NETSOURCING: IT MAKES SENSE

by

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An analysis of the concept that will revolutionize the way that businesses acquire information technology and the trends that led up to it.

This set of three articles examines the development of several business and information technology trends that evolved into netsourcing – outsourcing through the internet. It describes how many of today's business and information technology practices emerged, and why netsourcing is fundamental to the future of business.

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I. A general discussion of business concepts that set the stage for netsourcing

My vocabulary becomes larger and more sophisticated over time. For example, thirty years ago, I was unfamiliar with the verb "to fedex." Now I'm "fedexing" packages as part of my daily routine.

With apologies to other the package carriers, I use the verb "to fedex" even if I employing the services of Airborne Express, DHL, etc. I apologize to these companies for my slovenly behavior.

The verb "to fax" has similar connotations.

"Cellular" is another word that has crept into my vocabulary over time. Without this phenomenon, I would be a "desert island isolated in the sea of business."

I've even added some Italian words to my daily vocabulary, including "caffè latte" and "mochaccino." I use these words in places where I meet others for business – not in my office, or theirs, but in the "virtual office" that serves exotic drinks (at least relative to the coffee shops of twenty years ago or more.)

"Netsourcing" is a word that I have recently added to my vocabulary. Simply stated, netsourcing means outsourcing on the internet.

Of course, "internet" is another word that I have added with the last six to seven years or so.

Netsourcing is a trend associated with an emerging business entity known as an

application service provider.

Although still relatively unknown at the beginning of the twenty-first century, netsourcing will have a major impact on the manner in which information technology enables business in the years to come.

My objective in this article is to explain the trends that led to netsourcing and what can be expected from netsourcing and application service providers in the future.

If I achieve my objective, I will have provided the context for many emerging trends that led to the development of ecommerce and the digital society in general. To do so, I will explain the development of many business practices in the old economy that have shaped the new economy in a world of the internet.

This article consists of three parts:

I. A general discussion of business concepts that set the stage for netsourcing
II. A general discussion of some information technology management concepts that set the stage for netsourcing
III. A general discussion of the ramifications of netsourcing and application service providers

In this part, I will describe the origins of words such as "ecosystem" and "value chain." In the later parts, I will describe how these words relate to "value networks" that set the stage for netsourcing.

"Ecosystem" is a word that I did not use frequently until recently. This word is derived from two words: "ecological" and "system" and is used to describe life systems.

A classic textbook definition of the term ecosystem is "a community of organisms interacting with one another and with the physical and chemical factors that make up their environment."

It is becoming a common practice to use this term to describe business systems. The organisms are businesses which form supplier-customer relationships with one another within a marketplace. The physical factors include the products and services exchanged, and the chemical factors include the specific transactions between the businesses over time.

The word ecosystem has become more common in recent years because it

describes the ramifications of the increasing role of internet in business. The internet provides the linkages between businesses and consumers that form an electronic ecosystem.

In the industrial age, economies grew because of the growth of the transportation networks that linked them together. The networks progressed from horse and cart to shipping, then to road and rail, and lastly to air.

Once transportation linkages were established, economies were no longer dependent upon purely local products and services. The practice of importing and exporting goods and services grew with the broadening of transportation links. The development of refrigeration increased the potential for the import and export of food products.

In the information age, telecommunications networks have enhanced transportation networks as the links that join economies together.

Up until the information age, businesses were highly centralized, monolithic organizations with field operations that had strong reporting lines to their headquarters.

To businesses and consumers alike, advances in telecommunications have enabled information flows on an unprecedented scale.

Today we are used to short sound bites of news information that has traveled almost instantaneously from anywhere in the (free) world. We know as much, if not more, about what it going on in far corners of the world than in our own backyard, if we pay attention to the information that is available.

In fact, it is the wide-spread availability of information, coupled with mass production capability that has caused the economy to change from a seller's market to a buyer's market, thus making competition harder.

Today's telecommunications networks allow businesses to decentralize their operations along market lines, but keep information flowing between their various units.

In today's economy, a business can establish sales activities close to its customers, and manufacturing operations close to its suppliers. It can enable the various participants to keep in touch by phone, fax, video conference, email or even web-conference.

Over time, transportation and telecommunications networks have enabled

businesses to transform their activities from local to regional, and then to global in scope as market opportunities dictate.

How did "old-economy" businesses develop as a consequence of the availability of transportation and telecommunications networks?

Up until the nineteen eighties, a trip from Europe to North America, or from North America to the Far East, was a significant event. Today, even smaller cities, such as Birmingham, U.K., or San Jose, California, offer intercontinental flights on a frequent basis.

Up until the nineteen eighties, getting a document from Birmingham, U.K. to Chicago, Illinois, or from San Jose, California to Taipei, Taiwan was a time-consuming exercise. The most likely choice for sending the material was the post office mail, or telex if the document had a small amount of data. Fax was a possibility if the counterparty could afford a fax machine.

Today, email, faxing and fedexing are three popular choices with delivery times ranging from seconds to just a day or so. The impact is to make the world appear to be a smaller place.

Transportation and telecommunications networks have enabled the growth of "international" businesses and "multinational" businesses.

An international business imports raw materials or supplies from foreign country into its domicile country, or exports its finished products into foreign countries, or does both.

For example, a Swiss watch manufacturer imports diamonds and gold into Switzerland from countries such as South Africa, and then exports the watches all over the world.

As an international company, its presence in a foreign country is usually limited solely to import or export transactions through a representative office, or through a local agent or broker.

However, a multinational business operates in foreign countries along side its local counterparts.

Most businesses that have foreign operations have a blend of international and multinational activities, with manufacturing facilities close to raw materials and labor, and sales and service facilities close to customers.

For example, Apple Computer, Inc. makes computers in the United States and the Far East, but has sales and service facilities all over the world.

The Europeans were the developers of international business practices, importing exotic products from the Far East, such as tea and spices. For example, spaghetti is derived from Chinese noodles.

In the process, they established colonies around the world, which became export "customers" and eventually countries in their own right.

Just as natural ecosystems have plants and animals, so business ecosystems have commercial and industrial companies, and intermediaries, such as banks and insurance companies.

The banking and insurance industries grew as international trade developed. The banks financed foreign trade and provided the credit and payment system mechanism. The insurance companies carried the risk of loss of goods.

In fact, the word bank is derived from the Italian word "banca" (meaning bench) that the Lombardic bankers sat on to do business in London on what it now Lombard Street.

Lloyd's of London, the insurance brokers is nearby. In eighteenth century London, traders and merchants would meet at Edward Lloyd's coffee house to discuss how to protect losses of goods on the high seas.

The word "tips" is derived from the money box placed on the wall an adjacent coffee house to Lloyd's above which a sign was posted saying "to insure prompt service." (Our language has since evolved into the distinction between "insure" and "ensure.")

By the eighteenth century the British, French, Dutch, Spanish and Portuguese economies had become ecosystems linked by shipping.

By the nineteenth century, they developed internal ecosystems linked by rail, and in the twentieth century by linked by road and air. The British, French, Germans and Swiss fine-tuned their ecosystems with railways; the Germans and Americans led the development of highways, and the Americans led the development of air transportation.

The Americans were the developers of multinational business practices, by extending commercial and industrial businesses into foreign countries. These businesses found new markets in which to grow, and hence new sources of

revenue and profit.

Having led the way in mass production, the American consumer products industry and the automobile industry were leaders in multinationalization. Companies such as Mars, Colgate-Palmolive and Ford became as much a part of their foreign markets as their home markets.

As these businesses expanded, so the transportation infrastructure followed. Holiday Inns, Ramada Inns, Best Western hotels, Hilton hotels, and Sheratons hotels started sprouting up in foreign markets. These businesses gave a welcome sense of home to the weary American traveler, and provided a taste of American standards of hospitality to foreign residents. Behind the hotels came the restaurant chains and other service providers.

As regulations permitted both at home and abroad, airlines and financial institutions expanded their reach in to the far corners of the world, making names such as American Airlines or Citibank as common abroad as they are in Dallas or New York.

Hence, the global business ecosystem emerged.

As businesses expanded from their home bases, and the transportation and telecommunications networks improved, a new business management concept emerged known as the "center of excellence."

Under this concept, a business establishes operations in one location that serve many other locations within its organization.

The concept began in the manufacturing industry where factories were placed close to sources of raw materials, and assembly plants were placed closer to customer markets. One manufacturing plant became a center to many assembly plants. But the concept was expanded to specialized manufacturing. For example, one manufacturing plant makes bodies, another engines and another transmissions on behalf of many assembly plants.

The danger with this approach is that the entire operation becomes dependent upon the performance of each center. So a more prudent approach is to establish primary and secondary centers. For example, a factory that specializes in engines, could also manufacture transmissions on a limited basis as a back-up to a primary transmission manufacturing plant.

Telecommunications technology enables the center of excellence concept to expand beyond manufacturing. For example, a business headquartered in the

North East United States may establish a call-center for customer service in the South West. Land and labor costs are lower in the South West than the North East, so telecommunications capabilities enable an economically attractive location to become part of the business infrastructure. Perhaps more importantly, the South West is relatively free of natural disaster, making it an ideal area for call-centers and data centers.

The center of excellence concept can be used for any business function. For a business that is headquartered in midtown Manhattan with locations around the United States, the entire human resource function could be based in Minneapolis, Minnesota, for example, or the entire finance function could be based in Omaha, Nebraska.

The functions could be located in the most cost effective places to do business of a similar type, or close to areas of subject matter expertise. So if Minneapolis is a locus of human resource subject matter expertise or industry-specific personnel, it's a good place to put that function. Similarly, if Omaha is a locus for transaction processing expertise, it's a good place for a finance function.

For the global business, why not establish the finance functions in the Dominican Republic or in India, or in any place that enables the job to get done reliably and economically, if the transportation and telecommunications links are available?

A business located in the United States that requires access to foreign language expertise might consider Salt Lake City, Utah as an ideal location because of the abundance of foreign language expertise among the missionaries of the Mormon church.

A major consequence of transportation and telecommunications networks is that they enable a global ecosystem comprised of many sub-ecosystems of which almost every business is a member.

For example, if there is a drought in Brazil, my cost of doing business at my virtual office will increase over time, because coffee is an essential component of that activity.

If there were an earthquake in Omaha, Nebraska, the national (and potential global) retail and consumer financial services industries would be significantly impacted. (Omaha is home to First Data Resources, which is the world's largest credit card processor.)

The recent earthquake in Seattle could have been devastating to the nation's coffee drinkers, and to world's airlines and personal computer users. (Seattle is

the home to Starbucks, Boeing, and Microsoft.)

It is hard to imagine a world without the transportation and telecommunications systems that we have today. Our ecosystem could not exist without them.

So the global business ecosystem consists of businesses and consumers, and the transportation and telecommunications links between them.

Long after the word ecosystem was first used in science, but before it was used commonly in business, the phrase "value chain" became used commonly in business.

The word emerged in the nineteen seventies from the strategic planning academics and consultants to explain the relationships between the various activities within a business. (Up until this time, the focus of business academics and consultants had been on production, and improving productivity as a method of cost containment.)

As businesses mastered the techniques of production, academics and consultants turned their attention to "streamlining" business processes with the an objective of reducing duplication as a method of cost containment.

At this time (nineteen seventies,) most businesses displayed at least two common characteristics: they were managed hierarchically and they did everything in-house. (Many businesses suffered from a third common characteristic: they had excessive duplication in functions and processes that had resulted from growth in multiple markets in an uncontrolled fashion.)

Under the first common characteristic, most business were managed using command and control structures that had originated in the military, and became common practice at the time when the railways enabled industrialization.

The assumption was that all business activities could be managed in the same way. The consequence was that businesses were managed through a hierarchy. Control tended to be centralized in one or a few locations.

The ramification of this structure is that the decision-makers do not communicate effectively with the employees on the "front line" that have the direct contact with customers. The decision-makes become isolated. These businesses often rely on market research for customer suggestion and feedback, instead of getting it through their own employee network.

The huge growth in management information systems in the nineteen seventies

and eighties was supposedly a remedy to overcome the communications problems that resulted from decision-makers being physically removed from the constituencies and processes that their decisions affect. These systems sat on top of the transaction processing systems that processed the underlying data.

The transaction processing systems maintained the accounting records and performed operational functions.

Management information systems sliced the data by customers, products and organizational units and produced budget versus actual performance reporting.

These systems tended to produce information well after the fact, rendering it outdated even before it could be used.

The politics in many large businesses prevented timely information from flowing up and down the hierarchy. So with late and fragmented information flows management were very frustrated.

The second common characteristic of businesses in the nineteen seventies was that they did practically everything "in house."

There were few opportunities to use external service providers. The primary exceptions were the professional services firms who provided accounting and legal services, from which management consulting and systems integration services emerged, and construction industry-related firms.

In some industries, agency functions emerged early in their development. For example, an international airline could use the "agency" services of a local airline in a foreign market. For example, Aer Lingus would represent America West Airlines in Ireland.

As global consumer awareness increased, the concept of manufacturing products "under license" from a brand-owner overseas emerged. In fact, the initial entrance of IBM into the British computer market was through a license agreement with the local manufacturer International Computers Limited.

As will be discussed later, information technology dramatically enabled the availability of external services.

As business academics and consultants examined business processes in the nineteen seventies and eighties, the concept of the value chain emerged.

In its earliest form, the value chain concept was used to describe product-

oriented businesses in terms of their manufacturing and distribution activities, and sales and marketing activities.

The idea was simple: value increases as work-in-process moves through a chain of processes from raw materials to end products.

The value chain concept can be applied to any business and any related set of business activities. In its broadest form, a value chain can be used to describe planning and policy development, research and development, sales and production, and performance measurement processes of any businesses in a highly structured way.

One benefit of the value chain approach is that it enables business processes to be classified according to common and unique functions. For example, planning processes may be similar in many industries, but operational processes may differ widely between product and service industries.

However, processes in different businesses in the same industry should be the same, unless there is a good reason for them to differ.

As systems developers discovered in the late nineteen seventies, the data elements that describe business entities in the same industries should be the same. In fact, the data elements for the same functions in different industries should be the same also!

The early developers built systems according to the individual requirements of specific users. Hence, it was not immediately apparent that both process models and data models should be more or less the same for most businesses in the same industry.

There are two major conclusions that can be drawn from applying the value chain approach to analyzing a business.

The first is that work flows horizontally, whereas control flows vertically. The second is that not all processes require the same level of management.

The ramification of the first implication was not immediate. It was not until the quality movement in the early nineteen nineties hammered home the need for customer-driven processes and organizations, and the need to break down the vertical "silos" that existed in most organizations.

The driver of this phenomenon was the increasing competitive pressure coming from Japan, especially in the automobile industry.

When the Japanese first started selling automobiles in the United States, the vehicles were viewed as cheap and poor quality products. The Japanese employed management consultants from the United States, who worked with them in the development of "just-in-time" techniques, quality circles, and so on. "Kaizen" (plan, do, check, act) and "Hoshin" planning techniques became the norm.

In examining the automobile industry ecosystem, it is apparent that the behaviors of the manufacturers evolved differently between the United States and Japan. The Japanese enhanced their products from the cheap to quality over a period of thirty years, placing the American industry under extreme pressure.

The United States' automobile industry, which had ties to Europe, Latin America, Africa and Australasia, was built on the notion of mass production. Flat land is abundant in the mid-west, so huge inventories from long production runs built up made by a semi-skilled workforce.

As the United States became a more market-driven economy, the automobile manufactures offered more and more optional features on their products.

By contrast, Japan is a mountainous country, so production runs were shorter. The workforce was well-educated so that it could understand how to change the manufacturing jigs quickly. Instead of developing many optional features, marketeers developed "packages" of features in three or four derivatives. For example, in one derivative, the package might include a sun roof and higher quality upholstery. In another derivative, the package might include electric windows.

Many American consumers eventually traded options for quality because the feature-packaged Japanese cars were more reliable. Less variety of options meant that there was less that could go wrong.

Because the workforce was better educated, they could change jigs faster and, hence, respond quickly to changes suggested by feedback from the marketplace. As a result, huge inventory write-offs were unnecessary.

The American industry had to learn a lot from the Japanese, and adapted in time with the assistance of the quality movement.

The Japanese learned something too. The concept of a luxury Nissan, Toyota, or Honda wouldn't work. So they started from the ground up with Infiniti, Lexus and Acura. The Americans taught the Japanese a lot about branding.

But what really mattered for the luxury brands was the notion of high quality customer service.

By the mid-nineteen nineties, the economy was changing from product-driven to service-driven.

The efforts of the quality movement led to the reengineering of business processes that resulted in improved process management, delayering, and self-directed teams.

Information technology placed a major role in these changes as will be discussed later.

The ramification of the second conclusion – not all processes require the same span of control, challenged the notion of the "seven-person" span of control assumption which had prevailed in management science for years.

Under this practice, a good manager was expected to be able to supervise seven subordinates, assuming that the skills were the same.

By developing value chains for all processes within a business, it becomes apparent that the planning and performance measurement processes, research and development processes, and sales and production processes each require different knowledge skills sets. Hence the spans of control are different.

Planning and policy development, and research and development activities are heavily knowledge-based, and require closer direction and supervision. Production activities are usually highly routinized, and hence can accommodate wider pyramids with broader spans of control.

So there broadest spans of control should be in the most highly routinized functions.

However, thanks to the efforts of the quality movement, it is sometimes possible to achieve flatter organizations, not just through wider spans of control, but through establishing self-directed teams. These teams are often cross-functional and are formed to direct the horizontal work flow.

Under this concept, role of management shifts from controlling to supporting the team. As a consequence, management can focus on anticipating and planning the future, and evaluating performance on an on-going basis, adapting as necessary.

During the nineteen eighties, the promoters of the value chain concept shifted their emphasis from production to competitive strategy. Doing the right thing became just as important as doing things right.

By analyzing value chains,it became apparent that one strategy to beating the competition is to be a cost leader.

Business leaders that really understand the value chain can streamline processes, eliminate duplication, and become the "low cost provider." If a business becomes the low cost provider, then it can reduce its prices and still maintain its margins – and hence, win against its competition.

But being the low cost provider requires a relentless passion that is not for every business leader.

Are there other generic strategies?

By analyzing the value chain in terms of markets served and products offered, it became apparent that there are two other generic strategies available to business leaders: focus on specific products and services in specific market segments, or be a differentiated provider of products and services in specific market segments.

Volvo focuses on safety; BMW differentiates itself on sporty cars to "yuppies."

Some would argue that the culture of a business is driven by one of a customer, product or operational discipline.

The concept of the value chain impacted the information technology function. Management started to place emphasis on information for competitive advantage, which led to the notion of decision support systems.

It also became apparent that information technology itself would become the enabler of business strategy and competitive advantage in all industries over time.

II. A general discussion of some information technology management concepts that set the stage for netsourcing

The information technology function has probably felt the pressure of change more than any other business function. Just look at the turnover rate for Chief Information Officers. The name of information technology function and its position with the organization has changed many times.

It began in the nineteen sixties and seventies as the "data processing" function. The function typically reported to a finance function head or an operations function head.

During this stage of development, the agenda was to build the operational transaction processing systems that support the back office functions:payroll, inventory management, order entry, accounts receivable and billing, accounts payable and general ledger.

The primary job function was programming, which was a very tedious process. Knowledge of the inner workings of the computer were essential to do this job properly.

Right from the beginning, a mystic emerged that has held up to the present. The craft of technical personnel is not widely understood by business people, who often feel held hostage by computer technicians.

There is a strong dichotomy between business people, who would often prefer to stick with proven technological solutions, than bet the farm on a new technology. Whereas technical personnel want to move their skills ahead, and compete with each other, on the basis of who has the latest skills.

The computer manufacturers don't help. They are all guilty of protecting their own interests by directing the loyalty of computer professionals towards them than their employers.

Computer manufacturers often make upgrades that seem unnecessary from a business perspective, but are required to get the next advance in technology.

In the nineteen eighties and nineties, the name of the information technology function changed to management information systems.

This change reflected the changing agenda from operational systems to analytical systems that delivered management information and decision support capabilities.

The title: chief information officer was coined, and its incumbent became an executive member of the management team. (Although in most companies, it was a long, hard road.)

As the shift occurred to analytical systems, the skills requirements changed. Business and systems analysts designed systems with increasing industry and

functional skills. Design projects were defined separately from construction projects.

Business managers realized that a significant amount of design work was necessary before a cost/benefit analysis could be prepared.

But cost overruns, underachieved objectives and outright cancellation of projects are situations that have plagued the industry through out time.

To harness the cost overrun issue, systems development methodologies were developed that employed techniques used in the construction industry.

It took many years to evolve, but systems development lifecycle today includes strategy and architecture development, planning, scoping, design, construction, implementation, maintenance and enhancement phases.

To overcome the users' impatience to see something working, iterative development and prototyping techniques became popular along the way as emerging technology permitted.

As systems development methodologies evolved, the terminology was refined.

Application software became distinct from systems software; data models described the relationships required to deliver information; and databases emerged as the physical manifestation of the data models.

The term "information systems" describes the bundle of application software and databases that are packaged separately from the underlying technical infrastructure of systems software and hardware.

When the responsibility for management information systems and telecommunications merged in the late nineteen eighties or early nineteen nineties the combined function became "information technology."

The technical infrastructure now included the voice and data telecommunications equipment and an apparent role reversal began between the importance of computer hardware and telecommunications hardware with telecommunications gaining more importance.

When computers were being introduced into business for the first time in the nineteen sixties and seventies, only the largest businesses and governments could afford them.

Initially, most large businesses developed their own software and they were the only ones that could afford to do so.

They found the development of systems to be a very risky proposition.

They found the hard way that the management of systems development projects was quite different from the management of recurring business processes that most managers were familiar with.

Construction and manufacturing businesses fared better than service-oriented businesses in systems development activities because they had more experience with project-oriented work.

So systems development methodologies were based on techniques and approaches used in the construction industry.

Some businesses sold their "in-house" developed applications to other businesses to try to recover their own development costs. These costs were always greater than anybody would have ever imagined.

Application software houses emerged as the developers of "packaged" software, which was usually developed for one business, or a consortium of businesses first, and then sold in the general marketplace.

In this way, many businesses could share in the cost and risk. In fact some application software houses began as subsidiaries of commercial and industrial companies.

Overtime, even larger businesses replaced much of their "custom" software for "packaged" software, at least for their "utility" applications.

One major argument against packed software that it would limit the options capabilities of any particular business, because packages forced standardization. But as systems developers found, many business processes within an industry are standard.

But the issue was somewhat overcome with the introduction of "parameter-based" systems, that enabled businesses to set their own processing options within a standard framework.

The businesses who did their own custom development turned to consulting firms or systems integrators to build application systems with them.

It became apparent that firms that specialized in systems development had specialized skills that were acquired from many projects over time. Contracting firms emerged who provided individuals to supplement in-house or consultant personnel.

Much of the systems work performed in-house was related to maintenance and enhancement. It became apparent that, just like in other industries, there are many different skills in systems development: architects, designers and programmers.

The aspirations and skill sets of systems designers are different from those that maintain systems.

The term "independent software vendor" has emerged to describe an application software house that sells software in the general marketplace.

By the nineteen nineties, the trend moved from building utility applications to buying them from independent software vendors, in some cases over the counter.

In the nineteen sixties, service bureaux emerged as providers of computing resources to those businesses that could not afford their own, or did not want to lease them from the manufacturers. There were many varieties of service bureau offering, and many forms of service bureau ownership.

Some offerings included only the hardware; others bundled applications and databases with the hardware. Some service bureaux were general purpose; others were established by peers in the same industry as "data processing cooperatives."

In the early days of service bureaux, the inputs and outputs were delivered by courier, or by "remote job entry" in batch mode over telephone lines. As telecommunications capabilities improved, real-time access became feasible.

Hence, the trend of renting applications and hardware at a remote site first emerged.

"Timesharing" emerged as a specialized form of service bureau processing, where users could develop and run applications in real-time mode from a remote terminal.

Timesharing was ideal for early forms of decision-support or modeling applications which did not lend themselves to batch processing.

Smaller businesses used visible record computers from vendors such as NCR and Burroughs (Unisys) as their introduction to computers.

These systems were ledger posting machines that employed many of the concepts found in mainframe computers, but were much cheaper to buy, although very labor intensive. (Long gone are the days when the people were cheaper than the hardware.)

The hardware and software "platforms" may differ, but throughout the nineteen sixties and seventies, the intent was the same – automate low-value utility labor-intensive processes as a basis for reducing labor cost.

However, due to mismatched functionality, labor that was displaced in one area was often added in other. For example, lower cost operations personnel might be reduced, but more higher cost systems personnel would almost certainly increase.

So the alternatives of building, buying or renting information technology through custom development, packages or service bureau were firmly in place by the end of the nineteen seventies.

But, in the nineteen eighties, new words slowly entered common systems vocabulary to describe the phenomenon: "outsourcing," "insourcing" and "cosourcing."

The word "outsourcing" first entered my vocabulary about fifteen years ago. The term service bureau yielded to "third-party" processor to describe a provider remote (outsourced) computer systems services. If there was a subtle difference between service bureau and third-party processor, it was in related processes and procedures offered to the end-user.

For example, a third-party processor offering accounts receivable capabilities could include the processing of checks and the mailing of statements as part of the service.

Or the arrangement could be split with a bank, where the payments go to a "lock-box" at a bank which does the front-end processing of checks, and then the third-party processor does the rest. Third-party processors are common in health care, utilities, cable television and magazine subscription receivables applications.

High volume third-party processors have made arrangements with post offices to incorporate mail pickup services in their own operations.

As telecommunications capabilities improved, third-party processors could attract users from outside their local area. As a consequence, as they build volume, their processing scale increases, and their unit costs decrease. It becomes cheaper to go outside to a scale processor than to remain in house.

In some instances, what began as a computer application service became an entire business function.

For example, many business use a payroll service, such as ADP or Paychex. These "processors" run the transactions, prepare the reports and make the regulatory filings on behalf of their customers. In fact, with more knowledge of regulations than the employer, they become a source of regulatory information to the small to medium-sized business.

Through arrangements with banks, payroll "processors" now offer 401K plans, retirement plans, and a whole host of human resource management capabilities.

However, a business could go one step further and "rent" the employees and not have to worry about hiring and firing, and better balance its human resource supply with business demand. Look at the services offered by Administaffs, for example.

Entire functions, such as human resource administration, finance administration, customer service, collections, etc. can be outsourced. Outsourcing has become as popular for back-office (utility) processes as the notion of buying pre-manufactured parts versus manufacturing them.

The opposite of "outsourcing" is "insourcing," and the term "co-sourcing" is used to described the blended environment that most businesses operate.

Outsourcing works the best in well-established telecommunications environments.

In fact, in those countries where transportation is difficult, sophisticated telecommunications systems have emerged far beyond those typically found in the United States. The consequence is that information technology capability can be offered even in remote areas, even though the processing is far removed.

An emerging business practice is to insource strategic functions and processes and outsource everything else to the maximum extent possible.

The benefit of this approach is that it enables the management of a business to

focus its scarce resources on those activities that generate competitive advantage and differentiate itself from its competition. The ultimate objective is to increase shareholder value. Where economy of scale is an important criterion to cost leadership, outsourcing may well be the answer.

So in today's economy, an organization most likely will have a blended environment of cosourced activities. In fact, an emerging model is to insource the value-added analytical and operational systems and outsource the utility operational systems.

As described earlier, the "value-chain" concept was instrumental in the development of the notion of information for competitive advantage.

In the nineteen seventies, businesses often complained that their data was "trapped" within their application systems. (Many still do.) At the time, the entrapment was a consequence of batch processing. However, the emergence of real-time systems and database management systems users to get immediate access to their data for inquiry and update.

One of the first applications to emerge, using either real-time or database technology, or both, was the customer service system. In fact, highly specialized systems software was developed to support customer service systems, including IBM's Customer Information Control System (CICS) and Taskmaster.

Highly specialized database management system software such as IMS and ADABAS emerged also.

By this time, the alphabet soup of acronyms started to take hold. For the technicians, the use of these acronyms was a contest, for the layman the use of these acronyms seemed like a smokescreen from the technical community.

Acronyms such as ISAM, CICS, IMS DB/DC, OS, DOS, VM, VSAM, VTAM, JCL, etc., littered the vocabulary of the technical community, and the practice has continued over the years.

Confusion arose regarding two other phrases: "online" and "real-time." Online systems were those where an operator, usually for data-entry, had an immediate interaction with the computer, as opposed to the data being processed in "batch mode." "Real-time" systems operated interactively with a business process such that the process was directly impacted by the system on an immediate basis.

Online systems were harder to develop than batch, and real-time systems were significantly harder to develop than online.

Customer service systems began in the nineteen sixties and seventies in the utilities industry and the airline industry to answer customer inquiries in real-time mode, and enable "online" transactions.

The developers of these systems had to deal with a myriad of technical problems to get the computer and telecommunications hardware to work together efficiently and effectively.

There was a clash of culture between the well-established "batch" processing skills and the emerging "user interface" skills. Designers of real-time applications needed a better understanding of business processes to enable the integration of the manual and automated processes. They also needed to understand ergonomics and human behavior.

But there was another problem: data was entrapped within in transaction processing applications that had been built on a product by product basis.

The consequence was that in order to build a picture of the entire relationship in the presence of the customer, it would be necessary to build "information processing" applications with their own databases on top of the underlying product-driven transaction processing systems.

The nineteen seventies and eighties were bumpy times as systems developers labored to build information processing systems to answer common customer questions that the designers of the underlying transaction processing systems had never anticipated.

A common problem was that the underlying transaction processing systems were primarily accounting-oriented, whereas questions stemming from customers were far reaching.

For example, banking customers asked about missing statements, lost credit and debit cards, temporary changes of address, or wanted to know if certain checks had cleared.

The underlying transaction processing systems were built on monthly cycles, whereas the customer questions, were often very short-term oriented.

Throughout the nineteen eighties a vast reengineering of transaction processing systems and customer service systems took place, which strengthened the notion of buying or renting the transaction processing software.

Eventually, the "call-center" concept emerged as an operational facility devoted to customer service. The customer service concept grew into the customer relationship management concept about which I will have more to say later. Some third-party processors provided outsourced call-center services for their business customers. These businesses outsourced call-center services for their low-valued customers and insourced call-center services for their higher-valued customers.

During the nineteen nineties, customer service systems became a component of the broader customer relationship management suite of applications. By combining the analysis of demographics and psychographics, with customer service systems, direct and telemarketing systems emerged as a type of "information processing" system that takes the outputs of transaction processing and identifies opportunities for expanding customer relationships.

By the mid-nineteen eighties, it was becoming apparent that a significant amount of time had to be spent planning and designing information systems.

As business leaders developed business strategy so it became necessary to develop information technology strategy because the investments were huge and the environments complex.

It also became apparent that the skills were "technological" not merely technical, i.e., technical skills were required in many disciplines such as process design, data design, network design, hardware design, programming, database administration, systems administration and network administration, to name a few.

Information technology strategy has two dimensions. First what are the applications, databases and technical infrastructures required to enable business strategy? Second, how should the applications, databases and technical infrastructures be architected? With many follow-on questions. With what skills? At what cost? How do the existing applications and databases fit? What is the condition of the current applications and databases?

Just like in designing a city, and the buildings within it, systems had to be "architected." Telecommunications networks formed part of the "municipal" infrastructure that is equivalent to the highway system.

Operational transaction processing systems were architected, designed and built separately from analytical management information and decision support systems.

(There were some exceptions to this approach for integrated systems than ran on smaller hardware. These systems were designed using a "ledgerless ledger" approach were the accounting and other operational databases were integrated. However, in most cases these notion of the tight integration would eventually breakdown because there was always some need of the business that could not be met through the integrated system. The eventual impact was the interfaces would be necessary to systems outside of the tightly integrated environment that these systems sought to offer.)

The design of operational systems stressed performance and the design of analytical systems systems supported the needs of knowledge-workers. Fourth-generation languages were developed to enable users to program their own reports and inquiries to ease the burden on the information technology personnel.

(I witnessed entire applications that were developed in fourth-generation languages.)

Database management systems were essential for any form of real-time information management application, with their own highly specialized software.

Database developers and administrators separated the concept of data modeling from process modeling In fact, religious wars were fought over issues related to data redundancy and structured programming.

The genesis of database management software was in bill of material processor applications in the manufacturing industry. The problem was simple: how to track of the the part that make up a finished product. Software known as "bill of material processors" enabled product designers to build hierarchies of component parts. The software could "explode" an assembly into components.

IBM's Information Management Systems (IMS) originated from the notion of hierarchical data structures used in a predecessor product, BOMP. However, when customer service systems became popular, the database designers found the hierarchical model to be too cumbersome.

So the alternative was to adopt the "relational" model of database design. There was a significant amount of overhead in the processing of the data under the relational model, because the data was organized in sets of tables that have to accessed individually.

Hence, a significant amount of processing power was required to process the

data in reasonable timeframes.

There was also a high-degree of skill required to "normalize" the data models in such a way as to eliminate data redundancy within the requirements of processing efficiency. In fact, the skills required to develop data structures, and the associated terminology were quite distinct in their own right from programming skills.

Once again, religious wars were common regarding the approaches and tools that should be used to design and process databases. On of the elements in the religious wars
was the vested interests of the technicians. Whereas initially, loyalty had been to vendor, now its was extending to vendor's specific product. Were the religious wars based on the needs of the business, or the needs of the technician?

Customer service systems drove the business trend towards the relational model and database management systems such as IBM's DB2 and Oracle emerged over time as the leaders.

From a systems architecture perspective, the best approach to organizing the databases was to use a sequential organization for operational transaction processing and a relational organization for analytical applications, unless there was a good reason to do otherwise. In the nineteen nineties, the trend shifted toward the relational model for all processing.

Throughout the nineteen seventies and eighties, there was a perceived overhead associated with real-time processing and database management on mainframe computers.

The overhead increased with the paradigm shift from purely batch processing to real-time inquiry and update.

The mainframe hardware architecture was originally designed to support eighty column punched cards in sequential mode.

Real-time systems needed human interfaces and the mainstay in the mainframe world was the "3270." A 3270 screen was in effect a form built from twenty-four eighty column punched cards – hence a one thousand nine hundred and twenty character interface.

Was a form layout based on punched card the best way to design real-time data?

The mainframe sent a form layout to the terminal, and the operator sent the data

back in a highly synchronized manner.

The arrangement worked well for some applications, but there was huge overhead of terminal controllers, network controllers, network processors and so on, that made the process very complicated and expensive.

Back in the nineteen sixties, many students, engineers and computer technicians had worked with systems front-ended by teletypes. The transmission was asynchronous: character by character.

I can still smell the oil on the teletype print head.

The computers to which these teletypes were attached were not mainframes. They were called minicomputers, and they emanated from companies such as the Digital Equipment Corporation (DEC), Data General and Prime.

These machines, led by the flagship PDP/8 (and later the PDP/11) caused another set of religious wars in terms of the right "platform" for real-time processing. These machines were inherently real-time whereas the mainframe mainstay of business was not. But minicomputers were perceived as "amateurish" by business systems professionals.

PDP's were used primarily in academic, scientific and engineering environments that had different standards for systems design, programming and operation than the commercial business world. There was very little support from the hardware manufacturer, but the machines were workhorses and didn't seem to be as temperamental.

By the mid-nineteen seventies, minicomputers were appearing in the business world for the first time for stand-alone information delivery applications, especially for news information.

A breakthrough occurred in the financial services industry when Reuters introduced financial market data services through a network of minicomputers.

Two paradigm-shifts occurred. First, the banks were under pressure because the financial data market systems squeezed their roles as intermediaries. They had to react as buyers and sellers of funds could do business independently of banks through what became the commercial paper market, enabled by financial market data systems.

Second, some visionaries saw that it was possible to build entire real-time application systems on minicomputers. Whereas it was rare to find entire

organization of any size using minicomputers, many specific applications became minicomputer-based as opposed to mainframe-based.

Minicomputers were specially common in trading systems, and electronic funds transfer applications, where real-time processing was essential. They would "front-end" mainframes where the "enterprise" systems were operated and maintained.

The segmentation between the minicomputer world and the mainframe world worked reasonable well. Whereas there were religious wars, they were kept to a minimum because each constituency could do its own thing. Although battles frequently emerged as to where the true master files were: minicomputer or mainframe. (Usually mainframe.)

But the interface between a minicomputer and a mainframe was a tricky place to be. For all the technology that existed, it was not easy to build interfaces between minicomputers and mainframes. Often the burden was placed on the minicomputer systems developers since they were the odd-ones-out.

Magnetic tape was a common method of interface because it was hard to get a mainframe to communicate with a minicomputer on a real-time basis.

In one example, a financial institution headquartered in New York City built a system on a minicomputer that enabled users in its branches across the country to enter data locally and process it remotely in New York City.

The data was available to any of the users nationwide including those in New York City through the network of remote terminals connected to the minicomputer centrally.

At the end of the business day, the data was transferred from the minicomputer to the mainframe for processing overnight and updating the "enterprise" databases. Herein lay the problem. The systems designers, partly for technical and partly for political reasons designed a tape interface between the minicomputer and the mainframe.

The consequence was that whereas the data could travel across the country electronically from a terminal to the minicomputer, it required a human being to carry the tape the last three feet between the minicomputer and the mainframe. Data traveled over two thousand miles electronically, and three feet manually.

This model demonstrated the "store and forward" approach to application systems design. Usually, any databases that were maintained on the

minicomputers were refreshed on following day, and the "during day" updates were performed in "memorandum" mode.

Minicomputers created a struggle for the mainframe vendors. For example, IBM struggled for almost ten years until it introduced the AS/400 as an ideal machine for a middle-market business or a large department. But even today, the AS/400 developers and user base are in their own world.

Minicomputers were easier to program for real-time applications because of their origin in process-control type applications. They were harder to develop security and control, and systems management capabilities for because in the early days the systems tools did not exist.

However, the minicomputer hardware was physically smaller and cheaper than mainframes.

I am reminded on one instance where a minicomputer design a system to look like a mainframe so as to be taken for real by the establishment.

By the late nineteen seventies, minicomputers were being used for telecommunications type applications, including switching and voice response systems.

By the early nineteen eighties, minicomputer hardware was being used in special purpose devices such as automated teller machines and point of sale devices.

For the first time, computers were being used as "intelligent" end-devices. The days of the "dumb-terminal" were shrinking.

So another paradigm shift occurred as it became easier to build networks of computers with terminals and/or "intelligent" devices at the end points.

Through a combination of minicomputer, mainframe computer and telecommunications networks, businesses established electronic data interchange (EDI) protocols as a method of communicating information or instructions between each other.

The concept began as electronic funds transfer mechanisms between banks, which used computer systems to transmit payment instructions between one another. The concept was extend in industry to transmit data (often order information and related instructions) between customers and suppliers. With the emergence of EDI, the concept of electronic commerce was born.

The use of telecommunications networks to exchange data between suppliers and customers and intermediaries such as financial institutions leads to the notion of the "extended enterprise."

Under the extended enterprise concept, systems reached between businesses and across industries. For example, the retail industry and the banking industry teamed up with the assistance of a couple of hardware vendors to build point of sales networks. A credit card transaction originating in a retailer, could be authorized in the presence of the customer, and later billed to the customer through a linkage of networks and computers.

However, security and control were major factors to prevent fraud, and reliability was a major issue. If one component in the network failed, the entire system could be brought down, with a lot of finger pointing.

The abundance of special purpose devices enabled by minicomputers gave business strategists ideas to use information technology to enable business strategy.

For example, in the banking industry, bankers hoped that the automated teller machine would shift traffic away from branches and enable them to reduce headcount and maybe eliminate branches altogether. The benefit to the customer was the convenience offered by "twenty-four" hour banking.

This vision, that began in the nineteen seventies, has still not been realized. A combination of economic, regulatory, social, technological and consumer behavior and adoptance factors have impacted the realization of this vision.

Attempts to price services so as to redirect traffic to ATM's did not work. At the beginning of the twenty-first century, remote ATM's in retail establishments and other public places are commonplace. But banks are still building branches with tellers.

So business strategists learned that hard way that the lead-time for the adoption of new technology can be decades, if not years, even for the simplest device.

How much longer will we be using currency and coin instead of plastic cards? Five years, ten years, fifty years? I'll argue that a several thousand year habit will not be eliminated in my lifetime.

As the nineteen seventies turned to the nineteen eighties, another major paradigm shift occurred with the arrival of personal computers. Initially perceived as toys, they made the hardware platform cheap. Home computers, as

they were first called, sat at the convergence of game and traditional computer technology. A home computer was, in effect, a low-end minicomputer for a single user.

I could play games on a home computer, but I could also program it. It offered systems developers and computer technicians a tremendous amount of freedom, because they could perform their craft outside of the workplace – for their employer or for themselves, or for somebody else.

The home computer industry began with Radio Shack and Apple, but it wasn't until IBM entered the market that "personal computers" became widely accepted.

A dream emerged in the user departments of many businesses – "build our own applications on our own personal computers and minicomputers and we'll divorce ourselves from the centralized information technology department."

These users found out the hard way that cheap hardware didn't mean cheap systems as the cost of applications was still expensive relative to the hardware.

As users examined the "total cost of ownership" of applications over time, including the training and the maintenance and enhancement, costs of five to seven times the initial cost of the application were not uncommon.

The consequence of the dream was the "semi-decentralized" model to information technology management. This model requires a higher degree of strategy and architecture, standards and models, and common services (software components that can be shared.)

Early personal computers emulated mainframes in many ways: "3270" type interfaces and batch-style operating systems. Breakthrough applications were word-processing and spreadsheets as independent software vendors selling applications over the counter emerged.

The early telecommunications links between personal computers were peer-to-peer and later "star" and "ring" networks emerged.

Gradually personal computers replaced 3270's for knowledge workers and applications were almost exclusively packaged with some interoperability between personal computer and mainframe. The "dumb" terminal was dead. But a lot of personal computers were used for dumb things.

In the mid-nineteen eighties, with the introduction of the Apple Macintosh, a new type of personal computer emerged with graphical-user interfaces, desk-top

publishing, animation and sound – the personal computer becomes an event-driven truly interactive device.

A paradigm-shift occurs. Now computer technology is widely available and applications are being developed for personal computers that are "presentation-based," either for entertainment or for business, e.g., executive information systems.

The definition of what a computer is changes. No longer perceived as a big-box in an air-conditioned room with punched cards – the box becomes a personal productivity device.

A new generation of systems developers and users emerges who have no knowledge of the past. This generation are comfortable with the keyboard and the mouse. They can build applications that incorporate music and animation. But their "hands on" approach causes a repeat of the mistakes of the past: no proper planning or design with resulting cost overruns and slippages.

It was as if the lessons learned from the seventies were forgotten. Maybe they were, because a younger generation was entering the information technology industry.

The point was brought home to me in during the late nineteen eighties when I interviewed a Columbia grad for a job as a management consultant. He told me that he was very familiar with computers. I asked how so and he told me about his experience with word-processors, spreadsheets, animation tools and MIDI devices.

As he spoke, I realized that my image of a computer as a big gray box in an air-conditioned room on a raised floor with paper tape and punches cards was about as modern as the pyramids in Egypt.

I rushed out to buy an Apple Macintosh.

Local area and wide-area networks emerged with personal computers used by end-users and minicomputers used as network computers.

As "information-centers" and "end-user computing" emerged, with a plethora of personal computers and fourth generation languages, some users think that they know more about information technology that the information technology function itself. (Perhaps because of the guarded mainframe -centric attitude of the information technology function at the time, that statement was true.)

Some software vendors had a field day selling software to the end-users, often circumventing the information technology function altogether. It was often an easy sell, but anytime an end-user application needed "enterprise data" a battle or disaster would result.

A classic example was the executive information system. Taking advantage of color graphical user interfaces, a user could "drill down" from a control panel to get further information. Theoretically, a chief executive officer could get a display of their business's financial statements and then drill down into the detail. There was one snag. A one hundred thousand dollar executive information system may require millions of dollars of modifications to the operational transaction processing systems and analytical management information systems and associated databases to supply the data.

Another snag was that the business knowledge required to make these systems effective was significant. Besides, the information that executives want isn't necessarily the top of the classic information pyramid. Executives want external information about markets, competitors and customer satisfaction as much as internal information.

So there were a lot of disappointments with executive information systems.

Business intelligence and data warehouses are modern answers and their promoters are having to deal with the same issues.

By the late nineteen eighties, the client/server model emerged as a fundamental approach to application systems architecture.

The clients are the computers on the users' desktops – the servers link the clients together.

The earliest form was between the personal computer and mainframe, with "desktop" applications on the personal computer and a "3270" interface to the mainframe.

To some extent, this model had been in place for some years, but the applications become cooperative between the client and the server, with some functionality on the client and some on the server. Shared data was almost exclusively on the server. An enormous challenge arose, when a user connected to one server, need data from another computer connected to the same server or from a different server.

The notion of "interoperability" was necessary and the client/server model

became very complicated and very expensive.

But it was attractive to users because they thought that they could bypass the information technology function altogether.

We were programming in "C" instead of COBOL or FORTRAN.

Personal computers become more powerful and replace minicomputers as network computers and servers. A strategic error at the DEC in not seeing the huge potential of personal computers is disastrous. The mainstay of the minicomputer revolution is eventually acquired by Compaq, the founder of "portable" computing.

Two types of desktop computer emerge: the lower-end Macintosh and Windows machines and high-end workstation powered by UNIX. Workstations are used for CAD/CAM applications, and heavy number-crunching modeling applications.

Because of UNIX's roots in network computers, there's a natural fit for server applications.

Ubiquitous computing models emerged: anytime, anywhere, anybody and three levels: desktop, collaboration (group) and enterprise. LAN's and WAN's are the backbone. Private networks are the basis for inter-company communications (EFT and EDI).

A four-layer model emerges: client (presentation) layer, communications server layer, application server layer, data server layer. Mainframes in effect become enterprise application and data servers.

And somebody whispered to me that it should all be "object-oriented."

By the mid-nineteen nineties, information technology has its own ecosystem. Personal computers connected to servers (communications, applications, data) (local, department or enterprise) private within the business or private beyond the business through private networks. Dial-up or LAN connections.

In the extended enterprise, the systems and related processes of a business extend beyond its boundaries.

Thanks to private networks, servers, real-time and the like.

Another example of the extended enterprise is the airline seat reservation

system. These systems were originally developed to improve the effectiveness of the reservations process within each airline. However, these system were expensive to build and operate. Some airlines decided to extend their systems to the travel agents by placing their terminals on the travel agent's desks. By taking this step, they extended their enterprises and caused a paradigm shift. Whereas the original intention was to pass the data-entry cost to the travel agent, the extended system became a competitive weapon. Whichever airline got to the travel agent first won, because switching from one airlines terminals to another was unattractive to the travel agent. Of course, the airline controlled the information that was displayed, with the obvious benefits. Together with the airline seat reservation system, the airline industry built systems that enabled the clearing and financial settlement of tickets. This enabled one airline to issue a ticket that included one or more flight segments on other airlines.

The consequences of the extended enterprise in the airline industry were significant. The airlines that extended their enterprises through reservation systems became the winners – the others were either relegated to a back-seat position in the industry or went out of business altogether.

The extended enterprise concept enabled the airline industry to grow because flight information became persuasive. By making flight information widely available and giving passengers the opportunity to make, change and cancel reservations easily, an airline was advantaged.

A second order of extended enterprise emerged over time. When the airlines added car rentals, hotel reservations and other travel-related features, the extended enterprise concept became the extended industry. The airlines provided capability for each stage of the "passenger value chain" as opposed to purely the airline's value chain.

In the end, the capability to deliver information about an airline's flights and services became more valuable than the primary service of providing flights. Analogies can be drawn in other industries. Bloomberg makes a living from delivering financial market information, but is not a financial institution.

By linking supplier and customer value chains through the extended enterprise concept, the notion of value networks emerge. A value network links the processes between suppliers and customers into supply chains and demand chains that are governed by procurement and customer relationship management systems. Value networks are the physical factors in the modern business ecosystem.

By the mid-nineteen nineties the personal battle (Mac versus PC) reaches a

turning point – Windows becomes the poor man's Mac and Apple's position as a boutique is reinforced for ever -but a very classy and thought-provoking boutique.)

Just like DEC missed the PC market, so Apple missed the opportunity to license their superior technology – two of the biggest lost opportunities in business. But whereas Microsoft and Intel emerge as the winners in the personal computer industry, even Microsoft scrambles to gain a lead on the internet, with the resulting anti-trust suit.

The Macintosh becomes a high-end specialized graphical tool and UNIX competes with Windows NT for the server. UNIX's special feature of separating the console from the processor is a special benefit.

By the mid-nineteen nineties, the prospect of Y2K loomed, which meant that for the next five years or so, the information technology function would be tied up, redesigning and programming some applications and replacing others.

Clearly this activity was done well, because there were relatively few blow-ups – nowhere near as many as the pundits predicted. But at what cost?

Business executives have tried to get their arms around the cost of information technology since the dawn of computers, but even today seem to be able to do so.

Elaborate accounting mechanisms have been devised such as chargeback systems and cost/benefit analyses.

It should be simple – treat information technology is an investment, just like any other. So why won't traditional return on investment calculations work?

Part of the reason is because technology changes faster than our ability to absorb its true consequences. Another is because the visionaries and project sponsors tend to under estimate what it really takes to build applications, and what it really takes for users (whether employees or customers) to adopt them.

In fact, most "bell weather" systems such as airline seat reservation systems, point of sale and electronic funds transfer systems could not be cost justified on the basis of the information that was known at the time.

In fact, often the "high-order" effects of information technology, the business applications that provide competitive advantage don't kick in until years after a know technology is implemented.

So in order to get our arms around the return on investment of information technology, it is necessary to take into consideration the development cost, the implementation cost, the employee assimilation cost, and the end-customer adoption cost.

Return on investment calculations need to include provisions for contingency for both unplanned activities, and activities that took longer than planned.

Whereas return on investment calculations often are based on cost reduction assumptions, it is often increased revenue in future years from the higher order effects of technology that yield the true return.

In my experience over almost three decades, it takes a visionary to have the guts to introduce a new information technology because the return on investment calculations won't show the benefits alone.

Often, such visionaries get shot-down, but their legacy lives on.

But nowhere have the visionaries had a field day with two words that entered by vocabulary during the mid-nineteen nineties: "www" and "internet."

III. A general discussion of the ramifications of netsourcing and application service providers

In the mid-to-late nineteen nineties, another paradigm-shift occurred. What began as a governmental initiative, augmented by commercial bulletin boards and timesharing services became one of the largest economic and technological phenomena: the internet.

By the late nineteen eighties, home computer users were able to connect to timesharing services such as Compuserve to get access to information services. When Sears and IBM teamed up to form Prodigy, an early form of ecommerce became available. America Online emerged and greeted us with the expression "you've got mail."

E-mail was born although was initially available within individual networks.

The word "internet," which literally means "between networks," has become a significant part of the lives of most members of modern civilization. The internet has enabled its users access to information and undertake commercial activity on an unprecedented basis.

The paradigm shift occurs from the consequences of being connected to sources of information that can be transmitted almost instantaneously from anywhere in the (free) world. A new generation of application system appeared – the web-site, and a new breed of application systems developer entered the workplace – the web-site designer.

Just as the graphics artists who became users of computers with graphical user interfaces fifteen years ago, emerged from outside of the conventional computing work force, so the same happened again with website designers.

The internet has been around for a while, and the "world wide web" is actually only one part of it.

But when the concept of the "web-browser" was first introduced in early nineteen nineties a huge paradigm-shift occurred.

The early applications for computers with graphical user interfaces were graphics, music and animation, the same was true for web-sites.

Fifteen years ago, the results were incorporated into physical documents or demonstrations on a single personal computer. However, the results from web-site designers are instantly available on any computer connected to the internet.

The early applications for web-designers were for marketing purposes – brochureware: simple pages that incorporated text, graphics, and maybe music and animation, and document download capability. The novelty was in the site being found from anywhere on the internet.

An early breakthrough was the concept of a portal which provides links to other sites. Yahoo is the supreme king of generalist portals, but there are a myriad of specialist portals for industry groups, functional groups, technical groups, political groups, hobbyists, etc.

The next step for web-designers was to add database capability to their websites. With this capability in place, websites could respond to inquiries regarding products and services, policies, rules, regulations, and schedules. The concept of a website moves from brochureware to catalogs.

The next step for web-designers was to add news services and and other real-time capability. The availability of real-time information increases the utility of the internet to consumers and businesses alike.

Another major breakthrough was the ability of websites to accept payments

online in a secure manner. Once this breakthrough was surpassed, a website becomes a retail outlet in its own right with marketing, sales and service capabilities.

Much of the growth of the internet, and especially ecommerce was driven by...pornography.

Why?

Because the internet makes it easy for people to see and obtain products and services in the privacy of their own homes. So the ability to deliver pornography is a major driver of behavior.

However, just as we have seen with earlier introduction of earlier technologies, the adoption cycle can be very long. So unless there is a compelling need, the true adoption cycle of technology, even the internet may be years or decades.

Even though sponsors of websites could see the advantages of delivering purely digitized products and services through the internet, or taking orders for tangible products and services through the internet, the adoption time could and has been longer than most pure "dot coms" capital base can afford.

"Dot coms" were further hampered if they only way to find them was through the internet itself. So it was not surprising to see "dot coms" advertised on billboards along the sides of highways.

Problems with bandwidth and reliability of telecommunications services have also hampered confidence in the internet. However, as with every new technology, there are always growing pains.

So, when starting a internet-based business today, the answer is probably a combination of bricks and clicks.

One problem the internet has caused for traditional and ecommerce is the availability of products and services at marked-down prices, or free. The plethora of marked-down or free products and services was an attempt to persuade consumers to change their behaviors – no different to sales and mark-down events in the retail business industry in general.

The word "intranet" is a related term to the word internet, and technically means "within networks." Whereas the internet links computers on different networks together, so an "intranet" links computers on the same internal networks. An intranet can consist of one or more networks.

The key factor that differentiates an intranet from the internet is that an intranet is for private use, and the internet is for public use. However, thanks to the concept of a "virtual private network," an intranet can be enabled over the internet. The method of operation is the same; what differs is *who* has access to *what*.

Intranets link computers together within companies for the purposes of sharing data and information, and collaborating on activities. They exist as "local area networks" or as "wide area networks," which are local area networks linked together.

(As a technical matter, not all local area networks are intranets. In its purest definition, an intranet uses the protocol "TCP/IP" for communication, which by definition defines the internet. Local area networks can use other protocols for sharing data, and usually do for "desktop" tasks such as word processing, spreadsheets and presentations. The significance relates to where the data is stored. Under TCP/IP, the data is transmitted to the computer of the end-user and manipulated there. In the case of other protocols, although the data may be accessed from and transmitted to many computers, it is updated "in situ" through "save" commands. For updates to occur in a TCP/IP environment, specific transactions have to be formatted to transmit data.)

An extension to the concept of an intranet is an "extranet." An extranet is a hybrid allowing external users of the internet to have access to an intranet.

For example, a customer of a company who has been given special permission to access internal data on an organization's intranet does so through an extranet. The customer accesses a "private area" on the company's website, by supplying a username and a password. Assuming a positive authentication, the customer is granted access to the company's intranet. The implication is that an external user may have access to files shared with internal users, with the need for stringent levels of security and control.

When the internet was first used to link businesses and consumers or other businesses, the concept of a value network entered a new stage of development, and (electronic) ecosystems take on a huge step forward.

Two new expressions entered my vocabulary: "B2C" and "B2B."

By linking customers and suppliers externally and internally through internets, intranets and extranets, the concept of an (electronic) ecosystem becomes a reality.

The electronic ecosystem has five major building blocks: supplier relationship management/supply-chain management, customer relationship management/demand-chain management, enterprise resource management, business intelligence applications, and enterprise application integration applications.

The building blocks are not new – as we have seen throughout this article, these applications have evolved over time.

What makes the electronic ecosystem exciting is the ability to extend the enterprise in a fluid manner, and to blend market, sales, service and data interchange "relatively seamlessly."

In the nineteen seventies, we saw process design techniques emerge separately from data design techniques, the same trend is occurring with internet-based applications. The emergence of XML as the convention for data transmission will redefine the role of electronic data interchange, making it commonplace for all users of the internet.

However, many of the horror stories of cost overruns, and under delivery have repeated themselves with the efforts of "generation D."

In fact, there's a major gap between the over forty-five crowd and the rest. The baby boomers have had the experience of three decades of information technology projects – so they know what it takes. Generation D has never known a world without computers – it's second nature.

The alphabet soup of acronyms of the last century has become more like a broth in new century. Words and acronyms like Java and Javascript, ASP, flash, SOAP, browser, and so on have enriched my vocabulary.

What the baby boomers have in project experience, they lack in being "hands-on" assimilators of new technology. For generation d, it is the opposite. Of course there are exceptions. But until one generation fully understands the experience and attitudes of the other, there will be a gap between what the interact can do and will do.

The electronic ecosystem has some evolving to do.

It is in the context of the electronic ecosystem that netsourcing makes sense.

The word netsourcing is derived from the words internet and outsourcing.

But to determine why netsourcing makers sense, it is necessary to review business trends at the beginning of the twenty-first century and apply lessons that have been learned from the past.

We'll draw upon so of the lessons in part I and part II.

The pressures on the "C-level" have increased over the years.

The "C-level" has to address entrepreneurial pressure – the ability to generate ideas that create value over time.

The "C-level" has to address leadership pressure – the ability to inspire and motivate people in an culture where employer loyalty was waned due to the effects of the huge downsizing initiatives of the nineteen nineties.

The "C-level" has to address managerial pressure – the ability to deliver superior results – which is difficult in an environment where corporate analysts focus on results from quarter to quarter.

Many businesses fail because management cannot adequately respond to the "C-level" pressures.

If management focuses on short-term operations instead of balancing these needs with long-term marketing, operations and finance needs, then they run the risk of not being well-positioned in the marketplace, and not adequately financed.

Over time, these businesses fall out of touch with their customers, incur excessive costs due to inefficient businesses processes or outdated technology, and exhaust their capital.

As has been noted throughout this article, the information technology function is under considerable pressure.

The demand for both new and existing services challenges the information technology function's ability to deliver, which is compounded by high turnover and talent shortages. Resources are strained.

Increasing numbers of remote users and geographically dispersed locations add to the complexity of the management of information technology assets.

The availability of resources has changed between the old economy and the new.

In the old economy, scare resources included capital, technology and information, and third-party services.

In the new economy, scarce resources include attention spans,time and talent. Abundant resources include technology and information, and third-party services.

Capital is available when investors have confidence in the management team, and when they are satisfied that markets exist for a business's products and services that are in a state of readiness with growth potential; that can generate sufficient sales to cover operating expenses and provide a superior return on investment in a competitive environment in established or growing industries with economic channels of distribution; within known risk factors; when a clear exit strategy exists. (Wow!)

In the old economy, shareholder value was based on the present value of future returns, from predictable operations, and discounted for risk.

In the new economy, shareholder value is adjusted for ideas that can generate competitive advantage and create distance from competitors and actions that can sustain competitive advantage over time by creating barriers to competitor entry, and maintaining customer, employee, investor and supplier loyalty.

In the old economy, access to financial capital was a driver of wealth. In the new economy, access to intellectual capital is a driver of wealth.

To survive, management must focus on strategic initiatives, functions and processes that generate competitive advantage and outsource utility initiatives, functions and processes to remain focused.

Strategic functions and processes are those responsibilities and activities that relate to gaining competitive advantage and maximizing shareholder value.

These activities include developing differentiated products and services, increasing market share, and increasing revenue; reducing cost; and narrowing performance and satisfaction gaps with customer, employee, investor and supplier constituencies.

Utility functions and processes are those responsibilities and activities that support a business but do not achieve competitive advantage.

The criteria for insourcing should be based on whether a function or process is directly related to gaining competitive advantage or maximizing shareholder

value.

If the function is not, then management should consider outsourcing applications systems development, maintenance and operation, the related procedures, the related processes and the related functions, if possible.

Management should review functions and processes periodically, because strategic functions and processes become utility functions and processes over time.

Management should not outsource any function or process that causes control of the business to be lost. However, outsourcing low-value functions and processes will cause management focus to improve focus – hence improving the opportunity for overall control.

Outsourcing software development and maintenance enables information technology functions to focus on strategic technology initiatives. Focus internal information technology personnel on strategic initiatives, which is probably where they prefer to be, and partner with outsourcing companies that reduce risk and cost.

Application service providers have emerged as a consequence of the remote processing capabilities of the internet.

The internet changes the rules for outsourcing computer systems because access to applications and data is more easily enabled between third-parties. As a consequence, application service providers have emerged as third-party processors enabled by the internet.

Application service providers are a reminder of service bureaux and third-party processors of the nineteen seventies through nineties with the twist that the access if through the internet.

Any service bureau or third-party processor that does not offer access via the internet is doomed to extinction within the next few years.

Application service providers offer a netsourced subscription model to information technology services. The subscription model is based on renting applications and the associated resources for a contracted period of time.

Netsourcing enables even the smallest of organizations to rent applications over the internet. But small to middle-market businesses could not afford the cost overruns and false starts that have plagued larger companies.

Industry analysts estimate that netsourcing will be a $20 billion market by 2005, and that by the end of the decade, 80 per cent of all business applications will be netsourced.

The netsourced subscription model offers an economical method for small to medium-sized businesses to acquire information technology that historically only larger businesses could afford or risk.

The netsourced subscription model provides access to packaged software without high up-front cost; reduces the need for scarce and expensive resources; and reduces the cost of building and maintaining the internal applications and databases, and the technical infrastructure.

The application services provider model for netsourcing utility functions and processes reduces the total cost of ownership of information technology.

It reduces internal operating expense because scarce and expensive resources can be focused on strategic initiatives as opposed to being tied-up in time wasting low-value initiatives. Applications are updated "one-time in one-place,which is a significant benefit over the client/server model where updates usually have to be made on every machine in the network. In general, the information technology environment is less complex and easier to maintain.

The application service provider model reduces capital outlays and monthly fees can be reduced because of opportunities to share resources.

Application service providers have had to respond to issues related to security and control, and reliability.

One barrier to netsourcing today is psychological. It is the notion of an organization storing its data at a third-party. But this barrier has been overcome before in the traditional service bureau environment. Perhaps concerns about risk of hacking through the internet, or lack of control in less-experienced application service providers exacerbate the problem. But ultimately economics will drive the issue as the industry matures.

However, the users of First Data Resources, the world largest credit card processor, were able to overcome the barrier to storing their data at a third-party processor.

Credit cards are a very profitable product for retail banks. By providing easy access to credit, banks charge high interest rates. Hence convenience makes

credit cards a well-sough product and no bank can be without them. A huge infrastructure has been build by bank card associations to enable authorizations and transaction exchange and settlement between banks. So banks are used to sharing their data with other participants in the associations (Visa or MasterCard.)

Credit cards also provide a wealth of customer information, that, if used skillfully, can enhance a bank's relationship with its customers, and improve its profitability.

Embedded within and between credit card transactions are the psychographics that when coupled with demographics provide a significant amount of information about a customer. The key words are "frequency," "recency" and "value." These indicators show how often a customer does something, when they last did that something, and what the value of that something was. From this information, banks can determine attitudes towards credit, responses to marketing campaigns and general spending behavior. It's an extra bonus above the basis profits that credit card transactions bring.

Would a bank place that data in the hands of a third-party? If the bank was able to lower its processing cost and improve the profitability of the product, then it might be worth it. If the only way the profitability could be assured then it would certainly be worth it, assuming that the security and control is adequate.

First Data Resources became an attractive third-party processor because of their relentless pursuit of minimizing the cost of processing credit card transactions. The more card processing business they took on, the higher the scale and hence the lower the unit cost of processing.

So credit card processing became an excellent example of the notion of insourcing strategic functions and outsourcing utility functions. By outsourcing the utility processing to First Data Resources (or their competitors,) banks were able to improve the profitability of their credit card portfolio. By insourcing the processing and management of the information derived from credit card processing, banks were able to improve the profitability of the customer relationship, by managing credit or by further penetrating the relationship with other products and services.

First Data Resources is likely to processes transactions more accurately than a bank, because they have more experience. Hence, the relationship between a customer and the bank is likely to improve in an outsource transaction processing environment because there are likely to be less errors.

The key for a bank to use a third party processor such as First Data Resources was to overcome the issue of their data being managed in an environment shared by others. Successful banks overcame this obstacle even when First Data Resources was owned by American Express!

Just as we have seen portals emerge on the internet for access to websites in specific categories, we will see the same trend emerge for application service providers. These portals are application service provider aggregators, of which Jamcracker, Inc. is the leading example.

Application service provider aggregators will perform several functions, the most common of which will be to act as a common front-end to many application service providers.

The best ones will provide pre-screening services and periodic audits of application service providers to ensure the highest service levels to their customers.

Aggregators will also provide stability in an industry that is still emerging. The best will also provide "corporate" functions through their portals such as organization charts, telephone and e-mail directories, help and trouble-reporting facilities.

But thanks to the concepts of intranets and the internet, the application service provider aggregators portal can be a front-end to both outsourced and insourced applications. In other words, the portal enables full cosourcing if it provides access to internal applications and external applications with a common look and feel.

If the applications link customers and suppliers through extranets, intranets and the internet, then the organization has an ecosystem enabled by the aggregator's portal. In this case, using an applications service provider aggregator is netsourcing that makes sense.

In terms of getting started, the approach to netsourcing is the same as any other strategy: map-out a long-term game plan, and look for "quick-hits" on a short-term basis.

However, immediate opportunities may arise from netsourcing utility applications that currently distract information technology personnel from strategic applications. Such candidates include both information technology service-based applications and business service-based applications.

Candidates in the information technology services arena include desktop management, collaboration management and trouble reporting. Candidates in the business services arena include human resources administration, finance administration, sales force administration and customer relationship management.

There are a wealth of new vendors for these applications and many of the "more traditional" independent software vendors are moving into the world of application service providers.

For example, Oracle which began life as a vendor of database software and then added a portfolio of applications, has is in the early stages of redefining itself as an application service provider.

For the longer-term, develop a cosourced architecture that blends netsourced utility applications with internal strategic and legacy applications to lower total cost of ownership and improve competitive advantage.

It's ironic that netsourcing allows me to use a "thin client" – a computer that has not much more on it than a browser. It almost looks like a "dumb" terminal of twenty years ago.

But thanks to netsourcing, I am able to access all of my applications, whether insourced, outsourced or cosourced from anywhere from which I can access the internet with one single sign-on and common interface.

In effect, the entire network has become my computer.

In conclusion, netsourcing will be a major driver of renting software for utility applications and extending the enterprise through electronic ecosystems.

By the end of the decade, software development will be an activity related primarily to strategic functions within individual businesses or within application service providers. By focusing on strategic functions and netsourcing the utility functions, businesses can gain competitive advantage and maximize shareholder value which is netsourcing that makes sense.