

VISION E-COMPANY: THE NETWORK-CENTRIC ENTERPRISES

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The Vision e-Company Research Program investigates how information exchanges, out-sourcing and process cooperation will change professional links within and between businesses and determine the standards, which will become the norm in e-business. This paper gives an overview of the projects launched in the scope of this program and presents their main results concerning extended and virtual enterprises. It introduces in particular: a communication services infrastructures for collaborative processes that reduces the information overflow within horizontal enterprise organizations, several ways for sharing and integrating customer knowledge, a portal for building virtual enterprises through partnerships, a method for analyzing the impact of enterprises e-transformations, an infrastructure for hosting and managing business processes of Small and Medium Enterprises (SME).

1. NETWORKING OF BUSINESSES AND INFORMATION MANAGEMENT

How are new technologies significantly changing the way companies are organized, how work is done and how businesses interact with each other? Forecasting is an extremely delicate art, in particular when technological change is ever-faster and has to be analyzed in relation to the specifics of each firm. Is it possible to say what companies will look like in 5 or 10 years? This is precisely what the Vision e-Company research program started by France Télécom in 2001 aims to do. Many people are interested in the question about how business will evolve in 21st century (Laubacher and al., 2003), (Villasante, 2002) and how information will impact on it, but there is still a lack of organized research program with a large scale on this topic.

This research program considers socio-economy, knowledge engineering and information technology dimensions. It proposes solutions for producing e-services and e-activities for businesses both large and small, from holdings to SME. We believe that information/knowledge and processes are the fundamental dimensions for organizing projects in this area. As a consequence, the vision e-Company program is focusing on:

- Networking of businesses coordinating their processes, communicating, and cooperating with internal and external partners with varied and constantly changing structures.
- Information management in the companies, closely linking information and decision-making.

The Vision e-Company program has launched four 3-year projects¹ in 2001, called *e-Infovalue*, *e-Customer*, *e-Contract* and *e-Process*. They are corresponding to key problems in extended and virtual enterprises (Hedberg and Holmqvist, 2000) such as finding trust partners, avoiding electronic information overload, going from Business to Business (B2B) data exchange to B2B processes interoperability, managing customer relationship and sharing customer knowledge. The Vision e-Company program has developed a concept of network centric enterprises illustrated in figure-1 apprehending these key problems.

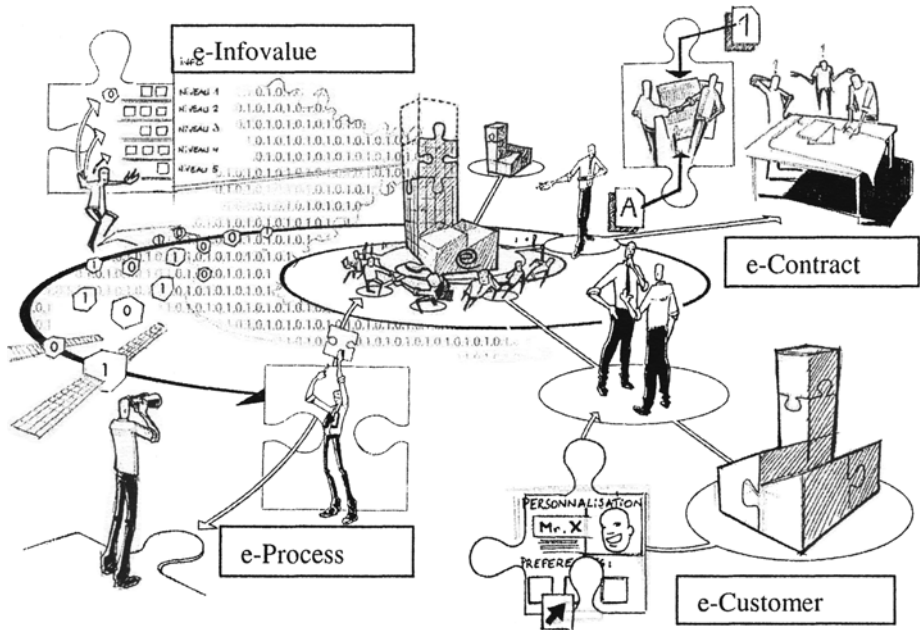


Figure 1 – Illustration of the e-Company vision

This paper gives an overview of the projects launched in the scope of this program and describes more deeply the projects results that could contribute to develop extended enterprises and virtual organizations. It concludes in underlining the contributions of the program in standardization committees.

2. VISION E-COMPANY PROGRAM OVERVIEW

2.1 e-Infovalue project: information exchanges within horizontal enterprise organizations

Information is now everywhere within the company, but does not always generate

¹ These research works have been led by France Télécom R&D teams cooperating with external research labs and innovative software societies: Center for eBusiness at MIT, Santa Clara University, LIRMM/CNRS, ERIC/Lyon University, GRID/ENS, CRI/Sorbonne University, Nemesia, Software AG, Aphykit, AEGIS, Mereco, CMI, Idéo Graphic, Teamlog.

value. If incorrectly used it can even lead to a drop in attention, which can penalize productivity (Edmunds and Morris, 2000). Decentralized organization including a large amount of partners increase this phenomena.

The aim of the Vision e-Infovalue project is thus to improve the efficiency and usefulness of information by factoring in the value actually created (increase in the knowledge capital of the company, gains in flexibility) and the cost observed (cognitive overload, noise/information ratio). The project analyses how inside enterprise electronic tools (e-mail, Intranet, Internet) modifies the communication and cooperation practices. We are developing methods and tools (probes) for analyzing electronic communication practices in organizations. This analysis is geared toward understanding the actual flows of information particularly in horizontal organizations, the motivational and organizational elements that play a role in these practices, and the impact of individual behavior on collective phenomena.

Communication services infrastructure for collaborative processes

Anticipating the fact that a large part of email overload is caused by a lack of communication environment structuring, we have designed and implemented a new information communication and sharing services infrastructure, called Team Open Space that enhance quality of communication in situations where employees are involved in multiple collaborative and information intensive processes such as projects. This service infrastructure is well suited not only for holding horizontal organizations but also for SME working in collaborative projects. Team Open Space attempts to reduce the information overload by providing one-stop document administration. It optimizes synchronization of cooperative tasks, in particular through Peer to Peer (P2P) instant messaging technologies and uses the WebDAV document sharing protocol. All the resources (shared documents, projects members, project web site, forum) of a given project are managed in a single space. All the communications (project members conversation, automatic notifications of document update) are based on instant messaging. This kind of tools based on a P2P infrastructure could be used without a centralized administration. Consequently it seems well suited for temporary collaborative projects joining small partners that can not benefit of Information Technology (IT) services administration.

2.2. e-Customer project: impact of customer knowledge in CRM practices

Acquiring customers and ensuring their loyalty are vital to the life and growth of the company. IT can offer an extremely useful way of doing this. This is particularly the case with Customer Relationship Management (CRM) tools, such as call centers and Web call-centers. Moreover, the customer relationship is an essential point to give an enterprise appearance to virtual organizations aggregating a myriad of enterprises, contractors and free-lancers.

The project builds an integrated approach to customer-relationship management illustrated in figure 2, covering: the acquisition and modelling of client-information, as well as the technological and organizational enablers for an optimal exploitation of this information. The project therefore intertwines various skills - company

sociology, data mining, software and knowledge engineering techniques - to determine what in the field of customer relations can be automated and what cannot.

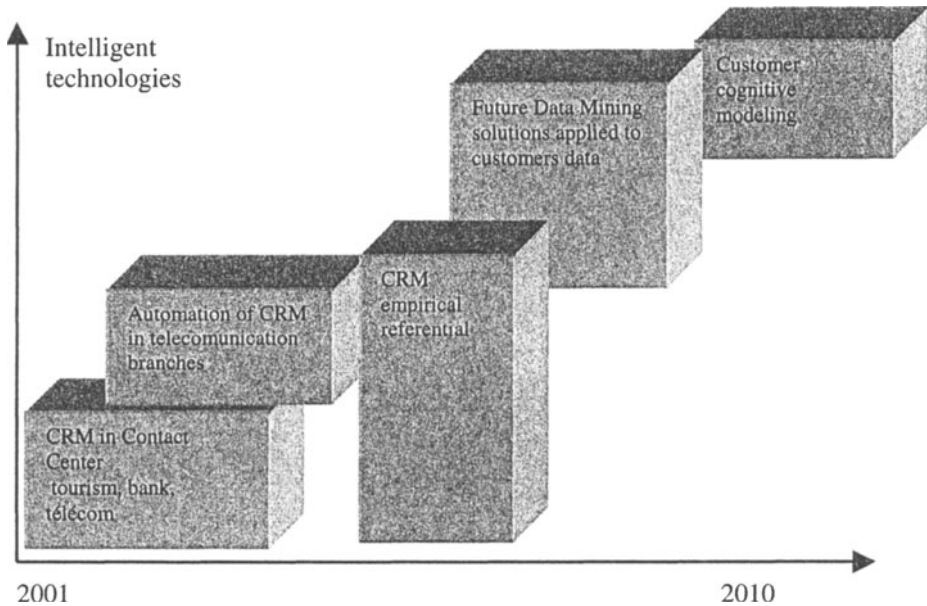


Figure 2 - an integrated approach to customer-relationship management

A conceptual baseline of CRM practices is drawn up including not only France Telecom internal surveys but also external surveys in bank and tourism sectors (Mounier, 2002). We have build a CRM empirical referential from case studies that we are now formalizing in customer knowledge ontology. At the same time, the project considers needed tools that can merge all the customers information particularly information of various data-warehouse (information system, internet access) and knowledge learnt by various operators (marketers, traders). A software, Khiops, was developed to speed up extraction of the information contained in large customer data bases (Boullé, 2002). We have also developed a competitive market simulation tool, called CUBES, for Customer Behavior Simulation (Ben Said and Bouron, 2001). Each consumer reacts individually to stimuli from the market, according to a variety of behavioral traits: predilection for innovation, mistrust, opportunism, imitation, and susceptibility to conditioning.

Personalization of CRM in virtual enterprises

The personalization of CRM in virtual enterprises has been considered through shopbot case studies. Shopbots such as Yahoo.com and kelkoo.com appear to us as typical virtual enterprise prototypes. A research work has considered the consumer behavior when they are choosing a product inside a catalog. An electronic shop assistant software for choosing products in on-line catalogs has been prototyped. It classifies competing brands products (eg. Orange and Vodafone products) according

to the buyer preferences (Latourrette, 2000)². Initially all the products are higgledy-piggledy. 3 categories of products corresponding to 3 display shelf's illustrated by 3 representative products are created dynamically in regards to the user preferences. At each time the user can choose one of the three representative products. It can also select or reject a given display shelf's or can introduce new preferences. Three new categories of product taking into account these user actions are created. The electronic shop assistant is based on clustering algorithm. 3 products are selected randomly for building 3 categories. They are considered as the reference product of their category. The others products are put in one of these three category following a proximity criteria. When all the products have been classified, we considering the product located at the center of each category. If the product does not correspond to the reference product, it becomes the new reference product and the process is reiterated. The categories and their reference products are display to the user when the 3 products located at the categories centers correspond to the references products.

2.3. e-Contract project: organization of virtual businesses on market places

By 2005, open, standard B2B communication solutions will be in place (ebXML, UDDI, web services, etc.), and could stimulate the emergence of virtual businesses. These businesses will make good use of the electronic market places in which contracts will be concluded between those offering skills (temps, freelancers, etc.) and those looking for them (businesses). This kind of market place could become very useful with emerging e-lance (Malone and Laubacher, 1998) and could accelerate the virtual enterprise development.

e-Contract project aims at the partial automation of establishing business-to-business relationships, including partner search and contracting, in an open B2B market place. Prototype solutions are based around standards. It considers the impact and appropriateness of B2B XML standardizations on the emergence of new business models and enterprises organizations evolutions (virtualisation, externalisation, market places).

Economic stakes linked to this virtualisation of businesses

An analysis of the economic stakes linked to this virtualisation of businesses in the United States and in Europe completes the project. The Californian market survey is conducted jointly with the University of Santa Clara and the European with CMI. Enterprises and activities sectors are selected in regard to their current activities externalisation, their use of new information and telecommunication technologies, their call for freelance or temporal employees. Interviews of people working in communication (advertising, cable TV, motion pictures, website design, etc), financial, healthcare, high tech Manufacturing, services (Recreation, Hotel / Motel / Restaurant, Shopping center) have been analyzed.

A portal for building virtual enterprises

The e-Contract portal is an electronic B2B market places in which contracts will be

² The Aphykit start-up provides an ASP release of this software.

concluded between those offering skills and those looking for them. A prototype of B2B market place based on a web services infrastructure (SOAP, UDDI, ebXML) has been realized. It includes a 'partnering' algorithm for the automated detection of competences that can provide a given service. It introduces "proximity" and "dependence" concepts for finding competences or more generally professional profiles which can include various types of information like "education profile", "jobs", "skills", and any kinds of things that could provide more or less a requested services. Ontology formalizations are in addition used for determining how complementary competences could provide a service. Thus it is possible to put generic request such as "the design of a CD ROM in e-learning domain" that can be accomplished by various combination of competences and so by various combination of persons, who be grouped for a limited amount of time in a project team. This prototype has been used for evaluating the relevance of an e-lance portal allowing the partner search and the automation of agreement establishment. The experiment underlines also the trust problem in the electronic search of partnership. Outside ebXML, web services are used for implementing generic applicative services like "notification", "invoicing" that are re-used by various providers.

2.4. e-Process project: on-line management of e-business processes

New opportunities for extended existing business appear with the Internet network. For instance, you can extend your business with online selling process or web contact center.

The e-Process project concentrates on the enterprise e-transformation, which should concern increasing numbers of small/medium enterprises. Its aim is therefore twofold: to contribute towards a better understanding of the processes themselves and prototype an infrastructure encouraging outsourcing and cooperation of processes between companies. The aim is first of all to model general small/medium enterprise processes in order to produce a formal representation compliant with standards comprehensible to the software (BPML, UBL, ...). Secondly, it is necessary to build an Information System (IS) as a set of components that can be reconfigured to keep pace with changes in the company.

A method for analyzing the impact of e-transformations on SME

In order to stimulate the e-transformations of SME, we have created a visual method that show the SME organization updates and the modification of existing processes caused by an evolution such as the introduction of a distant sales and delivery. The enterprise formalization is considered at several abstract levels. A first level considers the enterprise organization evolution in terms of 'strategy' and 'intention' while a second level models business processes in terms of activities, business roles, events, resources and using the UML standard notation specified by the OMG consortium. Change is first analysed at the upper level of intention and strategies and then impact of the changes identified at this level on operational processes is modelled (Salinesi and Presso, 2002). If these models are necessary for a deep understanding and analysing of the SME processes evolution and has to be considered for the design of the enterprise IS evolution, they are not well suited for illustrating and visualising the SME process evolution. As a consequence, in

addition, we define a way of communicating the result of change analysis using multimedia presentation and animation.

Hosting and management of processes and collaborative process networks

The e-Process project evaluates and prototypes a potential service offering by France Telecom composed of 2 phases. The first phase of the service offering consists in a service that provides enterprise customers with a Business Process Management platform hosted by France Telecom that allow them to define, deploy, execute and monitor their business processes. This platform combines communication services - such as presence and availability mechanisms that allow the dynamic allocation of resources needed in a process or wireless access to process information and remote execution of tasks- with process management services. This platform provides process templates stored in a process hub and relies primarily on web services technologies for the integration of the business processes within the information system (Giess and al., 2002). The second phase of the service offering consists in a collaborative process network in which France Telecom facilitates the collaboration and the coordination between business partners (Bitcheva and al., 2002). Process collaboration between enterprises is currently conjointly studied with MIT researchers. The scope of the joint work is the identification of a taxonomy of fit dependencies between processes and their population in the MIT process handbook. We have in particular analyses why a Process Library is useful and feasible and sketches out the challenges that must be overcome in development (Laubacher, Bouron and al., 2003).

3. CONCLUSION AND STANDARDISATION PERSPECTIVES

In modeling the company for the coming five to ten years and by prototyping the applications which will support this change, the Vision e-Company program is an ambitious attempt to see into the future not only in Europe but also in America and Asia. This paper has presented several projects results that could contribute to an increase of extended enterprises, the development of SME e-transformation and the emergence of virtual enterprise based on e-lance.

In the scope of the Team Open Space infrastructure development, we have used the WebDAV standard and try to promote Jabber as a standard de-facto for instant messaging.

The e-Contract project has develop an infrastructure based on ebXML, SOAP and UDDI standard, and has the opportunity to propose standard corrections as a member of the OASIS consortium. The project has shown that if the ebXML architecture (CPP - Collaboration Protocol Profile and CPA - Collaboration Protocol Agreement) is well suited for establishing low level agreements such as agreement about security and payment protocols, its seems insufficient for the automation of business agreement. We have also considered the interface of software agents to web services in the scope the e-Contract portal infrastructures. An agent platform, agentwork, compliant to the FIPA standard (Bouron, 2001) has been used to implement electronic assistants that are able to call web services registered in ebXML and UDDI registers. The agents are used to provide "Call For Proposal"

interfaces. The application of 'web semantic' technologies like W3C OWL to the formalization and publication of professional competences ontology's and customer knowledge ontology's are analyzed in the scope of e-Contract and e-Customer projects. Considering the work done by (Delteil and Faron, 2002), we explore the best way for integrating ontology services to the web services.

The e-process project follows closely and contribute to the emerging initiatives for the standardization of process description. It contributes to the Business Process Management Initiative (BPMI) and more particularly to its specification of the BPML language. It analyses also the BPEL language that could become a standard de facto and evaluates the feasibility of their support by the process hosting and management platform (Law and al., 2003).

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