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The Web Economy: Towards a New Spatial Context for Learning and Innovation processes in the Business Environment

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***The Web Economy: towards a new spatial context for learning and innovation
processes in the business environment***

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Abstract:

Because of the rapid evolution of the electronic market phenomenon, there is a growing and diffusing interest to consider the Web economy as a new source for the enterprise competitive advantage.

In this paper, the focus is on the Web economy impact on the enterprise learning and innovation processes.

To this end, our analysis looks at the following issues:

- the meanings of the new enterprise, characterized as an interactive, internetworked and virtual entity;
- the analysis of some significant case studies, in order to understand the dynamics of the enterprise value system in the Extranet environments;
- a re-thinking of some concepts related to the agglomeration economies and to the innovation production and diffusion spatial context.

The Web Economy: towards a new spatial context for learning and innovation processes in the business environment

1 Introduction

Geographical proximity is considered, according to the traditional approaches, a source of competitive advantages in the enterprises clusters creation, because of its support to learning and innovation processes. In this view, knowledge networks are localized and immobile.

In the present techno-economic paradigm, new digital knowledge networks assets are emerging. Our empirical analysis, based on 28 case studies, allowed us to analyze the dynamics of these digital knowledge networks, and to define characteristics and processes of the new global-virtual learning environment they have generated.

The global-virtual-learning environment processes and values system, has led us to analyze thoroughly the Web economy, defined as the Competitive Environment in which interactive processes between firms, organizations and individuals take place in a digital manner by means of Information and Communication Technologies (ICTs).

The Web economy structure and processes suggest to re-think the competitiveness sources related to micro-regional clusters formation and upgrading, because of the re-shaping of the learning and innovation processes spatial context. In this perspective we introduce the Innovation Virtual System, as an useful model for representing the business environment in which the self organizing and co-evolution processes are accelerated by the digital knowledge exchange at the speed of the light, and where new forms of collective knowledge develop, which may be interpreted as the Organizations cumulative experience and expertise of their employees, partners and suppliers.

More specifically:

- “System” synthesizes all business and no business agents and processes which interact and develop relationships/transactions in a varying spatial context;
- “Innovation” represents the value generated by the interactive learning processes;
- “Virtual” is the system attribute that characterizes players behaviors and economic processes, in the Web economy competitive space. Virtual players are buyers, sellers, intermediaries which can also be located in many different places at the same time and can yield multiple on line identities by using on line intelligent software agents. Virtual players set may also include public players, such as governments, schools, universities. Virtual processes are interactive and real time

transactions, or other communication forms, both in the supply chain management processes, and in the consumer need based products development.

Innovation Virtual System helps to define new externalities related to the web economy.

2 New emerging knowledge networks assets

Several studies, focused on local systems development processes, highlighted the strong relations existing between local systems competitiveness and local actors ability to learn and innovate (Becattini 1992; Brusco 1996; Camagni, Quévit 1992; Maillat 1996; Bramanti, Maggioni 1997; Markusen 1994; Cappellin 1997; Sabel 1996; Scott, Storper 1993; Vaccà 1995; Lipparini, Lorenzoni 1996).

More specifically, they outlined the role of the local knowledge networks, analyzing their dynamics and effects, although differing about the network learning processes considered strategic for the local systems development processes:

- in the industrial district approach, firms grow through learning by localizing processes, that's through direct observation and/or anticipation of the improvements realized by their local competitors in their products and processes;
- in the flexible organization approach, firms develop learning by specializing processes, focusing on specific phases of the supply chain;
- in the milieu innovateur approach, local actors (institutions, firms, universities, research centres, schools) develop collective learning processes;
- in the "learning by interacting" approach, Organizations learn by developing active plans of their growth processes, in cooperation/competition with other partners.

However, all these approaches agree with the hypothesis that knowledge networks are fostered mainly by close proximity within localized areas, especially for the production and diffusion of tacit knowledge (Anderson 1992). According to this hypothesis, knowledge networks are essentially localized and immobile and thus able to provide firms with valuable capabilities and framework conditions not available to competitors located abroad (Lundvall 1996). A local knowledge network provides access to specific resources and capabilities that are difficult to reproduce otherwise; it enables a firm to engage in peculiar types of coordination and organization; and it allows the firm to share activities with other network participants, so tacit knowledge can be internal to an area, without being internal to any specific firm (Porter, 1990; Enright, 1998; Spender, 1998). As Ernst states, Marshall's pioneering concept of externalities helps to identify these static and dynamic

advantages of a local knowledge network, such as the presence of a pool of skilled workers with industry-specific capabilities, the local supply of intermediate inputs, especially non-tradable ones, and the continuous, intense and rapid exchange of new ideas about technical, organizational and production improvements (Ernst 1999).

During last years, there is a growing interest in new knowledge network assets, which are emerging in the digital/global economy scenario (Cronin 1996; Martin 1996; Boyer 1996; Hagel III, Armstrong 1997; Mandelli 1998; Benjamin 1998; Szuprowicz 1998; Hagel III, Singer 1999). These assets are related to the Information and Communication Technologies development, and more specifically to:

- “knowledge digitization”: human communication, business transactions and explicit knowledge become based on ones and zeros;
- digital knowledge exchange, through instantaneous communication.

Because of the dynamic combination of these key factors, the new emerging knowledge networks seem to be ruled by a space-time independence principle: every people, every social group, every enterprise can communicate or can share information, knowledge, objectives, anywhere and anytime (Huey 1996).

In order to study these knowledge networks dynamics, we have realized an Internet based desk research, and analyzed some test cases, where it is possible to identify these networks fundamental processes. We have classified test cases in terms of Organization type, transaction processes, geographical dislocation and value created. Our analysis results are shown in table 1.

Our desk research results highlight two trends:

- the emergence of a new “Internetworked enterprise” paradigm: every enterprise is inside connected via Intranet, with suppliers and customers via business-to-business networks, called Extranets, and with other organizations, business homes and consumers via public Internet. This new enterprise is characterized by flatter hierarchy and team based work organization, so as to respond more quickly to changes in the business environment and customer demands. Because Internet has the power and capacity to open channels of human communications and collaboration dramatically within an office, across space, and across time, collaborative work increasly takes place in teams, on high capacity networks (Tapscott 1996);

- the development of the digital knowledge networks, related to the supply chain virtualization process: value-leading businesses focus on a limited set of core competencies and outsource virtually every other function; each enterprise adds one or more distinct aspects of product/service value for the end consumer, by exchanging digital knowledge with others members (Ticoll, Lowy and Kalakota, 1998). The supply chain management changes are related to the opportunity for business and industries to capitalize on the convergence of commercial interchange, consumer market, distribution channel and processing centres. The main virtual supply chain behaviors may be identified in:
 - horizontal collaboration among independent team-based structures, which is replacing traditional vertical hierarchies: teams are both clients and servers for other teams that are both internal and external to the organization;
 - production and transaction organization based on intermodality and complementarity instead of substitution, basing on the assumption that the best way to handle risk is to share it by leveraging capabilities and resources of many players.

These digital knowledge networks reshape the sources of competitive advantages related to the efficiency and effectiveness of the enterprise value system components: upstream value, firm value, downstream value.

As far as upstream value, supplier aggregation allows tight coupling of suppliers, partnering, outsourcing, decentralization of decision making. As far as downstream value, customer aggregations and customer services allow better demand forecasts, more sophisticated personalization and treatment of customer as a market of one. As value firm, aggregation and processes optimization allow the evolution from component manufacturing to assemblies, bundling, integrated billing, reduction of cycle time, increasing throughput and process integration, and less paperwork.

More particularly, competitive advantages fall into some broad categories, which involve:

- physical establishment: it is possible to set and maintain a web site instead of physical storefront (see the example of Boeing Airplane Co, where Extranet supplies information regarding 410,000 parts in stock to 700 customers worldwide);
- order placement/execution: the necessary information is often placed on line in an accessible format, transferring transaction costs (e.g. for obtaining products information, selecting products) to the customers, as in the AMP Inc. example;

- customer support/after sale services: by moving these supports on line, customers are allowed to access databases or “smart” manuals directly, as it happens in CSX Corporation, where Extranet allows customers to trace shipments to on-line level, simplifying identification and bottlenecks;
- production cycle time reductions: design and productions may be coordinated with business partners, as it happens in Adaptec Inc. or in Caterpillar;
- delivery time shortening, through collaboration computing, whiteboard applications and desktop videoconferencing, such as in Dofasco Steel Inc.;
- staffing: the number and the nature of staff hired is changing; these new enterprises require far fewer, high skilled employees.

The digital knowledge networks, which are location independent and mobile, generate new virtual enterprises clusters. Some scholars define these virtual enterprises clusters as “e-business communities” (EBCs): a set of distinct “Internetworked” enterprises, which use digital network to cooperate and compete with other e-business community partners, by exchanging knowledge and information across transnational borders (Harreld 1998; Ticoll, Lowy, Kalakota 1998).

Basing on 170 case studies, the Alliance for Converging Technologies has tried also to differentiate the EBCs, according two variables: their hierarchical level and their value integration level (Ticoll, Lowy, Kalakota 1998).

Four models of EBCs have been identified:

- “Open market” community, where value integration is relatively low, and no single entity is in control. “Open market” is the electronic version of the primitive, traditional agorà or town market, aimed at providing partners up-to-date information and news, and secure transactions. Partners focus on daily gathering of operational knowledge, though emphasis is also placed on strategic knowledge, especially for investing.
- “Aggregation” community, where value integration is low and economic control is high: in the “Aggregation” community a primary company organizes and represents diverse product/service offerings to end consumers, positioning itself as an intermediary between producers and customers. Aggregators typically offer a diverse portfolio of products and services, which often have little or no need to be fully integrated. The communities are built around these key players, that link groups of supplier and end-users that exchange operational and planning knowledge.
- “Value chain” community, where value integration and economic control are high: a primary company leads suppliers and distributors to achieve key distribution processes operational

excellence. The primary company end is to produce a product/service outcome that pulls together, in a single customer offering, the contribution of multiple resources. This community is then built around relationships among suppliers of raw materials and finished components, manufacturers and assemblers, distributors, retailers and customers, which exchange operational and planning knowledge for cost and time savings.

- “Alliance” community, where value integration is high and economic control is low: multiple producers comply with standards, customer tailor, and integrate their own solutions to create and support a “value space”, that’s an idea or a vision of how to meet customers requirements in a specific domain. The community is based around this value space: to this end a great deal of strategic and planning knowledge is exchanged among partners.

These new market organizations have generated a new competitive space, where physical closeness is losing meaning. Internetworking enterprise and the EBC can be considered a new distinctive mode of coordinating economic activity and economic organization.

The emerging knowledge networks assets related to these new market organizations, allow us to introduce, as a base of the new competitive space, a new global-virtual learning environment:

- the global attribute is related to the distributed and unlimited space of interactions;
- the virtual attribute is related to the production, delivery and receiving speed, which is becoming the speed of the light.

3 The new global-virtual-learning environment

The new global-virtual-learning environment, defined in the previous paragraph, may be configured in terms of multiple trigger options, knowledge based interactions and value relationships (Lipnack, Stamps 1997).

3.1 Multiple trigger options

Multiple trigger options contribute to characterize the learning environment nervous system. This system is conceived as an Internet based platform that supports rich, relevant and productive individual and group on-line actions, and provides an infrastructure leading to a sustainable EBC (Benjamin 1998). This Internet platform components, which allow Intranet and Extranet solutions, are grouped in three levels:

- the connectivity level, -made up by building blocks of basic universal connectivity and access – upon which communication, collaboration and content provider value can be built. This level includes network and protocol integration (gateways services), network management services and applications integration services;
- the real-time communication level, that mainly consists of software-based client and server tools to broadly facilitate two-way and broadcast communications, collaboration, entertainment, information search, delivery and analysis, and commerce;
- the solution level, where the emphasis shifts from technology to applications that satisfy specific learning environment actors requirements.

3.2 *Knowledge based interactions*

Knowledge based interactions provide shared communications which trigger the knowledge conversion processes, upon which learning processes are based. More particularly, interactions generate a continuous and dynamic tacit-explicit knowledge conversion among individuals, groups and Organizations.

In order to explore the contribution of the Internet based platform to these interactions, we have tried to associate to every conversion process of tacit and explicit knowledge some specific multiple trigger options. Table 2 synthesizes the results of our analysis.

The multiple trigger options -as videoconferencing (desktop video) and room based videoconference-, enhance the learning mechanism related to the conversion from tacit knowledge to tacit knowledge (socialization process). In fact socialization process is facilitated by brainstorming camps, informal meetings, detailed discussion, sharing experiences between product developers and customers.

The multiple trigger options -as e-mail, groupware shared databases, consulting, collaboration tools, workflow tools- enhance the learning mechanisms related to the tacit knowledge articulation into explicit concepts (externalization process).

The multiple trigger options –as telephone, www based phone systems, e-mail, FTP, directory, Usenet, audio-conferencing, chat systems, web chat, computer conferences, webcasting, document archive, and workflow tools- enhance the combination process, that represents the conversion from explicit knowledge to explicit knowledge: individuals exchange and combine knowledge through

such media as documents, meetings, telephone conversations or computerized communication networks.

The multiple trigger options -as groupware (Decision Support Systems), groupware shared databases, data mining, search engine and webcasting- enhance the internalization process, that represents the embodying of explicit knowledge into tacit knowledge. This conversion is helped by knowledge verbalized or diagrammed into documents, manuals or oral stories.

3.3 Value relationships

We consider value relationships as the cumulative results of interactions. They are patterns of interactions, where a virtual team accumulates its long-term learn, and, consequently, is driven towards innovative behaviors.

By using collaborative technologies, such as Internet, Intranet and Extranet, Organizations can harness more of their dispersed knowledge resources and focus their collaborative brain power on a given problem or opportunity.

Value relationships, developed by Organizations, may be evaluated in terms of continuous innovation opportunities within and between the Organizations.

Innovation opportunities concern general communication improvements, productivity enhancements, business effectiveness, cost reductions and delivery costs lowering.

As far the general communications, innovations are identifiable in internal information exchange savings, related to a better integration of the basic business processes with Web technology, which speeds decision-making procedures and creates opportunities for working a project continually. Some effects of this better general communication may be identified in a more effective marketing, sales and customer support.

Related to the employees productivity, innovations concern the opportunities to reduce their time spending in searching for information or in reading papers documents. They also concern new tools to increase the development, distribution, and quality of employees training systems and their curricula.

Business enhancements innovations are focused mainly on a faster time to market, by concurrent engineering, efficient collaboration between participating groups, better and faster feedback at an early stage in the innovation process. The most important results of business enhancement innovation

are identifiable in rapid project development and product delivery, optimized sourcing and material supply organization and improved coordination with all parties involved.

Cost reductions concern reduced errors, improved comparison shopping, reduced administrative and operational costs, elimination of paper publishing cost, substitution of face-to-face meetings with Extranet collaboration sessions.

Information delivery innovations concern the opportunities to leverage legacy systems; other innovations are related to standard delivery systems, ease of their maintenance and implementation, elimination of paper publishing and mailing costs.

The global-virtual-learning environment suggests to think of this economy as a new knowledge based Web Economy.

4 The Web economy dynamics

The new competitive space and the global-virtual-learning environment analyzed in the previous paragraphs, are the result of the new techno – economic paradigm generated by changes in the ICTs.

What emerges from our analysis is that the new economy is:

- *Digital*: business transactions are based on ones and zeros;
- *Knowledge-based*: knowledge is a source of competitive advantage;
- *Interactive*: innovation is developed by knowledge-based interactions between participants to a system. In this sense focus is on processes rather than structures;
- *Space-time independent*: physical closeness is losing meaning and business transactions speed is becoming the speed of light.

Firms, organizations and individuals interact in a context characterized by a massive use of Information and Communications Technologies, using a relational and electronic network to produce economic results.

Assuming the previous four stylized factors for the new economy: digital, knowledge-based, interactive and space-time independent, our focus is on the dynamics by which these factors generate competitive advantage. It's from interactions between these four factors that, for example, is emerging globalization as driving force of new business dynamics.

The new form of economic organization is network-based, experiencing a *space and time independent* web structure because of the digital nature of interactions. We can define *the Web economy as the Competitive Environment in which interactive processes between firms,*

organizations and individuals take place in a digital manner by means of ICTs. In this new context firms, organizations and individuals develop networks of relationships to produce a high degree of value integration. For this aim they use digital networks and particularly Internet with the World Wide Web philosophy. Focusing on firms, the Internetworked enterprise defined in previous paragraphs is an organization that has the capacity to compete in the Web economy. Its “value web” derives more from the capacity to establish connections in the Web environment than from competition with other firms.

Networks reveal as powerful means to produce and manage knowledge inside and between organizations. Phenomenology reported in previous paragraphs demonstrate that knowledge-intensive activities are more competitive in the Web economy context: virtual networked knowledge is a fundamental factor of innovation creation and hence is essential for economic growth and wealth creation. Virtual networks amplify knowledge creation by means of a strong integration between supplier, firms and customers. Innovation is produced by knowledge sharing in interactions of these actors. For this reason the problem of innovation creation and competitiveness of a firm or a system of firms cannot be studied only looking at the structure, but we need to understand the processes involved in the knowledge-based interactions.

In the Web economy suppliers, firms and customers build communities (Electronic Business Communities, EBCs, defined in previous paragraphs) which are *customer-driven* instead of *supply-driven* and in which value creation is shifting from a finite physical base to intangible factors with unlimited capacity. They use digital networks to share knowledge and to establish a complex web of relationships. In this sense Web economy is a complex system, where complexity is given more by the overall system of interactions than complex behavior of single parts of the system. This complexity is necessary so that system can follow the rapid changes generated in the new context. A change of the system, whether it is exogenous or endogenous, produces an adjustment of the system itself, thanks to the interactions of an actor with each other. In some sense such systems behave like a neural network, capable of experiencing learning as nodes or connections are modified. The learning process is due to a pattern of core competencies connected by knowledge links. In this approach the focus is on the nature of interactions between nodes, not only on the nature of the nodes.

These patterns of nodes and connections manifest itself at different ontological levels (individuals, groups, organizations, etc.), so a network of relationships can be established between individuals, between groups, between organizations in the Web context. At each level, patterns of interactions

show the same topology, but “dimension” of nodes are different. Anyway, in this framework cross-border interactions between levels are possible, so individuals inside an organization can interact directly with individuals in another organization.

The optimization of knowledge creation processes drives the behaviors of firms in the global web context. As explained in the first paragraph of this paper, activities of a firm focus on a limited set of core competencies, so that outsourcing of others functions is a dynamic process forcing creation of the EBC. Thanks to ICTs, particularly Internet, it is possible to realize a strong integration of core competencies of participants to the community, and because of space-time independence of relationships, EBC can have a Worldwide extension. In this sense one can get an extension of economic transactions across national borders, what Ernst calls “dispersion”, with a growing inter-penetration of national economies, hence the term “integration” (Ernst, 1999).

5 A re-thinking of the competitiveness sources in the micro-regional clusters formation and upgrading: towards the Innovation Virtual System

Web economy structure and processes suggest to re-think the models related to micro-regional clusters upgrading or creation dynamics.

Our approach of the global-virtual-learning environment, as the new competitive space generated by the digital economy, going in the dynamic theory perspective described in the third paragraph, shifts the analysis related to micro-regional clusters upgrading toward a new virtual and global learning economy context, where the success of individuals, firms, regions and national economies reflect their capability to learn. The virtual and learning economy is an economy where change is rapid and where the rate at which old skills get obsolete and new one become in demand is high.

In the virtual and global learning economy perspective, our vision of the global-virtual-learning environment binds together the ideas of competitiveness at both national (regional, sub-regional) and firm level.

The global-virtual-learning environment overcomes the limits of the traditional perception of a world made up by simple, linear, closed and predictable systems. It prospects, like described in the third paragraph, a world based on complex systems which are not linear, open and interactive. Conceptual models of the “complexity theory” as “self-locational” and self-organizing systems are therefore useful in order to ground the micro-regional clusters formation and upgrading dynamics in the digital economy competitive space.

5.1 *Toward the Innovation Virtual System*

The global-virtual-learning environment stimulates individuals and Organizations innovative behaviors, and a continual renewal of products, systems, processes, marketing and people.

In this environment, the self organizing and co-evolution processes are accelerated by the digital knowledge exchange at the speed of the light; new forms of collective knowledge develop, which may be interpreted as the Organizations cumulative experience and expertise of their employees, partners and suppliers (Valdani, Ancarani 1997; Malerba 1993).

These considerations suggest to identify the global-virtual-learning environment as “Innovation Virtual System”, assumed as a conceptual model for micro-regional clusters creation and upgrading in the Web economy context. This model includes the “self-locational” and self-organizing systems attributes, because (Romano, Passiante 1998):

- “System” synthesizes all business and no business agents and processes which interact and develop relationships/transactions in a varying spatial context;
- “Innovation” represents the value generated by the interactive learning processes;
- “Virtual” is the system attribute that characterizes players behaviors and economic processes, in the Web economy competitive space. Virtual players are buyers, sellers, intermediaries which can also be located in many different places at the same time and can yield multiple on line identities by using on line intelligent software agents. Virtual players set may also include public players, such as governments, schools, universities. Virtual processes are interactive and real time transactions, or other communication forms, both in the supply chain management processes, and in the consumer need based products development.

This conceptual model is useful for re-interpreting the competitiveness sources in the micro-regional clusters formation and upgrading in the Web economy context.

Various scholars have attempted to explain the new micro-regional clusters upgrading perspective: some approaches introduce cross-border linkages between Porter’s diamond of one country and that one of another (Dunning 1997); others present some new concepts - as double or multiple diamond - (Rugman 1993), others introduce the international business activity - as an exogenous variable-into Porter’s model (Dunning 1993). Dunning conceives these various approaches as attempts limited to identify and evaluate some of the effects of the geographical integration of economic activities, both in a sector or a country perspective (Dunning 1997).

Innovation Virtual System can be useful to overcome these limits, because it allows:

- to reduce Porter's diamond dependence from spatial constraints, by interpreting its four factors – factors conditions, demand conditions, related and supporting industries, firm strategy, structure and rivalry- as virtual components;
- to integrate the industrial district approach, the flexible specialization approach, and the milieux innovateur approach in approaches that relate the growth dynamics to the firm and to its relationships in the global-virtual-learning environment.

The Innovation Virtual System model allows to interpret the increasing complexity of the relations between the Organization and its external environment; it frees the agglomeration economies advantages from the “locational” factors dependence, bringing them more and more toward a unifying communication and coordination digital infrastructure (Romano, Passiante 1997). The digital networks, as a new Information and Communication infrastructure, therefore become sources for dynamic and virtual agglomeration economies, which empower every level of the enterprise, providing greater flexibility and the ability to respond more effectively to rapid changes in the global market.

6 Provisional conclusions

In the Web economy, new knowledge networks assets are emerging, which are location independent and mobile. Web economy is then generating new competitive advantages sources and new market organizations, connected to a new global-virtual-learning environment.

Our model, the Innovation Virtual System, can be considered an useful framework for a research agenda aimed at reshaping the local and regional systems of innovation, in the Web economy scenario.

In the Web economy, suppliers, firms and customers build communities “customer driven” instead of “supplier driven”, where value creation is shifting from a finite physical base to intangible and mobile factors, with unlimited capacity. The Web economy is a complex system, where complexity is given more by the overall system of interactions than complex behavior of single parts of the system.

Our Innovation Virtual System framework supports a vision that privileges, in the innovation systems analysis, processes rather than structures.

Table 1: Significant virtual knowledge networks characteristics

Name	Type of Organization	Transactions details	Geographic dislocation	Benefits
24 Hours in Cyberspace	Publisher	Extranet for organizing 150 photojournalists, leading editors and over 50 hardware, TLC and software companies	Worldwide	Supply chain integration, time to market, quality
Adaptec Inc.	Microchip manufacturing	Coordination of design and production with business partners Supply chain integration through software that incorporates automated workflow and e-commerce tools	Hong Kong Japan Taiwan	Reduction of the chip production cycle time Shortening of the order-to-product delivery time
AMP Inc.	Leading connector products manufacturer	Order placing automation Forum for communicating with wholesalers, distributors, reseller and customer, which is going to become a transactional system	Worldwide	Communication with 15,000 customers 80,000 different products worldwide
Aon Group Inc.	Insurer broker organization	Subscription-based information service and research tool for high-end risk management customers Assistance to corporate directors of risk management in developing company policy manuals on political and health hazards	Chicago	Enhancing customer relations, for increasing their loyalty
Boeing Airplane Co.	Aircraft manufacturer	Extranet that: allows commercial customers to place and track part orders on the Web supplies information regarding 410,000 parts in stock to 700 customers worldwide	Worldwide	Substantial increase in efficiency for the company and its customers
Booz, Allen and Hamilton	Managing consultants	Extranet that links offices and 2,000 remote consultants	22 countries	Cost savings
Caterpillar Inc	Heavy equipment manufacturer	Extranet that connects Caterpillar engineering and manufacturing divisions with active suppliers, distributors, overseas factories and customers Customer can retrieve and modify detailed order information while the vehicle remains in the assembly line	Worldwide	Shorter production cycle between design, suppliers and customers
Coopers and Lybrand	Accounting and tax consulting	Corporate tax information for 75,000 employees Web site for public users at various levels and prices, including free access to some tax information	Washington DC	Up-to-date information on the constantly changing tax laws and regulations
CSX Corporation	Railroad Transportation	Extranet for managing shipping, which includes the largest suppliers of transportation services, such as railroads, trucks, container ships and barges. Extranet allows customers to trace shipment, initiate work orders and discover pricing data	Worldwide	Tracking of the shipments to the line-item level, simplifying identification of bottlenecks and problems
Dofasco Steel	Steel manufacturer	Extranet for real-time collaborative computing, whiteboard applications and desktop videoconferencing Web based applications to provide interactive access to company databases for selected suppliers	Canada	Cost savings in communication Shorter delivery time Improved product design
Fruit of the Loom Activewear Online	Manufacturer	Extranet for online catalogue and sales ordering infrastructure for all its key distributors	USA	Supply chain integration, distribution and marketing
General Electric	Multinational manufacturer	Special trading system for handling commercial contracts between 1,400 suppliers and business partners. Two systems handle: The purchasing of materials required for the manufacturing processes The ready-made product and services required for running GE business units	Worldwide	A more competitive bidding environment and lower costs

Source: adapted from B. Szuprowicz, "Extranets and Intranets: E-commerce business strategies for the future" and http://www.actnet.com/Research_And_Analysis/index.html

Table 1: Significant virtual knowledge networks characteristics (continued)

Name	Type of Organization	Transactions details	Geographic dislocation	Benefits
General motors	Auto and track manufacturer	System for marketing automotive products, through dealers and directly to consumers, by accessing to kiosks and personal digital assistants	Michigan	Instantaneous updating of changes in configuration or price of a car in all the company information services
Herve Thermique	Heating and air conditioning	Extranet to coordinate 23 offices and 8,000 business suppliers	France	Increasing efficiency and standardization
J.B. Hunt Inc.	Truck transport services	Internet-based applications designed to streamline the shipping and North American customers. The new application suite accomplishes order entry tasks, shipment tracking, and real time access to logistic data. The goal is to provide business-to-business applications that integrate the entire company supply chain.	North America	Improvements in customer services and reductions in transportation costs
Info Test	Largest manufacturing technology Extranet trial	Collaborative applications among major vendors	Worldwide	Demonstration of Internet-based collaborative applications, among manufacturers, components and materials suppliers, distributors and customers
Java	Information technology	Extranet joins together hardware and software firms, venture capitalists, and MIS managers	Worldwide	Sustaining Java as the platform for application development
Kinko's Inc.	Worldwide photocopy chain	Extranet links 850 stores and 23,000 employees, and offers: Internet access and rental of PC computer time to Kinko's customers Access to confidential data, such as credit information, sales reports and company policies and procedures	Worldwide	Better coordination of stores and employees
The link	Players directory	Extranet handles 16,000 biographies and photos of actors for agents	Worldwide	A new way for agents to immediately forward vital statistics of actors to casting directors
Linkage Inc.	Human resources consulting	Extranet provides service to mobile clients nationwide, which can access local and shared files, databases and e-mail from anywhere on the Internet	Massachusetts	Improvements in client services
Lockeed Martin	Aerospace manufacturer	Extranet for collaborative projects, which transmit meeting minutes, baseline documents, contracts and schedules	California	Improvements in productivity
Marshall industries	Electronic equipment distributors	Provides 200,000 Web pages of information, using an Extranet for competitive worldwide marketing to customers. Qualified users can interact with the system to obtain status reports of transaction profile, check order status, design registration and monitor sales activity	Worldwide	Rapid product development
Microsoft	Leading software supplier	Extranet for purchasing supplier from preferred vendors. It combines the function of requisition, general ledger, and supply chain management	Worldwide	Cost savings
Power AG	Agricultural products association	Extranet for linking manufacturers, distributors and retailers. Actually the network is used for e-mail communications. Member companies are developing applications for order management, container tracking, regulatory compliance and financial information	Washington DC	Reductions in inventories
Reynolds & Reynolds	Business forms supplier	Extranet allows clients to obtain customized supplies, often a whole day earlier than previous procedures allowed.	Ohio	Increase in company's market share

Source: adapted from B. Szuprowicz, "Extranets and Intranets: E-commerce business strategies for the future"

and http://www.actnet.com/Research_And_Analysis/index.html

Table 1: Significant virtual knowledge networks characteristics (continued)

Schwab and Partners	Investment services	Extranet supplies on line brokerage	Worldwide	Access to an aggregated of products, services and customers that is difficult to find elsewhere
Trane Corporation	Heating, ventilating and air conditioning	Extranet supports 300 independent wholesale vendors for purchasing, selling, and accessing information about its products	Wisconsin	Increased functionality
VHA Inc.	Healthcare Organizations alliance	Extranet for collaborating and accessing an electronic catalog of products for approximately 22,000 dial-up users. In the future VHA members will buy and sell merchandise and offer a wide range of medical, legal and pharmaceutical research capabilities	Texas	Better information exchange, through ubiquitous, secure environment

Source: adapted from B. Szuprowicz, "Extranets and Intranets: E-commerce business strategies for the future" and http://www.actnet.com/Research_And_Analysis/index.html

Table 2: Correspondence between knowledge conversion processes and multiple communication options

	Tacit knowledge	Explicit knowledge
Tacit knowledge	<i>Socialization</i> <ul style="list-style-type: none"> • Videoconferencing (desktop video) • Room based videoconference 	<i>Externalization</i> <ul style="list-style-type: none"> • e-mail • groupware shared databases • consulting • collaboration tools • workflow tools
Explicit knowledge	<i>Internalization</i> <ul style="list-style-type: none"> • groupware (DSS) • groupware shared databases • data mining • search engine • webcasting 	<i>Combination</i> <ul style="list-style-type: none"> • telephone • www based phone systems • e-mail, FTP, directory, Usenet • audio-conferencing • chat systems • web chat • computer conferences • webcasting • document archive • workflow tools

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