms are faced with radical uncertainty.

They do not, they cannot, know what they need to know. An organization's knowledge is always emergent - it is not possessed by a single agent; it partly originates outside the organization; and it is never complete at any point. The organization is always recreating itself, as its members exercise their own judgments in different and particular circumstances.

The implication of this is for management? Given the distributed character of organizational knowledge, the key to achieving coordinated action does not so much depend on those 'higher up' collecting more and more knowledge, as on those 'lower down' finding more and more ways of getting connected and interrelating the knowledge each one has. A *knowledge base* is more than an information system, and the problem to be solved is not how to distribute information but to encourage a form of life, a community, in which individuals come to share an unarticulated background of common understandings.

This first section of this paper will focus on the concept of organizational intelligence. It can be understood as the ability of an organization to preserve its current knowledge, its ability to learn new knowledge and to apply this knowledge to all situations that it might face in competition.

The question on what intelligence could be or could not be has dominated the scientific discourse for quite a long time. Most of the existing definitions support the notion that intelligence has to do with mastering new challenges, with being intangible and with being comprised of a bundle of characteristics.

Besides being able to find answers, the quality of each answer is of critical importance. The corporate environment is becoming more and more volatile and thus, reacting fast is one of the most crucial elements of future success. Finding the right answers too late or wrong answers fast is irrelevant since both will not lead to sustained growth for the respective company.

This amounts to a more balanced equation of speed plus quality. With the decreasing times to market (concept to cash flow time) this combination will eventually gain importance. Those enterprises that manage to build up organizational intelligence will be the ones, which will become tomorrow leading companies.

Organizational intelligence is the ability of an organization to find answers to NEW questions. The value of this ability is expressed by the time it takes until an answer is found and in the quality of the answer itself.

Figure: 3
Organizational intelligence defined

Organizational intelligence is comprised of three elements or "ingredients": learning ability, memory and knowledge. These are related to each other in a continuous cycle. Once the organization gains an experience and thus learns, this experience has to be stored in order to be recaptured at a later point of time. With its storage, the experience become a part of the organizational knowledge and can, in turn, be used for all following learning experiences. The cycle repeats itself afterwards.

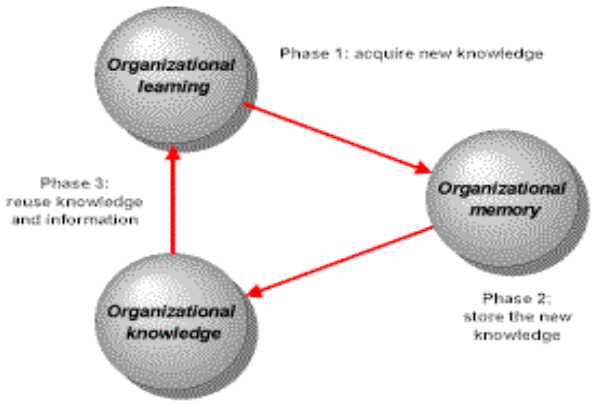

Figure: 4
"Ingredients" of organizational intelligence

Following the three "ingredients" will be briefly described.

The organizational ability to learn represents the maximum value of organizational learning.

Similar to individual learning it refers to the gain in experience and knowledge. But in its organizational context it is more than the sum of individual learning experiences, since the single individuals will also influence each other and thus can achieve a better (or sometimes worst) learning result.

The objects of learning can be everything that is encountered in the industry and business segment. A typical example is the learning of competitor behavior, substitute products, vendors and customers on the strategic level.

Organizational learning also refers to learning of detailed operational activities as the operation and maintenance of a specific machine.

Organizational memory is the starting point and the result of organizational learning.

It is, unlike the human brain, not located in just one place, but is "distributed across the organization. The organizational memory, of course, uses the individual brains of employees, but has to find other mechanisms of "storage" as well.

All hard disks within the company can be used as storage space for organizational knowledge and experiences. Here the concept of knowledge bases, specialized databases, which contain the collective knowledge of a group of people, is one first effort to preserve vital information within the organization even if the individual brain has long left the respective organization.

Organizational knowledge influences the behavior and actions of everybody within the organization.

How could you begin to think about the question of whether knowledge is being used efficiently in your organization? "Firms tend to form around product-knowledge constellations. Thus, an input-output matrix of knowledge inputs and product outputs for the economy would display broad product-knowledge clusters which correspond to industries - within which smaller clusters correspond to individual firms." A perfect congruence between what the firm knows and what it produces will never happen. The result? This mismatch creates opportunities for strategic alliances with other organizations, so that knowledge trading between partners can result in fuller utilization of knowledge.

VIRTUAL BUSINESS PROCESSES

The corporate environment has been changing drastically in recent years. Today the need to design, sell and redesign a company's products is more then ever a necessity rather than a strategic option. One possible way to achieve the required high speeds and best-in-class-value for customers is the concept of virtual corporations. In the next section, the business processes, which are applied in virtual corporations, will be shown.

The concept of virtual processes has by now been applied to the much more general context of companies working on a distributed basis. This can be a globally distributed department, a cooperation or joint venture between different companies or a flexible network of independently operation entities. Until today most companies have operated more or less autonomous and independent from each other. This fact will change drastically with the emergence and following exploitation of new network technologies like the World Wide Web. The concept of virtual corporations was first developed by Mowshowitz (Mowshowitz, A.: Social Dimensions of Office Automation, in: Yovitz, M.: Advances in Computers, 25 (1995), S. 335-404) more than ten years ago. By now there are already virtual corporations existing today.

A virtual corporation is a „temporary network of independent companies - suppliers, customers, even erstwhile rivals - linked by information technology to share skills, costs, and access to one anther's markets." Thus it „ seeks to establish a set of dynamic relationships to manage systems that produce customer value." A possible organizational structure of a virtual corporation is shown in the second figure above as a modification of Porter's value chain. The different participating partners (puzzle pieces) only perform one or two activities in the value chain. Even though this should not imply that they are „hollow corporations", which have outsourced all other activities they have just concentrated on their core competencies and will only contribute these.

The process management within each participating organization is one of the most important factors of synchronization if the virtual corporation is to succeed. Therefore the business processes in virtual corporations -the virtual processes- need to be synchronized so that each partner is „speaking the same language". A *virtual process* is the sum of

subsequent and geographically spread value activities which are carried out by different entities. It is limited to certain duration and might never exist in its current structure again. A transformation of existing processes into virtual processes can be achieved by applying to seemingly contrary concepts at the same time: standardization and customization. The new and standardized processes will have clearly defined beginning and final events, which can allow an easy fit between the different partners. In order to achieve this, the processes need to be configured individually according to the situation and the preceding as well as following processes. The virtual corporation works like a „plug and play" system where each component can be fit into an existing structure fast and convenient.

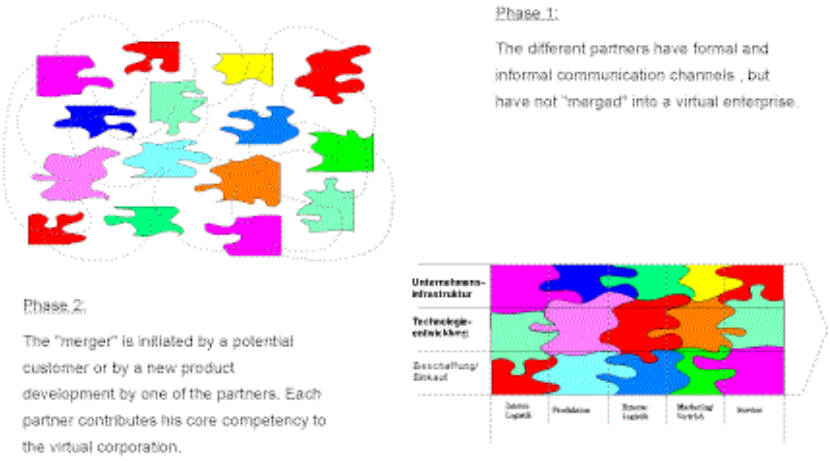

Figure: 5
Building a virtual corporation

Each participating enterprise within a virtual corporation will need to have a repertoire of supplementary business processes. These -like the pieces in a construction set- can be taken out whenever necessary to build a certain object. Since all participants are concentrated on their core competencies. Many of these supplementary processes will be focused around that specific competency. They will seem more or less alike and only differ in concern to their optimization for specific situations or the linkage to specific partners. All processes within the company's construction set will have logically predeceasing and following processes. They will all have the same underlying structure as shown in figure 3. This framework is a modular design of virtual processes. It will allow a very fast configuration of a seemingly homogeneous virtual corporation.

On the first level are virtual processes, which as a whole determine the value creation of the virtual corporation. An example of a virtual process could be marketing, production or external logistics. These can be differentiated into several different value activities on the second level, where each "box"in the value chain is one value activity. They will be equivalent to core competencies in most cases. The virtual process "marketing" for example can be divided into value activities like market research, product development or advertising. The value activities on the second level are then differentiated into logically coherent activities on the third level. The "product development"to stay with the example could consist of the logically coherent activities of generating ideas, conceptualizing an idea or testing the unfinished product.

Coordination can be understood as the synchronization of different activities towards a given goal. According to organizational theory four different mechanisms of coordination can be differentiated.

The mechanism of *personal instruction* can not be applied to virtual corporations since there will be no hierarchy and thus no predefined superior instance, which could issue orders. The second mechanism of *self-organization* can be implemented with teams, work groups or task forces. Most of its functioning will depend of the informal structures within the virtual value chain. It will be applied to the management of virtual processes in almost all cases of coordinating a specific task or solving a problem. This basically means that the partners get together and talk about the task or problem until a solution has been found. The third mechanism of *standardization* is also fully applicable to virtual corporations. It was already discussed as a means to ensure compatibility of value activities and will not be explained here. Finally the mechanism of *planning* will require the support of independent instances which actually create the necessary plans. These do not correspond with the lean processes and high flexibility of virtual corporations.

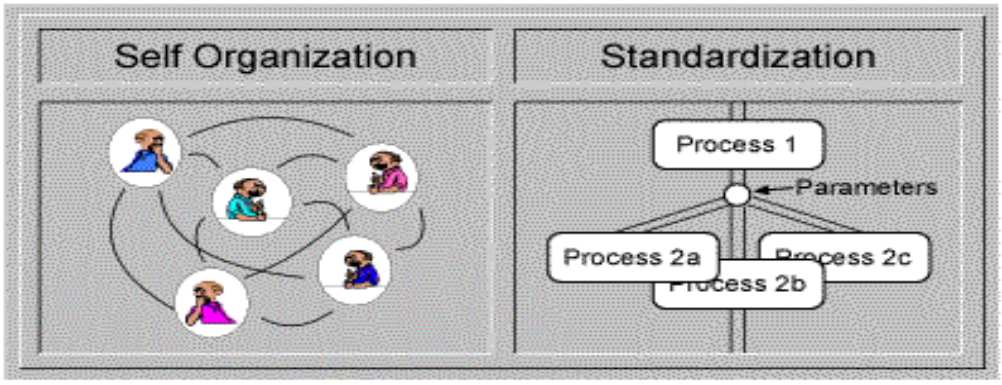

Figure: 6
Coordination in distributed enterprises

The concept of standardization shows the control of a process chain. All sub-processes must be initiated at the right time and assigned to the appropriate organizational units. The members of a team within the virtual corporation can initiate sub-processes automatically by specific events or interactively. The event at the end of process 1 will initialize different other sub-processes shown as 2a to 2c. The control mechanism of which sub-processes should be started according to certain events can be implemented with e-mail, voice-mail, video conferencing, computer supported cooperative work, groupware or workflow systems.

The framework of virtual processes is thus based on the concepts of standardization in order to ensure compatibility and on coordination which in turn comprises the mechanisms of self-organization and standardization.

ARCHITECTURE FOR DISTRIBUTED INFORMATION SYSTEMS

Today's applications programs are like ready-made clothes - one size fits all. So most are ill-fitting, and we have to contort ourselves to improve the fit... Great gains will be achieved when individuals and businesses can bend and fashion information tools to do exactly what they want them to do, rather than bending themselves to what the tools can do. This quest for customizable information tools with specialized knowledge will be no different than the current trend toward customized manufacturing. It could well be that by the close of the twenty-first century, a new form of truly accessible programming will

be the province of everyone and will be viewed like writing, which was once the province of the ancient scribes but eventually became universally accessible... When people will program in the future, they will not writing the detailed code and instructions that make computers run. Each individual's 'programming' will account for a very small fraction of the software code, maybe 1 percent. But it will be the crucial factor that gives the program its specificity. It will be like building a model railroad; you don't make all the track or engines or cars, but you do arrange the pieces to create your own custom railway pattern."

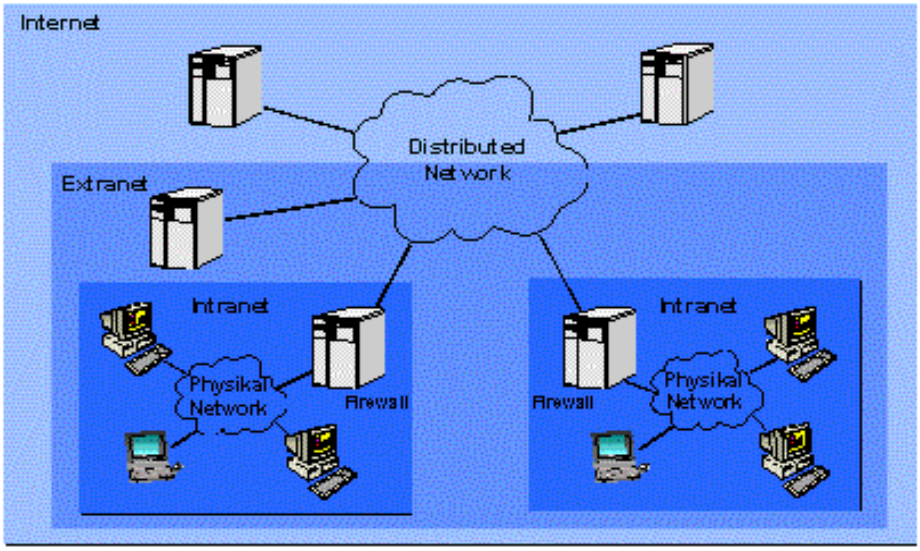

Figure: 7
Internet, Extranet and Intranet

The Internet is currently the world's largest computer network. It began as a government research tool over 25 years ago, but has now evolved into a worldwide communication system for commercial and non-commercial use. The World Wide Web (WWW) is the fastest-growing area of the Internet since it provides more than just textual information - it also includes graphics, sound and video. Most people equate the use of the Internet with the World Wide Web. A "Web Site" is an area on a computer system set aside by a company or individual to share information on the World Wide Web. Anyone who has access to the Internet and "Web browser" software may view and interact with any Web Site. Have you every noticed that most firms have Web Site addresses that begin with "WWW"? Intranets are internal networks that use Internet communications technologies. They are normally used for internal use by employees to share information, such as human resource data, accounting information, and so on. Extranets are networks that use Internet communications technologies through which companies run Web applications for external use by customers. Even though most companies today use the Internet for their customers, Extranets may be the newest growth area in the use of Internet technologies, especially with regards to commerce. Extranet used to mean two things. If an Intranet is a private closed internal network, an Extranet is an Intranet with private external connections. For example, you might have supplier companies and organizations attached to your Intranet via private, permanent connections. Confusingly, Extranet is also used to describe the opposite of an Intranet.

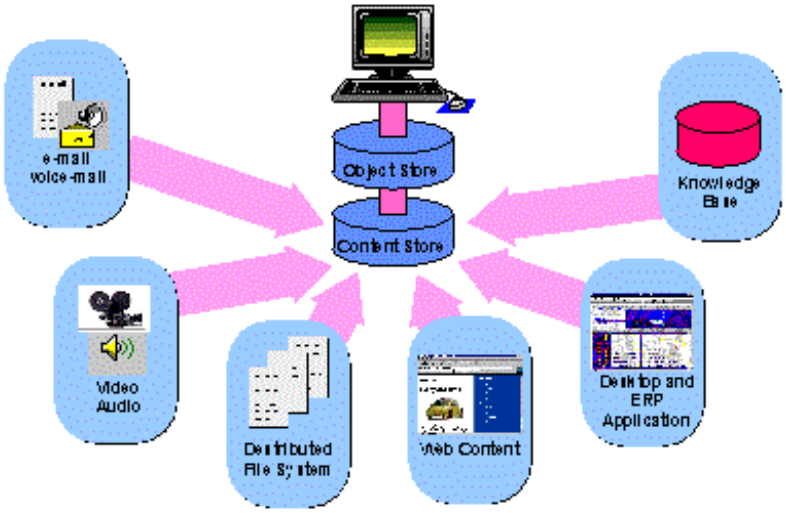

Figure: 8
New information system architecture

The figure 8 shows intelligent, automated content management tools so that users can harness all of the networks content. This architecture has been recently developed by Netscape Communications.

Intelligent object stores will enable agents to notify their "owners" when important new content is made available or changed on the network. These object stores will take a lot of the responsibilities from the user and will thus create the flexibility to access any content most efficiently.

The content store will manage the contents of the companies server as well as content which is provided by the outside world, whether from a vendor located in the same city or from a Latin-American University located thousands of miles away.

CONCLUSION

Consider the following scenario: Because of the complexity of modern life, more and more "everyday" decisions now require a crisis management perspective. Crisis managers need to learn to make decisions on the basis of incomplete and ambiguous information - and simply to accommodate for unplanned events or unexpected shocks using a distinctively non-bureaucratic approach. Bureaucracy is no match for crises: In a bureaucracy there are no surprises; every type of expected event has been classified and assigned to specified bureaucrats who find it difficult, if not impossible, to work under conditions of ambiguity and uncertainty. What should a crisis manager do? One of the first things on a to-do list is the creation or identification of "watchdog" systems to keep the organization apprised of threats and opportunities in the environment and to audit critical organizational decisions and behavior: Crisis managers have learned the importance of detecting 'weak signals' that foretell 'big trouble'.

In the sense of support, the distributed information system architecture will enable both: the distributed business processes and organizational intelligence as well. It can be understood as a tool, like a pencil or an eraser, which fulfills a certain function. Nothing more! Viewed from this angle, the information system architecture is a "hygiene factor" - it will not have any particular effects once the company has installed it, but will have devastating consequences, if it is not implemented at the right point of time.

Besides the hierarchy and modular design of distributed business processes there are several other relevant factors: the overall enterprise strategy, the organizational culture, change management measures or the change proficiency of employees.

The enterprise strategy will influence the way in which the resources of the enterprise are allocated to the different tasks within the company. Thus, it has to explicitly focus on building up and maintaining organizational intelligence. The organizational culture can be

understood as a collective programming of employees. It is based on a dual relationship because the culture influences the behavior of people and, at the same time, the behavior of people will also influence the culture. Thus, learning, memorizing and knowledge of the company's employees will determine organizational intelligence. Change management measures will influence the way that an organizational intelligence concept is implemented on the one hand side but will also determine which new information will enter the company and will become a part of the organizational knowledge. The change proficiency of employees is closely related to the last point, since it refers to the ability of employees to accept changes as a new part of their working environment.

The concept of intelligence is based on an organization's ability to open itself to the outside world and to acquire, process and utilize information it will receive from other entities. Thus the distributed business process is a vital part of the organizational intelligence. This of course refers to organizations working globally as well as to those participating in flexible, agile networks of different entities. In the end, the concept of organizational intelligence has to contribute to the competitive advantage of the company. It will be achieved by concentrating on the gains in flexibility and speed. Besides the (already discussed) effects of organizational learning on competitive advantage the distributed business processes as well as information system architecture will also bear gains in flexibility and speed by them self. Still it is the combination of all factors that will decide on the successful implementation and usage of organizational intelligence.

CONTACT ADDRESSES of AUTHOR

Hanns-Christian Hanebeck
Director Enterprise
Applications GlobeRanger.com
DALLAS, TEXAS-USA
Email: hhanebeck@globeranger.com