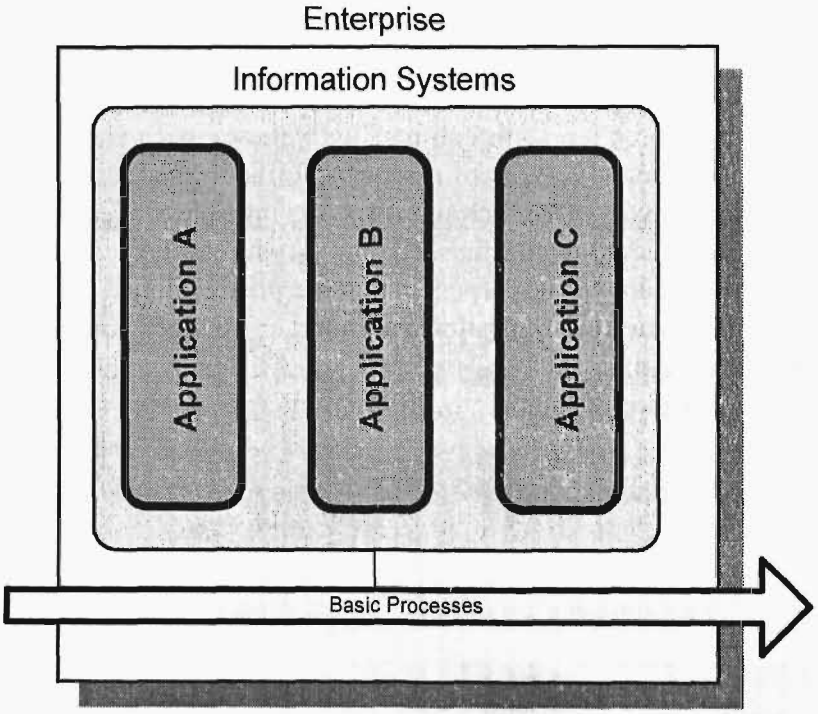
OFF-LINE ENTERPRISE

The off-line enterprise is a typical solution for the industrial enterprise, which operated in the 1950's and 1960's. Several applications such as payroll, stock control, production control, and customer orders had been processed independently and their data were provided in batches. Rooted in the 1980's and 1990's, such data processing modes can be found in small enterprises, such as small retail stores or small repair shops. A model of such an enterprise is shown in Figure 2-1.

Figure 2-1: A Model of Off-line Enterprise



ON-LINE ENTERPRISE[3]

The organization of an on-line (networked) enterprise is based upon computer networks such as Local Area Network (LAN), Metropolitan Area

Network (MAN), Wide Area Network (WAN), Value-added Network (VAN), and Global Area Network (GAN), and the Internet. A network enterprise can have the following types of organization:

- Internal enterprise network among its own organizational units,
- Single partner collaboration,
- Multiple external collaboration (extended enterprise),
- Internet-based enterprise,
- Combination of the above.

Computer networks enable the transformation of a hierarchical organization into a "network" organization, which is characterized by the following attributes (Alstyne, 1997):

- Its purpose is to advance co-operation,
- Horizontal integration is stronger than a vertical one,
- Decentralized, internetworking teams,
- Trust is moderate and even high,
- Conflict resolution is based on negotiations and reciprocity,
- Tasks are carried out through the internal management of the project,
- Decision-making is based upon persuasion and consensus, and
- Strong support of computer networking.

These attributes create an on-line (networked) enterprise, which at the same time can be:

- The horizontal enterprise,

- The extended enterprise,
- The Internet-driven enterprise.

The *horizontal enterprise* reflects the philosophy of work organization, which largely eliminates both management hierarchy and functional and departmental boundaries. In its purest state, the horizontal enterprise may be composed of a skeleton group of senior executives at the top in such traditional support functions as finance and human resources. But everyone else in the enterprise works together in multidisciplinary teams that perform core processes, such as product development or sales generation. As a result, the enterprise might have only three or four layers of management between the chairman and the staff in a given process.

Simple downsizing in the 1980's and 1990's did not produce the dramatic rises in productivity many companies had hoped for. Gaining quantum leaps in performance requires rethinking the way work gets done. To do that, some companies are adapting a new organization model. Here is how it might work (Byrne, 1993):

- Organize around process, not a task. Instead of creating a structure around functions or departments, build the company around its three to five "core processes" with specific goals. Assign an "owner" to each process.
- Flatten hierarchy. To reduce supervision, combine fragmented tasks, eliminate work that fails to add value, and cut the activities within each process to a minimum. Use as few teams as possible to perform an entire process.
- Use teams to manage everything. Make teams the main building blocks of the organization. Limit supervisory roles by making the team manage itself. Give the team a common purpose. Hold it accountable for measurable performance goals.
- Let customers drive performance. Make customer satisfaction – not stock appreciation or profitability – the primary driver and measure of performance. The profits will come and the stock will rise if the customers are satisfied.

- Reward team performance. Change the appraisal and pay systems to reward team results, not just individual performance. Encourage the staff to develop multiple skills rather than specialized know-how. Reward them for it.

- Maximize supplier and customer contact. Bring employees into direct, regular contact with supplier or customer. Add supplier or customer representatives as full working members of in-house teams when they can be of service.

- Inform and train all employees. Do not just spoon-feed sanitized information on a "need to know" basis. Trust the staff with raw data, but train them how to use it to perform their own analyses and make their own decisions.

Companies moving toward this new organization model:

AT&T Network Systems Div. reorganized its entire business around processes; now sets budgets by process and awards bonuses to employees based on customer evaluation.

Eastman Kodak. Kodak unit has over 1,000 teams, ditched senior v-ps of administration, manufacturing, and R&D in favor of self-directed teams.

General Electric. Lighting business scrapped vertical structure, adapting horizontal design with more than 100 processes and programs.

Lexmark International. Former IBM division axed 60% of managers in favor of cross-functional teams worldwide.

MOTOROLA. Government Electronics group redesigned its supply management organization as a process with external customers at the end; team members are now evaluating peers.

XEROX. Develops new products through multi-disciplinary teams that work in a single process, instead of vertical functions or departments.

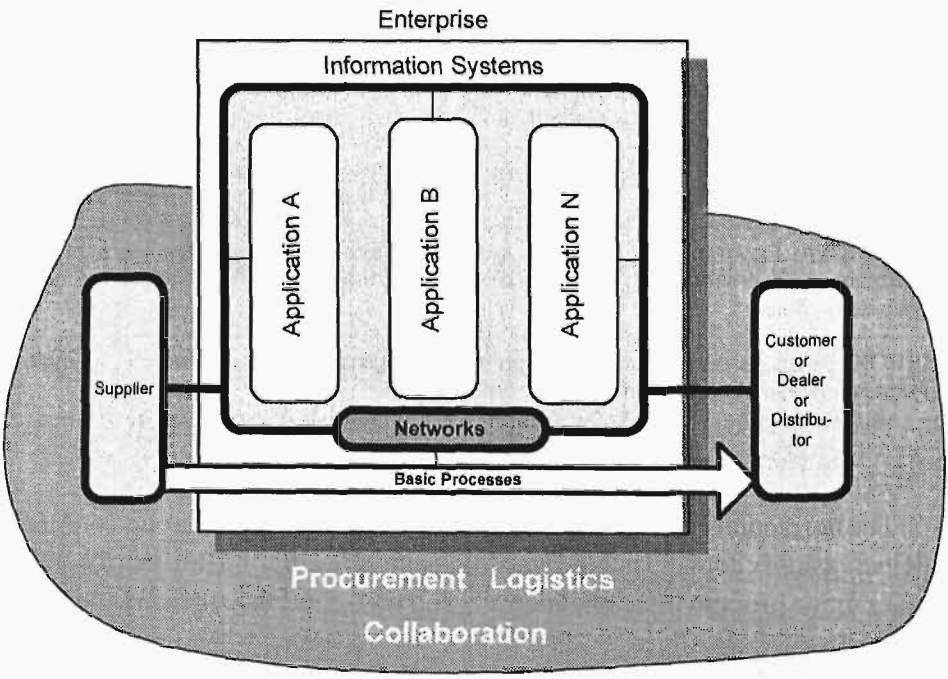
The horizontal enterprise is a solution that is gaining currency and one that will increasingly demand people who think more broadly and thrive on change, who manage process instead of people, and who cherish teamwork as never before.

The *extended enterprise* is emerging from computer networks which link suppliers with producers and customers. This form of integration of partners

creates so-called supply-chain management (advanced logistics). A supply-chain coordinates customer requirements with a producer's internal planning and scheduling and suppliers' delivery of materials and components.

> Wal-Mart has transformed business and has become a successful retailer through inter-enterprise networking with its most important suppliers. It allows Wal-Mart to reduce inventory and improve product availability on the shelves. Today when someone buys a skirt at Wal-Mart, a stream of computer applications is processing information across the computer networks, all the way to the factory that makes the skirt. The new skirt, however, did not first go into a central warehouse. It was sent directly to the store from the manufacturers, as 97% of all Wal-Mart's goods never pass through a warehouse.

Figure 2-2: A Model of an On-line (Networked) Enterprise as the Extended Enterprise



Chrysler has won kudos from suppliers and shareholders alike for its highly regarded SCORE program – the acronym stands for Supplier Cost Reduction Effort – in which cost savings stemming from suppliers' suggestions are shared with suppliers. Since 1989 the Auburn Hills, Michigan-based automaker has received some 25,000 supplier proposals that have yielded $3.7 billion in cumulative cost savings. Every week suppliers submit more than 100 ideas or proposals that offer practical ways for Chrysler to reduce costs (Industry Week, 2.02.1998).

The networked enterprise model is shown in Figure 2-2.

INTEGRATED ENTERPRISE

Once an enterprise is equipped in computer networks, the next step in its evolution is the integration of application around a common enterprise database. This integration leads to so-called enterprise-wide computing and the development of enterprise-wide information systems and services. Companies are stockpiling ever-larger amounts of data on products, customers, and transactions in an effort to understand and control what sells, reach new customers, and make better business decisions.

Companies that implement enterprise-wide systems usually acquire software packages. Those companies no longer want packages that merely automate existing processes. Instead, they want packaged applications that support integration between functional modules, can be quickly changed or enhanced, and that present a common graphical look-and-feel, thereby helping to drive down training and operating costs.

Furthermore, companies require suites of applications that support their desires to operate worldwide. The cost of maintaining custom applications has been growing, and the packaged suite of applications (called ERP - Enterprise Resource Planning) has emerged as a solution.

The enterprise-wide software is provided by several vendors and is customized and implemented by several "integrators." Among leading software packages one can mention the following:

- **SAP (*Systeme Anwendung Produkte*)**, a German company which has about 30% of the market. The company sells the R/3 software package

which supports a high degree of integration and multi-site, multi-currency operations. The R/3 package integrates Financial Accounting, Treasury Management, Sales And Distribution, Human Resources, Product Data Management, Computer-Integrated Manufacturing, and Enterprise-Wide Reporting. The R/3 package is supported in the local languages of 35 countries.

- **OCA (Oracle Cooperative Applications)** are integrated around Oracle relational database system, which is supported on multiple platforms. OCA is composed of six enterprise-wide applications; Supply Chain Management, Manufacturing, Financial Management, Project Accounting, Market Management, and Human Resources Management. Oracle has also introduced a family of applications for the Web, such as Oracle Web Employees, Oracle Web Customers, and Oracle Web Suppliers.

- **PeopleSoft** sells an integrated package which contains the following integrated applications: Human Resources Management System, PeopleSoft Inventory, PeopleSoft Order Management, PeopleSoft Purchasing, PeopleSoft Manufacturing, PeopleSoft Distribution, and PeopleSoft Financials. PeopleSoft applications run on several top databases, including DB2, Oracle, Informix, Sybase, and MS SQL Back Office.

- **Baan Co.**, from the Netherlands, sells a software package which supports such applications as: Supply Chain Management, Project Control/ Planning, Suppliers scheduling, Self-Billing, Financials, Logistics, Process Control, Shop-Floor Monitoring, EDI, a product Configurator, Distribution, and Simulation.

- **Software 2000** offers a package containing the following applications: Financial Management, Human Resource Management, Material Management, and Manufacturing. In addition, the vendor provides a user interface for access to management and business analysis information. Software 2000 provides Web access to information for customers.

The ERP software systems are very complex; for example, SAP R/3 has about 500 million lines of code, 80,000 tables, and 10,000 icons. Its implementation is a very complex and costly undertaking, which can take several years and millions of dollars. To make a successful implementation of

ERP it is necessary first to adapt business processes (about several hundreds) to new software requirements. Failure to do so is one of the main reasons for many difficulties, even business malfunction. For example, Kellogg had to replace Oracle's ERP by SAP R/3 at the cost of $400 million.

The implementation of ERP systems is provided by so-called system integrators. System integration and outsourcing is a $300 billion business. Selecting an IT integration service provider is the most important decision an information executive ever makes. The average company spends one-fifth of its budget each year on these experts, relying on them to fill huge skills gaps, cope with technological complexity, and ultimately, to help drive a new business.

Among the 10 top integrators one can include the following:

- Andersen Consulting,
- EDS,
- Pricewatershouse-Coopers,
- Ernst & Young,
- KPMG Peat Marwick,
- Deloitte Consulting,
- IBM Global Services,
- Computer Science Corp.,
- Compaq/Digital,
- Hewlett-Packard.

Among the most popular integration and outsourcing services one can mention are the following:

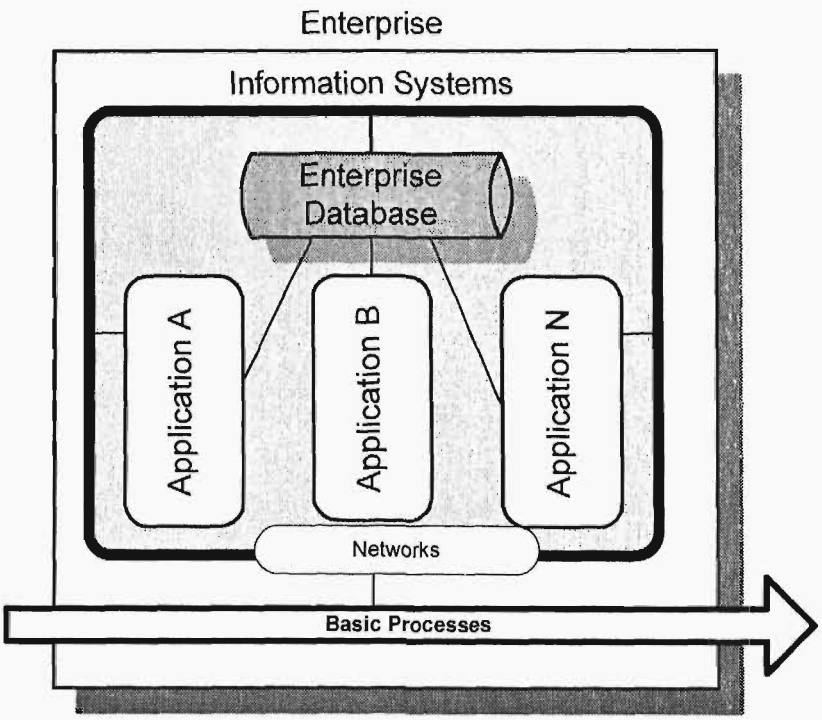
- Application development,
- PC support and procurement,

- Network integration and management,
- Data centers management,
- Internet hosting (e-commerce),
- Help desk,
- ERP integration,
- Extranets.

Along the long-term dangers IT organizations face in using integrators and outsourcers to augment internal staff is the risk that their very best employees will be eliminated, or that they may not develop essential skills and know-how to manage and maintain new systems.

A model of an integrated enterprise is shown in Figure 2-3.

Figure 2-3: A Model of an Integrated Enterprise



Examples

IBM installed SAP R/3 software for its own internal information processing. This decision saved millions of dollars, not only through faster flows of consistent information, but also as a result of the elimination of hundreds of other software programs. IBM had 47 different order-entry systems and about 6,000 applications; today that figure is down to 300. IBM expects to have 26,000 employees using SAP.

The R/3 Supply Chain application was able to reduce IBM's demand/supply calendar – the time it takes the company to rebalance supply with changes in product demand globally – from 60 to 20 days. The process improvements obtained from the shift to SAP's applications package are impressive. Prior to installing the enterprise system, the entire process of handling a purchasing request took two days; today it requires just two and half hours. The time needed to give a customer a committed date for shipping a PC – previously a day – now can be done over the phone immediately. Orders can be scheduled or rescheduled in real-time, compared with the former overnight wait.

IBM formerly offered about 3,000 different PC system units; today the company offers 150 systems. The time to bring new hardware to market was reduced from 54 to 16 - 18 months. As a result, sales advanced from 1.9 to 2.2 million units, and from 8.2% (1995) to 8.7% of the market (in 1998). In the disk-drive unit, the integration of IBM's enterprise systems via SAP enabled the unit to cut its manual workload from three-fourths of all orders and shipment to zero. The 15 to 20 minutes it took someone to respond to a customer's question about a bill was reduced to an immediate response. The job of shipping a customer a repaired or replacement part, which used to take three to 44 days, now takes two days. IBM has slashed information systems expenses dramatically, from $4.3 billion in 1992 to about $2.3 billion in 1996. Much of the savings came from consolidating the firm's 155 data centers around the world into only 28, eight of which are manned; the remaining 20 are fully automated.

As a result of these improvements, IBM's stock has risen from $40.62 in 1993 to $179 in late May of 1998 (Industry Week, 07/07/1998). However, in the 2000's IBM's stock went down, but mostly due to the decline of almost all technology stocks.

With more than 10,000 employees and annual sales approaching $5 billion, one large global chemical company chose to differentiate itself by being first in its industry to use the ERP system. The company's aggressive corporate

goals called for accelerating revenue growth, identifying and quickly developing new income streams from emerging market segments, and establishing itself as an industry leader. The first phase established the EMC Enterprise Storage Network™ (ESN) at the company's headquarters to support corporate SAP R/3 operations. The second phase brought the Microsoft Exchange environment, currently supporting 9,000 users and rapidly becoming a lifeline for business communications, under the same high availability of the IT environment as SAP R/3. In the third phase the company broadened the ESN to tie into their information infrastructure the rapidly growing number of applications such as ERP (SAP), customer relationship management (CRM), supply chain management (SCM), and data warehousing (DW). These applications in turn support the company's business processes that are carefully mapped to corporate goals and strategies. By placing information at the center of this environment, the company is well positioned to make sound business decisions based on timely information, adjust rapidly to changing business conditions, maintain tight control over manufacturing, order processing, and distribution functions, and maximize customer satisfaction. The following results have been achieved: significant improvement in company's performance, $510,000 annual savings in people costs, $1.4 million annual savings for disaster recovery contract, and others.

AGILE ENTERPRISE

The mass production of standardized goods was the source of America's economic strength for generations. But in today's turbulent business environment, mass production no longer works; in fact, it has become a major cause of the nation's declining competitiveness. The most innovative companies are rapidly embracing a new paradigm of management – mass customization – which allows them the freedom to create greater variety and individuality in their products and services at desirable prices.

New ways of managing, together with new technology, now enable savvy businesses to provide each customer with the attractive "tailor-made" benefits of the pre-industrial craft system at the low cost of modern mass production. Companies that have discovered and successfully implemented mass customization are swiftly outpacing their competitors in gaining new customers and achieving higher margins.

Among the firms that are leading their industries to this new frontier are McGraw-Hill, which can deliver custom-made classroom textbooks in quan-