THE NETWORKED CORPORATION: 
BUSINESS LITERATURE REVIEW, STRUCTURING AND ANALYSIS

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ABSTRACT

The business environment has dramatically evolved over the last 50 years and traditional hierarchical organizational structures adopted by companies is no longer appropriate.

One possible solution to this problem is the networked corporation model: an advanced organizational model characterized by a strong project driven culture, a dynamic structure, empowered and accountable teams, new leadership models, and available resources that span across the organization and beyond traditional boundaries.

The networked corporation does not offer any absolute model or structure to be applied. Instead, it combines powerful principles such as empowerment, horizontal communication, strategic alliances together with advanced IT in a consistent and integrated system.

Networked corporations can be implemented at the corporate, business unit or plant level. They can be efficient in both service or manufacturing industries.

Implementing a networked corporation is not easy. A critical success factor is aligning human, organizational and technological parameters. Incentives and reward systems are crucial to the success of implementation. Trust between internal and external partners must be managed. Technology risks are not absent: the advanced communications and information system’s development will be no less challenging.

Thesis Supervisor: Stuart E. Madnick
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Introduction

The business environment has dramatically evolved over the last 50 years. Globalization and internationalization have widened the scope of most business activities and are pushing management to include many more parameters in their strategic analysis and decision making.

Radical changes in the basis of competition are forcing companies to devise new business strategies. In addition, new technological developments are constantly challenging companies' operations policies and managerial practices.

The traditional organizational structure adopted by most of the companies is no longer appropriate to cope with the environment as it is evolving. Rigidities created by hierarchies in companies weaken their ability to devise and implement the necessary transformations of their operations.

Management practitioners and academics have developed new ways to think about organizational structure in order to allow companies to be more responsive to the environment.

One of these new ideas is the networked corporation concept: a flexible organization, supported by an extensive information technology system, which adapts to the environment and breaks away from hierarchical rigidities.

Different authors have developed models similar to this networked corporation concept: ad-hocracies, flat hierarchies, virtual corporations, cluster organizations, agile manufacturing enterprises, and knowledge- and information-based organizations.

This paper reviews different sources presented in the business literature which describe organizational models capturing these dimensions of flexibility, non-hierarchical structure and leverage of organizational structure with IT.

After giving a general description of the new business environment and the new potentialities of information technologies (Chapter 1), we identify themes which are common to all the sources we have reviewed (Chapter 2). We characterize them as they are presented by authors, and we describe how they relate to each other.

Then, we analyze how these themes can be applied in the real world and how they have to be adjusted to fit the realities of specific operations in a specific industry (Chapter 3).

The last chapter (Chapter 4) discusses implementation and the potential problems companies which move toward a networked corporation model will experience.

The scope of this paper is very broad and thereby does not go into details. We attempt to give a wide review of issues to stimulate thinking about the concept of networked corporations. Our goal is to structure the overwhelming flow of information on the
topic. As an example, two books were published while we were working on this paper. Therefore, in parallel to the main text, we insert independent text boxes to give more information or to refer to more detailed sources about the issues discussed. In addition, we attach a list of selected article and book abstracts to the reference section, so that the reader can easily identify readings to learn more about a particular issue.
Chapter 1:
The New Basis for Competition

The business environment has changed considerably along several dimensions, putting heavy pressure on management. Competition is not only stiffer, it is different. Information technology advances have revolutionized the way companies are managed. In this section we will use a framework similar to the one David Nadler presents in *Organizational Architecture* to analyze the new dimensions of competition and the main factors that contribute to the changes in the business environment. (Nadler; 1992) Then we will present what impact technological advances have on managerial practices. In this last presentation, we will use a structure similar to the one Stuart Madnick uses in “The Information Technology Platform.” (Scott Morton; 1991)
1.1. Changing Market
Recent technological advances have dramatically improved transportation and communication, making the world a global village. The resulting shorter distance and time have resulted in several major consequences: a larger but more diversified market, more competitors and a shorter product cycle.

1.1.1. Larger Markets
Larger markets have evolved in two main forms, geographical expansion and growing sophistication. Companies faced the double-edged sword of potentially higher profits but also of an overall more challenging market since markets not only grew as they became global, but customers also demanded more for their money. Companies have had to adapt products to different standards, specifications and preferences across geographical markets.

This market segmentation necessitated a better understanding of each respective domestic market while not losing an overall international "vision." To respond to the demands of a more diverse market, firms have had to increase development costs as well as marketing outlays. The direct consequence of this state of affairs is both more costly and slower response to the market while paradoxically, markets want goods faster and cheaper.

1.1.2. Global Competition
The potentials of global markets have lured more players into all industries. Competition has therefore intensified both on the domestic and international sides. The increasing number of players in any industry have left virtually no monopolies. More importantly, global capacity has increased to the point where industries suffer from overcapacity. Although governments have intervened a number of times to regulate markets, as a whole and in the long term, protectionism is decreasing. Concentrating on domestic strategies is dangerous as both foreign and domestic competition will become important sooner or later in every industry. More competition implies higher costs as well as lower profits. To survive, companies have to consider becoming more efficient on a cost basis and differentiating themselves in the market.

Finally, as the number of competitors and the resulting supply of any product increased, markets became saturated faster and the pace of innovations sped up. Just to keep abreast of innovations and ahead of product cycles, companies have had to pump more resources into development. This increased commitment raised each company's risks substantially to the extent that companies were forced to cooperate more.

1.1.3. Changing Customers
The simple dynamics of supply stripping demand have led to consumers who are more demanding. Consumers have more choices and have changed the supply-based world economy to a demand-driven economy. While two decades ago, companies could just develop, build and then push products through marketing to consumers, they now have
to adapt their organization to satisfy consumer preferences. This effectively ended the age of the mass produced product and gave birth to the age of customization.

Time-based competition and shorter development and manufacturing cycles must not be achieved at the expense of quality. Quite the contrary, companies have to deliver better quality products, cheaper and faster. Today's company is therefore required to be highly flexible, fast and innovative to satisfy consumers.

1.1.4. Changes in Demographics

Structural changes in the composition of the work force has resulted in new challenges for today's firm. The work force is more diverse by culture, education, and training. Different people have different needs, skills, interests and responses to incentives. In short, people are more demanding in the workplace. In addition, traditional work routines do not work anymore.

While much of the work ethos was centered on the sum of individual performances, that approach is not going to be sufficient to tackle the present challenges. Teamwork and combination of skills and talents are necessary. To implement this transition new management techniques as well as new incentive schemes have to be devised.
1.2. New Technologies
Technology has evolved tremendously in the recent decades and has taken over functions that used to be the realm of middle management. The advent of the information age has brought powerful tools to data management, communication and decision-making. Data is not only greater in quantity but also in quality. Adjusting to, adopting and successfully implementing such technologies is probably one of the greatest challenges faced by management today.

1.2.1 Technological Trends
Information technologies have had a strong influence on managerial practices because their capabilities have grown extraordinarily quickly over the last 50 years. The cost/performance ratio of hardware and software systems has steadily grown tenfold every decade for the three last decades. (Scott Morton; 1991)

These impressive developments of IT were supported by fundamental performance improvements in a few basic supporting technologies:

- workstations;
- communication networks;
- databases systems.

1.2.1.1. Workstations
From the card punchers of the 1950's to the multimedia terminals of the 1990's, workstations and user interfaces have improved by an incredible amount. Current terminals offer high definition color monitors and versatile keyboards, with additional devices such as mice, trackballs or screen pens, to ensure a convenient user interface. Embedded intelligence allows users not to care about the details of transactions with the processing unit. Often users do not even have a good sense of where their requests are processed.

In the future, even more sophisticated terminals will become common, with multimedia capabilities. Today, people use a phone, a fax machine and a computer terminal. Tomorrow, multimedia terminals will offer voice, data and image interface to a computer or another user. This will make user-machine interactions more natural and will allow people to use IT applications without any special training.

Miniaturization has led to the development of very light and compact portable terminals. People no longer have to go to the machine, they take the machine with them.

With the wireless technology, not only can users carry their terminal with them, but they can also communicate with other users.
People are now used to being linked to each other by the telephone network, and for many years already, packet switching networks link computers together across borders and continents, and local area networks have allowed the set up of clusters of interconnected computers. All these communication networks are currently experiencing very fast developments. After the advances in fiber optics and microelectronics technology, most of the telecommunications and computer companies have agreed with different stakeholders upon standards which will foster new communications networks improvements. For instance, data transfer speed will increase from 1.5 Mbps to 100 Mbps or even to the Gbps, or the different networks will merge into one global integrated network. (Financial Times; April 20, 1993)
In addition to being faster, communication networks will penetrate more places. Systems are tested which allow people to transfer image and operate multimedia applications on regular phone twisted pairs; wireless technology enables phone or data terminals to communicate without being hooked to a wall plug, and an ambitious project of worldwide total communication coverage is currently being devised: Motorola's Iridium satellite system.

1.2.1.3. Database Systems
Powerful workstations and fast communication would be useless if no data were to be retrieved or transferred. Databases are already the knowledge center of corporations. Customer service, operations scheduling, inventory, and resources management all depend on data stored in computer databases. In addition to capacity and access speed advances, the most important progresses in database systems are the developments of distributed database architectures. These new database management systems will integrate different databases in different locations into one mega database. Each sub-database will retain its "identity" and can be locally maintained but users can access and initiate transactions as if there were actually only one huge database. (IEEE; Dec. 1991)

The combination of Distributed Database Management Systems (DDMS), fast data communication and enhanced workstations offer very powerful technical solutions for companies which want to give their employees access to extensive information on line.

1.2.2. Information Technology and Managerial Practices
There are two major areas where information technologies have a strong impact on companies' management and organizational structure:

- cross-boundaries relationships;
- coordination support systems;

1.2.2.1. Cross-Boundaries Relationships
Organizations (company, department or any sub-entity) regularly interact on a supplier/customer or support/client basis. A plant will order raw material from a supplier, a workshop will order spare parts from a warehouse, a company will request support from a maintenance service company. Each interaction requires specific actions, e.g. to initiate the transaction or to monitor its completion. This has long monopolized many clerks responsible for the paperwork associated with these actions (order forms, request forms, shipment request, etc.).

Today, companies are automating a large part of these inter-organization transactions in order to reduce clerical work, and to improve cycle time and responsiveness. Different organizations set up electronic links so that orders and requests can be generated without any human intervention from end to end. This trend was supported by technical standards such as ANSI's X12 EDI standard (Electronic Data Interchange) which specify common data formats and possible transactions. ANSI adopted a new
standard this year: EDIFACT (Electronic Data Interchange for Administration, Commerce and Transport). This standard is compatible with its European counterpart and will facilitate global communications. (Dunlop; 1993)

Thanks to these electronic links, factories can implement just-in-time manufacturing because automated ordering systems reduce transaction costs and transaction cycle time and make multiple daily orders financially and operationally viable.

Similarly, organizations can set up automatic systems to monitor machinery and generate a request for maintenance or repair when needed.

Basically, these cross-boundaries automated transaction systems allow a company to initiate actions inside another organization, without explicit decision from this other organization. This dramatically modifies the way organizations must think of themselves: when they improve productivity and responsiveness with cross-boundaries automated transaction systems, they also relinquish a part of their decision power, and they let their own boundaries blur. (Malone, Yates; 1987, 1989)

1.2.2.2. Coordination Support Systems
Companies face a much more complex environment than they did twenty years ago. The first parts of this section showed how globalization, time competition, costs of new product development created an extremely difficult environment for management. The need for coordination within and across organizations is imposing very demanding conditions for companies' managers, policies, and organizational structures.

Coordination within and across organizations is increasingly critical. The new environment in which companies operate today forces them to optimize their resource utilization. Successful companies will be the ones which are able to take advantage of more synergies, economies of scale or scope, and which will be able to coordinate all their resources.

Information technologies offer a rising number of tools and systems which can help coordinate activities across large organizations and maximize resource utilization. Communications systems, planning and project management software packages, control and reporting systems are some of the IT tools companies use to reach the level of coordination they need. (Malone; 1992)
Not only does IT help companies, but it already has initiated some structural changes. By offering new communications and control channels, IT has changed the way people manage and work. Some organizations have already tailored their structure to take a maximum advantage of these new IT tools' capabilities. The others will have to understand how to adapt their organization, if they want to remain competitive.
1.3. **New Focus of Companies**

Increased competition has put pressure on firms' profitability and pushed them to search for savings in time and money. More stringent demand for quality and the challenge to stay innovative have created the need to motivate employees and give them an increasing sense of accountability and empowerment.

The basic change from mass produced, standardized product to customized products has made old management tenets such as economies of scale more difficult to achieve. Traditional hierarchical structures were well suited for this original purpose but are ill prepared for modern day needs. Hierarchies are not fitted to handle the triple diversity of markets, customers and work force.

Externally, the global character of the competition has sent companies on a quest for true competitive advantage, not only domestic protections. Hierarchies cannot effectively face the particular challenges posed by different cultures and countries.

Internally, firms have to address diversity within the workplace and be more receptive to the needs of its work force. Hierarchies assume a very homogeneous work force, quite the contrary to the work force of today.

Companies around the world are therefore scurrying to develop alternative models to cope with these new challenges and replace their now obsolete strategies and organizational structures. They have come to a crucial crossroad and have to determine which path to follow in the future.
In this section, we will present what we feel are the key components of the networked corporation as described in the business literature we have reviewed. Although the name "networked corporation" is not mentioned very often, we encountered many different models which share the same set of principles, such as cluster organizations, virtual corporations, or agile manufacturing enterprises. We found that there are seven main recurrent themes that we feel are worth exploring:

- Project driven organization;
- Dynamic organizational structure;
- Empowerment of employees and action teams;
- Availability of resources across the network;
- Leverage of Resources beyond Traditional Organizational Boundaries;
- Interdependence among organizational units;
- New models of leadership and organizational cohesion.

Each of the new organizational models presented in the literature varies slightly in how it implements or emphasizes the principles. The table "Networked Corporation in a Nutshell" lists a few of these models and how their authors define them. Some models also introduce new concepts such as continuous improvement or learning organization. In order to select the seven themes we think are fundamental in the network corporation model, we have used a KJ method, which is especially appropriate to organize and structure qualitative concepts (Shiba, 1991). First, we listed all the themes we had encountered in the literature. Then, we organized and grouped them according to the KJ method. The seven themes mentioned above result from the KJ's final grouping.

All these themes are presented in the literature as possible solutions to most of the problems corporations will face in the future. Reality, of course, is not as wonderful. Although we believe that the networked corporation is a potential good answer to many of the future challenges, we also believe that it is surrounded by pitfalls. The first pitfall would be to believe that the networked corporation is a universal solution. Another one would be to believe that the model is easy to implement. However, it would also be unwise to think that it is impossible to implement or that it does not work for a particular industry.
In this chapter, we will describe and illustrate each of the themes one by one. We will present them as the situation in "the best of all possible worlds." A critical analysis will follow in chapter 3.

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<td>&quot;What will a virtual corporation look like? There is no single answer. To the outside observer, it will appear almost edgeless, with permeable and continuously changing interfaces between company, suppliers, and customers. From inside the firm it will be no less amorphous, with traditional offices, departments, and operating divisions constantly reforming according to need. Job responsibilities will regularly shift, as will lines of authority — even the very definition of employees will change, as some customers and suppliers begin to spend more time in the company than some of the firm's own workers ... Virtual corporations will thrive only in an environment of teamwork, one in which employees, management, customers, suppliers, and government all work together to achieve common goals.&quot; (pp. 6-8)</td>
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<tr>
<td>The Cluster: &quot;A group of people drawn from different disciplines who work together on a semi-permanent basis. The cluster ... handles many administrative functions, thereby divorcing itself from an extensive managerial hierarchy. A cluster develops its own expertise, expresses a strong customer orientation, pushes decision making toward the point of action, shares information broadly, and accepts accountability for ... results.&quot; (pp. 3, 7, 29-36, 42, 53-65)</td>
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Companies are organized in a number of small temporary teams called clusters.

Table 2.1: Networked Corporation in a Nutshell
### Table 2.1: Networked Corporation in a Nutshell (Continued)

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<td>&quot;As a different architecture, the network organization goes beyond its formal structure. Pools of assets, knowledge, and competencies are 'distributed'; that is, they reside in multiple locations. Resources are neither solely concentrated in the center nor distributed to business units. Not all business units play the same role in the organization ('design asymmetry'). In developing new products or marketing strategy, some units lead while others play a supportive role. The interdependence among entities is facilitated as necessary through shared goals, management processes, and common incentives.&quot;...</td>
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<td>&quot;In the network organization, patterns of interaction (flow of information, product, and people) are dynamic and established by need rather than by a rigid plan... Whenever required, direct contact is initiated between individuals and groups who need to work together. The hierarchy is not used as the primary means of communication, coordination, or initiation of action.&quot;</td>
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<td>&quot;The network's wide reach and deep technical knowledge can be deployed rapidly to deal with problems and opportunities, and the results of these efforts, whether success of failure, enhance organizational learning.&quot; (pp. 32,33)</td>
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<th>Tom Peters</th>
<th>Liberation Management, 1992</th>
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<td>A networked corporation consists of &quot;coherent, self-contained, multi-function, fully accountable, self-managed cells/ clusters/teams/'businesses' of 2 to 35 [people] – supported, real-time, by all the organization's (and appropriate outsiders') information and expert resources, on-call as needed; and fully empowered to do whatever it takes to serve/respond to the customer/other members of the value-adding chain.&quot; (p. 71)</td>
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<th>Alvin Toffler</th>
<th>Future Shock, 1970</th>
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<td>The Ad-Hocracies &quot;will be adaptive, rapidly changing temporary systems. Executives and managers ... will function as coordinators between the various transient work teams. They will ... communicate across groups, translating and interpreting the language of one into the language of another. People in the system will be differentiated not ... according to rank and role, but flexibly and ... according to skill and professional training. People will have to learn to develop quick and intense relationships on the job, and learn to bear the loss of more enduring work relationship.&quot; (p. 129)</td>
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"Agile enterprises are totally integrated organizations. Information flows seamlessly among manufacturing, engineering, marketing, purchasing, finance, inventory, sales, and research departments ... Distributed enterprise integration, and distributed operational concurrency, are made possible by strict, universal, data exchange standards, by robust 'groupware.' ... Enterprise integration is also made possible by an atmosphere of mutual responsibility for success, within enterprises and between cooperating enterprises ...

The ultimate expression of trust, given the proprietary attitudes towards information that prevail today, is the routine formation of 'virtual' companies by groups of agile manufacturing enterprises ...

An agile enterprise has the organizational flexibility to adopt for each project the managerial vehicle that will yield the greatest competitive advantage ...

Flexible production technologies and flexible management enable the work force of agile manufacturing enterprises to implement the innovations they generate ...

A knowledgeable work force, expected to display initiative and provided with the means to exercise it, is the single greatest asset of such an enterprise."

(pp. 8-10)

Michael S. Scott Morton

The Corporation of the 1990s, 1991.

"Networks may be the most effective way to design and accomplish many kinds of work, ... For work that can be usefully networked, then, what are the key attributes of the more networked approach? We see seven: 1) shared goals 2) expertise 3) shared work 4) shared decision making, 5) shared timing and issue prioritization 6) shared responsibility, accountability and trust 7) shared recognition and reward."

p. 192

Etienne Charlier, Victor Chu

Networked Corporations, 1993

The networked corporation is a dynamic network of project-oriented and empowered teams that:

- have complete access to the whole organization's resource pool – human resources, expertise, knowledge, information;
- are bound by a strong strategic vision and a collaborative culture;
- are supported by an advanced communication-information network.

Table 2.1: Networked Corporation in a Nutshell (Continued)
2.1. Project Driven Organization

In organizations, individuals are exposed to various internal and external pressures. Individuals pursue needs such as security, recognition, or achievement. Organizations develop sets of rules or cultures to set up an environment where individuals can optimize their behavior. In this process, which is either explicit or implicit, organizations link fulfillment of individual needs with an organizational goal. Some cultures most value a low risk environment and consequently emphasize compliance to rules or procedure and minimize failure risk. Others most value results and consequently emphasize accomplishment of objectives and encourage initiatives.

It is of course impossible to satisfy at the same time low risk and high results. Companies must rank their priorities.

Networked corporations emphasize project achievement and results. Basically, the networked corporation has a bias toward selecting the fastest way to solve a problem, independent of the organizational or technical difficulties to be overcome: everything will be undertaken to get the work done.

In order to develop this culture throughout the whole organization, networked corporations apply three principles:

- full and definite accountability for individual and teams;
- appraisal and incentive systems based on output and not behavior;
- project leadership based on expertise with regard to the project and not on seniority.

2.1.1. Accountability

There is no scapegoat when objectives are not achieved: the person or the team in charge is held accountable for results and is expected and empowered to take all necessary initiatives to lead the project to success. The entire organization resonates the message: if you are in charge, you are in charge.

2.1.2. Output vs. Behavior

Managers have two alternatives to control a group: either they control their employees' work content and monitor deviations from assigned objectives, or they micro-manage employees' work and allocation of time. This is the difference between output control versus behavior control.

In the networked corporation, the focus is on output control. Managers are not really concerned with how their people are working, but they rather control closely how much work has been done, and they remind people of objectives.

Output or result control combined with full and definite accountability arouse people to be creative and to take control of the situation.
2.1.3. **Expertise vs. Seniority**

The best evidence that the networked corporation most values project results is in how it selects project leaders based primarily on skills and relevant expertise rather than seniority or position.

In the networked corporation, as we will discuss later, the organizational structure is dynamic and completely project driven. Members of teams and work groups are foremost selected on their potential contribution to the project. If necessary, leadership will shift from one person to another as the critical issues shift.
2.2. Dynamic Organization

Project driven organization need networked companies to achieve flexibility within the organization. In order to achieve the necessary flexibility, a project driven organization need to adopt a networked structure. The new business environment necessitates an unprecedented level of flexibility and therefore requires a dynamic structure to replace the traditional hierarchical structure.

A dynamic organization foregoes hierarchy in its daily operations to the extent to which such structure impedes the completion of a project. The competitive firm must be highly adaptive to and well interfaced with the market.

In the *Rebirth of the Corporation*, D. Quinn Mills tries to resolve this issue. (Mills; 1991) In Quinn Mills' view, the organizational structure is a function of the needs of its customers. Customers drive strategy which in turn may alter the organizational structure. While some aspects of the company's day to day management (such as payroll, accounting and other ancillary functions) remain centralized, other traditional corporate boundaries are eliminated. The company's professionals are organized in temporary teams to complete tasks at hand rather than in rigid departments.

The key is that employees are assigned to projects according to their competence and abilities rather than to their belonging to any particular organizational unit. This ensures that the best and most competent people are assigned to a team. The resulting organization should therefore be much more flexible and responsive to the needs of its customers.
Quinn Mills' cluster model.

Quinn Mills' organizational structure is simpler than hierarchical structure, involving what he calls clusters, people drawn from different disciplines who work together on a semi-permanent basis. The clusters include:

- the core team (top management)
- business units (direct interface with customers)
- staff units (support for internal clients)
- project teams (temporary task force)
- alliance teams (J.V. with other corporations)
- change teams (internal SWAT team to clean up broad aspects of the firm)

Employees assigned to such clusters, for example a project team, may move to an alliance team once the particular project is completed.

It can be argued that the dynamic organization and the networked corporation is nothing more than a highly decentralized organization. However, beyond the apparent similarities, there are some substantial differences. The decentralized organization attempts to push the decision making process further down in the organization but the base structure remains a rigid hierarchy: it merely displaces the decision making centers to several "mini hierarchies." In addition, the decentralized organization remains structured along functional lines and is not project oriented. Networked corporations are different since they break away from the traditional hierarchical structure by creating new communication and control channels and develop ad-hoc infrastructures for each particular project.

While the dynamic organization concept may seem attractive, it can hardly be effective if other managerial measures such as leadership issues, incentive schemes and empowerment of employees are not taken.
2.3. Empowerment of Employees and Action teams

Traditional organizations have divisions, departments, units and groups, organized according to a rigorous and complicated hierarchy. Each work unit has a specific function and responsibility.

In contrast, the networked corporation is a network of project-oriented, multi-disciplinary and self-managed teams, interconnected by ad hoc formal channels and an informal network created during each member's career. Each work unit (team) is in charge of a specific project and is fully responsible for its completion.

The two most important concepts here are:

- empowered teams;
- project orientation of teams;

2.3.1. The Empowered Team as the Network's Basic Building Block

D. Quinn Mills describes "true empowerment [as] lower-decision making without specific guidance by higher levels." (Mills; 1991) He lists four main factors that ensure that power delegation will not lead to chaos:

- each person must know and understand the mission of the team in which he or she works;
- all the team members, not only the boss, must have the necessary competence to act on their own initiatives;
- people need information in order to make correct choices in local circumstances;
- people need to know that they are trusted.

In the networked corporation, the building block around which everything is organized is a task-oriented, multi-disciplinary, self-managed team, composed of specialists. In other words, the networked corporation designs teams so that they are the most appropriate for empowerment.

2.3.1.1. Understanding the Mission in Task-oriented teams

Structuring around tasks-oriented teams facilitates communication of teams' mission. Task-oriented teams exist only because they have a problem to solve or a mission to accomplish: no purpose, no team. As soon as the problem is solved or the mission completed, the team dissolves and its members move toward other occupations. It is not possible to dissociate team and mission. Thereby, the team members have a clear vision of the team mission. They also know that they will be evaluated upon how well they
achieve their mission's objectives. Therefore, they have strong incentives to continuously seek information to understand these objectives.

2.3.1.2. Securing the Necessary Competencies in Multi-disciplinary teams
Team staffing is done according to the project's needs and not because someone is idle and available. The initial core team (a few managers) uses formal directories or personal relationships to identify potential team members who can bring relevant expertise and skills.

In addition, the initial team is not limited to looking only at people in its direct environment. As we will see in the next sections, resources are available across the entire network, both internal and external to the company. Within the company, when an initial core team is brought together to develop a new consumer electronic product, for example, it will contact marketing specialists and R&D and production engineers to involve them in the action team. Outside the company, the team core will probably contact executives of traditional distribution channels to involve them also, at least in some of the product development phases.

2.3.1.3. Trust and Self-Managed Teams
Most of the administrative and managerial functions (productivity, quality and cost measurement; budget control; work assignment and scheduling; attendance and time recording; and appraisal and promotion, to name a few) are completed by the team itself.

The team is given a mission or project, and is provided with human, material, financial, and information resources. It has collective responsibility for managing these resources and to complete the mission. The team is given trust and is expected in turn to be responsible and accountable.

2.3.2. Action-Oriented Teams vs. Committees
Empowerment and empowered work teams can take many forms once implemented. However, the critical factor which guarantees real empowerment is the fact that teams are action teams and not committees.

Committees are information and discussion centers. They bring together people from several horizons in an effort to diagnose delicate situations, devise possible solutions, weigh pros and cons, and then come up with a consensual set of recommendations. Committees are set up because they are a good communication, discussion and exchange instrument. They are a significant improvement over the parochial attitude of some organizations. They are also a good instrument to transition from a parochial culture.

However, the problem with committees is that members do not always have authority to implement their recommendations. Sometimes they do not even have authority to request information from the source. After an agreement is reached inside the committee, recommendations will be studied and challenged again by the persons who will
implement them. This leads to inefficient use of time since committees are then forced to write very detailed recommendations with an extensive set of supporting data and arguments. In addition, implementors are often not committee members and were not exposed to the same multi-disciplinary environment and discussions as committee members. They therefore do not necessarily understand the rationale behind recommendations, and the risk is high that they will implement the letter rather than the spirit of the recommendations.

The best people to implement the committee's recommendations or to build upon the committee's findings are the committee members themselves.

Action teams have the same attributes as committees. They are multi-disciplinary and bring together representatives of all the stakeholders for a particular issue. However, they are expected not only to devise a set of recommendations but also to solve a problem. Action teams are expected to achieve some project objectives and are fully accountable for results. They have authority to make and implement decisions. They are given some of their resources but are expected to search for more resources throughout the organization, if they need it.

For example, if an action teams is set up to study and design a new product, it will be composed of a few people from marketing, R&D and production. When they need to address market issues, they will "hire" more marketing people for a short period of time. If a market research study is needed, they will decide to hire an external consultant and monitor the study. If they feel field visits at the client are better, they will organize such a visit. When they need to do financial analyses, they will find a person from the finance department and will include him/her into the team for the necessary period of time. The team has authority to make all these decisions; it is also fully accountable for the success of its mission.

Another example is a worker team on a manufacturing factory floor. A team composed of about ten workers – from new recruits to experienced workers – is given specific production quantity, quality and cost objectives. The team members' bonuses are explicitly tied to achievement of these objectives. Workers are allowed to organize themselves as they want: they are responsible for work scheduling, tasks allocation, upstream and downstream quality control. Management makes resources such as quality control advisors accessible to the teams, but it is the team's responsibility to take the initiative to take advantage of these resources. Again the team is allowed to make decision about how to organize the work and how to achieve objectives.
In the networked corporation, when a team sees an opportunity and is convinced it has a high potential for success, they should "just do it." No one will be admonished for unsuccessful new approaches to attempt to reach a goal as long as the goal is finally reached. But every team knows that it will be admonished if goals are not achieved.

Empowered teams are the building block of the network corporation. Teams are empowered, not individuals. When the team makes a decision as a team, it has the explicit right to go and implement it. Teams do not have to refer to higher authority before taking actions. The team is the decision center of the networked corporation.

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**The project team is not a committee:**
- Set goals/deadline for key subsystem tests;
- Keep team members' destiny in the hands of the project leader;
- Aim for full-time assignment to the team;
- Give members authority to commit their functions, and resources from it;
- Allot space so that team members can "live" together;
- Remember the social element (ceremonies for arrivals, milestone celebration, etc.);
- Allow outsiders in;
- Construct self-contained systems;
- Let teams pick their own leaders;
- Let teams spend/approve their own travel, etc.;
- Honor project leadership skills;
- Honor project membership skills;
- Make careers a string of projects.

Tom Peters: *Liberation Management*
2.4. Availability of Resources across the Network

So far we have presented the networked corporation as a dynamic organization, based on multi-disciplinary teams whose staffing is exclusively expertise and skills-based. In such a setting, it is important to get easy access to all the resources teams need. Therefore, there are some important questions to ask. How do they know where to find the right person for a particular project? Who is the most experienced person to give advice on a particular topic?

Two resources are critical: people and information.

With people, we get access to knowledge and expertise, to authority and decision making power. In addition, most of the other financial or material resources are subjected to someone's approval or decision. Thereby, by having access to people, we get access to these resources.

With information, we can make new decisions, take actions and create.

In the networked corporation, these two critical resources are made available across the entire network.

2.4.1. Information

The networked corporation concept is based on free flow of information. One can conceptually visualize it as a huge central database to which anyone has access and from which anyone can retrieve information.

Since more decisions are pushed down to front-line empowered teams, it is crucial that these teams have access to more information than in the traditional organization. As Quinn Mills says: "To make the correct choices in local circumstances people need information: not just local area information of the type they are closest to and to which they have the best access, but information as well about the overall setting in which they're acting." This means that operation, financial, and strategic information must be accessible for all the employees throughout the organization.
Financial information to workers: the case of Tiger Creek.

Tiger Creek is a paper mill of American Product Corporation. In the 1980s, it experienced productivity problems and managers decided to cope with the problem of increasing production costs. Their solution was the Expense Tracking System (ETS) which provided instantaneous fiber, chemical and energy usage information for operational cost optimization to control room operators. These three categories constituted 80% of the total production expenses.

Before the system was installed, operators were requested by engineers to keep production parameters as close as possible to target values. After installation, their mission was to produce paper of constant quality and to minimize production costs. Operators were allowed to modify old target values to achieve lower production costs and were able to track these savings in real time on ETS.

The system was expected to save $200,000 a year, and actually went beyond expectation as the mill saved $240,000 after the first year.

(Bronsema and Zuboff, HBS case)

In the networked corporation, everyone has the fundamental right to get information about the whole company as long as it is of use to the current project’s completion. If a team thinks it needs a piece of information, it has the right to look for it. When it asks the appropriate person for the information, it will get it. This implies a strong culture of transparency in the company.

Teams are fully accountable for their project and thereby are responsible for finding relevant information. In some cases, for instance when the team involves people from outside the organization, the team will set up special information channels. However, the networked corporation must already have deployed an extensive infrastructure (communications and information systems) in order to facilitate information exchange.

This dependence on free flow of information explains a paradox of the networked corporation where decentralized decision centers use centralized information systems. This is the central database analogy we introduced earlier. "The objective of centralization is to foster more and more decentralization" says Tom Peters. (Peters, 1992)

2.4.2. Human resources

One major issue for teams is to identify the right persons and to get them to collaborate with or within the team. Teams are continuously looking for expertise and knowledge: experts to bring into the team first, experts and advisors to help the team later.

Once an organization reaches a certain size, when a problem arises, there is almost always someone who has already encountered a similar situation or has knowledge about the topic. The networked corporation strives to facilitate identification and collaboration of these in-house experts in several ways:

- the corporation develops a supportive culture and individual attitudes;
it allows teams to look for support and collaboration across the entire company and independently of any administrative structure;

- it provides teams and individuals with directories, tools and services which make expertise and knowledge identification and localization easier.

**2.4.2.1. Culture and Attitudes**

As we have already seen, the company's organization is dynamic: that is, it changes with time according to the different projects on hand. People do not belong to an organizational unit in the same sense as in the hierarchical organization: they know they are not tied to one organizational unit forever and will move to other projects where they will work with people from other groups. Similarly they expect others to be ready to work for their project when needed. Basically, the organizational structure is no longer a barrier to collaboration, and anyone is expected and ready to help others in the corporation, by virtue of membership in the corporation.

Therefore, when staffing a project team or looking for some advice or support, networked corporation employees do not only look toward familiar people, but also are ready to approach strangers with relevant competence.

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**The new “Associative Man”**

New organizations require new kinds of people. In the new dynamic and flexible organization, where teams are temporary, individuals will no longer be enslaved to their organizational group. "There will be a reduced commitment to work groups. While skills in human interaction will become important, due to the growing needs for collaboration in complex tasks, there will be a concomitant reduction in group cohesiveness. People will have to learn to develop quick and intense relationships on the job, and learn to bear the loss of more enduring work relationships ...

... The loyalty of the professional man is to his profession and not to the organization that may house him at any given moment ...

... Thus we find the emergence of a new kind of organization man – a man who, despite his many affiliations, remains basically uncommitted to any organization. He is willing to employ his skills and creative energies to solve problems with equipment provided by the organization, and within temporary groups established by it. But he does so only so long as the problems interest him. He is committed to his own career, his own self-fulfillment.”

(Toffler, 1970)

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**2.4.2.2. Accessibility of Resources Independent of Administrative Structure**

We know that networked corporation teams are not committees but action teams. When a team faces a problem it cannot resolve by itself, it tries to identify people in the organization who have relevant experience or knowledge and makes provisions to get his collaboration. In doing this, it is free to look anywhere in the organization, and to
address anyone. When it thinks that someone is appropriate, the team "hires" him/her for a temporary mission such as training, consulting-advising or technical support. This is a direct agreement between the team and the person, and not between their supervising authorities.

In the section about empowerment, we gave an example of this, where a worker team on the plant floor "hires" an advisor to cope with quality problems and control issues. It is the team which perceived the necessity to know more about quality management and which decided to involve a specialist, not the specialist who forced the team to attend seminars and to apply new methodologies.

2.4.2.3 Tools and Services

In order to help teams identify the right person, expertise or knowledge, the networked corporation develops formal systems.

The most straightforward is a directory. The easiest way to identify someone is to have a directory where people's background and expertise are listed. It can take on various forms – from a book to a sophisticated database. The only important thing is that it is regularly updated and that it is easy to use. Directories can list not only people (individuals or groups), but also references or material where one can find relevant information.

**The Knowledge Resource Directory at McKinsey and Co.**

"The Knowledge Resource Directory lists the Firm's experts and resources. It is designed to help us leverage our colleagues' experience and skills, in particular those of us in the Firm's Centers, Sectors and Working Groups."

(Excerpts form the Directory)

McKinsey has set up a series of knowledge and expertise clusters or study groups, composed of consultants who have a particular interest or experience in one field. About 50 such groups exist and their members meet regularly to discuss relevant issues. They are in charge of knowing who is whom and who has what expertise in the field, as well as monitoring the latest trends. Their names and references are listed in the directory, and any member of the firm can call them to seek advice.

(McKinsey, 1991)

When a team has a question about any topic, it refers to the directory which lists gatekeepers as well as references and introductory material. The team then can learn more about the topic and contact the gatekeeper whose responsibility is to know who is who and who does what in the field.

The networked corporation can also set up a pool of resource management experts who will work in support of other teams and will provide service to them. They follow people's career and interests and play the role of a "broker" between teams looking for expertise and people offering expertise.
British Petroleum Engineering, Inc’s Engineer Resources unit.
BPE is an engineering department in BP corporate. Facing productivity problems in the 1980s, the department restructured to adopt a structure close to the networked corporation concept. In order to help empowered engineer teams find the right people to staff their teams, BPE set up a central support unit which follows every engineer’s career, experience and aspiration, and is able to advise project teams. This Engineer Resources unit functions in support mode, that is they do not have any authority over project teams to assign someone to a project. However, they ensure that the right person finds the right place on the right project.
(A more detailed discussion of this case is proposed in Chapter 3: Analysis of the Networked Corporation Model)
(Mills; 1991)

For the networked corporation to be able to work this way, individuals and teams must have access to very efficient communications systems. This includes an extensive internal phone system, voice-mail, and e-mail. For large companies, more sophisticated systems such as video-conferencing, electronic bulletin boards, and multimedia communications systems may be needed.

These technologies help in two ways: first they release both the space and time constraint in communicating; second they offer enhanced communications channels.
2.5. Leverage of Resources beyond Traditional Organizational Boundaries

The traditional firm is increasingly unable to compete effectively in both time to market and quality, having to choose to sacrifice one at the expense of the other. This state of affairs results from the exponential improvement in technologies, particularly in the telecommunication area. In *The Virtual Corporation*, William Davidow and Michael Malone try to argue that hierarchies were the firm's information system and became obsolete with the advent of information technologies. (Davidow and Malone; 1992) New technological developments not only improved the speed but also the scope of information available to a firm's decision maker. The increased speed of information flows also caused shrinking product cycles in most industries, creating logistical problems. In short, it became clear that single firms did not have enough resources by themselves to compete effectively.

In recent years, firms have faced two major problems: time to access any given resource and cost to obtain such a resource. In the first case, the firm has the resource in-house but the urgency to bring a new product to market makes it unproductive for the firm to develop it in-house. In the second case, the firm's main challenge is to muster the quantity of monetary or human resources necessary to achieve its goal.

A few examples should help to illustrate our point. Apple Computer's strategy to bring its Powerbook 100 notebook computer to market was to cooperate with Sony and a number of other firms. Sony provided its manufacturing and miniaturization know-how while Apple secured the design and technology end of the deal.

NUMMI is an example of the second case where two firms, GM and Toyota teamed up together to share the technologies and pool the R&D costs of designing automobiles.

The Airbus consortium is an example of both cases. Time and responsiveness to market as well as huge development costs constituted the core challenges to the venture. By effectively coordinating efforts and pooling resources, Airbus was able to enter a very competitive market successfully.

Russell Johnston and Paul Lawrence refer to this model as Value Adding Partnership (VAP). (Johnston and Lawrence; 1988) The VAP is a mutually beneficial arrangement between two firms to cooperate on a specific project while remaining competitors for other areas. This pooling of resources benefits both partners as each brings his expertise. The dynamic organization, in Johnston and Lawrence's view, is a firm that sees its own limits and successfully seeks resources beyond these limits and if need be outside the firm.
2.6. **Interdependence between Organizational Units**

A successful networked company must be able to move away from the traditional organizational structure. However, the first objection that comes to mind is that such an organization is not an organization any longer! The networked corporation circumvents the lack of formal structure by establishing a set of informal ties between different units and individuals within the firm. Through its incentive system and focus on projects rather than organizational functions, the firm manages to achieve higher productivity.

With the advent of new telecommunication technologies, companies benefit from more efficient and faster data collection so that more information is available faster. However, on the flip side, as information flows increase, the efficiency in information processing decreases. Companies now find themselves overwhelmed with relevant as well as irrelevant information. The challenge they face is to direct and redirect relevant information while discarding the rest so as not to slow down the decision making process.

With new technologies and more demanding markets, products are becoming increasingly complex, necessitating the cooperation of teams to solve problems. Multi-functional teams are needed to develop increasingly sophisticated and customized products as well as to respond to more challenging customers.

Single, individual teams are not able to face such a challenge any longer. Companies need to create an environment that allows cooperation but still stimulates team motivation. Unfortunately, the challenge is that a cooperative agreement often lessens motivation while a competitive environment lessens cooperation. To achieve such a decentralized model therefore necessitates one essential component: enlightened leadership.
2.7. New Model of Leadership and Organizational Cohesion

While it attempts to do away with traditional hierarchy, the networked corporation still needs some form of leadership (albeit modified) to pull the system together. Traditionally, the CEO is viewed as the "hero" in the firm: he represents the firm and in certain cases is the firm. In the concept of the network, the leader still plays a central role but instead of being the firm's only center of decision making, he is seen rather as a rallying point.

In a move toward this direction, Nadler refers to the leader as an organizational architect, a master builder. (Nadler; 1992) The CEO becomes a guide, a project supervisor. His role goes beyond leading and involves two key responsibilities/attitudes:

- pulling together all possible resources, whether internal or external to the firm, to complete a project by being a facilitator;
- formulating and communicating a clear vision throughout the firm.

In achieving these goals, the leader effectively makes his vision a shared goal within the organization and at the same time optimizes the use of resources.

The networked corporation is by no means an anarchy. While it is loosely controlled, the networked corporation is an organization whose entities and components are in certain ways even more closely linked than in a traditional hierarchical organization.

In his article Balancing Corporate Power, Charles Hand compares the networked corporation to a federal system. (Hand; 1992) The traditional executive team is the "central federal government" while the operating units are "states." It is clear from this analogy that the resulting structure departs from the more conventional hierarchy which Hand refers to as a monarchy with one supreme central decision maker. The federal system delegates much of the power to operating units. While certain policies and major strategies as well as benchmarks are decided on the top, much of the implementation strategies and processes are left to the discretion of operational decision making centers. Xerox is probably a good example of this new type of management. (Howard; 1992)

Xerox's comeback in the late 80s is a classical example where CEO Paul Allaire released certain managerial decisions and pushed them further down in his organization. Teams were organized to implement basic objectives and the company's vision, in this case to regain the initiative over Canon in copiers.

To do so, Paul Allaire drastically changed his organization. He transformed the company's structure by just issuing guidance and objectives, leaving all implementation issues to his staff. This empowerment and clear objectives in effect allowed front-line employees, the most knowledgeable and closest to customers, to take the initiative to develop tactics. Encouraged to act upon their tactics, employees formed multi-functional teams to accomplish their tasks. It is important to note, however, that Paul Allaire did set up a framework in the form of an incentive system so that he could retain control of the company. The incentive system was an instrument used to control at a
distance and motivate employees to collaborate in reaching particularly difficult objectives. We will come back to this crucial issues of incentives systems in Chapter 4.

This type of leadership has the obvious advantage of allowing faster and wider acceptance of corporate policies as all implementation issues become the responsibility of front-line staff. In addition, it considerably alleviates the burden on top management.

Volvo is probably a good illustration of this system. (Mills; 1991) The auto maker has adopted such a system in handling its production lines. Plant staff is organized in teams with the duty to produce cars. Process issues, materials requirements, work hours, organization of shifts and so on are left for each team to decide. Top management merely issues general guidelines and benchmarks for minimum volume, quality and other product specifications.

The Volvo system therefore requires total involvement of its production line staff. This encourages employees to feel accountable and to work in teams. It also facilitates communication between team members and top management. This empowerment allows employees to increasingly take initiative to secure productivity gains. New production technologies are more easily implemented as employees are involved in selecting such technology and participate in decision making. In addition, less training is required as employees are aware of such technologies from earlier in the process.

While leadership is crucial to implement such a system, it cannot act alone if a carefully tailored incentive system is not in place. We will discuss implementation issues in the last section.
2.8. Conclusion
It clearly follows that the networked corporation is a step beyond merely restructuring the organization. Rather, it is a destruction of traditional hierarchies and a move towards a more dynamic organization. The destruction of hierarchy implies the necessity to find a system that can adequately replace it. This system must involve all factors discussed above.

Clearly, most CEOs would agree that all the factors mentioned above are key to the success of a networked corporation and most of these managerial techniques already exist in one form or another. However, few, if any, firms have successfully integrated all these components into their organizations.

The main difficulty in implementing this system in its entirety resides in the fact that there exist fundamental contradictions between some of these components. One central concern of executives is how to maintain control in such a decentralized organization while empowering employees, outsourcing sensitive key technologies and/or cooperating with outsiders.

The problem therefore lies in resolving some of these contradictions to form a coherent, manageable structure and organization. The crucial point here is that it is impossible to create a coherent system as long as all the components are not in place. Empowerment without an extensive information system and a new kind leadership will generate internal frictions and contradictions.

We will try to address this central issue in the next section.
In this section we will discuss the structure of our concept of networked corporations and demonstrate the following main points:

1) There is no absolute, generic model or structure that is applicable across industries and firms.

2) The networked corporation does add value and is different from existing models in its structure and scope.

3) There is a networked corporation model for any size company or any industry.

4) Hierarchies may still have some uses, and some companies may use a hybrid of networked and hierarchical structure for different functions.
3.1. The Value Added of Networked Corporations

The major themes associated with the concept of networked corporations do not seem to be fundamentally new. Empowerment, boundary independent resources, availability of resources across the network, dynamic organization, and project oriented organization sound familiar and similar to other new managerial practices such as empowerment, horizontal communication, flat organization, or strategic alliances.

Galbraith already describes how an uncertain environment overloads the communications channels in a traditional hierarchical organization. (Galbraith; 1973) Problems arise because when uncertainty increases, hierarchical channels are solicited more and more often, and are gradually overloaded.

Galbraith proposes two strategies to overcome this problem:

- increase the capacity to process information,

  and/or

- reduce the need for information processing.

Increasing the capacity to process information consists of developing sophisticated vertical information systems and fostering horizontal information. Reducing the need for information processing consists of securing some slack resources and empowering front line people.

In *Designing Complex Organizations*, Galbraith describes why organizations have adopted a hierarchical structure. The complex tasks companies have to perform requires work division and coordination. Organizations can adopt several approach to ensure coordination. They can set up rules, programs, and procedures where all possible situations are considered. The problem is that it is practically impossible to think of everything. To overcome this situation, organizations have designed hierarchies. A hierarchical organization sets rules and procedures so that the lower layers can handle expected situations and upper hierarchical layers are involved whenever unexpected situations occur. This is the principle of management by exception.

Unfortunately, problems arise when uncertainty increases, because hierarchical channels are solicited more and more often, and end up being overloaded.

Galbraith proposes two strategies to cope with this: increase the capacity to process information and/or reduce the need for information processing. Increasing the capacity to process information consists of developing sophisticated vertical information systems and fostering horizontal information. Reducing the need for information processing consists of securing some slack resources and empowering front line people.

J. Galbraith, *Designing complex organizations*, Ch. 2-5
Other academics and practitioners have come to similar conclusions and have identified solutions which are similar to the networked corporation principles. However, organizations which try to implement these new practices are not networked corporations per se. For instance, neither an organization that fosters horizontal communication nor an organization which empowers its employees is a networked corporation.

The networked corporation concept is more than the sum of its components. The most important is how the components support each other and how they form a coherent system. It is possible to implement empowerment or any of the networked corporation managerial practices in a traditional hierarchical company. However, this creates fundamental internal contradictions which undermine the benefits of the new practices introduction.

The next section illustrates how new business practices create internal tensions in traditional organizations and thereby do not help to resolve the problems they are supposed to overcome.

3.1.1. The Shortcomings of Going Halfway

3.1.1.1. Horizontal Communication in a Functional Organization.
In functional organizations, each department is very good at doing what it has to do, but the whole organization experiences some typical problems such as:

- bad inter-departmental communication;
- lack of system approach;
- tendency to develop parochial cultures and locally optimal solutions.

In an attempt to overcome these problems, functional companies try to foster communication among employees. They create multi-disciplinary committees, cross-divisional strategic teams, and rotational programs and facilitate communication both within and across departments. Essentially they develop a communications system which fosters collaboration and a system approach.

However, it does not solve all the problems. Multi-disciplinary committees are good at devising recommendations but often do not have either the authority or the resources to implement them. Action is still confined within the traditional boundaries of departments and subjected to approval by department senior executives.

This leads to frustration, demotivation and inefficiencies when people know what can be done, but cannot make it happen. There is an internal contradiction between the flow of new available information and the lack of authority to take the actions implied by that information.
3.1.1.2. IBM an Under-Used Communication Network.

IBM has an extensive communication network linking all its employees worldwide. It is a technically remarkable system, using advanced telecommunication technology, satellite communications, and sophisticated computer systems. However, while the firm networked its employees by putting terminals on almost everyone’s desk, it had not altered its basic organizational structure. IBM staff has kept its old ways, and the new technologies did not improve the company’s responsiveness.

Employees could gather data quickly and communicate with each other easily, but they were not empowered to act upon the information and therefore were unable to raise productivity. This increased inflow of information created a paralysis of the company's hierarchy. This internal bottleneck led the staff to concentrate on internal problems. The resulting red tape gave them less time to address external challenges. This process of excessive introspection referred to as "groupthink" by psychologists can lead decision makers and the whole organization to set unrealistic goals and objectives — ultimately leading to both self delusion and ineffective decision making.

It is interesting to notice that IBM's newly decentralized PC division is again coming into the black. (Business Week; May 3, 1993) Freed from IBM Corporate's detailed guidelines, and empowered to regain a strong position in the highly competitive PC market, it is now able to be more responsive and to devise more appropriate strategies. At the same time, the PC division keeps the advantage of the physical communication network, which allows its employees and executives to keep in close touch with others in the company. If IBM further develops this operations decentralization and empowerment while maintaining the communication network and promoting its use, then it has a serious opportunity to transform into a networked corporation.
3.1.1.3. Empowerment in a Traditional Organization
Quinn Mills does not believe that implementing true empowerment is realistic in a traditional organization: "'Empowered' people, free from bureaucratic restraints, will act quickly at the customer's behest. But achieving such liberation of people from the system has proven very difficult in traditional organizations."
(Mills; 1991)

In the traditional hierarchical organization, when front-line employees face a situation they have never encountered and which does not qualify for any known procedure, they refer to the upper management. This attitude destroys any sense of initiative in the organization.

Quinn Mills supports his statement as follows:

"The danger of empowerment was that each person would do his or her own thing, and all would be chaos. What would happen to direction if each person felt free to substitute his or her judgment for corporate directives?

Yet people in the field were closer to the scene of action and often had knowledge of specific situations which was better than that at headquarters. Also, waiting for directions and clarifications from corporate was often a slow process that caused opportunities to slip away ...

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IBM PC Division's Comeback
In the early 80s, IBM controlled 75% of the corporate market for PCs. By 1992, its market share fell to 16.4%. and the company posted a $5 billion loss; the same year, IBM freed its PC division. In 1993, the company brings to market scores of badly-needed new products (including Value Point and ThinkPad), shores up its market share from 10.9% to 14.9%, and regains some of its innovative power. Previously disgruntled customers are elated and the PC division makes a profit.

What happened?
Pre-decentralization, new products took three years to develop, price changes took six months to be decided at headquarters, and resources and decision making were the exclusive monopoly of bureaucrats in Armonk, N.Y. Post-decentralization, the PC division has regained managerial discretion, the company has moved away from functional structure to five brand teams comprising the division's five main product lines. Each team now controls all aspects of its brand: development, manufacturing, pricing and marketing. Products are rolling out to market in only three months. Overall, the division is more open-minded and "is shedding the not-invented-here syndrome".

Considering the recent performance of the PC division, IBM's decentralization strategy is paying off. Says one customer: "This is a much more market-savvy group."
(C. Arnst; 1993)
In the past firms had answered this question by establishing careful procedures ... Unfortunately, procedures had grown so elaborate that they were both unduly time-consuming and so complex that they were unclear. A person in the field, anxious to avoid mistake that could cripple his or her career, asked for guidance from headquarters about the procedure. The result was paralysis.

True empowerment meant lower-level decision making without specific guidance by higher levels. ...

To make the correct choices in local circumstances people need information — not just local area information of the type they are closest to and to which they have the best access, but information as well about the overall setting in which they're acting ... Traditional hierarchical methods deny them needed information (so that people must operate in the dark about the context of their activities) or require them to go up and down a chain of command to get information. This process is usually too slow and too fraught with potential for misunderstanding to be effective."

Organizational Paralysis: An Extreme Case.
Tom Peters mentions an unfortunately true story. He cites Mike Walsh, CEO of Union Pacific Railroad: "I went down to the Jenks Shop, a big locomotive repair operation in Arkansas. Two weeks before, I had written a memorandum telling everybody I was coming, asking them to submit questions in writing so I'd know what was on their minds. When I got there, I noticed a piece of paper on the bulletin board, dated the day before, telling people I was coming. I asked, 'What happened?' Well, even though it came directly from me, the manager of the shop didn't feel he had authority to act on it ... First he sent it up to the general manager in Texas. That guy sent it back — noting that ... it was really a matter for the mechanical department to decide. So the shop boss sent it back to Omaha, to the head of the mechanical department. After it sat in his office for a couple of days, he okayed it and sent it back to the shop. In the meantime, nothing happened." (Peters; 1992)

Again, new business practices applied in an organization whose principles have not changed generate internal conflicts and inconsistencies.

3.1.1.4. Saturn vs. Other GM Divisions
The Saturn division of GM is a case of an experiment with new business practices within a highly hierarchical corporation where communication and culture transfers do not seem to work well. Two different cultures exist in the automobile behemoth: while Saturn enjoys great flexibility, employee empowerment, and involvement, the other GM divisions remain hierarchical. Saturn has successfully applied manufacturing techniques such as JIT, while its sister divisions have failed to implement similar techniques.

On a stand-alone basis, Saturn is largely considered a success. However, on the corporate level, it has caused many problems. The Saturn experience has caused GM's different divisions to become very competitive with each other rather than cooperative. Saturn's innovations has not been successfully transferred to other GM divisions. Rather than promoting a comprehensive change policy that would allow the other
divisions to attain Saturn's performance, GM has created jealousy among the other divisions. Saturn has, in effect, created very sensitive internal tensions.
3.2. Structure of Networked Corporations

All organizations need some sort of structure to operate. While hierarchies are "low tech" structures, networked corporations are "high tech." We will examine two issues below:

1) Why does any organization need a structure?
2) How is the networked corporation structured?

3.2.1. Purpose of Organizational Structures

Why do companies want to structure? Galbraith explains that organizations have adopted a hierarchical structure in order to ensure and control the necessary coordination between the numerous parts of the organization when operations become complex. (Galbraith; 1973) Michael Schrage highlights the importance of collaboration in problem solving. Organizations also structure in order to let the right people collaborate to achieve a common objective. (Schrage; 1990)

However, these concepts of collaboration and coordination are very general. We might want to disaggregate them a little. Let us ask the question again: why do organizations need any structure?

We can answer, non-exhaustively, that they do structure in order to:

- identify the right resources and allocate them to the right place;
- locate the right expertise and knowledge when needed;
- find the right piece of data and information when an organization member needs it;
- develop and update expertise and knowledge;
- make the right decision and ensure an arbitration role when needed;
- build and support the cohesion of the organization;
- analyze the environment and devise the organization’s common goals and strategies.

In order to perform all these functions, organizations need coordination and collaboration. However, there is no reason to believe that the right structure to foster good coordination when searching for information will also be optimal when allocating resources. And yet, most of the organizations try to optimize a unique model to perform all these functions.

Hierarchy has traditionally taken on many simultaneous roles: information channel, decision making organ, resource identification and allocation center, and core of the organization's strategy. As a matter of fact, hierarchy has long been the only possible
solution to structure. But today, as David Nadler says: "... the role of hierarchy as the principal means to coordinate, control and facilitate communication is dramatically impacted by the capabilities of information technology." (Nadler; 1992) Nadler summarizes the major influence of IT on organizations in the three following tables:

<table>
<thead>
<tr>
<th>Communication Capabilities of Information Technology</th>
<th>Organizational Design Benefits of Enhanced Communications</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Go anywhere&quot; e-mail, facsimile, and data interchange</td>
<td>Organizational functioning independent of time and distance</td>
</tr>
<tr>
<td>Desktop video teleconferencing</td>
<td>Greater dissemination of information and expertise, particularly to people located remotely</td>
</tr>
<tr>
<td>Voice and video annotated document and electronic mail</td>
<td>Creation of ad hoc group and organizations tied together electronically</td>
</tr>
<tr>
<td>Joint authoring and other &quot;groupware&quot; applications</td>
<td>Enhancement of collaboration, in physical proximity and at a distance</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Linkage Capabilities of Information Technology</th>
<th>Organizational Design Benefits of Enhanced Linkage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Across organizational boundaries with customers and suppliers</td>
<td>Business processes that reach directly into customers' or suppliers' value chain; integration possible at the industry as well as at the company level</td>
</tr>
<tr>
<td>Across function, such as between sales and manufacturing</td>
<td>Business processes that integrate company's value chain more effectively</td>
</tr>
<tr>
<td>Within individual functions, teams, and so on</td>
<td>Enabling of parallel processes and facilitation of reciprocal interdependencies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Knowledge Enhancement Capabilities of Information Technology</th>
<th>Organizational Design Benefits of Knowledge Enhancement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codification of technical knowledge and subject matter expertise</td>
<td>&quot;Smart&quot; transaction processing systems with higher levels of automation</td>
</tr>
<tr>
<td>Representation of knowledge of &quot;how things work&quot; to facilitate use</td>
<td>Less reliance on human expertise to solve problems and operate complex systems</td>
</tr>
<tr>
<td>Creation of &quot;smart tools,&quot; software &quot;agents,&quot; and &quot;knowbots&quot; that accomplish communication, computing, and administrative tasks previously requiring human intervention</td>
<td>Reduction of training costs when systems are redesigned and enhanced</td>
</tr>
<tr>
<td></td>
<td>More efficient extraction of information from complex networked data bases</td>
</tr>
</tbody>
</table>

Table 3.1: IT and Organizational Design  
(From: David Nadler, "Organizational Architecture")
3.2.2. The Networked Corporation

The networked corporation model tries to uncouple the organizational structure for each of the functions the company has to perform. For this purpose, it builds a specific network for each of them. Information no longer has to follow the same channels as decisions, resource are no longer available through the same channels as goals and objectives.

Engineers characterize communication networks by their connectivity, bandwidth and protocol. Similarly we can say that for each function, the networked corporation has a specific network with its own connectivity, bandwidth and protocol.

<table>
<thead>
<tr>
<th>Connectivity</th>
<th>how people are connected, that is who is in relation with whom and in which mode. (permanent-temporary-on request)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth</td>
<td>how much information the channel can handle</td>
</tr>
<tr>
<td>Protocol</td>
<td>convention and procedures to ensure good interactions</td>
</tr>
</tbody>
</table>

**The Telephone Analogy**

We want to use another technical analogy to illustrates the difference between a hierarchy — a low tech organization — and a networked corporation: the telephone system.

The traditional telephone network has fixed terminations linked to complex switches by means of fixed and buried twisted pairs. When one wants to contact someone, one has to know the location and the number of that location. When that person moves or is traveling, one has to know the new locations and their respective numbers.

A wireless system such as the future pan-European GSM will connect two subscribers from any place to any other place, as long as one of them knows the personal number of the other. There is no need to know where he is located. The system is designed to transfer voice independently of location. The "phone function" is uncoupled from other functions such as the "travel function" or the "residence function."
We think that we can capture most of the functions performed by the classical hierarchy in the following list:

- Strategy and common goals management;
- Missions and project assignments;
- Resource management;
- Knowledge management;
- Information flows;
- Administrative tasks.

Each of these functions have particular requirements in terms of connectivity, bandwidth and protocol, to use the technical terminology. For instance, administrative tasks such as salary disbursement are subjected much less to uncertainties than is strategic management. The "administrative network" can be organized on a permanent basis with steady procedures (stable connectivity and simple protocols). The necessary capacity is well known and the work load patterns are regular (deterministic bandwidth). The "strategic network" requires much more flexibility. It has to reach a larger number of diverse people on a temporary basis (dynamic connectivity), to handle a wide range of issues with unexpected outcomes (versatile protocols and wide bandwidth).

One possible network configuration is given in the following table:

<table>
<thead>
<tr>
<th>Function</th>
<th>Organizational Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy and common goals management</td>
<td>Core team</td>
</tr>
<tr>
<td>Missions and project assignments</td>
<td>Dynamic network</td>
</tr>
<tr>
<td>Resource management</td>
<td>Support mode, database concept, gatekeeper</td>
</tr>
<tr>
<td>Knowledge management</td>
<td>Support mode, database concept, gatekeeper</td>
</tr>
<tr>
<td>Information flows</td>
<td>Infrastructure, physical network</td>
</tr>
<tr>
<td>Administrative tasks</td>
<td>Support mode/Outsource</td>
</tr>
</tbody>
</table>

*Table 3.2: An Example of a Network Configuration*

Top management is organized as a network and devises overall strategies in conjunction with feedback provided by operational units. These operational units are themselves organized as networks and are in charge of the implementation of strategies. Together these two networks form the nucleus of the networked corporation. Other units are support and can be outsourced if necessary. Such a system can only work if the proper
resources and knowledge management can be successfully implemented around smooth information flows between the different networks.

In sum, traditional corporations used hierarchies for several reasons. As most authors agree, hierarchies served as the main communication channel of the firm. Front-line employees relayed information to top management which in turn sent instructions, policies and strategies back down. At the same time, hierarchies provided management with an instrument of control over the organization and facilitated allocation of resources within the enterprise. However, with new technologies, hierarchies and some tasks of middle management could be replaced by machines at a lower cost and higher efficiency. Traditional communication channels were unable to process and/or transmit the huge amounts of information that were becoming available to the corporation. In short, hierarchies had lost their usefulness as communication tools and could give way to new structures.

It can therefore be argued that all managerial issues do not necessarily have to be handled using only one structure. Rather, networked corporations will adopt different structures for different functions. Thus communication does not need to use traditional hierarchies and can adopt a more flexible structure. Networked corporations have a virtual structure that changes depending on the needs of the moment and/or the task to be completed.

<table>
<thead>
<tr>
<th>Function</th>
<th>Structure</th>
<th>Type of Task</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative</td>
<td>Hierarchy</td>
<td>Routine</td>
<td>Efficient and standardized</td>
</tr>
<tr>
<td>Strategy</td>
<td>Semi permanent personal</td>
<td>Volatile</td>
<td>Long term vision, Objective setting</td>
</tr>
<tr>
<td></td>
<td>network of executives and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>key operation personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td>Networked based on needs</td>
<td>Volatile</td>
<td>Fast completion of projects with most</td>
</tr>
<tr>
<td></td>
<td>of project</td>
<td></td>
<td>competent personnel</td>
</tr>
<tr>
<td></td>
<td>(including development,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>marketing and production)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Table 3.3: Different Model for Different Functions (E. Charlier and V. Chu)*

The following figures show how a networked organization can be composed of a series of entities, each organized to maximize efficiency. In contrast, in a hierarchical organization, all the functions are represented in each branch of the organization.
Tasks that are highly routine can follow a hierarchical system while functions that require flexibility will be networked. The level of networking will depend on the time response needed and the relative volatility of the task to perform. Routine tasks requiring hierarchies can alternatively be outsourced as well.
3.2.2.1. **The Communication Network Model as the Central Nervous System**

While communication used to be carried through the hierarchy in a linear, vertical fashion, allowing some degree of vertical communication in certain cases, much of the communication followed a rigid organizational chart.

The networked corporation needs a faster and more efficient system, one that we compare to the central nervous system. In a central nervous system no single unit holds a monopoly on information. It is, rather, a network of neurons where no one has precedence over another. Information is transmitted throughout the network without regard to positions and titles. It is diffused throughout the organization until it reaches someone who finds it useful.

Such a system has the benefit of keeping everyone informed and eliminates the problem of information bottleneck. In addition, the information is improved as it passes through the network, since people add feedback.

3.2.2.2. **Strategy Formulation and the Puzzle Analogy**

When we refer to hierarchies, we encompass any structure that has a permanent character whether it be horizontal or vertical. The networked corporation is a step beyond these traditional solutions even if they use novel management practices such as empowerment, horizontal communication and the like. Networked corporations are entities that have no permanent structures.

Tom Peters refers to the networked corporation as a kaleidoscope, having the same components but with an ever changing structure. (Peters; 1992) The position of the different pieces (i.e. corporate units or outside partners) depends on the image (i.e. project) that the company wants to create.

Nadler's model compares the CEO to a master builder who brings together and coordinates resources to achieve a particular objective. (Nadler; 1992) This model can be easily extrapolated to describe an entire firm within a network of firms. One of the firms becomes a master builder while the others are basically contractors.

These models fail to provide a clear answer to the question of the long term viability of a networked structure as well as the inconvenience of adopting such a structure. The essential tradeoff involved in a networked structure is that firms give up a certain degree of control in favor of flexibility. Internally, empowerment of employees if not properly carried out can lead to total managerial anarchy, while externally, some alliances can result in the loss of key technologies to competitors.

Firms that adopt this model therefore face two contingencies. Internally, they must avoid loss of focus and anarchy among employees. Externally, they must prevent their erstwhile partners from integrating in such a way that they would engulf their business. In short, the company could lose not only its competitive edge but also its very identity, thereby becoming an empty shell.
To respond to the problem of control and long term competitiveness, we have developed the "Puzzle Analogy." In our analogy, we liken each piece of the puzzle to a distinct, sustainable core competency or asset. The core competency can be any specialization or field that other firms need but cannot emulate. The key to staying competitive is to keep control of a core competency or asset — to retain control of a puzzle piece. The whole puzzle can be viewed as a project where each participant in a project brings a piece to the puzzle until it forms the final image.

In formulating long term strategy and identifying needed resources to complete a project, the firm must select the image it wants to draw. Then, it decides which part of this image will stay in-house (determining the piece of the puzzle that the firm has opted to develop and keep for itself), and which part will be outsourced. If the choice is made wisely, the firm will retain a competitive advantage.
3.3. Where to Build Networked Corporations?

3.3.1 Are Networked Corporations Dependent upon Firm Size?

We have presented the networked corporation as a network of action oriented empowered teams which are fully accountable for the results of the project they are assigned and which have access to resources, information and skills across the entire corporate. This is a general description, but does suggest how to build a networked corporation.

The question is whether this model is applicable for an organization of any size. Can a 250,000-person corporation implement a network-like organization in the same way a 50-employee firm could? Does hierarchy disappear entirely? Which parts of a large company should be "networked" first, and which part are less critical?

The business literature does not really address these issues. The problem is that while the hierarchical organizational model is easy to characterize, the flexibility and versatility of the networked corporation allows an extremely wide range of implementation.

In order to address this issue of how the size of the overall organization influences the way the network is implemented, we will describe three examples: the first is an organization at the corporate level; the second is at the business unit level; and the last is an hypothetical case at the plant level. None of these cases are perfect illustrations of networked corporations. However, they feature certain principles which characterize networked corporations.

3.3.1.1. Corporate Level Organization in the Case of ABB

Asea Brown Boveri (ABB) is an international corporation with revenues of more then $25 billion, employing about 215,000 persons in 140 countries. ABB's major activities are in power plant construction, power equipment manufacturing and transportation equipment manufacturing. ABB's CEO, Percy Barnevik, has turned around the entire corporation and transformed it into a new type of organization which still surprises many by its boldness and novelty. (Peters; 1992) (Taylor; 1991)

The corporation is split into eight business segments covering cohesive activities such as Power Plants, Power Transmission, Transportation, or Financial Services. The next level in the organization consists of 65 business areas. Then come 1,300 incorporated companies and 5,000 profit centers. With 215,000 employees, it allocates an average of 40 to 50 people to each profit center.

ABB's "pyramid" is not very tall. It consist of the following:

- a 13-member executive committee at Zurich;
- 250 senior executives including 100 country managers and the 65 business area managers;
• 5000 profit center chiefs.

Each profit center is managed by a 5-member team with a profit center chief. It has its own income statement and balance sheet. Profit centers are related to a country manager and a business area chief. (See figure 3.3) It looks like a matrix organization, but it is more than that.
First, unlike in many matrix organizations, profit center managers do not refer to two different bosses: they are the bosses. Profit center managers are in charge of their center,
and they are fully accountable for results. Business Area executives are not their supervisors, nor are country managers.

Second, entities which look like hierarchical units (Country Management teams and Business Area teams) have no infrastructure. Business Area teams have no more than 10 to 15 people. When they need more people to perform a specific study, they bring specialists from the profit centers into temporary projects. This logic is applied throughout the corporation, and only 200 persons work in Zurich’s headquarters.

Profit Center managers are accountable for their center's results. Business Area managers are accountable for the overall strategy of their area and for meeting agreed-upon budgets. Yet, Business Area managers do not have authority over Profit Center managers. They have to play an evangelist role and convince Profit Center managers to buy into their recommendations. Their principal activity consists of visiting the local operations of their business area and foster discussion, transferring of technology and managerial practices, and promoting strategic thinking between local profit centers.

All the "staff" teams have very limited resources: teams are small, and they do not have much infrastructure. Thereby, headquarters and Business Area teams are completely dependent on local Profit Centers for their mission's accomplishment. It ensures that decisions are effectively pushed down to the lowest level, at the Profit Center level.

How does a Business Area manager get his job done? Whenever a particular issue, such as production method improvement or product development, is to be analyzed or whenever common decisions have to be made, the Business Area manager sets up a temporary action team composed of people from Profit Centers, Country Management teams, and sometimes even from other Business Areas' Profit Centers.

In a traditional hierarchical organization, a special task force composed of staff officers would have met, and then would have written a report to instruct an operational unit. In ABB's organization, the persons who meet are the front-line people, with the Business Manager as a facilitator. Once an agreement is made, it is actually a virtual decision for Profit Centers since the persons who met and agreed were the concerned persons in the Profit Centers.

In conclusion, ABB's structure looks like a matrix, and it is partially one. However, staff is designed to be understaffed so that it is dependent on front-line teams. This has two beneficial consequences. First, it protects the front-line team's empowerment from too close supervision. Second, it involves front-line people in all the strategic functions traditionally performed by staff officers. In addition, it gradually builds very strong informal networks in the organization. Officers from different Local Profit Centers who met in one of these strategic teams tend to maintain close contact and to exchange ideas and solutions on their own initiatives.

3.3.1.2. Business Unit level Organization in the Case of British Petroleum Engineering, Inc.

British Petroleum Engineering, Inc. (BPE) is an engineering center for the corporation. It completes internal contracts for other Business Units (BUs) which need engineering support. BUs are free to contract with external engineering bureaus if they consider
them to be a better or cheaper alternative. In the late 1980s, BPE was experiencing serious difficulties: rising costs and slow reaction were weakening the bureau's productivity and many projects went to external contractors. This triggered a radical reorganization, which concluded with a structure close to what can be called a networked corporation. (Mills; 1991)

![Figure 3.4: BPE's Cluster Organization](image)

Figure 3.4 shows how engineers are reorganized into 16 Engineers Clusters of about 50 engineers. Around the Engineers Clusters, three Functional Units offer support in resource management (Engineering Resources), new technology and innovation management (Technology Development), and client development and management (Business Services).

Engineer Clusters are composed of engineers in different disciplines but with experience in the similar projects. In addition, each Cluster has a Senior Consultant who has enough seniority in the company to be respected and be able to help the other engineers interact with BP's other entities.

Engineers Clusters refer directly to the Managing Director. During a project, engineers are fully responsible and accountable for success. It is their responsibility to manage and
supervise their own work. There is no external supervision by any project manager or the Senior Consultant. Engineers Clusters are self-managed.

Functional units are at the clusters' service. They have no authority over Engineers Clusters and do not control or supervise their work. They work as resources for them. In each functional unit, at least one person is dedicated to each cluster and is its preferred contact. Engineering resources employees follow engineers' career and evolution (background, experience, aspirations) and help project leaders or other people find the right persons to staff a team. They take into account the needs of each project, the long term needs of the company (e.g. develop new skills), and engineers' own aspirations. The Technology Development Functional Unit is responsible for the management of new technologies. It monitors emerging technologies, benchmarks them, and runs feasibility studies. Its members do not interfere with technical decisions encountered during specific projects. They are only a resource for clusters' engineers, and provide them with descriptions and characterizations of new technologies. Business Services employees have preliminary contacts with the clients. They take care of the detailed specification of the project requests and follow up with clients after a project is completed. They have the role of gatekeeper, but once the project is started, engineers are in charge and manage the client interface themselves.

This looks like a functional organization with HRM, Marketing and sales, Fundamental Research, and Development. However, it is not! Again, BPE's organization is characterized by a light and informal structure, and it features some of the networked corporation characteristics. Engineers Clusters are independent and refer directly to the Managing Director. Functional Units do not have authority over them. Functional units are resources and clusters are action units. Clusters are empowered to carry out the project they are assigned. When engineers are assigned a project, they are in charge of client relationships, planning and scheduling, technical decisions, and quality control. The organization is dynamic as well. Project teams are staffed with engineers from several clusters, identified with the help of Engineering Resource. Thanks to both the Engineering Resource and Technology Development functional units, resources such as human resources, skills, technology and knowledge are available across the entire organization. In addition, project orientation underlies the entire organizational structure.

3.3.1.3. Plant Level Organization MRP vs. JIT
We have not been able to identify actual examples of networked corporations on the plant floor. Nevertheless, we can devise a hypothetical case which illustrates how we think the networked corporation principle would help implement a true JIT system in a factory.

In a classical MRP based factory, when an order arrives at the plant, it is analyzed and entered into the MRP system. Then the computer generates orders for parts to suppliers and requests for sub-assemblies to warehouses. The computer also optimizes the tasks scheduling for the factory.

The entire organization is based on the MRP system. Production engineers evaluate and eventually modify the computer generated schedule. Foremen ensure that the tasks are performed to meet the schedule and that their team produces the right quantity at the
right time. Workers do what they are told to do. Figure 3.5 illustrates the kind of structure the factory would have with a central planning unit which coordinates events and gives instructions to managers who pass instructions to the specialized teams who do the work.

![Figure 3.5a: A MRP Factory: Organizational Chart](image)
Other manufacturing enterprises have JIT plants. In this "pull" system, when an order is received, it is transmitted to the teams that assemble the final products. Then these teams schedule their own tasks and issue their own orders to external suppliers, internal warehouses or other teams. The advantages of this production philosophy are well documented: low inventory, faster reaction to manufacturing default, focus on production cycle because no buffer inventories are there to compensate. Figure 3.6 presents what the JIT factory would like. Teams are responsible for the orders they receive from outside or from inside. They make important decisions, such as parts ordering or tasks scheduling, and perform quality and productivity control.
Figure 3.6.a: A JIT Factory: Organizational Chart

Figure 3.6b: A JIT Factory: Process Flows
For a plant like this to be efficient, teams must communicate. In addition, teams must be empowered so that they can make their decisions without having to refer to the direct superior. But, workers cannot be at the same time an experienced welder and a quality control specialist. Worker teams need help and support; when they identify some recurrent quality problems, they will call upon and work with a quality control specialist to devise an action plan. But the initiative will come from the worker team, which now have access to resources outside its own boundaries.

JIT can be implemented in a traditional plant. However, the need for communication between worker teams will probably overload traditional communication channels sooner or later. The networked corporation offers a model to build an integrated system where empowered teams can make operational decisions. A communications system will foster collaboration between the teams. A set of specialists will provide support to help and train workers for some particular techniques and will be called upon as needed. These qualities are embodied in the themes of the networked corporation, stated earlier as being empowerment, availability of resources across the network and beyond traditional boundaries, project driven organizations, and dynamic structures.

3.3.1.4. Lessons
The three examples mentioned above are very different in terms of scope, organizational structure and pursued goals. However, they all share the same set of principles, the basic themes of the networked corporation. It shows that the network corporation model does not offer an absolute model applicable only to certain types of industries or to certain type of businesses. It is a set of principles which reinforce each other in the pursuit of different sets of objectives.

3.3.2. Are Networked Corporations Applicable to any Industry?
The networked corporation is but one of the existing management models, and it is not clear that it is adaptable to all industries. It seems that in certain cases, networked solutions are not optimal and/or do not contribute to improving a given firm's competitive position.

One such case is seen in an industry where products are highly standardized, routinely mass produced, and unsophisticated. Commodity products (where differentiation, marketing, and close customer interface are not needed) do not seem to benefit from a networked structure. Industries that are not technology intensive, that have no substitutes, or do not need close cooperation to produce do not fit the model either. Finally, products that have very long product cycles are probably not a good fit for the networked corporation model. In such cases, the traditional hierarchy structure is probably as good if not better than a networked structure.

3.3.2.1. Service Industry
Compared to manufacturing, the service industry seems particularly well suited to the concept of networked corporations. The service industry is heavily dependent on the proper leverage of human capital. In addition, due to the faster cycle of the product,
feedback is more immediate than in manufacturing where the time to develop, manufacture and market may take much longer. Concepts such as project orientation and empowerment are therefore much more easily implemented.

In Davidow and Malone's words, the service industry has a "product that exists before it is even produced." Service is instantaneous and the interface between the company offering the service and the customer therefore becomes crucial. Moreover, more competition and an increasingly demanding customer base necessitates shorter as well as better response time and service.

CNN is probably a good example of this faster time response. The competitive advantage of CNN resides in its ability to come up with newsreels faster that competition. This involves and necessitates the cooperation of newscasters and reporters in selecting, processing and sending tremendous amounts of information. While telecommunication technology is crucial to the success of CNN, close cooperation and empowerment of field teams dedicated to one news "project" is essential as well. (Peters; 1992)

The fact that teams decide what goes on the air substantially speeds up the process of producing the company's "product." Supervisory teams and management are therefore much less under the strain of excessive information and can therefore concentrate on strategy.

CNN's employees have access to the company's resources and therefore do not need to waste time seeking approval for the use of some telecommunication gear. This not only speeds up the process but also motivates employees as they know that they will have access to needed resources to complete their projects.

In addition to this hands off policy, CNN management is understanding toward mistakes. Employees are encouraged to "do it" rather than not to make mistakes. While this attitude can seem unimportant, it has tremendously improved employee initiative and motivation by encouraging them to take up projects and weigh risks and rewards in a responsible fashion.

3.3.2.2. Manufacturing
For a manufacturing firm, the dynamics of the market have changed so drastically in recent years that such firms are now offering two products: the manufactured product itself and the newly added, but equally important, soft customer service. The implication of networked corporations for manufacturing is therefore twofold. Customers now demand more quality and are more selective in products they purchase because there is more choice from increasing competition. In addition, customers are increasingly insistent on having customer service.

Manufacturing firms are therefore no longer competitive if they provide only a good quality but standardized product. They must also be more responsive to the customer's demand for more customized products. This basic change in consumer demands requires better coordination between different parts of the hitherto relatively broken up value chain. Marketing must work closely with research and development while R&D must cooperate with manufacturing to ensure smoother production.
Customer service is an important component since it is the direct interface between the company and its market. It provides feedback to the firm about its products as well as information on what, when and how much to produce, develop and so on. It is clear that such an integrated task requires levels of cooperation and communication that were not necessary before.

In short, quality and price are not the only differentiation factors any longer. Manufacturers must respond quickly and efficiently to changing consumer demands and preferences. Being best at manufacturing is no longer sufficient for today's companies to compete. Rather, firms must be able to have a seamless organization that allows maximum cooperation and communication.

Toyota is a good example of seamless communication between the front-line marketing, sales team and the design, production teams in the back. The company has set up computer terminals at all its dealerships in Japan that link directly back to their plants. This system allows Toyota to customize its automobiles to each buyer and optimize its JIT system. In addition, Toyota gets valuable customer preference data and can subsequently track consumer trends better.

A similar system was also adopted at its Lexus luxury division. Each dealership is equipped with a computer that will track every individual car's performance. Each Lexus is fitted with an internal computer that records the cars performance and possible breakdowns. Lexus mechanics can therefore track problems easier and faster thus providing better service should a problem occur. In addition, since all this information is on computers, it can easily be relayed back to engineers at the plant for re-engineering or modification.

Benetton and Batterymarch are also examples of seamless links between the sales force, design and production teams. Both have their sales force connected to production and shipping. Each sale is recorded and therefore provides data that allows minimum inventory requirements and optimized trend tracking.

All these models have, whether it be manufacturing or service, emphasized time based competition, flexibility and empowerment as keys to success.

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**Agile Manufacturing: Networked Corporation Applied to Manufacturing**

When referring to manufacturing firms, most people only envision production. However, a manufacturing firm encompasses more than production: it includes product development, marketing and customer service. In fact, Stan Davis, in his book *2020 Vision* argues that 80% of a manufacturing firm's business is dependent upon information and therefore is networkable. In agile manufacturing, the model advanced by Rick Dove and others in their report *21st Century Manufacturing Enterprise*, flexibility is applied not only to the production segment of the manufacturing firms but also to all its departments. Focusing on systems that improve the flexibility of production only is short sighted and ineffective.

(Nagel and R. Dove; 1991)
3.3.3. The Scope of Networked Corporations

3.3.3.1. External vs. Internal Networked Corporations
Different models discussed so far put different emphasis on the necessity to network the inner corporate structure versus developing the firm's external "connections."

Many business gurus seem to have emphasized one at the expense of the other. In our view, their explanation of the corporation of the future is therefore incomplete and still resembles traditional hierarchies too closely.

3.3.3.2. External Networked Corporations
External networked corporations are firms that emphasize the development of external alliances and joint ventures rather than internal transformations. Such companies often operate as hierarchies internally and therefore fall short of being a fully networked corporation. The concept of Value Adding Partnership discussed by Johnston and Lawrence (1988) is probably a good illustration.

Other cases could involve companies that Davidow and Malone would refer to as "virtual." Telepad is such a case.

Telepad encompasses the concept very nicely. The company is a small outfit with limited design capability and only fourteen employees. The company has very limited resources both financially and technically but is confident that its product will be successful. It therefore has opted for an alternative solution, outsource much of its needs to produce its product. (Davidow; 1992)

The company is relying on outside companies for all its needs, including administrative matters such as payroll management. Telepad is a virtual company and relies on the effectiveness of its network for its success. The company is heavily dependent on outside sources for implementation of its strategy. However, it is important to note that the company has kept its basic core competency: the concept of its product. Telepad is therefore a good illustration of Nadler's model of the master builder. The company depends on outside sources for the pieces of the Puzzle and the implementation of its project but is the master of the "blue prints" that will allow the project to come into existence.

Apple computers is to a certain extent an external networked corporation. The company relies on a number of suppliers for key components such as Motorola for CPUs. Apple's close links with its suppliers and distributors allow the company to stay current with new technologies and customer trends. The company refers to this networked organization as its "info channel." In short, the company outsources whatever it considers as not central to its core business or too costly to develop on its own. However, Apple did keep large sections of its product in house so as to retain a competitive advantage and prevent competitor entry into its segment of the computer market.
3.3.3.3. Internal Networked Corporation

Asea Brown Boveri, the Swiss-Swedish concern, seems to be the opposite. While the company is of substantial size, it has a very reduced headquarters staff of only 250 people. ABB's CEO Barnevik has totally decentralized its organization, leaving much of the decision making to its division heads. However, on matters of company's wide, long term strategy, the CEO still retains firm control. Such management style requires good communication, trust between the different heads of the company.

Owen Corning is also a good illustration of an internal networked corporation. The CEO has decentralized the decision making process and has entrusted much of the firm's strategy to what he refers as his 100 centurions. While final objectives and grand strategy are decided at the top, much of the strategy at country and divisional levels is left to the discretion of his centurions. Close communication again is key.

In the internal networked corporation, the CEO and top management decide on the general direction of the firm but leaves much of the operational and day to day management to the line managers. In short, top management acts as facilitators and visionaries.

3.3.3.4. Are Japanese Keiretsus Applied Networked Corporations?

One of the factors most cited by U.S. businessmen as a Japanese competitive weapon is the keiretsus, the huge Japanese business groups.

Davidow and Malone developed their model of virtual corporation as a possible U.S. response to these competitive behemoths. Changing dynamics in customer and market preferences have led to the demise of U.S. business strategies in favor of Japanese management practices.

The Japanese keiretsus are organized around a banking or insurance concern which provides the financing to the firms of the group. Each company or division has its own set of subcontractors and own independent operations.

Davidow and Malone's proposal is different in that it does not involve a center of any kind. Keiretsus have a set of subcontractors or junior partners that will take the brunt of the risks, while the virtual corporation calls for partnerships of equals.

In addition, keiretsus are typically centered around one mother company and still involve traditional hierarchies. Typically, outside alliances will involve companies closely affiliated with the keiretsu. Japanese companies will forge alliances outside the group only if they have exhausted the possibilities within their respective keiretsus.

In sum, the networked corporation is more flexible than keiretsus both in their internal corporate structure and their alliances.

Keiretsus also differ from networked corporations in the incentive system they use. Their incentive system is centered around seniority and mainly involves promotions along the corporate ladder.
Networked corporations are also more technology intensive. U.S. firms generally make more use of networking technologies such as e-mail while Japanese prefer to use face to face networking.

Finally, unlike networked corporations where government has no involvement, the Japanese government sometimes play a substantial role and work closely with *keiretsus*. In fact, in certain cases, the government besides being an arbiter becomes an active partner by providing through subsidies and/or outright cash contributions.

While on the whole, *keiretsus* are different from networked corporations, they do have certain characteristics that are similar. Japanese firms are organized around teams albeit more permanent than under the networked corporation model. Employees are empowered to a certain degree and are definitely listened to. Japanese firms also resort to lots of alliances to achieve economies of scale in research by tallying their efforts. The VCR industry is but one of the many examples where Japanese teamed up to develop a low cost product. However, it is interesting to note that there was a conflict between Sony and Matsushita as to which standard to adopt, VHS or Beta. Japanese firms seem to be both cooperative and competitive.

Although this model may seem attractive, U.S. firms do not use the keiretsu model because of a number of reasons. First, culturally, the keiretsu system does not appeal to Americans. The legal system would not permit such organizations because of the anti trust law. In addition, keiretsus have affinities to government that, for historical and political reasons, are currently not popular in the U.S.
Figure 3.8: The networked corporation structure
3.4. The Corporation of the 21st Century, the Total Network Solution?

Another extreme alternative is a corporation which operates on a seamless, boundary independent network. In other words, the firm would not distinguish between internal and external resources. Several examples can help illustrate this point.

The AT&T, Marubeni and Matsushita Safari project involved each three companies' core competencies. AT&T provided design capabilities while Matsushita offered production and Marubeni marketing capabilities.

The IBM, Apple and Motorola alliance to develop and produce the next generation of computers is also a good example. Hitherto arch rivals IBM and Apple teaming up with Motorola and each providing their core competencies to the alliance. IBM provides its knowledge of integrated systems while Apple brings its knowledge in graphical interfaces and Motorola its expertise on CPUs. It is clear that in this example every party stands to benefit and are equals. This cooperation considerably lessens each company's respective risks and allows leverage of their mutual resources and capabilities. If properly managed such an alliance should allow shorter lead time and reduced development costs.

The important difference is that these companies while cooperating on this particular project competed on other product segments. No single partner was a junior partner, rather it was an alliance of equals with each partner "outsourcing" areas it was not in measure to come up with cheaply and/or fast. Each partner was dependent upon the other for this particular project but remains independent for other segments of their businesses.
3.5. Conclusion

In this section, we have determined that networked corporations do not follow a generic corporate structure. No single model can satisfactorily be applied to effectively replace hierarchies across different corporate environments. Optimally, different functions should be handled using different structures. In short, while we found that a good organizational structure is crucial to a firm’s success, it is clear that it is not sufficient alone. A good implementation and smooth transition are absolutely essential. New and flexible corporate policies and visions must be implemented for such a structure to produce the desired results. We will discuss these issues in the next section.
In this chapter, we will address issues implementation issues from several points of view. We will examine both the human issues and the technological issues. Human factors will be divided in two parts, the employee and the employer's stand point. We will also assess the risks of implementing different technologies. We will attempt to demonstrate that:

1) Trust must be secured in order for the networked corporation to work
2) Accountability goes hand in hand with empowerment
3) Vision and leadership must be clear and concise while not interfering with operations
4) The incentive system is the tool management uses to implement its vision
5) Management has to adapt rate and degree of change to the company's parameters
6) Management has to determine whether present technologies can implement corporate strategies
7) Management must carefully weigh the risks and implications involved in choosing and implementing new technologies
8) Technological changes must be accompanied by the necessary organizational changes to be effective

Networked corporation are very complex organizations not so much in their structure but in their management and therefore necessitate sophisticated management systems to bring about their full potential. In certain ways, managing people in a very flexible and ever changing organization necessitates more discipline than in a simple hierarchy. While traditional management systems have to be done away with, other schemes must be devised to replace them.

It would be naive and irresponsible to think that networked corporations are totally self managing and sufficient. In this section, we will discuss implementation issues and come up with some suggestions as to how to make networked corporations a reality. In doing so we will analyze two complementary factors, the human component and the
technology element. Neglecting one at the expense of the other is a mistake that executive could commit in redesigning their organizations. A successful integration of the two is a prerequisite to achieving the goal of becoming a true networked corporation.
4.1. Managing a Flexible Organization

4.1.1. Human Factors
In switching to the more flexible structure of networked corporations, executives must realize that they are de facto bringing a substantial paradigm shift to their organizations. Under the hierarchical system, operations, processes and people were essentially following procedures and orders in a mechanical fashion. Networked corporations depart from this passive attitude to reach a more proactive stance regarding employees. However, to achieve greater involvement on the part of employees without jeopardizing either productivity and/or control of the organization, both employee and employers have to cooperate.

4.1.1.1. Trust
The trust issue is a central component that is needed in all organizations but is probably even more essential for networked companies. In the absence of a clear hierarchy and chain of command, informal mechanisms must regulate the organization and ensure the timely and effective completion of projects.

The base assumption in using hierarchies is that nobody is to be trusted. Employees were not to be trusted on the use of resources and on decision making pertaining to the use of such resources. On the other hand, employees regarded initiatives from the top as simple orders to be carried out and seldom volunteered their suggestions even in the case of blatant strategic mistakes. This top to bottom stand off is further aggravated by mistrust among personnel at the same level.

The traditional hierarchical system used competition and employees' eagerness to climb the corporate ladder as a productivity whip among peers working at the same level. While this approach may motivate individuals to work hard and compete with each other, it hardly facilitates cooperation and trust. Internal competition is effective as long as the company is doing well, so that the positive effects outweigh the negative effects of competition. However, if one considers a situation of crisis, mistrust and competition may lead employees to withhold information and/or assistance from each other. This unhealthy environment is a paralyzing, internal disease, should the company need teamwork to achieve a given objective.

At the higher level, mistrust and competition may result in executives vying for the top spot by engaging into intrigues and office politics instead of focusing on managing their firms. Again, while this state of affairs is acceptable when all is well, it can prove fatal if the company is experiencing difficulties. In short, such games cause executives and employees alike to think of their own well being at the expense of the company as a whole.

In addition, it is crucial to note that such internal strife and rivalries would be even more dangerous to a networked corporation. Networked corporations do not have a formal legitimate structure that would allow conflicts to be solved through hierarchical rank and/or rigid rules.
This issue is even more important considering that companies are increasingly moving towards knowledge-based and information-based organizations. Information has, in certain cases, replaced resources as the central asset and therefore has to be handled very carefully.

However, it is important to mention that in certain cases, political behavior regarding information is not always irrational or inappropriate for specific organizational situations and/or projects. (Davenport, Eccles and Prusak; 1992) The central issue is to determine the degree of "secrecy" and to what type of information it applies. Networked corporations do not profess to be lax organizations when it comes to information. Rather, they are flexible as to what is to be revealed, communicated and shared inside and outside the organization. Networked attempts to break the monopoly that certain departments may hold on information in traditional organizational structures do not signify advocating anarchy either.

4.1.1.2. The Employee Side

Accountability
Accountability is a direct offspring of empowerment. It is the factor that will ensure a certain degree of informal control over an empowered staff. It is essential to let employees know that empowerment is a responsibility.

An anecdote may help illustrate the importance of accountability within a team: a football team member rages that he did his job and that it is not his fault that the team lost. The coach responds that if he really had done his job, the team should not have lost. It is clear that the team member has a point but so does the coach. In today's firm, it is not sufficient if an employee only "does his job" and thereby rejects responsibility for the failure of his team. Refusal to be accountable is probably one of the chief causes of office politics and is highly counterproductive. (Davidow; 1992)

The whole environment of networked corporations should be set up so that it fosters learning, communication and initiative. It is therefore very important that accountability remains reasonable in the sense that management must assume its share of responsibility as well. Mistakes should be dealt with in a fair fashion. Mistakes should yield a positive learning experience rather than engender a feeling of mistrust and bitterness between management and employees.

However, it is important to remember that accountability will not occur unless several systems are put in place, among which a clear vision supplemented by an unequivocal incentive system are essential elements.

4.1.1.3. The Employer Side

Vision and Leadership in the Context of Networked Corporations
It is important that management has a clear vision and supports the diffusion of that vision to all employees through adequate leadership. The vision is essentially a company's identity, its image, a statement of the company's perceived mission. Besides
giving the firm a sense of direction and position relative to outside firms, vision should provide employees with a rallying point, a center and concept they can identify with as well as feel proud of belonging to. The vision is often very generic and general, leadership, on the other hand should be more precise while not being stifling.

Top management should issue directives and guidance as to how to fulfill the vision. Objectives and general parameters or standards should be clear and realistic. This is best achieved by going through the process by negotiating directly with the people in charge of the given project. Indeed, if objectives to be reached have been endorsed and agreed upon by employees, it should be easier to make the team more accountable as well as responsible.

Once these benchmarks are set up, management's role is to act as facilitators, "internal consultants," or problem solvers. They should let the staff do its job and intervene only in crises. This stance allows employees to take the initiative within this preset framework in a faster and more efficient fashion as they feel more in charge. As a result, everyone knows who is accountable for which projects. Public knowledge of accountability decreases the likelihood of later finger-pointing.

Finally, management must ensure that resources are available so that employees can complete their tasks and really act upon their creativity and initiative. Aside from lightening management's burden in daily operations, this strategy should also improve productivity as an employee in charge should have higher self-esteem and therefore will be more motivated and productive.

In short, resources should be available and an "open door" policy between management and employees should exist to secure the best environment for cooperation. But all the communication, open mindedness and trust will not be sufficient to secure an optimized use of resources if an unambiguous incentive system is not in place.

**Incentive System**

The incentive system is the backbone of any organizational structure but is probably even more crucial in a networked corporation. It is the management duty and to its advantage to set up a good incentive system. However, it is probably also the most arduous task, especially for networked corporations.

The reduction of managerial layers makes it more difficult and somewhat meaningless to use promotions as incentives. Alternative means have to be used. Monetary incentives are obviously a possibility. Devising an adequate replacement incentive for promotions is challenging but not hopeless. One central advantage that networked corporations have over traditional hierarchies in regards to the incentive system is that by its very structure, the environment of networked corporations offer more flexible incentives. In addition to monetary incentives, networked corporations offer a more interesting job as people are not organized along functional lines but rather along projects. This job diversity, the opportunity to work with a larger number of different people, and the ability to be empowered can be incentives in themselves and compensate for more traditional incentives.
Finally, while promotions are not so prevalent in networked corporations, they still exist de facto through increased responsibilities, greater challenges, and higher priorities for project assignments. In short, networked corporations offer real executive promotions without the title.

Networked firms also face the challenge of deciding whether their incentive system will emphasize personal, individual performance or group accomplishment. It is fairly obvious that overemphasizing either brings costly trade-offs. If individual incentives are favored, individuals will have no interest in cooperating and will actually find it more beneficial to compete aggressively with his peers. On the other hand, if only group performance is evaluated, the problem of the "free rider" may develop, since individuals will lose motivation and see no interest in putting too much effort in completing their task while the rest of the group is carrying the project to its completion.

A two-tiered system based on both individual performance and group performance seems to be the best solution to this problem. However, it still remains difficult to reach the appropriate balance so that both individual initiative and team cooperation are activated. One solution is to tailor teams with people that are highly complementary and highly dependent, therefore forcing everyone to contribute in order to complete a given assignment.

One other important question is to decide whether the incentive system should be enforced by top management or left to the front-line to enforce through peer pressure.

We do not believe that there is a generic and absolute incentive system that will work for all situations and organizations. Rather, the incentive system will depend highly on the organization, its goals, its people, its business and its general environment.

Rate of Change
The transition to a networked structure can be very costly both monetarily and timewise, Individual firms' present organizational structure and culture will be more or less accepting of this transition. The implementation of a new model therefore has to be carefully prepared. The rate and degree of change must be adapted to the particular firm's existing parameters. It is the management's responsibility to fine tune the move towards the networked structure and monitor the process so as to avoid straining their organization.
4.2. Managing Complex Outside Alliances

The final challenge faced by networked corporations is to apply their methodology to outside alliances, mixed project teams and so on. While executives can fairly well control within their own firms incentives, organizational structures, and other issues that require managerial discretion, they are in a less favorable position to do so when it involves outside organizations. Different cultures, objectives, and strategies — mainly different interests and issues of control over strategic decision making and key technologies — are all substantial barriers. However, we believe that many of the strategies used within the "internal boundaries" of networked corporations are actually applicable to the outside environment as well.

The same principles that were crucial in managing flexible organizations are central in managing complex outside alliances as well. Communication, trust and negotiation to set clear congruent objectives and responsibilities, if successfully implemented, should achieve the same positive results. In addition, alliances are by definition a coming together of two entities that are in need of each other and if properly managed should become symbiotic. This interdependence and respect for each other's interests should result in a mutually beneficial partnership. If this last goal is achieved, everything else should fall in place logically and very nicely.

An example should help illustrate the crucial importance of the factors mentioned above. The Sematech consortium and the Japanese effort to develop supercomputers yielded significantly diverging results despite their apparent similarity. Both consortiums were formed to develop key technologies vital to their future development. However, while the Japanese successfully developed supercomputers, results at Sematech were mixed at best.

The differences lie at several levels: the organization of the alliance, the incentives, the review system. The Japanese consortium was composed of less than ten firms, while the Sematech consortium included a larger number of firms. The Japanese had one focused project while the Americans diffused the focus by endorsing a variety of projects. Finally, the Japanese used the government as an arbiter to monitor the performance of all participants. The U.S. government did not play an active role, leaving the system to develop independently. While it was difficult to become a Sematech member, once a company gained membership, there were no formal systems to ensure active collaboration and high performance. The Japanese on the other hand picked the participants of the supercomputer task-force but kept the privilege to expel non-performers.

Alliances must have a clear agenda with defined, focused goals and realistic objectives. The success of the project must be crucial to all parties involved so that it is in their interest to commit reasonable resources and efforts to the completion of the project. An incentive system must be set up so that no "free rider" is allowed. Alternatively, an arbiter, preferably a knowledgeable outside third party, must monitor participation. If set up properly, this system should resolve long-term and fair collaboration among participants.
Finally, the changing business environment with increasing global competition should facilitate the process by forcing companies to cooperate more closely and to learn to trust each other.
4.3. Technology Factors

4.3.1. Technology Risk

The technologies presented in the Technology Trends section (Chapter 1) are currently in development. Some, such as ATM-based computer networks are already in use in a few sites.

Asynchronous Transmission Mode (ATM) networks are computer networks built around a broadband ISDN switch. Each computer is linked to the switch in the same way as telephones are connected to switching stations. However, although inter-computer communications are point to point communications, the network management system ensures that only the computer ID number is necessary and not its location. From the user perspective, ATM networks operate like very wide bandwidth LANs (S. Girishakar and B. Schultz; 1992)

Others, such as advanced groupware systems or extensive distributed database systems, are more experimental. All the technologies are very promising and attractive, but there is still a long way to go before they will be developed enough to be reliably integrated into a comprehensive system for group work and network support.

As Kemerer and Sosa say (1991), in information system conceptualization, "technology is often thought of as a driver, providing the inspiration for new ideas. However, the technology must be currently available for the company to benefit." When restructuring an organization toward a more network-like organization, managers are not to forget the lag between technologies’ potentialities and current capabilities. A realistic understanding of the current technological state of the art is crucial for managers to be able to leverage their managerial new practices with supporting technologies.

The three basic technologies supporting IT were identified as:

- workstations;
- communication networks;
- databases systems.

Communication networks do not seem to present major risks. International standards are set and a large group of companies are actively working at developing applications. In terms of large computer networks, the necessary infrastructure will build up gradually but will probably follow the demand. For very wide bandwidth local area networks (LANs), the situation is maybe a little less clear because the proposed new solutions break away from classical LAN architectures.

Workstation development is already advanced. Portable and wireless technologies are proving to be workable and reliable. Other more uncertain improvements, such as speech and hand writing recognition, are not fundamental to satisfy a networked corporation needs.
Database technologies are crucial for the working of the networked corporation. Prototype distributed databases are being tested. Some systems work already. The issues here are whether the new database management system will offer the necessary security and reliability to avoid catastrophic losses of data. This is of fundamental importance since the networked corporation is extensively based on flows of knowledge and information.

4.3.2. System Development Risk
The complexity of information systems is steadily growing, especially when they encompass entire organizations, such as in the case of the networked corporation. The system development itself is a major risk. It is a well known fact that many large scale information systems projects failed to show expected results. Those that were successful required tremendous effort from the developers.

Kemerer and Sosa (1991) discuss this issue. They identify problems at the conceptualization phase, when designers do not take into account the needs of all the users, or when they rely too much on technically unfeasible solutions (see previous section). In the implementation phase, problems come from the interactions with vendors who want to sell and do not always realize how ambitious a system can be, and how it will push their equipment or software application beyond its limits. Another issue when using leading edge technologies is their cost. Advanced computer and network systems can easily become "bleeding edge" technology as Kemerer and Sosa call it.

4.3.3. Implementation and Operational Risks

4.3.3.1. Organization Structure and Supporting Technologies
It is important that IT supports the organization’s structure. IT does not change people’s behavior by itself. Instead, people optimize their behavior to satisfy their own aspirations in function of the organization’s incentive system and in spite of existing technology. To take full advantage of IT systems, they must be in line with the organizational structure and support the principles and managerial practices promoted within the organization.

Wanda Orlikowski (1992) describes how the introduction of the groupware system Lotus Notes failed to foster collaboration within an large service firm nicknamed Alpha. Lotus Notes, which was supposed to help foster collaboration, was thrown into an organization whose culture, policies and reward systems cultivated individualistic attitudes. No special training was foreseen when the new package was introduced, and communication about what to do with it seemed to be unclear. Two quotes are sufficient to understand why technology did not lead to the expected organizational changes:

“I know absolutely nothing about Notes. I don’t know what it is supposed to do. All I know is that the firm bought it, but I don’t know why.”

“We made a conscious decision between whether we should throw [Notes] to the users versus spending a lot of time training. We decided on the former.”
4.3.3.2. Information Quality Management

The networked corporation is highly dependent on information and especially on data stored in databases. Even with a completely operational database system, retrieved data will only be as good as data entered in the system. One of the major problems with large databases is how to maintain the good quality of stored information: not updated, inconsistent, incomplete, or even wrong pieces of information are common.

Maintaining the good quality of database information is a relentless effort and no satisfactory solution has been devised to cope with it. Research is currently being held, for instance at MIT, to investigate methodologies and frameworks which could help IT managers and front-line managers approach this issue.
While our study is by no means exhaustive, we have attempted to provide an overview of the concept of networked corporations and to bring up some issues to help understand the implications of such a model in today's business environment.

We have come up with the following findings:

1) The networked corporation model is not a strategy but a model of organization to implement strategies.

2) No absolute model is applicable across all industries and business environments. The networked corporations include to a varying degree all the models that fall in between the two extremes of a totally market-driven organization and a totally hierarchical organization.

3) The model, while attractive, is very difficult to implement. It requires a combination of IT implementation as well as organizational changes.

The model is based on several key attributes:

- Project driven organization;
- Dynamic organizational structure;
- Empowerment of employees and action teams;
- Availability of resources across the network;
- Leverage of resources beyond traditional organizational boundaries;
- Interdependence between organizational units;
- New model of leadership and organizational cohesion.

The firm must resolve contradictions that may exist between these attributes and/or between these attributes and its present culture.

4) Different models will apply to different environments. The level of networking has to be modulated and adapted to the relative flexibility needs of the firm.

5) The transition to a networked structure has to adapt to the relative rate of change that is acceptable to the firm.

6) The same firm may adopt several organizational structures depending on the type of task each department is handling.

7) Hierarchies are not dead and can still be useful if implemented in routine areas that do not require creativity or flexibility. Hierarchies can be used if they do not obstruct the firm's flexibility and response.
Based on these findings we have come up with the following definition of the networked corporation:

The networked corporation is a dynamic network of project oriented and empowered teams that:

- have complete access to the whole organization's resource pool — human resources, expertise, knowledge, information;
- are bound by a strong strategic vision and a collaborative culture;
- are supported by an advanced communications-information network.
Appendix:
KJ Detailed Groupings

KJ Grouping: Top Level Grouping and Relationships
Organization's Focus is Project Results

Feedback and incentive systems focus on results vs. behavior

Leadership is determined by expertise with regard to the project

Teams and People in charge are totally accountable for project results

Culture has a positive attitude toward mistakes when they help learning

The N.C. needs accountability

The N.C. has a culture and is organized so that learning can happen

People and teams are accountable for a particular objective

The N.C. allows employees to make mistakes and recognizes failures as a learning experience

Team are project oriented and totally accountable for its success

KJ Grouping: Detailed Sub-grouping

-85-
Teams are temporary

Teams are staffed according to members' potential contribution to the project and not according to their position in the organization

The N.C. gave up its traditional hierarchy

Employees are assigned projects according to their competence and abilities to cope with them, and not because of their belonging to a particular organizational unit

*KJ Grouping: Detailed Sub-grouping*
Empowerment and Self-Sufficiency

- The N.C. is a network of self-sufficient, self-managed teams.
  - The N.C. is composed of many task oriented self-managed teams
  - The work unit is a self-managed team which takes initiatives and implements them
- Employees/teams are expected to find solutions
  - The N.C. empowers its employees
  - Decision making centers are pushed down as close to the front line as possible
  - In the N.C. the focus is "doing it". People are expected to figure out solutions and to experiment with them
  - The team is not a committee but an action team with full discretion of used means

*KJ Grouping: Detailed Sub-grouping*
Boundary Independent Resources

The firm organizes resources to fit the needs of the project

The N.C. does no longer consider hierarchy as its unique information system and has developed more efficient systems based on information technologies

In the N.C., an entity's organization and work modes are designed to best implement a strategy or to best perform a specific task

The N.C. recognizes there is no need to own the whole value chain to control

The N.C. needs to manage trust between partners (J.V., Suppliers, Clients, ...)

In the N.C., interactions and communication channels are dynamic and particular objectives

Communication flows across functional and organizational structure

The N.C. uses all resources to complete tasks, regardless of its origin (outsourcing, ...)

The N.C. encourages any kind of horizontal communication

Communication channels are bi-flows both from top to bottom and vice-versa

The N.C. employs people who are both specialized in one field and knowledgeable in the others

The N.C. must develop trust between management and employees

The N.C. is open to information regardless of its origin

The N.C. rests on the crucial need for free flows of information

KJ Grouping: Detailed Sub-grouping
Availability of Resources across the Network

Teams are given resources to complete projects

The N.C. will form multi-disciplinary teams to solve problems

In the N.C. teams have—are allowed to look for and find—the resources to implement their ideas

Full information is available to anyone in the network (internally and externally)

In the N.C. any employee has access to the whole information available in the company in real time

The N.C. has a culture and is organized so that information flows more easily

*KJ Grouping: Detailed Sub-grouping*
Cohesion and Leadership

Shared goals through the network maintain cohesion

In the N. C. both management and employees share the same goals

The N.C. is a collection of entities loosely controlled that work to reach common objectives

The N.C. needs a clear vision and leadership, but of a non oppressive kind

KJ Grouping: Detailed Sub-grouping
Every member is responsible and accountable to the team

*KJ Grouping: Detailed Sub-grouping*
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G. Bronsema and S. Zuboff, The Expense Tracking System at Tiger Creek, HBS Case No. 9-485-057, HBS 1984
Abstract: Case of a paper mill where a new information system (ETS) providing frontline workers allows them to take initiatives and improve productivity. Description of the reasons leading to this new system, of the project development and its implementation. Then, description of the internal tensions generated by ETS because incentive systems were not adapted at ETS' introduction.

Abstract: Installed computer capacity has dramatically increased in the US and yet productivity has not significantly improved, especially in the service industry. The paper reviews several hypothesis which can explain this paradox. Mismeasurement of productivity: macro-economic indicators do not encompass qualitative and intangible improvement. Lag between deployment of IT and its effects: some time is needed to learn how to use new IT systems. Redistribution to others of the benefits and improvement generated by IT: "IT rearranges the shares of the pie without making it any bigger." Mismanagement of IT: IT has not been managed to take full advantage of its capabilities.

Abstract: The article briefly presents a formal method to solve complex design problems (IBIS). It recognizes the design process for complex problems essentially as a conversation among stakeholders in which they bring their respective expertise. The IBIS method helps group members to foster a constructive discussion by providing a strict framework into which each intervention must find a place. Thereby, people are discouraged from making unconstructive rhetorical interventions. The method has been implemented in a software package to support group working.
Key Concepts: The framework consists of nodes and links. Nodes: Issues of a problem; Positions of group members about Issues; Arguments supporting Positions. Links: relationship between nodes, such as Supports, Questions or Responds-to.

Abstract: Many new organizational models are based on free flows of information. Information systems design often takes for granted that information flows are
free. It is not the case, each organization show political behavior regarding information. The authors describe these political behaviors in specific organization with a framework of five information politics models: Technocratic Utopianism, Anarchy, Feudalism, Monarchy, Federalism. It is important to understand each particular organization's model of information politics before developing any kind of information system.

Abstract: The company of the future ignores traditional corporate boundaries, leverage resources regardless of source and use extensive outsourcing to face the challenges posed by new technologies, a changing work force and more demanding markets. The virtual corporation must have multi-disciplinary personnel to allow flexibility and shared dreams to ensure maximum involvement on the part of the employees.
Key Concepts: virtual corporation, shared dreams, multi-disciplinary teams
Cases Mentioned: Xerox, Ford

Abstract: The article reviews different aspects of groupware, i.e. different types of computer and telecommunication systems that are designed to make group work easier.
Key Concepts: user/machine interface vs. user/user interface; time space taxonomy of groupware; Message systems - Multi-user editors - Group decision support systems - Teleconferencing - Desktop teleconferencing - Intelligent agents - Coordination systems

Abstract: Top management is corporate designers not corporate operators. Decisions that influence the organization as a whole are made by top management while implementation and every day management issues are delegated

J. Galbraith, Designing Complex Organizations, Addision-Wesley, 1973
Abstract: Galbraith describes why organizations have adopted a hierarchical structure. Organizations can adopt several approach to ensure coordination. They can set up strict rules and policies. They can design hierarchical systems and adopt management by exception philosophy. Finally, they can adopt a management by objective philosophy. In any case, the hierarchy tends to be overloaded when uncertainty increases. Two strategies are proposed to cope with this: increase the capacity to process information and/or reduce the need for information processing.

Abstract: Often, when restructuring or implementing IT, companies automate old practices without assessing whether the practice is good and without studying how it could be improved. Hammer gives five principle to be followed to ensure a real restructuring. Organize around outcomes, not tasks. Have those who use the
output of the process perform the process. Subsume information-processing work into the real work that produces the information. Treat geographically dispersed resources as though they were centralized. Link parallel activities instead of integrating their results. Put the decision point where the work is performed, and build control into the process.


Abstract: Hand likens the company to a federal system with top management as central government and operational units as states. Most of the decision making will occur at the state level or operational. The central government or management is in charge of general issues and has no precedence over operational decision centers.

Key Concepts: subsidiarity, interdependence, common law, separation of powers, twin citizenship

Cases Mentioned: ABB


Abstract: Paul Allaire describes his vision on decentralization and empowerment. He believes in pushing the decision making down but within a framework that top management has previously set. Empowerment works best if objectives, performance are clearly asserted.

Key Concepts: design and redesign the business concept, flexibility and power of adaptation to market, entrepreneurism, motivation software and hardware

Cases Mentioned: Xerox


Abstract: The article emphasizes the way small companies can strike strategic alliances to circumvent the disadvantage of small scale and at the same time achieve economies of scale as well as efficient pooling of resources. IT is described as a strategic weapon to achieve these goals.

Key Concepts: value adding partnership, close ties across value chain, knowledge sharing, power and control

Cases Mentioned: McKesson, Japanese trading and auto firms, U.S. construction industry


Abstract: Discuss the different risks an organization incurs when it design and develop a large scale information system. The major identified risks for the conceptualization phase are: conceptualization which does not address the need of all the users; reliance on technically unfeasible solutions; insufficient financial analysis and too high costs. During the development phase, the authors identify four risks: equipment problems; relationships with multiple vendors and compatibility; lack of inter-organizational cooperation; Bleeding edge technology.
Abstract: Paper study the issue around the idea of coordination. It defines coordination as "managing dependencies between activities." Then it looks at coordination processes in several settings (shared resources, producer/consumer relationship,...) Finally it shows how It can be used to facilitate, improve and foster coordination, and how to design coordination tools.

Abstract: The article presents a computer environment, called Information Lens, which allows to share information without overloading users with irrelevant or redundant messages. Information Lens is an extended e-mail system, that allows users to set up rules to filter incoming messages.

Abstract: Electronic data exchanges are changing the way companies interact with suppliers or with customers. Companies that performs different steps in a product value chain can be coordinated without vertical integration and can enter a value added partnership. It has advantages for both parties in terms of clerical work and inventories.
Cases: Sabre, Telaction,

Abstract: Nadler and his collaborators show how progresses in information technologies have made feasible alternate organizational structure beside hierarchies. They introduce the notion of architecture and how future managers will have to become organization master builders, using all the tools available. Then they use their framework to analyze how companies can restructure by merger and acquisition, strategic partnerships, how high-performance work systems (empowerment,...) can be integrated in the process. They finally address new managerial practices and how they fit into the entire system.

Abstract: This report results from a industry-led study of new models for manufacturing. It presents a description of the "Agile Manufacturing Enterprise" (see networked corporation in a nutshell in chapter 2) and develops several scenarios for future firms. The basic concepts are flexible manufacturing, seamless flows of information, distributed operations, trust and virtual companies.

Abstract: This paper describes a real case of unsuccessful implementation of groupware because of contradictory incentives. It shows how a poor communication and training as well as conflicting reward system and culture undermined the introduction of the Lotus Notes package project prevents the company from enjoying the expected package benefits.

Abstract: The book is a long plea for empowerment of front line employees, flexibility in organizations, and project focus culture. It uses many short cases to show how companies which trusted their members and pushed down decision became more efficient and profitable. The book attempts to prove that companies are better off liberating their people from the rigidities of hierarchy.

Key Concepts: Knowledge based company, project based teams, accountability, professional firm model, network vs. integration.

Cases Mentioned: EDS, CNN, ABB, Union Pacific Railroad, McKinsey and Co, IBM, GM Europe, and many other small ones.


Abstract: The company of the future is organized in clusters. Clusters are people drawn from different disciplines who work together on semipermanent basis. These clusters are independent from the rigid hierarchical system, are self-managed and have a strong customer orientation.

Key Concepts: clusters, dynamic organization.

Cases Mentioned: BP, Volvo.


Abstract: The CEO must set up a clear framework of performance and objectives, and subsequently keep track of it. This system clearly defines goals and accountability so that employees feel both empowered and accountable. Implementation and operations are left to employees. The CEO intervenes only in crisis that cannot be resolved by employees.

Key Concepts: incentive systems, goal system, measurement system, people matching with job

Cases Mentioned: Cypress


Abstract: The chapter discuss the concept of collaboration. Issues such as how and why people get together to achieve certain objectives are addressed. The end of the chapter briefly discusses how to design a environment that foster collaboration.

Key Concepts: Collaboration as shared creation and value adding process, collaboration as a process limited in time, collaboration as series of arguments challenging partners' assumptions, frank arguments as engine of productive collaboration, conceptual vs. technical collaboration.


Abstract: This book presents and discusses the implications for companies of the technological advances of information technologies. It gives a description of the state of the arts for critical technologies, then discuss how IT can be taken into account in companies' strategy, and finally touches upon organizational issues induced by the new technologies.

Abstract: This preliminary document explains the details of the KJ method and provides the reader with a step by step description of how to apply the KJ method to organize and structure quantitative and intangible information.


Abstract: Weick shows how people's understanding of the reality is weakened by electronic systems when they face raw data on screens. Electronic systems prevent people from using their common procedures to make sense of what happens around them: effectuating, triangulating, affiliating, deliberating and consolidating. This paper shows that it is very important to take into account how people perceive raw data and how they make sense of it in order to develop an effective and learningful IT system. A good system would allow users to use the listed procedures to make sense of their environment.


Abstract: This issue of the magazine Computer reviews different aspects of multimedia research and development. It includes a tutorial introducing to the basic concepts in digital multimedia systems, an article about distributed databases in multimedia systems, and an application for conferencing systems.


Abstract: Issue of Micro which covers several topics about database implementation. Comes with a companion issue reviewing all the aspects of heterogeneous distributed database systems


Abstract: Discusses the trends and advances in technology in different fields: PCs and workstations, software, large computers, telecommunications, data communications, and others.