

# **Underlying Principles of the Electronization of Business:**

## **A Research Agenda**

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# **Underlying Principles of the Electronization of Business: A Research Agenda**

## ***Abstract***

This paper discusses the underlying principles of the electronization of business and its impact on accounting information systems (AIS). The concept of electronization of business processes and the consequent deconstruction of the value chain in the new economy is introduced. A bitable society requires an entirely new set of processes and players, where traditional companies will either perish or incorporate substantive changes in the way they conduct business. The general effects of electronization of business lead to the introduction of 8 emerging business issues and 13 research opportunities. The paper concludes that the phenomenon of electronization is a heterogeneous one with firms and industries developing features at different paces. This heterogeneity presents yet another challenge to developing new and relevant accounting standards that drive the processes found in state-of-the-art systems.

## **1. INTRODUCTION**

The recent debacle of Internet companies and their stock prices has raised major issues about the viability of dot.com companies. While the first and second waves of the Internet brought emphasis to B2C and B2B activities respectively, the third wave of the Internet is bringing some sobriety and an emerging rationality to inter-networked markets. In certain markets (e.g. Online Brokerage) indigenous Internet businesses may have competitive advantage due to new paradigms and lack of traditional process inertia; however, most traditional firms will not be able to continue to conduct business in the traditional way due to a major change in the basic processes of business. For example, traditional brokerage houses accustomed to \$90-100 a trade face financial challenges charging only \$10 - \$15 a trade. Companies accustomed to differential pricing across geographical boundaries will struggle with full information and international comparisons across companies and countries. Organizations accustomed to brand name differentiation will struggle with the increased commoditization of services and products.

Internetworking and broadband services are altering some basic premises of productivity and production processes. The introduction of an ubiquitous broadband network allows for remote management through intensive communication through text, video and audio. Consequently allowing for business deconstruction and process outsourcing. Furthermore, internal organizational networks now providing broadband communications within businesses are changing intra-corporate processes by providing a rich information set and enhanced knowledge

bases. These more agile processes<sup>1</sup> present great productivity improvements and create a new set of cost/benefit tradeoffs for performing corporate processes. Intrinsic to the concept of more agile processes, and new business process valuation methods, is the idea of sharing processes across organizations and opening information to partners both up and down the value chain. Organizations now open their inventory files to their suppliers and allow them to manage shelf content. Clients can go into corporate Intranets and order products, interact with suppliers' web sites, get customized billing, and instruct intelligent agents to monitor many offers and choose the most attractive.

The rapidly emerging digital business environment is yielding an entirely new set of processes and players into the electronized business domain, where traditional companies will either perish or incorporate substantive changes in their processes. Large existing businesses, with strong brand names, will morph into leaner, agile providers. Corporate B2B auction places, despite their current doldrums, will heavily commoditize many markets where suppliers and customers will interchange roles. New paradigms, such as open information and pricing on the Web (prescription drug information), naming your price (Priceline.com), B2B electronic commodity markets (Covisint), and negotiated prices for consumers are changing the panorama of business. In this paper, we discuss the underlying principles of electronization and the related driving and main effects on business processes and accounting information systems. Drawing on the theory of electronization, we develop 8 emerging issues about the business environment, the accounting profession, and accounting information systems and we also identify 13 research opportunities.

## ***2. THE THEORY OF ELECTRONIZATION***

### **2.1 Basics**

"No single force embodies our electronic transformation more than the evolving and rapidly growing medium known as the Internet. Internet technology is having a profound effect on the global trade in services (white House, 1997). The area of sales and related processes facilitated by electronic media has popularly been referred to as "electronic commerce" (e-commerce). Electronic business (e-business) encompasses e-commerce, but also the entire range of business activities that are conducted electronically with associated technical data. Further, it encompasses

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<sup>1</sup> For example Michael Dell in discussing the Dell business model emphasizes process rapidity as a key variable for the success of his firm and its superior profitability.

an entire set of digitally enabled activities that are progressively replacing the more traditional brick and mortar commercial functions. The wider phenomenon of *electronization of economic activities* encompasses the digitalization of all processes of economic wealth generation including economic analysis, production, storage, information provisioning, marketing, etc. Consequently, within the more general phenomenon of digitalization of modern life, we find a very important phenomenon - the increasing electronization of business.

Corporate, not-for-profit, and governmental systems incorporate many related processes of business cycles. The digitalization of many of these processes is resulting in an astounding productivity gain for the World economy (Reingold et al., 2000). Many processes are changing their essence and becoming less expensive, time consuming, and more useful. For example, in the past, a directory assistance call required both person and operator involvement: the operator manually looked up the listing in paper-based directories in a localized search. Now directory assistance involves the caller, a national (or international) computer database, voice synthesis, and automatic connection. Furthermore the process has been expanded, and reverse searches can be conducted through the Internet that will point to the owner of a listed telephone number, link this to the requestor's telephone, and not involve any individual at the service provider. Thousands of system processes are undergoing this type of mutation leading to cheaper, more efficient, yet expanded types of services. We further expand upon Greenstein and Ray's (2002) depiction of AIS and the Customer-Oriented Value Chain (COVC) and incorporate a wider group of electronic business processes in Figure 1: The Electronization of Business and the COVC. This diagram illustrates the customer-centric focus of today's emerging business models and links together the components of the business processes (e.g. marketing) and e-business tools (e.g. Web banners) that are structurally changing the way business is conducted. The e-business set of processes can be grouped in five major groups: Revenue (sales, marketing, advertising, etc.), Service/E-Care (the new CRM component), Expenditure or Supply Chain Management (purchasing, logistics, delivery, etc.), E-Financial Processes (Accounting, Finance, Auditing & payments) and Asset Management (HR, Fixed Asset, R&D, etc.).

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Figure 1: The Electronization of Business **and the Customer-Oriented Value Chain**

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Sales, marketing, advertising, and e-care are the core of the e-business phenomenon. One-to-one marketing (where large customer databases link much information about clients and create very efficient leads) is linked to highly tailored advertising mechanisms. The firm knows the client and when he/she is connected to the Internet it fires off a series of individually targeted banners catering very closely to the client's needs. When a customer responds to such advertising and a sale follows, e-commerce is then fully realized.

Electronic care (e-care) is an emerging process of the new organization. Typically, consumers expect that technologically rich products will have a high level of, and possibly superior, technologically based support. For example, consider the level of technological support that a customer would expect from an online bank versus a small, local credit union with little or no online presence. The online banking customer would expect to view his account, make payments, transfer money, apply for loans, and perform any other desired services online in a 24/7 environment, whereas the local credit union account holder may not even hold an ATM card and do banking in a much more traditional fashion. E-care, which is a mix of e-mail, web based support (i.e. customer self-service), and, when essential, phone support, is cheaper and more powerful when properly administered than traditional approaches. Organizations are increasingly finding that the same stringent standards of traditional care must not only be applied in the e-organization, but enhanced as poor or weak business practices become transparent when “advertised” on corporate websites.

The e-business revolution is in its initial phases and will progressively take over all processes either directly or indirectly. The distinction of traditional (manual) commerce and e-commerce will disappear with all processes being either digital or aided by digital processes. The pace of this transformation will differentiate winning and losing competitors, industries, and successful investors. The intrinsic nature of the product and processes, as well as both the dynamics and inertia of corporations and industries will determine the pace of change and the gains in productivity. Similar to the telephone, railroads, and electricity; the Internet has radically altered modern life.

## **2.2 Driving effects**

An entirely new set of *driving effects* of commerce is emerging. Five primary effects and their implications for IS are discussed in this section.

- *First*, the realization that a Malthusian physical world gives way to a place where information is abundant and eyeballs limited (Schwartz 1999). The provisioning of financial information will tend to

be abundant and ubiquitous with human information processing and disclosure limitations as the main obstacles to utilization. One can envisage an XBRL-based world with corporations posting different levels of aggregation of financial information on the Web and spiders with formation sniffers bringing it to desktops enabled with spiders, filters and analyzers.

- *Second*, the realization that paradoxes exist due to technology, and that paradigms of the e-World may include giving away goods and services for free, not protecting software against privacy, and paying for users and site visitors. New models for financing information dissemination may emerge with individual users paying for information, companies paying to be included in selected filters, and individuals paying for analysis and correctness scrutiny (data level assurance) of the information being received. The fall of Enron and Andersen raise the question – for whom is the audited information produced and whom should pay for it? Theoretically, auditors are not supposed to be client advocates, but rather a purveyor of reliable and trustworthy financial data to external stakeholders that are faced with a moral hazard scenario. Assuming that accountants provide valuable and accurate information, new models may be developed where interested users of financial information pay for the data from the accounting firm or its agent.
- *Third*, the meaning of the words competitor and industry are changing. In the faceless world of digital, international trade, a company's customers and suppliers of today are its suppliers and customers of tomorrow. They are also likely to be the company's competitors and allies. Organizations are outsourcing and creating alliances at an unprecedented level. New forms of accounting for these entities will emerge even if without statutory approval. XBRL will enable "loose form" consolidating of partial entities allowing for information users or corporate stakeholders to understand the specific value chain and the effects of particular events / trends.
- *Fourth*, as industries blend and change, affiliation agreements allow for the creation of entire product cycles without the ownership of inventory or production facilities. Inventory accounting, measurement and management are being transformed, but current standards do not deal well with them. Direct disclosures that are online-real time will allow for better understanding of the value components and their ownership. The challenge is for the accounting profession to develop standards that support the

spirit and nature of such affiliation agreements. The accounting profession must be able to deliver good, reliable and timely measurements of both the results of operations and the health of the companies involved in affiliations to interested stakeholders in both summary and detailed data as desired by the information users. XBRL will be a useful vessel to deliver and retrieve this information.

- *Fifth*, current pricing models are changing and hybrids of fixed pricing, auctions, variable pricing, contingent pricing, and name your price pricing are emerging and creating new business models. Alternate pricing models are creating havoc with revenue measurement. The difficulties of valuing Priceline and E-Bay transactions for their corporate reporting illustrate this fact.

Many other effects in the financial cycle are emerging as a consequence of electronization. Later in this paper we specifically examine emerging changes in the measurement process, the assurance process, and corporate finance.

## **2.3 Mode of Electronization**

### **Main Venue**

Great differences exist in the electronization of B2B, B2C and B2E processes. The business-to-business (Sawney, 1999) sector of E-commerce presents both vertical and horizontal models. In the vertical model, firms focus on an industry and develop great industry expertise to develop markets. In the horizontal model, firms focus on one type of product or service and offer it across industries (e.g. internet payroll services). The business-to-business sector is intrinsically different from business-to-consumer. Business buyers are usually well informed, possess many resources and can negotiate based on volume. Brand name is much less of a consideration than price, quality, delivery time and reliability. Three different models have emerged for business-to-business transactions: 1) the e-catalog model for situations where many different items at distributed locations are offered and price is fixed (e.g. auto parts), 2) the auction model where products are not standardized and great differences exist in the perceptions of value (e.g. auctions of used capital plant products), and 3) the commodity auction model where few variations are available for the type of product and a large number of buyers and sellers (natural gas, pork bellies, coffee, etc.).

Electronic commerce is progressively and irreversibly changing the facade of many businesses with three dominant phenomena discussed in the following section: re-intermediation, deconstruction and cannibalization. Related phenomena include: bitable goods and e-commodities, customer demands for information, industry

morphing, techno-intensification, and re-channeling. After this discussion, the main effects of these phenomena are discussed and eight propositions presented that relate to their impact on AIS.

## **Dynamics and Industries**

The natural evolution of electronization is that industries will focus on the electronization of their key processes and create leaderships on their major competencies. For example, Federal Express leads logistics and Cisco is among the leaders in E-Learning. These leaderships will eventually be transported to other industries that have less reliance on these key processes but can benefit from the technology and electronized processes. For example, package-tracking technology is being integrated in the e-care portion of Dell customer relationships. Also, an increasing reliance on remote electronic transactions for information dissemination, billing, record keeping and payments is electronizing banks and electronic brokerage houses.

The measurement and assurance world of the CPA/CA firms has led to the development and electronization of the field of knowledge management and has been one of the main beneficiaries of office automation, in particular for its mobile devices. The CPA firms are increasingly less dependent on manual staff labor and paper-based documents. Due to their semi-partnership organizations, these firms have not made the long term investments necessary to be leading the electronization of these processes and advanced methodologies in automated working paper management, group work support, continuous reporting and continuous assurance have lagged.

### **3. PRIMARY EFFECTS OF ELECTRONIZATION**

Business has been progressively electronized throughout the industrial revolution. The advent of electric sorters, typewriters, and the first few generations of computers have affected organizational efficiencies, bringing in more cost-effective processes. The introduction and use of computers has substantially changed the efficiencies of back office processes, initially focusing on natural applications that replaced labor, such as utility billing and corporate payrolls. After labor-saving applications, business started to focus on analytic efforts such as Management Information Systems (Laudon and Laudon 1999), Decision Support Systems (Turban and Aronson 2000), and Executive Information Systems (Rockart and DeLong 1988). Personal computers allowed for productivity

enhancements that focused on the desk-top and white collar processes which characterized the mid-eighties to mid-nineties.

While computers were being developed an even stronger effect emerged, the change in the nature of telecommunications and computer interconnections. These interconnections moved computers first from independent batch processors, to time-shared machines, to parts of corporate networks, and finally to the current environment of interconnected networks with symbiotic relationships across a ubiquitous public network.

The business processing and telecommunications evolution has been of major value to businesses by creating the current cycle of revolutionary change that we call the electronization of business. Furthermore this transformation is causing permanent effects that permeate the organizational arena. The main effects of the electronization of business that are redefining areas of action and methods of work are discussed below.

### **3.1 The Value Chain – Internal and External**

The corporate value chain links the different processes along the value creating exchanges between different entities. Less discussed in the literature is the internal value chain where several internal corporate processes cooperate with the goal of adding value by aiming to perform specific functions fulfilling both global and local organizational objectives.

In the value sequence, a series of inputs are provided to the organization through traditional logistics and the Internet. These inputs include raw materials, patents, services, labor (in the form of external service contracts), etc. These inputs are brought into the organization and receive added value or are consumed in the process of providing customer added value. Ultimately, outputs are delivered in the form of products or services to the clients, and these are becoming increasingly intertwined. The client value includes the product and a series of informational services that are necessary for business activity. For example if you are selling a printer you must have supplies, instructions, billing services, warranty services, customer support services, etc. Added value services, mainly of bitable nature, are being rapidly electronized and changing in terms of performing agent (who performs the function, the organization, outsourcer, or affiliate), nature of the process, and the velocity of its completion.

The bitable part of the value being delivered can be substantially supported by electronic distribution mechanisms. EDI, voice response systems, and call centers are technologies progressively supporting these processes. Extranets are a selective use of the corporate Intranet that is opened to third parties. The internal corporate value chain is composed of many processes (some sequential, others parallel) such as marketing, advertising, research and development, production planning, production, financing, accounting, auditing, etc. These processes create value for the corporation in facilitating and producing its final product regardless whether it is a service, physical good, or bitable goods.

The accounting profession will have to adapt the choice of guidelines and tools used in order to best service its client base. Accounting firms will increasingly be faced with new challenges and opportunities for serving their clients. For example, as the protection of personal information becomes an increasing concern and firms must conform with new legislative requirements, accountants will need to aid client organizations in assessing related risks and achieving compliance. Accordingly, standards setters need to modify or create standards to appropriately deal with the digital environment (Greenstein and Ray 2002).. One such example of the work that needs to be done in this area is the FASB's Emerging Issues Task Force Issue No. 00-x4, Accounting for Advertising or Other Arrangements Where the Service Provider Guarantees a Specified Amount of Activity. As of late-2002, this Issue still had no description and its status was "currently inactive pending further progress on active EITF Issues, receipt of additional information, or further developments in practice."

***Emerging Business Issue 1: The accounting / auditing financial services value chain is permeated with new challenges necessitating the development of new methodologies and tools to facilitate performance.***

***Research Opportunity 1: New players will emerge in the assurance and financial services value chain providing site-specific services. Identification of these new players and theory development regarding how they affect traditional service providers is necessary.***

### **3.2 Deconstruction**

With the progressive advent of e-business, a trend has emerged: the progressive outsourcing or alliancing-out of parts of the internal processes. Furthermore, unorthodox competition (often pure-play entities) is coming into the market attacking the noble points or core components of the chain. Figure 2 represents this concept with different elements of the internal value chain and the main organizational effects that are impacting it.

Figure 2: Deconstruction

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Take the example of an automobile manufacturing concern. Over the years, automobile manufacturers have provided an integrated set of processes that resulted in the delivery of a car to a dealership that is eventually sold to a consumer. Producing and delivering this product entails research and development, engineering, manufacturing, information tracking about the car, logistical arrangements for delivery of the car to the dealer, and servicing. Deconstruction analysis breaks the array activities into discrete components and considers each component on its own merits. Modern organizations have strategically entered into alliances and outsourcing to focus on critical competencies and competitive advantages. For example, an automobile manufacturer may decide that its core competencies are in engineering and research/development. As a result, they may decide to outsource the tasks of manufacturing, information tracking, and logistical arrangements for delivery of the cars. Affiliations can serve to share in the proceeds of any part of the process, e.g., information systems, without having to dedicate any substantive resources to this process. Alcatel is an example of a company shedding manufacturing and focusing on other aspects of the value chain. Alcatel recently announced that they would abandon the manufacturing process and sell 120 of their 130-plus production facilities (Perera 2001).

As businesses continue to increase efficiencies and increase their bottom-line figures, the accounting, auditing, and financial services functions in firms will be more closely scrutinized for the value they add to the firm. This leads to another emerging business issue:

***Research Opportunity 2: Like other industries, the accounting profession's value chain needs to be examined from a deconstruction perspective, in particular to identify the feasibility and value-added potential to be gained from the separation of sets of current services.***

### **3.3 Bitable goods and e-Commodities**

A bitable good is an item that can be transmitted over the telecommunication network in the form of binary digits, better known as "bits." Among bitable goods are found most financial products (banking products, insurance products, brokerage products), software, music, videos, and information of many types. Advanced societies have evolved to less manufacturing and more services. Advanced economies have also focused more rapidly on developing bitable products and their distribution. As noted earlier, a large part of the value delivered in non-bitable

goods is its information component that is bitable by nature. Consequently, even most firms with a physical product (e.g. a palm pilot) have a substantive part of their value-added bitable in nature (e.g. free news services and fee-based messaging services).

An e-commodity is a good sold online that does not need to be seen, touched, squeezed, tasted, or tried on by the consumer to be purchased. Factors like reputation of the vendor, experience by the consumer, distance from the source, and availability of the good, may change non-e-commodities to e-commodities. The amount of information that investors can get online is vast, and the production and delivery of such bitable financial information may become an e-commodity to the naïve investor. The challenge is for information disseminators to differentiate themselves as being providers of superior information to avoid being a provider of an e-commodity.

***Emerging Business Issue 2: The accounting profession, being the distributor of a bitable good, information, is rapidly transforming into an e-business. As information production is increasingly electronized, members of the accounting profession will increasingly have to identify and convince the markets of the value their services add to the electronic production of information in order to minimize the effects of commoditization of information production and dissemination.***

Because AISs are a subset of ERP systems and can be delivered by ASP services, auditing, and professional financial services are being severely commoditized and eroding some of the brand advantage of the big four accounting firms (Greenstein and Ray 2000). The recent accounting failures of Enron and Worldcom, among others, indicate that the accountants can add or detract value from the electronized processes. Research is necessary to identify the ways in which human judgments or programmed expert systems reflecting related decision models of accountants and electronized AIS processes can be combined to add value and safety to the market.

### **3.4 The Customer View**

Customers do not see their needs the same way a company does. Merck may see a customer as the buyer of a drug, while the customer may be trying to acquire the solution or cure for an ailment which may also include medical insurance, food products, prosthetics, etc. Internet-related technologies have progressively allowed organizations to better satisfy needs of clients. By creating value bundles of products and services offered by meta-organizational entities (higher level entities that offer integrated service and products from more than one entity), these needs can be satisfied. Because of the need for a customer-centric focus, AISs must change their emphasis

from pure financial numbers to encompass broader business measures of customer satisfaction, markets estimates for bundled products, and other customer-driven information. The accounting profession must also consider its new business environment and the implications of a customer-centric society.

**Research Opportunity 3: The normative accounting model that has guided the accounting profession from an information-user perspective needs to be updated in the context of a digital environment. A particularly challenging issue to untangle is “who is the customer”.**

Substantial dissatisfaction has already surfaced due to the lack of customer-orientation of accounting and auditing processes. **In the traditional assurance function, a challenge is that the customers for the produced information are not the same group as those paying for the services. Thus, the normative accounting model needs to be enhanced to consider the difference between customers of information produces and clients that pay for the production of information. Accountants will increasingly need to sharpen** their ability to direct a message that is very much based on the profile of a particular customer and tailored to the perception of that customer’s needs.

Another issue related to e-marketing tactic is the use and measurement of mass-customized marketing techniques. When used properly, these practices substantially increase the hit ratio of advertising and revolutionize marketing strategies. Wide-brand advertising is giving way to narrower, personalized advertisements and marketing. As such, the measurement and reporting of advertising costs per customer becomes feasible if the underlying information systems are appropriately designed to facilitate such information production..

**Emerging Business Issue 3: New AISstructures and accounting principles are needed to incorporate marketing and customer measures into the reporting and management framework. One to one structures will eventually be part of the firms accounting methods and marketing costs, in certain service industries, can become “above the line” production costs.**

### **3.5 Industry morphing**

One of the key tenants of financial analysis and business strategy has been the concept of industry and industry codes. The Internet and modern e-business have not only created entirely new types of industries, but they have also greatly confused the concept of industry by deconstructing and reconstructing value propositions. Businesses are often composed of many parts that belong to different industries, and businesses work on morphing towards the components of their work that are more profitable or in which they have a competitive advantage. The modern e-

business may be seen in the future as an aggregation of elemental atoms (business processes) that support the value chain. These basic atoms (owned or outsourced) will better define lines of activity than the current oblique industry classification. On the other hand, businesses often maintain parts of their businesses with which they are identified even if these are a small component of all their activities. GE, a leading US industrial entity, still has its refrigerator division, but GE as an enterprise is a major conglomerate with more than 100 diverse units.

Intuit is an example of an evolving organization focused on strategic diversification. Intuit began its diversification with the acquisition of Chipsoft and the PC tax software Turbo Tax. Intuit subsequently entered the ASP market by offering Internet access for the QFN (Quicken Financial network) portal. It also made an affiliation agreement with Checkfree to facilitate payments by customers. Eventually it made agreements with over 100 banks to connect directly from the desktop to the bank activities allowing availability of checking information, capability to make payments, and ability to conduct other semi-online activities. Intuit now offers an extensive program of insurance, loans, market information, etc. Intuit, originally a software developer, has evolved into an integrated financial services provider by carefully choosing which sectors of the financial industry it will enter, affiliate, or avoid.

From an accounting perspective, traditional accounting research relies very heavily on “industry analysis,” with heavy usage of SIC codes for corporate clustering and comparison. These SIC codes have become less meaningful for such research purposes because the many diverse businesses in which conglomerates, such as GE, operate. New views of company classification must emerge as well as better rules for segment disclosure (SFAS 14) as not enough information is provided for meaningful business comparison along a very segmented (atomized) value chain. Research conducted prior to the New Economy (Greenstein and Sami 1994) found that segment reporting may have indeed resulted in more informative and finely partitioned information sets being presented to investors.

Research Opportunity 4: Researchers need to examine the current level of heterogeneity actually represented in segment reporting of businesses which have atomized and outsourced many aspects of their value chain.

Accounting firms have also morphed into conglomerate professional service firms emphasizing consulting and legal services. Although the trend is to now spin-off these consulting arms, what remains in the professional services

firms still encompasses more than just traditional financial audit work. The recent enactment of Sarbanes-Oxley Act of 2002 restricts the extent to which the diverse services can be offered by the audit arm of these firms. Regardless of where these financial reporting audit services are offered, a challenge to the profession is that much of the monitoring and control revenues will increasingly be electronized and programmed into software modules. Therefore, accounting firms must understand that their business environment is changing due to the electronization of what their core products, providing control and assurance over information systems and producing financial information.

***Emerging Business Issue 4: The “software industry” will progressively become a competitor of firms in the accounting profession and represent a threat to related accounting and auditing revenues earned by accounting firms.***

### **3.6 Techno-intensification**

The electronization of business processes has as a basic tenant techno-intensification - the increased use of technology and its consequent increased capitalization and decreased human resource intensity. Most electronization processes focus on decreasing the labor content of its activities through a judicious usage of technology. With this factor, the intrinsic nature of technological processes assumes an important role in e-business. Businesses are progressively:

- Having larger and larger capital investment per employee;
- Relying more extensively on third parties for equipment installation, provisioning of software, equipment and software maintenance, etc.;
- Hiring more technically proficient personnel;
- Training personnel on technical matters on a continuous basis;
- Producing items with higher value per pound;
- Executing rapid and efficient processes;
- Providing availability 7 x 24 x 365 (seven days, 24 hours, 365 days a year); and
- Experiencing high vulnerability to down time due to increased importance of systems.

Techno-intensification creates interesting accounting reporting problems as companies will invest in building human resources, performing R&D, and obtaining technology in unorthodox ways while, for example, our

accounting rules often do not allow capitalization of R&D or of massive expenses on human training for help desks. Our accounting rules also deal very poorly with the assurance and disclosure of assets and investments in joint agreements, affiliations and alliances. The next emerging business issue follows closely to the previous one:

***Emerging Business Issue 5: In order to remain competitive and to address the current and emerging digital business environment, the accounting/auditing financial services industry will have a larger and larger software / hardware component.***

### **3.7 Re-channeling**

As mentioned previously, the deconstruction of business implies a breakdown of the different business components of its main processes. Some of these components are then potentially divested through outsourcing, alliances, or competition. Re-channeling also implies that businesses may change their focus to related products and services. As a result of the atomization of value-added processes, a company may selectively opt for contributing only profitable or critical processes. Opportunities may also arise where a business chooses its most promising or expertly run processes and considers them as separate products. For example, a European manufacturer of truck frames is launching its welding process (a sub-process of the assembling and manufacturing) as a separate product line, and thus re-channeling the division's efforts.

Another form of re-channeling is when companies change their methods of distribution or sales to take advantage of the Internet. Most of the dis-intermediation that is occurring in the brokerage, auto sales, and travel industries (decreasing or eliminating agents) is a change from traditional to electronic channels. Re-channeling is less radically affecting other markets as well. For instance, the progressive increase of Internet sales by CircuitCity.com implies a change from the traditional brick and mortar channel to an electronic channel or a click and mortar channel where customers buy over the net and pick up the product at a physical store. This re-channeling cannibalizes brick and mortar stores through re-channeling some sales, but it may also stimulate the entire market for electronics.

Re-channeling raises interesting company measurement issues and stress on its AIS. While massive sales to dealers and intermediaries pose a certain set of information needs, the direct dealing with customers, and providing them with service transparencies and customer service related information poses a different, more voluminous and

exposed set of informational requirements. The implication for the accounting profession is that we need to consider how our own industry needs to consider rechanneling. For example, our traditional corporate performance ratios and other information reporting services need to be enhanced, perhaps even redesigned, to focus on direct delivery channels.

***Emerging Business Issue 6: Tax, accounting, assurance, and financial services will increasingly be re-channelled to be delivered by online means.***

Another issue regarding re-channeling as it relates to AIS is the relative value-added of various services offered by the accounting profession. The atomization of the services offered by the accounting profession may actually have led to the loss of perceived value-added of the traditional audit function. The high-value, technical aspects are internally outsourced to a separate team (Greenstein and Ray 2002). As legislators increasingly examine the numbers provided to the General Accounting Office for audit vs. non-audit fees in an effort to examine a firm's independence, accounting firms will also have an incentive to more accurately categorize atomized support activities as audit services.

***Emerging Business Issue 7: Assurance and risk management services will increasingly be morphed by reengineering the traditional audit function to incorporate many of the internally "outsourced" functions, such as network security assessment, as opposed to re-channelled to increase the value and scope of activities that are directly related to the traditional audit.***

#### **4. PROCESSES, THEIR ELECTRONIZATION AND THEIR TOOLS**

This section focuses on the meta-processes that can be viewed as the most important and most affected by electronization. These meta processes are discussed and their implications for AIS are presented.

##### **4.1 Customer Relationship Management**

Customer Relationship Management (CRM) has progressively encompassed an increasingly larger importance in the evolution of business. Many organizations in the past have neglected the ultimate consumer by focusing on their immediate customer, the intermediary. For example auto-makers focusing on the dealers; pharmaceuticals on doctors and pharmacists, airlines on travel agents. With the progressive dis-intermediation of many of these

intermediaries, business entities are attempting to focus on the consumer through extensive efforts of identification, construction of databases, and creating methods of interface. Simultaneously, products and services are progressively more technologically rich.

The three main components of a CRM package – sales force automation, marketing automation and call-center automation – have existed for over a decade. They have been fulfilling the corporations' need to collect customer information to better understand their user base and to let employees in the front office do their jobs more efficiently. Many smaller firms have been attracted to a wide-open functional niche: *Internet-enabled sales, marketing and support*.

The evolution of IT with knowledge systems based on data warehouses, data mining, marketing databases and profiling allows for an unprecedented targeting of accuracy. Three tools of modern IT and logistics come together in facilitating the evolution towards one to one marketing (Peppers and Rodgers 1999): Data warehouses, data mining tools, and client profiling. These tools put together in a judicious marketing plan allow for the improved utilization of the e-business environment by taking advantage of the intrinsic characteristics of the environment. This plan allows for: 1) geographic focus, 2) timely reaction, and 3) customer focus.

While a large store of customer data have existed over the last decade in many companies, the rise of the Internet and e-business has allowed, and even required, companies to use this data on a continuous, interactive basis during the interaction with the client. Some instances of this use entail:

- Credit card companies: approval of a particular transaction at the moment of transaction;
- e-tailers: suggestion models during the moment of purchase (e.g. customers that bought this item also bought these...); and
- Routing: geographically based suggestion models linking geographical map and wireless communications (e.g. in order to go to the museum you must take route 23, by the way you can buy gas on route 23 with the enclosed coupon).

Progressive levels of one-to-one marketing are facilitated by several different technologies that bring increased efficiencies to the process. Noteworthy technologies are:

- Extensive databases of client characteristics and profiles;

- Banner provisioning: based on knowledge of client characteristics;
- Suggestion models based on client characteristics;
- Product bundling based on the customer view; and
- Progressive integration of the mobility characteristics of customers for M-Commerce (e-business transactions performed on mobile devices such as cell phones and PDAs).

By tracking the sites users visit and how they use the sites, marketers can build complex portraits of individual users. Special tools can draw information of particular tastes and tendencies that questionnaires and surveys fail to capture. Amazon.com and LandsEnd.com have web sites with tools that enrich the buying experience and at the same time provide interesting and valuable experience to the merchant.

Data warehouses may link a series of different sources of data or may bring this data into a common receptacle. Traditional data warehouses could contain financial databases (banking, credit card, and credit references), scanner data (from purchases in supermarkets), census data (for building profiles), and more recently, Internet type data as click paths and accessed web sites. Massive data warehouses with terabytes of data present interesting and challenging storage and data mining issues for companies.

The e-care market has attracted many actors including well-known software providers such as Oracle and PeopleSoft. Most ERP suppliers are adding a CRM module to their products (e.g. SAP). Even smaller ERP vendors, such as Great Plains, are offering CRM modules for their products. The competition between IT providers is getting tough as the CRM market is expected to drastically increase in the near future. According to IDC, the global revenues from the CRM services markets will increase from \$34.4 billion in 1999 to \$125.2 billion in 2004.

Oracle Applications v1 offers a free CRM module. This module provides a more efficient set of data about the customer. Oracle offers also CRM outsourcing, the management of the customers for its clients. The information will be made available through WAP and PDA devices<sup>16</sup>. CRM provides not only office-based services, but also progressively more information and services through mobile devices. These will bring new ways of communicating and servicing customers from the very first stage of the product ideas and research and development through to the offers to the customer and the relationship management. As acquiring a new customer is on average eight times more expensive than keeping a customer, CRM systems are a required and critical layer of any information system.

Web pages that adapt to the clients' information (my.yahoo.com, my.ebay.com, mySAP.com, myCity.com) as well as products that can be mass-marketed, but individually tailored (e.g. custom Levis jeans, custom mountain bikes, custom tires by Pirelli, custom shoes by Nike, etc.) will become more common and widespread. Customized measures and reports are emerging over the Web, and these will permeate the AIS world as well. For example, a stockholder in the future may wish to know how a firm's earnings announcement affects them. Mass-customization tools can be used to illustrate to each stockholder, based on the number of share they hold and the types of share, how specific accounting drills down their own personal shareholder value. Also, cost accounting systems will need to be designed so that accurate cost numbers can be determined from mass-customized products that are offered to customers. This will demand that the AIS systems have embedded in them advance dynamic pricing modules.

***Research Opportunity 5: Designers and researchers of AIS systems need to be at the forefront of mass-customization and dynamic pricing technology and their integration into AIS reporting systems.***

As consolidated databases are built, however, consumer concerns of privacy-related issues arise. AISs need to incorporate well-thought out privacy policies for data warehouses and systems that use profiling. A breach of a stated privacy policy when handling consumer data can result in loss of customer faith and/or class-action litigation. Certain industries in the US have privacy legislation to which they must adhere, such as the Gramm-Leach-Bliley Act for the financial services industry, Health Insurance Portability Accountability Act for the healthcare industry, and Children's Online Privacy Protection Act for the online industry. Further, US companies that have operations, employees or customers in other countries also face an array of strict privacy legislation, such as the US's Privacy Directive (Safe Harbor Provisions apply), Canada's PIPED Act, and Australia's Privacy Act. While the accounting profession is trying to place a stake in the privacy assurance field, so are software companies, attorneys, and security consultants. The bottom line is that AISs are affected by the data they collect, the security over data storage, and how the data is used by the AIS and other ancillary systems.

***Research Opportunity 6: A comprehensive normative framework for incorporating privacy controls into accounting and business information systems is needed.***

## **4.2 Production and logistics (Supply Chain Management - SCM)**

While bitable goods present a very different type of supply chain with a different logistics model, brick and mortar companies are increasingly benefiting from the power of inter-networking. Inter-networking technology solutions link together the systems of the various players in the supply chain so data can be shared in an apparently seamless fashion. Middleware is typically necessary to facilitate inter-networking. Applying inter-networking to the supply chain can bring great efficiencies to corporate production, storage, distribution and acquisition processes. Supply chain management (Christopher 1998) has benefited extensively from:

- Electronic catalogs that point towards inventory of multiple provisioners;
- Product tracking through different entities and phases;
- Web processes that manage the distribution of cargo;
- Vendor managed inventory (VMI);
- Shared and distributed manufacturing processes; and
- Shared inventory management.

Supply Chain Management is one of the five core areas of the electronization of business. Since brick and mortar transformation has been slower than in the bitable goods area, the productivity gains acquirable from this area are just beginning to be realized. The next several years will present many opportunities for competitive advantage in SCM.

AIS are intertwined with SCM and the controls and reliability around such systems are of tantamount importance. Increasingly, the selection, implementation, and maintenance of such SCM systems that are an integral part of the AIS make assessing the controls of the AIS financial systems component in isolation meaningless. Large integrated systems continue to challenge auditors to comprehensively perform their traditional control assessment tasks. The cost-benefit analysis of unreliable and insecure SCM systems include significant risks associated with unstable or unreliable systems.

As part of SCM, companies are linking their Intranets to other companies' systems. Often these companies open their inventory records and allow providers to manage inventory and decide on inventory composition, reposi-

and changes. Dell, in the provisioning of large orders of computers to their corporate clients, links clients' Intranets to Dell's hardware customization as well as creating middleware to allow for automatic approval, billing, and payment. The interweaving of systems and structures creates allocation and measurement problems that accounting standards cannot currently resolve.

***Research Opportunity 7: A normative framework for inter-networking contractual arrangements among value chain partners needs to be developed along with new accounting measurements for such arrangements among the partners.***

### **4.3 Financial Processes**

Organizational Finance Departments are substantially benefiting from the technologies that the Internet brings to the platter. Most organizations today will have a finance area that also has accounting responsibilities. On top of an infrastructure of information processing systems, typically legacy and/or ERP systems, new methods and tools exist for corporate measurement, assurance, and financial management, several of which are discussed below.

#### ***4.3.1 The Measurement Process (Accounting)***

Accounting is the process of business measurement. In order to provide meaningful measures, a series of concepts must be assumed. These concepts provide a framework of processes around which measurements assume some meaning. For example, the Recording Industry Association of America (RIAA) primarily produces digitized assets, yet how is their value measured. What if these assets are stolen? In its battle against online theft of its assets against Napster, specific daily statistics of the number of unauthorized downloads were submitted as evidence in court. However, the theft of such assets by the member firms of the RIAA have not been reported to either the SEC or the firm's stockholders in their annual reports. Does this mean that the assets were not really stolen? Do accountants need to be concerned only with the theft of physical not digital assets because measurement is an insurmountable hurdle? What does it say about the going concern assumption of an industry struggling to protect its asset base in a new business/consumer environment. The questions need to be thoroughly debated and research. The fact that they need to be pondered indicates that current accounting standards are not necessarily designed to support other users' information needs.

Developing, implementing and providing measurements is costly. Every additional measurement has a marginal cost. Particularly in management accounting, managers will make decisions concerning the value of a particular measure and its cost. Regulators have made these same tradeoffs over the years, but the cost and capabilities of information processing have changed. Currently, specific identification inventory valuation methods has many more benefits than in the past, including leaner inventory management, customer relationship management and inventory tracking. FIFO/LIFO inventory valuation methods don't apply to digital assets, and entirely new measurement and valuation methods are needed

The role of the accountant, if the profession is to grow and prosper, will involve the measurement of multiple business functions beyond just the financial processes. The advent of the "Balanced Scorecard" (Kaplan and Norton 1996) exemplifies the potential for enhanced measurement across many dimensions, most of which are non-financial. Figure 3 defines some additional measures often used with marketing and web issues.

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Figure 3: Web Metrics

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The role of the accountant in the electronization of business is that of a measurement specialist that:

- looks at the different processes and firm assets;
- creates measures for them;
- proposes and evaluates the implementation of measurement schemata;
- analyzes the measurements and analytics received and incorporates them into software solutions;
- evaluates and proposes inter-process measures;
- and advises management on the meaning of the outcomes.

Some examples include interactive database technologies allow for efficiencies in variable pricing, name-your-price, group buying, etc. that are changing the economics and the practice of commerce.

*Research Opportunity 8:* The accounting model needs to be expanded to include a broader set of business measures. Research is needed that will help identify optimal sets of related metrics.

In a highly connected, electronized world, a merchant can set up one shingle and service any place in the world. New provisioning methods and approaches will serve to complement the supra-nationality of a Web site.

*Emerging Business Issue 8<sup>3</sup>: Effective supra-national auditing and accounting rules will emerge to facilitate the management and measurement of internationally de-constructed entities.*

### **4.3.2 The Assurance Process**

As a complement of the measurement function the new economy presents opportunities for a wide range of different assurance services. The AICPA, through the Elliott Committee, has established several task forces to develop a set of expanded assurance services which include WebTrust (assurance of Web Sites), SysTrust (assurance services on System Reliability), Enterprise-wide Privacy assurance, and ElderCare (health care assurance services), as well as a list of over one hundred and forty other services. The crucial issue to understand is the motivations and causes of the emergence, and potential importance of, additional assurance services.

Both the annual financial report and the consequent annual audit report are old, maturing products with progressively less added value. Statutory factors are prolonging the products life (as they are required for a company to be listed), but their actual usefulness for managers and investors has been decreasing progressively. On the other hand, the following factors lead to the need for an entirely new framework that links together theoretically entities, processes, metrics, analytics and alarms:

- increase in speed of business;
- increase in the number of intraday investors;
- increase in complexity of local and federal laws;
- ubiquity of e-commerce; and
- participation of several business entities in the life of a transaction,.

Research Opportunity 9: A new integrated framework is needed to theoretically link together entities, processes, metrics, analytics and alarms

The new integrated framework is to be based on continuous measurement<sup>21</sup> of a set of internal processes, strategic metrics, and external variables. Continuous measurement leads to internal continuous reporting and monitoring. Eventually some level of external continuous reporting will occur. The structure for process monitoring and

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<sup>3</sup> These are already emerging but are far away

assurance is displayed in Figure 4. Woodruff and Searcy (2001) have already contributed to this avenue of research with their conceptual model of continuous audit in the debt covenant domain using digital agents and alarm triggers.

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Corporate metrics are provided by the process management information system (MIS) on a real time basis. A monitoring structure on top of the MIS links several disjointed systems, selects and filters data, compares these metrics with standards, and if variances surpass discrepancy standards, an alarm is issued. These alarms are issued to operations, auditors, or eventually to other stakeholders.

Research Opportunity 10: Development of monitoring devices and related alarms that support continuous assurance and the assessment of their relative effectiveness.

#### ***4.4 Human Resources***

Many organizations with foresight have focused substantive efforts in the electronization of many human resource functions through their corporate intranets. A traditionally very labor and paper intensive function has been transformed to a large series of self-service, automatic report functions, and database-enriched mini-processes. These processes may encompass a series of services such as:

- **Administrative activities:** employee data, company forms;
- **Career management:** job adds, resumes, open positions;
- **Value of employment:** compensation, benefits explanation;
- **Payroll:** time reporting, W2, electronic funds transfers;
- **Employee Services:** travel, electronic agenda, calendar, group meeting tools; and
- **Health Management:** Donor Services, HIP, Dental plans.

The area of HR has benefited extensively in its electronization of ASPs that provide extensive, reasonably priced human resource service providers. This approach of outsourcing IT for HR or the entire human resource function has become very popular among startups that do not have the desire or competency to develop in house these

competencies. For the accounting function and AIS, the management of employees' compensation and benefit data, as well as employee travel expenses need to be considered from an internal control and data integrity perspective. As with any outsourced function where the financial statements are based on information provided by an entity that processes transactions on behalf of the client firm, SAS 70 applies. The tasks performed by the other entity is considered to be part of the outsourcer's *information system*. The accounting firm in performing an audit must perform a *service auditor's engagement* in which they actually go to the service organization and examine the service organization's description of its controls over the functions it performs for user organizations (Scherinsky 2002).

Research Opportunity 11: Empirical research is necessary to determine the scope and quality of service auditor's engagements.

#### ***4.5 Research and Development***

While the area of R&D brings images of individual creativity and physical processes, it will be strongly affected by electronization. The R&D area, in particular, has been benefiting from:

- Groupware for distance work;
- Large databases;
- Telemetering and sensing;
- Powerful databases;
- Visualization software;
- Powerful super-computers; and
- Knowledge management systems.

In many industries, customer service data residing in data warehouses will provide valuable R&D input for product enhancements and new product development. Interesting accounting issues arise in the allocation of cost of such data that serves diverse purposes, such as support for call-centers and R&D activities.

Research Opportunity 12: Empirical research is necessary to determine the extent to which cost allocation methods are being used and their effectiveness across R&D and CRM activities.

## **5. MANAGEMENT ISSUES**

The dramatic advent of the electronization process results in the emergence of phenomena like Amazon.com, E-Bay.com, and Cisco.com. These firms' loss of value in 2000 and the demise of many similar, formerly highly-valued, players raises the question of how permanent are these entities, and what are the management issues that arise and may be perpetuated in the cyber-age?

Many traditional businesses venturing into e-business have failed and will continue to fail during the initiation period. The rate of survival will likely be somewhat proportional to years of existence. Consequently, the fact that reality is being played out and many business-to-consumer (young) businesses are failing in the normal Darwinian fashion of the economy should come as no surprise to the business community.

Research Opportunity 13: Empirical tests of the Darwinism theory needs to be conducted to examine whether the rate of survival is proportional to years of existence. Underlying factors leading to survivorship besides years in existence also need to be identified from the empirical data.

Researchers will need to define "survival". Does it mean exist in its original form, purchased by another firm, merged with another, etc.? Some issue to consider in this research avenue are that managers are realizing that the economics of e-business are potentially quite different. Experienced e-business managers are progressively finding out that:

- They should keep away from the excessive promotion expenditures that have plagued dot coms;
- They often will outsource a much larger portion of their processes than traditional (non-EDI and non-ebusiness) businesses;
- Often the incremental costs of products are small and the startup costs are enormous;
- Early entrants have great advantage in most new businesses
- Supply and demand laws matter;
- Most businesses should be positioned for growth based on progressive increase in cash flow;
- Earnings matter, but business plans can be designed for progressive (multi-year) entry into profitability;

- Price-earnings ratios often are not perfect ratios to evaluate a dot com and other ratios, for example, market value to sales, must also be used;
- Well-known competent management matters;
- Skills in traditional matters as logistics, billing, receivables management, etc are important and
- Funding is becoming much more competitive.

Each of these items can be examined when considering the above research issue. Other items to consider are the internal processes that companies must perform are changing dramatically. Some of these major changes are:

- an increased pre and post sale care;
- an increased use of databases and user interfaces;
- flatter organizations;
- development of customer profiles;
- an increased reliance on cooperation software;
- much faster product-to-market strategies;
- mass tailorization of customer interfaces
- an increased reliance on third parties; and
- faster turnaround of cash flow.

## **6. CONCLUSION & SUMMARY**

The electronic business juggernaut is not without its dangers and shortcomings. It is drastically affecting traditional businesses that cannot continue to work the traditional economic model. Examples given earlier, such as the downward price pressure of brokerage fees illustrate the need for businesses to rethink their business policies and processes. The security weaknesses of the electronic commerce infrastructure have been well-divulged. Viruses, security intrusions, and denial of service attacks due to volume attacks are not phenomena that will disappear. They will evolve in a continuous struggle between facilitating technologies, intrinsic technological dangers, and the management of these factors.

Privacy issues present a different set of challenges. The same technology that facilitates business activities and provides wonderful services is also a major threat for individual freedom. Large databases linking dynamic economic activity information from different sources (purchases, banking activity, medical records) provide great economic advantages as marketing is more efficient, loans more targeted, and medical information ubiquitously distributed. They also create great dangers for privacy and abuse. Doubleclick.com, a marketing analysis technology firm, tracks customer activities in web sites. Their click-path analysis allows for firms to understand customer behavior and improve their offerings. However, they have 11,000 clients and linking the buyers' profiles in these sites together is by far too intrusive for the Web privacy advocacy groups. Complaints have been filed with the Federal Trade Commission and boycotts proposed.

Solutions however are not as straight-forward as they may seem. Creating illegalities by enacting laws actually creates arbitrage opportunities and extraordinary margins for Internet players. Gambling rules are stricter in the U.S. than electronic casinos that are created in cooperative havens in the Bahamas. A legal obstacle in the U.S. is a business opportunity for another country, state, or municipality. Restrictions are placed on the usage and content of databases in Germany, and then offshore database havens appear immediately. Web site censorship appears in China, then free-Chinese Websites are put into place. Telephone systems are monitored and taxed by PTTs, then the creation of supranational satellite telephone networks beings.

Consequently, easy fixes will not exist and new methods of establishing order, efficiency and decency will have to be created. Among these, as the Internet is a truly supranational entity, nations need to band together to maintain order and efficiency and reasonableness on the Internet. The same economic factors that allow for arbitrage can also be used for self-policing and monitoring of the electronic commerce environment. Companies, entities, and nations, in order to benefit fully from this medium, must have payment clearing solutions, customs solutions and access to the large markets of the economy. Rogue countries can be excluded from the payment clearing chains. Rogue companies behaving in unacceptable ways can suffer boycotts and be excluded from any affiliation and linking deals.

Self-policing seals, inspections and certificates can be used for monitoring and supervision. International information structures, involving many cooperating organizations can alert rogue behavior and motivate the creation of reasonable, unbiased rules. Technology can be used to monitor and detect money laundering, illegal product

flows, and information trafficking. The same positive monitoring could turn into 'big brother watching' type of behavior and must be carefully conceived and supervised.

The phenomenon of electronization is a heterogeneous one with firms and industries developing features at different paces. Bitable products and services and suppliers of e-commodities are ahead of the game with substantive focus on improvements. Other industries will observe this focus and piggyback on the developed technology through inter-industry emulation and acquisition of competitive economic advantage.

Principles underlying electronization were discussed considering the internal and external value chains of the firm, the deconstruction of business, bitable and non-bitable goods, e-commodities, customer view, industry morphing, techno-intensification., and re-channeling. Based on these concepts, a series of main effects on the future world of business were made that included: globalization of markets, changed business models, one-to-one marketing, customization of site and product, integration of systems with clients' systems, new e-services, and the commoditization of products.

A very different business set of models and economy bring in the questions on whether management and AISs knows how to work with the new economics. Can current accounting and auditing standards and AISs support the major changes in the business process? New paradigms and metaphors have emerged. For example new paradigms in relation to methods of advertising, methods of stock trading, and the entire structure of the wellness industry have emerged and AISs need to be able to appropriately measure these activities and provide relevant internal and external reports. The 8 emerging business issues and 13 research opportunities should provide some guidance to future researchers and industry standard-setters for morphing current AISs into cutting-edge AISs.

**Figure 1: The Electronization of Business and the Customer-Oriented Value Chain**

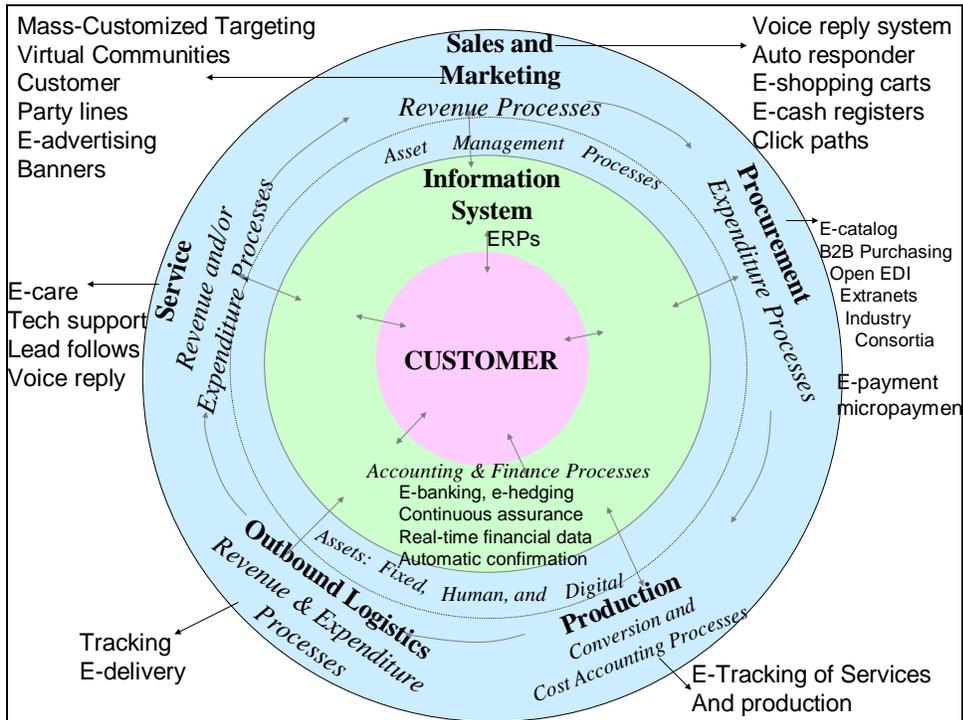
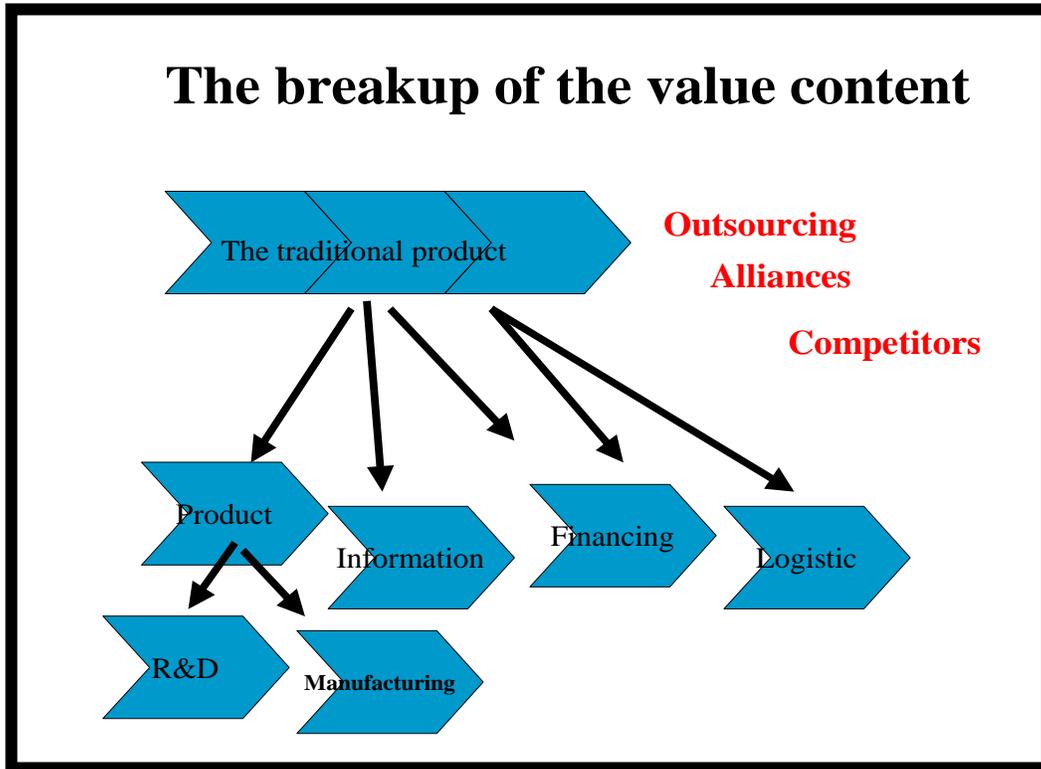


Figure 2: Deconstruction

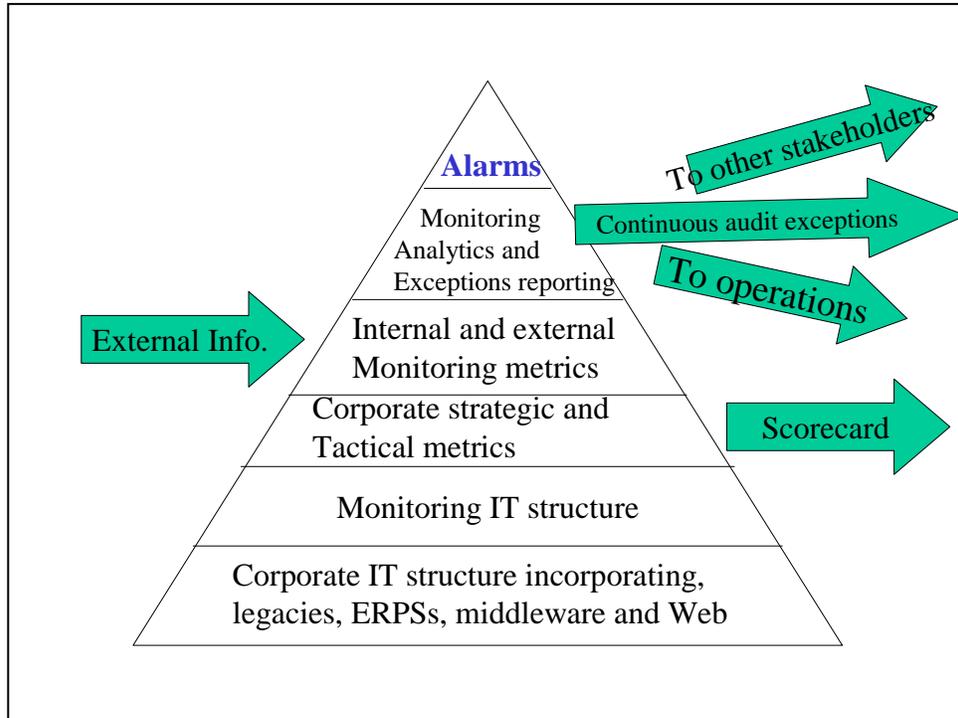


**Figure 3: Web Metrics**

Abandonment	Incomplete purchase actions
Acquisition	Overt action by customer expressing interest
Attrition	% of customer that stopped buying
Churn	Measure of the turnover of the customer base
Conversion	Turning a prospect into a customer
Duration	Time spent on Web over number of visits
Loyalty	Frequency of customer re-visits or re-purchases
Reach	% of visitors that are potential buyers
Recency	The elapsed time since a proactive customer action
Retention	Keeping existing customers as measured by their purchases
Unit retention cost	Cost of promotion to retain an average customer
Winback unit cost	Cost of regaining a customer lost to the competition

Adapted from Alexander, Steve, "E-Metrics," Computerworld Communities Story, December 11, 2000.

Figure 2: Monitoring and Control Structure



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## **Notes**

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