Development of a Transnational Competency Network Architecture for Packaging Engineering within an Office Products Corporation using Virtual Teams Principles

by

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Submitted to the System Design and Management Program

In Partial Fulfillment of the Requirements for the degree of

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Abstract

Firms in the electronics and office equipment industries are experiencing strong competitive pressures to deliver products more quickly to seize market opportunities on a global basis, but without ignoring regional and national differences. OPCorp in particular is experiencing a competitive crisis that is shaking the formal structures and the established processes. We see this tension between centralization and local responsiveness in the Packaging Competency Center at OPCorp. One way of coping with the pressures for immediate improvement of financial performance is to downsize through outsourcing. However, top management have to be very careful dismantling entirely a function that preserves the value of the products that OPCorp offers to its customers. In-house Packaging Engineering Organization has to remain accountable for the protection of products during distribution cycle. Whether outsourcing is implemented or not, the Packaging Engineering Organization has to provide responsive and reliable support to development teams, manufacturing sites and service groups in worldwide basis. An alternative is to utilize more effectively the geographically dispersed competencies of the company. The "transnational" model, in combination with principles of virtual teams can provide operational excellence with global efficiency, national responsiveness and worldwide innovation. This study provides a model for using the existing competencies that the Packaging Engineering group has created throughout the world by setting up the mechanisms to motivate coordinated work and link knowledge in real time among the different packaging groups residing at development centers and manufacturing sites. This model suggests to abandon the centralized decision-making process, migrating to a networked environment where decisions are taken locally with the input and knowledge sharing of the rest of packaging organization.

The socio-technical approach of the system needed the combined use of 3 frameworks: Organizational Processes framework, Systems engineering framework and Transnational Capabilities framework. This unique blend allows to cross levels of analysis, from the strategic level to the operational levels that are aligned to the original intent to solve the competitive crisis that packaging group is facing as well as other areas in OPCorp. This study suggests how the companies of the 21st century can deploy the strategic capabilities of global efficiency, local responsiveness and worldwide innovation through the use of virtula teams principles, a new way of working across distances.

Thesis Supervisor:
Professor D. Eleanor Westney
Society of Sloan Fellows Professor.

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To my brothers and friends – Thank you for being there.

To my children – Alonso, Anamy and Azhali, my best reason to keep pushing up. I love you. Now is time to have fun together!!!

To my parents – This is for you.

To you.

A. Benjamin Arellano M.

May 2001

Dichoso aquel que no renuncia

a su sueño por el pan de cada dia.

Anonimo

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Introduction

"Emergence, the driving force behind evolution is the arrival of the fittest not the survival of the fittest"
Stuart Kauffman

Motivation of the thesis

There were three factors that motivated me to pursue this topic. They are all related to the fact that companies of the 21st century are facing a competitiveness crisis due to rapid technology both in their own industries, and especially in the telecommunications field. The incredible pace of change in information and telecommunication technology can be the most devastating weapon for competitors or the most valuable tool for one's own companies. The speed of information availability is changing investors' decisions, business models and buyers' preferences in less time than it takes to type this single paragraph.

OPCorp is suffering the effects of investors' decisions and buyers' preferences due to this endless flow of information. However, the company is uncertain about how its business model must change if it is to take full advantage of information technology.

The three factors I am referring to are:

- One: Companies of the 21st century have to adopt an "adaptive" [6] model that allows them to change their business models to take full advantage of the surrounding conditions and opportunities.

- Two: Companies of the 21st century have to evolve their organization structures from global, international and multinational operational modes to the transnational [7] operational mode that will allow them to develop global efficiency, national responsiveness and worldwide innovation, which are the strategic capabilities required to survive this competitiveness crisis.

[6] Highsmith III, Jim, "Adaptive Software development, Collaborative approach", DH Publishing Co., 2000
[7] Bartlett, Christopher, "Managing Across the Borders", Harvard Business School Press, 1998

- Three: The transnational operational mode requires interdependent entities that are constantly communicating and interacting with each other. Each of these entities exists because it has a specific competency. Information, knowledge and learning have to flow in a coordinated manner among the networked entities. Nowadays, telecommunication technology is available to achieve this interconnection, but the architectural concept of the technology components, the processes and the human interactions, are not clearly defined.

This work applies the conceptual frameworks underlying these three factors.

Problem Statement at OPCorp: Restructuring a traditional organization

OPCorp is experiencing one of the worst crises in its history. This situation has forced the corporation to eliminate activities that are not considered core competencies for the business. Organizations have been eliminated, outsourced, downsized and restructured to the minimum operating size. The objective is to reduce operating costs. However, since this "strategy" has been implemented in a very short period of time, a lack of coordination has been observed between in-house and outsourced resources in keeping processes and activities running, which has adversely affected company results and employee morale.

The specific problem that this work will be focused on is the Packaging Engineering function, which is a clear example of the situation explained above.

The Packaging Engineering function has traditionally been centralized in two main groups localized in U.S.A. and England. These two groups were responsible for providing the packaging design for products and supporting the operations of the manufacturing and distribution organizations. Every time one of the remote manufacturing sites (Netherlands, Mexico, Canada and Brazil among others) had a problem with the sourcing of materials or a quality problem in the manufacturing line or field due to the packaging design, the engineers at these sites had to request a change or deviation of specifications from the Packaging Engineering groups in USA or England, depending on the product line. Unfortunately, response time was not always adequate. This fact created the need to have small groups at the manufacturing sites that would take responsibility for contacting the Centralized

Packaging Engineering groups or solving the problems locally in an expeditious way. A Packaging Engineering capability started growing outside of the centralized groups.

Nowadays, the restructuring task is virtually dismantling the Centralized Packaging groups, but the trend it is to outsource this support function.

Although outsourcing is one of the alternatives, it may not be the most efficient. Disadvantages of outsourcing design and engineering support for packaging activities to one local supplier are:

- It will limit designs and costs to specific materials or processes that the supplier is familiar with and that are not very common in other parts of the world.
- It will reduce flexibility to cut cost during the program's life.
- It will make it difficult to define design ownership and drawing responsibility within the corporation, causing ambiguity and lack of responsiveness when field quality problems arise due to different sets of priorities (new projects) that, a "full service" packaging supplier (in charge of the original design) may have at the time when problems arise.
- Most suppliers are willing to work with the customer to customize a packaging component (not the whole configuration) to local materials only if volumes are attractive enough to spend time on the redesign of such particular components (i.e., box, bag, cushioning, pallet, etc). However, there is no evidence of any packaging supplier holding the same transnational, global and multinational capabilities that OPCorp has to respond to all our needs (design, cost reduction and problem solving) during the different phases of a product to protect the OPCorp value for customers all over the world.

The major management initiatives of the past decade all led companies to work across internal boundaries, where competition can be even fiercer than it is outside. Decentralization, matrix organizations, cross-functional teams, and quality improvement all require companies to work across internal boundaries, another form of co-opetition. Co-

opetition combines the concepts of competition and co-operation. On this project teams co-operate, while they still compete in other arenas. Manufacturing sites and support groups, such as packaging engineering, used to compete and cooperate (sell the service) for new development projects.

Today, due to the reduction of resources, there is no more competition, and co-opetition has been transformed into co-operation, coordination and co-evolution. Competency has to be shared to reside wherever it is needed. There is no longer any reason to lack responsiveness or to not take full advantage of global efficiency.

Goal of this thesis

The goal of this thesis is to propose to OPCorp's management a new way to spread competencies throughout the corporation, in order to use more efficiently the capabilities that the different packaging engineering groups have been developing through the years in response to manufacturing and field needs. With downsizing and restructuring there is the opportunity to create a new way of working without centralizing the information, knowledge and learning. The goal of the thesis can be summarized by answering the following three questions:

1. The "what": what does the company need to survive this competitiveness crisis?
2. The "which": which are the strategies that the company needs to implement to become adaptive?
3. The "how": how can the company reach these capabilities?

What:

What does the company need to survive this competitiveness crisis? "Adaptation is what drives increasing return business, not optimization" [8]

[8] Arthur, W. Brian, "Increasing returns and new world of business", Harvard Business Review July-August 1996)

Companies have traditionally been viewed as machines or mechanisms that produce profits; investors feed money into them, managers pull some strategic levers and employees work hard to produce the product or service that customers demand. Those are frequently the three elements that every company considers when laying out strategies and plans: stockholders, employees and customers. The traditional management theory comes from the old deterministic theory; it is the mechanistic "scientific management." However, if those are the three main elements in a business, then why is the company not considered a "living form" instead of a mechanism? A company is a community organized for a certain purpose, an alternate model of the corporation is as a living entity.

Self-organization is the tendency of living things that work for a common purpose in the absence of a central organizing force. In nature, some cellular forms cooperate to form higher level organism. Natural selection is the mechanism for further evolution.

The theory of Complex Adaptive Systems (CAS) postulates[9] the creation of new life forms through self-organization, followed by refinements induced by natural selection. CAS is based on the principle that adaptation is more important than optimization. Adaptation is the ability to respond to environmental stimuli. For a company, adaptation means the ability to utilize the emergent order to alter actions that are essential for the organization to survive in a complex socio-economic ecosystem. It mainly resides in the ability to make local changes without depending too much on a slow centralized controlling entity.

In an adaptive system, the interdependent elements are characterized by the following:

- Interaction creates an ecosystem;
- Interaction is defined by the exchange of information;
- Individual actions are based on some system of internal rules;
- Self-organization uses non-linear ways to produce emergent results;
- It exhibits characteristics of order and chaos that evolve over time.

The Adaptive Management Model (Leadership-Collaboration) focuses on forging an adaptive culture that identifies adaptive practices, such as faster learning through iteration and concurrency existing in distributed work groups with high rates of change, collaboration and management of results.

[9] Highsmith III, Jim, "Adaptive Software development, Collaborative approach", DH Publishing Co., 2000

Some of the operational principles of an adaptive system are[10]:

- Working outside one's comfort zone
- Identifying the adaptive challenge
- Maintaining healthy levels of stress
- Focusing and creating a sense of urgency
- Not feeling compelled to come to the rescue and provide all the answers
- Staying the course through leadership
- Mobilizing people through communication
- Creating a learning obligation

The "Which", Becoming Adaptive: The Transnational Model.

Which are the strategies that a company needs to implement to become adaptive?

In order to become adaptive, it is necessary to understand the emergent order. Then the question is, what are the key capabilities required in the new order of the socio-economic ecosystem? According to Bartlett, [11] there are three strategic capabilities required for companies to survive during the 21st century:

- Global efficiency;
- National responsiveness;
- Worldwide innovation, knowledge transfer and learning.

These capabilities resemble the "transnational capability model."
None of the traditional operating models of doing business will work as effectively in the near future as they did when they were created. Whether the company follows a global, international or multinational operation mode, it will need to adopt some form of emergent operation mode to overcome the competitive crisis that many industries are experiencing.

The characteristics of the traditional operation modes are:

- Multinational: Typically practiced by European companies, it is focused on building a strong local presence through sensitivity to local markets and national responsiveness, a decentralized federation operation mode.

[10] Duarte, L Deborah, Mastering Virtual Teams, Jossey-Bass Publishers, 1999
[11] Christopher Bartlet and SumantreGhoshal, Managing Across Boundaries, Harvard Business School Press, 1998

- Global: Typically practiced by Japanese companies, it is focused on building cost advantages through centralized global-scale operations, a centralized hub operation mode.

- International: Typically practiced by American companies, it is focused on exploiting the parent company's knowledge and capabilities through worldwide diffusion and branch expansions, a coordinated federation operation mode.

Companies with a strong operation mode heritage in one of these modes are struggling to enter new markets, to expand globally or to maintain positive growth.

The transnational mode is a new management model that is based on the simultaneous development of strategic capabilities: global efficiency, national responsiveness and worldwide innovation and learning.

Strategic capability	Organizational Characteristics	Management Task
Global Competitiveness	Dispersed and Interdependent assets and resources	Legitimizing diverse perspectives and capabilities
Multinational Flexibility	Differentiated and specialized subsidiary roles	Developing multiple and flexible coordination processes
Worldwide learning	Joint development and sharing of knowledge	Building shared vision and individual commitment

Fig. I –1 "Building and Managing The Transnational Model", Source: Managing Across the Borders, Christopher Bartlett and Sumantra Ghoshal.

Some attributes of the transnational operation mode are:

- An integrated network configuration
    - Specialized operations
    - Interdependent relationships
- Differentiated organizational roles and responsibilities
- Management of multiple organizational processes
- Internally consistent organizational system
- Balanced capabilities

- Development of flexible coordination processes

	Old Order			Emergent Order
Organizational Characteristics	**Multinational**	**Global**	**International**	**Transnational**
Configuration of assets and capabilities	Decentralized and nationally self-sufficient	Centralized and globally scaled	Source of core competencies centralized others decentralized	Dispersed, interdependent (*) and specialized
Role of overseas operations	Sensing and exploiting local opportunities	Implementing parent's company strategies	Adapting and leveraging parent's company strategies	Diffrenciated contributions by national units to integrated worldwide operations
Development and diffusion of knowledge	Knowledge generated and retained within each unit	Knowledge developed and retained at the center	Knowledge developed at the center and some is transfered overseas.	Knowledge developed jointly and shared worldwide

Fig. I – 2 Organizational Characteristics of Transnational, Source: Managing Across the Borders, Christopher Bartlett and Sumantra Ghoshal

The chart above shows the comparison of some of the characteristics of each of the operational modes.

Once the "transnational mode" has been identified as the emergent order, the required capabilities have been defined and the next step is to establish the enablers required to develop such capabilities.

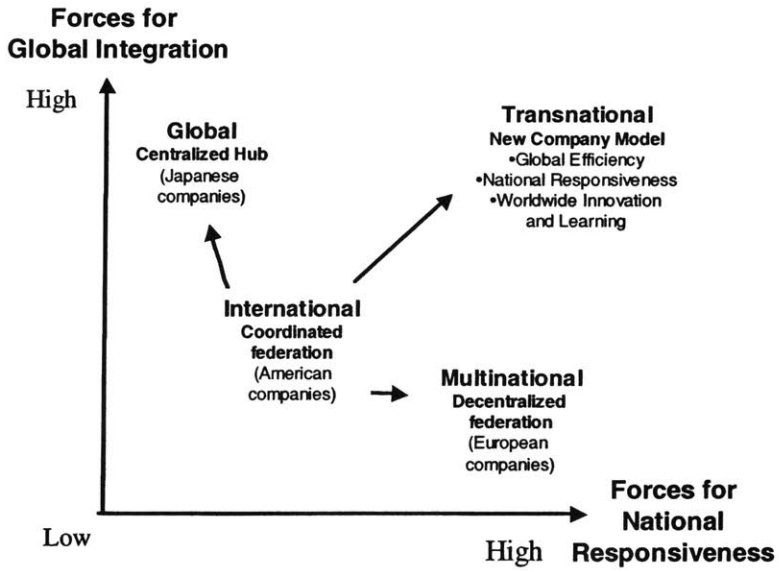


Fig. I – 3 Integration and Responsiveness Matrix, adapted from Application Handbook of Managing Across the Borders by Christopher Bartlett and Sumantra Ghoshal.

How:

How can the company reach these capabilities? Information networks are the key of the new transnational model.

Today, networks co-exist with bureaucracies and hierarchies[12]. They make life easier because they don't carry the costly administrative overhead of bureaucracies or the slow-moving top-down control of hierarchies. Along with networks, virtual teams have emerged as ways to innovate across distances. As information and communication technologies advance over the next few years, enabling real-time video conferencing, virtual teams will tend to become almost real, as team members will be able to see each other in real time and work on the same documents using all the normal social cues. Where differences in time and space prevent teams from coming together in real-time, technologies will enhance this virtual environment as well. Teamwork rules will be adapted to enable remote interactions to work together anytime and anywhere. To work smarter, virtual teams need to build explicit models with common categories and the right relationships.

The hypothesis:

The development of transnational capabilities is the answer to the competitiveness crisis that OPCorp is experiencing, and Transnational capabilities can be deployed through the implementation of a network of linked and interdependent teams that will operate under the virtual teams' principles to exercise their specialized competencies and deliver efficient global results, with responsiveness and knowledge-sharing for common learning.

The methodology:

This thesis focuses on taking a business-operating model that follows a specific strategy plan and enabling it with technology. This thesis is different from other projects on dispersed teams because it is focused on a long-term operating mode with long-term relationships among the members of the competency network, with the goal of creating new competencies such as efficiency, responsiveness and learning. This is not a study of project-based process.

[12] Lisa Kimball, Managing Virtual Teams, Team Strategies Conference, Federated Press, Toronto, Canada, 1997

The methodology followed to complete this work was as follows:

- Literature research was performed to discover the state of the art in business strategy where the adaptive models and transnational capabilities were identified as the key goals for the next generation of companies. The state of the art was identified for virtual teams and networked dispersed groups.

- Field research was conducted using survey and interviewing tools. There were three different surveys, depending on the type of information that was required for the study: one for top managers, one for packaging managers and one for packaging engineers. The objectives and target for each of the surveys types were:

    - Top management:

        - Knowledge of driving forces of the office equipment industry;
        - Knowledge of the driving forces that define strategy for the company;
        - Knowledge of the competitive advantage and key transnational competencies of the competitors;
        - Knowledge of the key transnational competencies of the company;
        - Opinion about the key transnational capabilities for a turnaround of the company;
        - Opinion of the strategic sequence for restructuring the company;

    - Packaging Group Managers:

        - Structure of the packaging group;
        - Group's competencies inventory;
        - Information flows and communication links;
        - Obstacles to information flows;
        - Roles and responsibilities inventory.

    - Packaging Engineers:

        - Years of experience;
        - Background;
        - Skills inventory;
        - Information flows and communication links
        - Obstacles to information flows.

- Field experts' opinions were gathered to find answers to problems with virtual teambuilding and trust development without any face to face interaction opportunity.

- Diagnosis:

  A summary of the surveys was prepared to diagnose the top management's knowledge of the driving factors of the industry, the driving factors of the company's strategy and the competencies required for the company to start the recovery from the competitive crisis. Another diagnosis of the packaging group's competencies and communication practices was prepared to evaluate the roles of the groups in the network and the capability level to start working in a virtual communication system.

- Proposal:

  At the end, using a systems engineering and organizational approach, all the theoretical principles are combined with data gathered from the diagnosis to propose the architecture required to create a new competitive model of operation: a transnational competency network.

SDM Principles, Processes and Tools

Socio-technical systems are the main focus of System Design and Management practitioners. This kind of system combines technological and human elements. Such elements cannot be managed separately; therefore, there is a need to apply systems engineering and organizational strategy tools jointly.

This thesis applies principles of systems architecture, such as a holistic view, to consider the context surrounding the system such as the market, competitors and business strategies, as well as the interactions and links of the related elements inside the system itself. It requires an iterative approach to eliminate ambiguity and reduce complexity, and it requires creativity in using new methodologies to facilitate the definition of architectures to consider the technology limitations and the human factors of virtual teams as socio-technical systems.

Systems engineering processes were followed to define high level specs, decomposition, modularization, critical parameters definition, interface management, integration and validation, as required to design or redesign such systems. However, the most important element of socio-technical systems is people. Therefore, methodologies to define the vision,

goals, performance metrics, incentives and culture are extremely important to assure the desired outcome from the system.

Technology strategy tools such as the "S" curve were used to evaluate the technology maturity of virtual teams.

Expected Results

The intent of this study is to show the linkage between an organizational strategy and the deployment of technology and processes blended in a new way to work: virtual networked teams. It tries to demonstrate to top management that it is a feasible option to improve operations if implemented properly.

It is prepared as a summary of principles to apply and a reference guide for all the members of the Transnational Packaging Competency Network when the initiative is implemented.

It is the first attempt at the implementation plan for restructuring the Packaging Competency Center at OPCorp. Feedback and comments to improve it are welcome from all the people that are involved with this topic.

Chapter Descriptions

From the system architect's perspective, the problem is analyzed from the level of strategic perspective to the level of component's interface. In Chapter 1, the transnational strategic capabilities are analyzed with the input of top management members. A diagnosis of the existing competencies of each packaging group is performed to identify the overlapping capabilities and gaps with input from packaging managers and engineers. Based on this capability mapping, in Chapter 2, the strategy is matched with the goals and functions required to transform the international model of the company into a transnational one, creating a functional abstraction of the system.

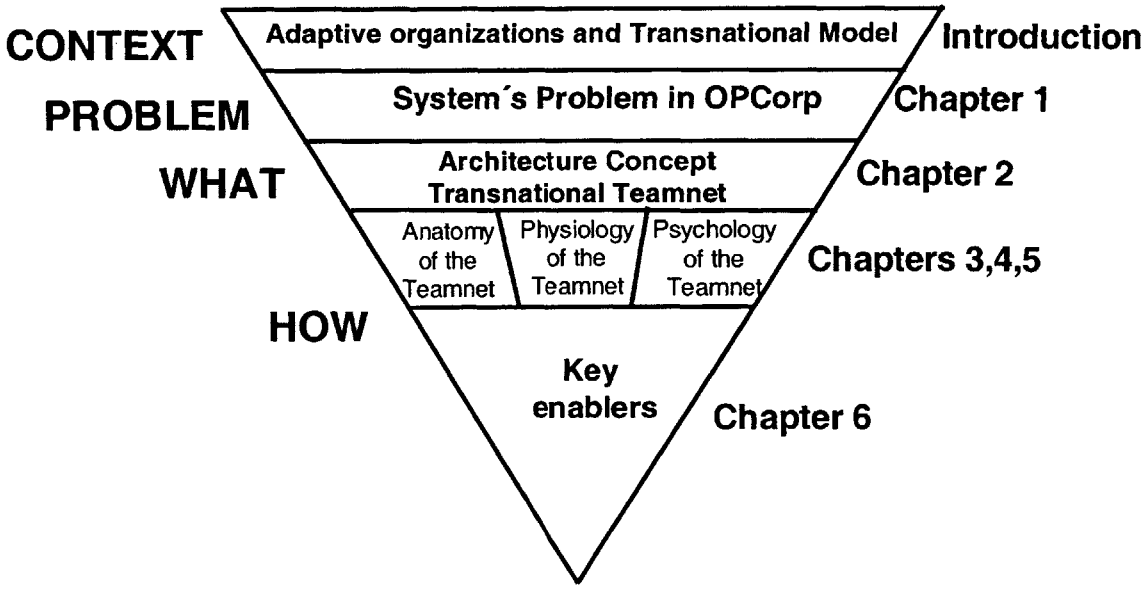


Fig. I – 4 General Structure of the thesis.

Once goals and functions are aligned, in Chapter 3 the anatomy of the model is studied and the architectural concept of the transnational network is described, based on the operation principles of virtual teams. The architectural abstraction is decomposed to define the basic elements and the formal regrouping of them. In Chapter 4, the linking mechanisms, what Bartlett and Ghoshal call the physiology of the system, such as interfaces and processes are established. An information exchange model is identified during the product design life cycle; this model enables the identification of information flows and interactions among the packaging groups and the external customers in order to start laying out the mechanisms for sharing information in a more efficient way without overloading the members of the transnational network while maintaining the visibility of the relative importance and urgency of communication. At the end of the architectural process, Chapter 5 shows how the strategic alignment mechanisms are established through metrics redefinition, the creation of a new cultural model that is reinforced by an incentive system to foster cooperation among the dispersed teams.

In Chapter 6, key enablers are highlighted in a summary of the process followed to build the architecture of the new transnational model for the packaging competency network.

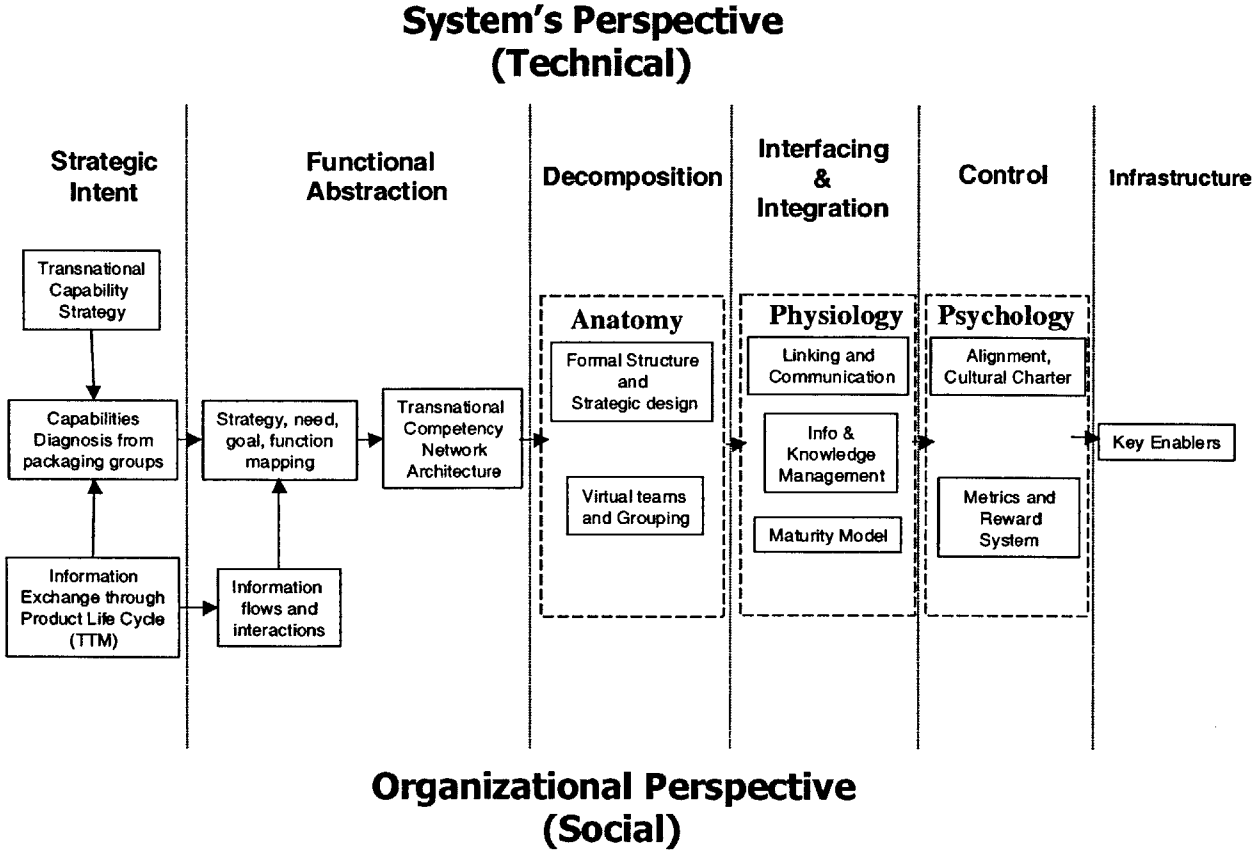


Fig. I – 5 Socio-Technical approach of the thesis structure.

1. Context and Strategic Intent

"The architect defines the boundary of the "closed system" which constitute the design of the system and its implementation process, interprets corporate strategy and defines the functions required to achieve the goals."[13]

This chapter explains the current strategies and objectives of the company, the current formal structure of the Packaging Organization at OPCorp, the problems and challenges that this organization is facing in achieving the company's objectives and a three level diagnosis that is elaborated to achieve the following goals:

a) 1st level: Identify the strategic thinking of top managers with respect to the transnational capabilities required to trigger the company's turnaround.

b) 2nd level: Identify the specific competencies of each of the existing packaging groups, gathering information from the four Packaging Managers from the USA, Europe, Mexico and Brazil.

c) 3rd level: Identify the information flows and existing barriers that engineers themselves identify as making it difficult to set up a virtual team environment.

The information was gathered through a survey. Three groups of people, (top managers, packaging engineering managers, and engineers) received their own survey focused on strategic capabilities, competencies and communication links.

The diagnosis will help to understand gaps between present and required strategic capabilities based on a transnational operation mode. It will contribute as well, to understanding what the specific competencies of the packaging groups are, and it will show current practices for communication among the groups and the main barriers to transforming this communication practice into a coordinated structure for knowledge transfer, innovation and cooperation.

1.1. Company Heritage: International operation mode

In terms of Bartlett and Ghoshal ; models presented in the previous chapter, OPCorp evolved as an "international" company, with most technology developed at the center, but with some competencies distributed across locations[4] (see Table I – 1). In general terms, there is a centralized location that dictates the strategies, goals, metrics and processes that should be followed or reproduced in every OPCorp office around the world. In this particular case, the Packaging Organization is distributed throughout the world: USA, Canada, Mexico, Brazil, England and the Netherlands. Most of the processes, standards and specifications are dictated by the USA and England.

1.1.1. Strategic intent and context

In the last couple of years, the OPCorp has experienced one of the worst crises of its history. Nevertheless, its strategic intent to maintain its reputation and market domination has been demonstrated through the implementation of a set of product/market strategies that will allow the company to grow in the "digital color" segment while expanding the business into new arenas such as the "document management" market.

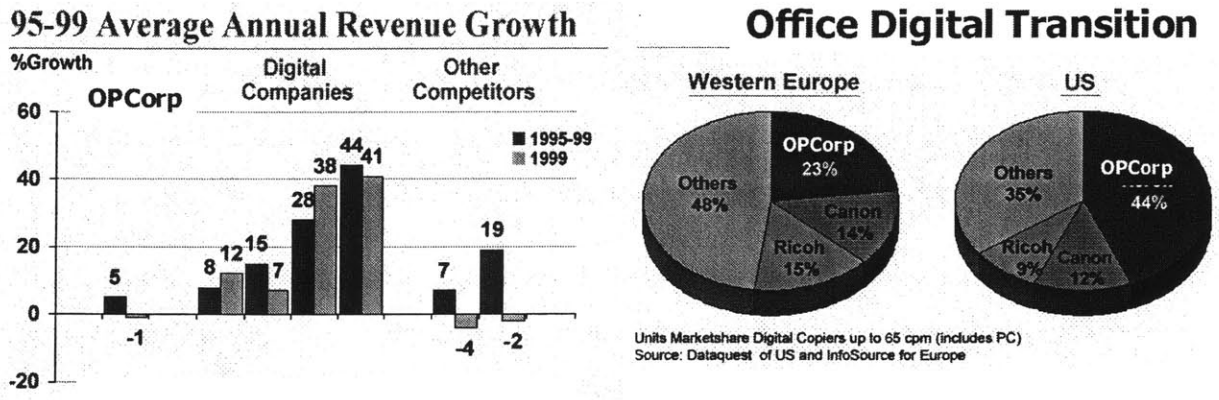


Fig. 1 - 1 OPCorp's Revenue and Market Growth

[13] Crawley, Ed; Systems Architecture notes, 2000, MIT

1.1.2. Company Goals:

Some of the corporate operating strategies have been linked closely to customer loyalty and business operating efficiency. These operating strategies are reflected in the two most important goals for the company this year: customer satisfaction and cost reduction.

The intent is to recover customer preference that was lost due to a restructuring activity that was deployed ineffectively. In 1999, OPCorp tried to increase the focus on customer needs. The CEO, in charge of the company at that year, decided to restructure the company from geography to a customer orientation. The strategic intent behind it was to reduce the number of interfaces with the customer; complete office management solutions instead of isolated product offering. The original idea was extremely valuable to re-gain customer satisfaction but unfortunately, at the time the plan was implemented, a lack of coordination for the creation of the new competencies, training, and responsibility transition, caused some holes in critical areas such as order taking, invoicing and service. Since revenues decreased due to the loss of actual sales, operating costs had to be reduced to help the generation of cash. Actions aimed at increasing revenue and cash flow have been strictly executed. Assets and some other resources have been sold and non-vital activities have been outsourced. Constant analysis of processes to identify new cost reduction opportunities is being applied. The packaging function is being analyzed as a potential area to be outsourced. However, this study will explain some of the risks of implementing such an initiative without maintaining a minimum level of in-house packaging competency. Many companies have outsourced completely some competencies considered non-core, loosing entirely the coordination of such activities with the in-house competencies because there is nobody left in the company with enough knowledge to interface and coordinate the linked tasks. This study will present some other options to achieve operation efficiency and cost reduction.

1.1.3. Current Organization Structure

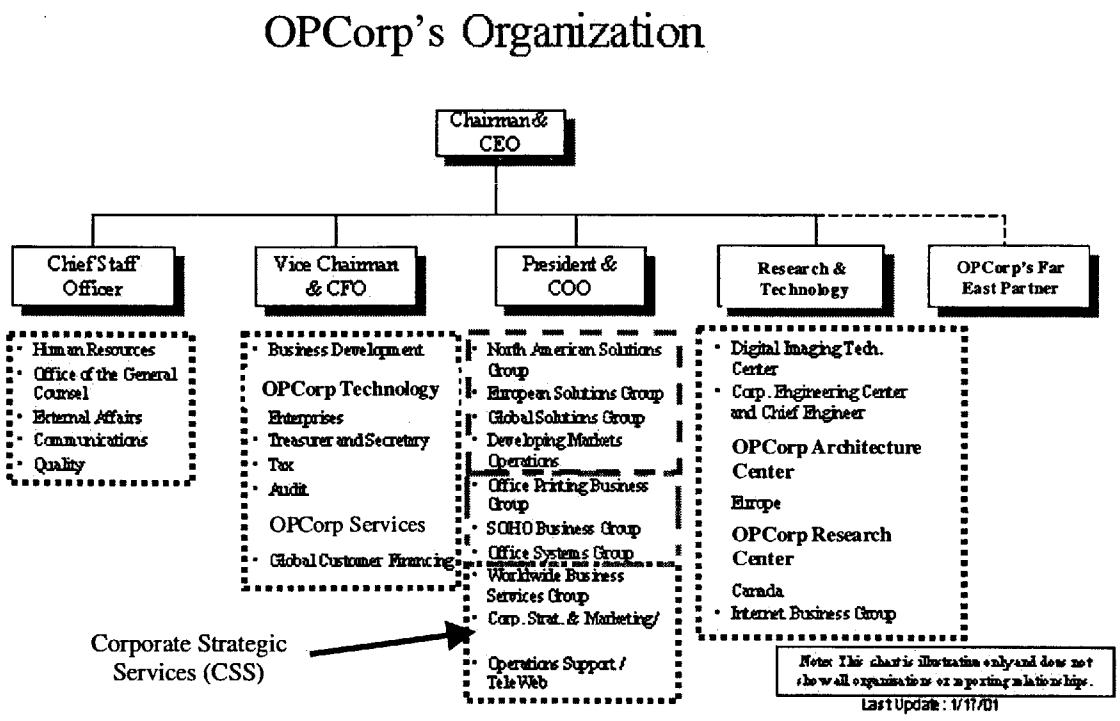


Fig. 1 - 2 OPCorp's Organization Chart

The company has a hybrid structure geography-functional-market. The chart above shows the functional groups inside blue dotted blocks; the geography-based groups are marked with a green dashed block and the market focused groups with an orange dashed block.

Reporting to the Chief Operating Officer (COO) is Corporate Strategic Services (CSS), pointed out by the arrow; this organization includes Global Purchasing, Manufacturing and Logistics for each market region (Developing Markets, Europe and North America) and other support organizations such as Industrial Design and Safety.

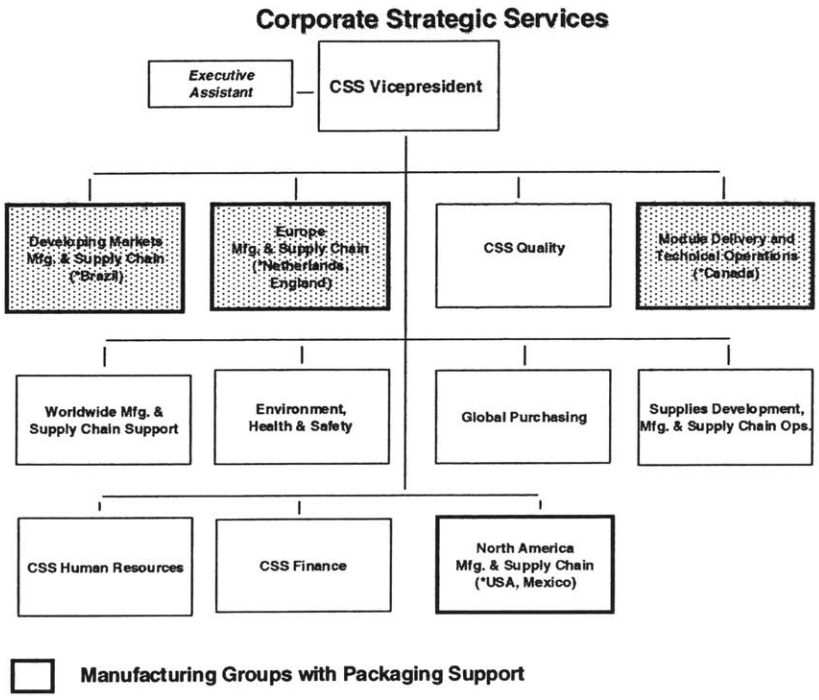


Fig. 1 - 3 Corporate Strategic Services Organization Chart

Within CSS is Module Delivery and Technical Operations, which includes the Manufacturing Technology Group, to which packaging engineering teams report in a dotted line since they belong officially to the manufacturing sites and support the product development teams (PDT).

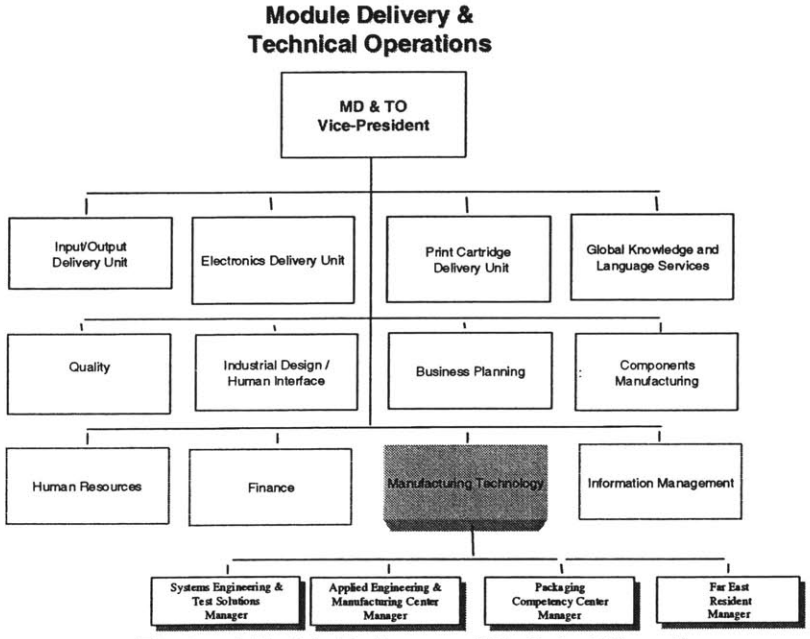


Fig. 1 – 4 Module Delivery and Technical Operations

This Manufacturing Technology Group holds the Packaging Competency Center, which regulates and sets standards for the packaging function in the corporation.

The Packaging Competency chart below shows how the manufacturing packaging groups (bottom-left corner) are considered partners of the "Packaging Competency Center." As a matter of fact, the chart represents the structure of the USA packaging group, where the Packaging Competency Center physically resides. The USA packaging group is formed by five different teams (IOT/spares, 3R´s, Container Engineering, CRU and FSS, and Design Engineering). They support different organizations such as the Print Cartridges Delivery Unit (PDCU) and the Supply Chain Services for the North America group (NASCS). There are dedicated people to work with those organizations. The chart explains the "centralized" nature of the operations and processes of the Packaging Competency Center.

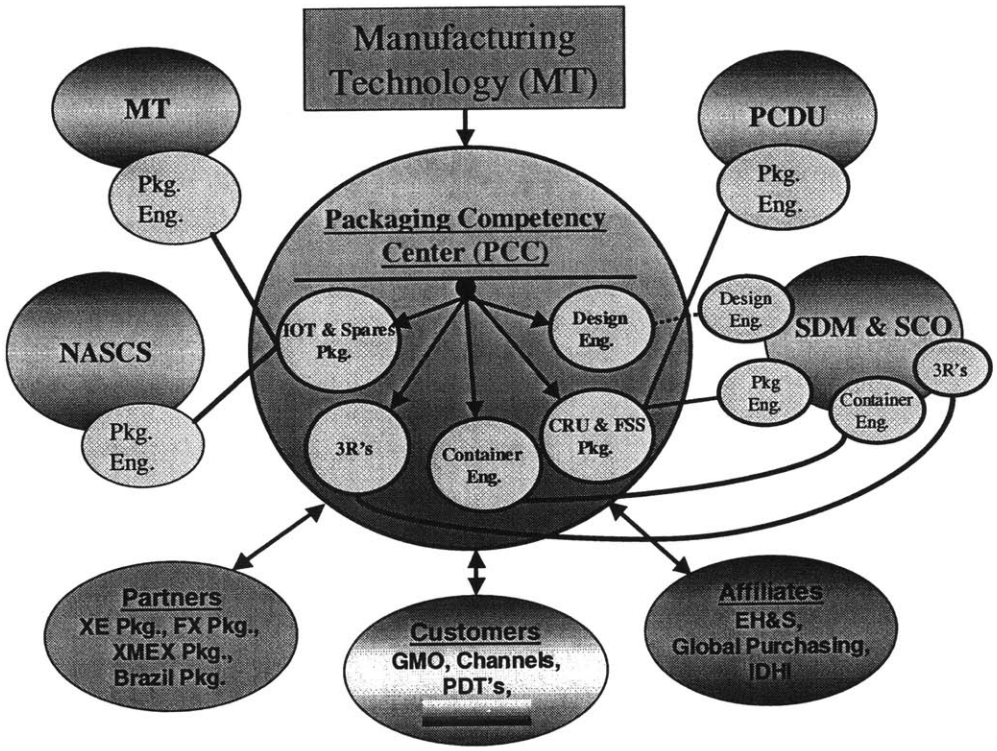


Fig. 1 – 5 Packaging Competency Center Structure

Centralized Operations

Only two packaging sites, USA and England (OPCorp Europe), are authorized to release designs and approve changes for existing packaging designs and configurations. All the "official" designs and authority are centralized in these two sites. The rest of the sites, Netherlands, England, Brazil and Mexico, have to request support or at least authorization to issue new designs or any improvement changes to existing designs or processes. These sites are the centralized authorities for the packaging activities in the corporation.

Thus, USA Packaging Engineering Group (USAPEG) and OPCorp Europe Packaging Engineering Group (EPEG) are the only groups dealing with the support to Product Development Teams (PDT) for new product designs. On top of product development support, these two groups have to provide "continuing" engineering support to the other packaging groups (at Netherlands, Mexico and Brazil) at the manufacturing and service operation locations. From the view point of thegroups outside the two centers, the two central groups face serious problems of overload, making difficult a timely response to field quality problems or cost reduction opportunities that have to be explored to make more effcient the supply chain operation.

1.2. Current Organizational Capabilities

In order to determine if current capabilities match the corporate strategies of the company, this work, using an "architectural" approach, will define the main functions that the packaging engineering groups are performing for the corporation. Then it will describe the current structure of the groups to finally show the results of the survey in which capabilities inventory data was gathered from each location to identify the resources, group competencies and personal skills, experience and abilities of the individual engineers on each packaging team. In addition to this competency inventory, an information flow analysis is presented, and a communication link practice summary along with a communication barriers analysis is shown.

1.2.1. The System: Packaging Organization at OPCorp

Every organization requires a strategic direction to link the detailed activities to the main goals of the company. The following mission and vision, set by the Packaging Competency Center, provide this strategic direction for the packaging organization.

Mission:

The Packaging Organization will deliver robust packaging solutions meeting Quality, Cost, Delivery and Environmental (QCDE) goals for new OPCorp products and provide ongoing support for all installed products.

Vision:

The Packaging Organization will be viewed as the experts and knowledge base in innovative design, testing and standards for packaging for all OPCorp products.

Functions:

- Design and document packaging solutions to protect OPCorp products for the customer during the distribution cycle.
- Domesticate packaging design to enable global, cost competitive responsiveness to local market requirements as well as environmental goals and commitments.
- Test and approve packaging solutions for distribution channels that Integrated Supply Chain (ISC) will use to deliver products to customers.
- Provide ongoing support to manufacturing and service for all installed products.

The functions listed above are performed for the different products that OPCorp sells, including consumables such as paper, toner cartridges, copy cartridges and ink cartridges; accessories such as high capacity feeders, automatic document handlers, sorters, and finishers; and machines from personal copiers to high volume copiers and printers.

1.2.2. Structure and Architecture of the Packaging Organization

The primary structure of the packaging organization is oriented by geography-product-customer. There are four main packaging team locations in the corporation that support operations geographically: U.S.A., England; Mexico; and Brazil. The USA and Mexico teams are groups whose members are co-located on its own locations; the European and Brazilian teams are distributed teams, as all their members are located in different buildings or cities. For instance, the European team has some members of the group located in England and other members of the team located at Netherlands, each of them supporting the activities at the manufacturing plants and providing assistance to the product development centers.. The Brazilian team has members distributed among the commercial division at Sao Paulo and the two manufacturing plants in other zones of Brazil.

Each team is meant to support at least one manufacturing facility. Each group is organized internally to support families of products such as system assemblies (machines), customer replaceable units (CRU) and spares. Each family of products has different customers that require packaging services, such as, the light-lens division, the digital business unit, the color business unit, the compatibles division, the "soho" business unit (small office/home office) and others.

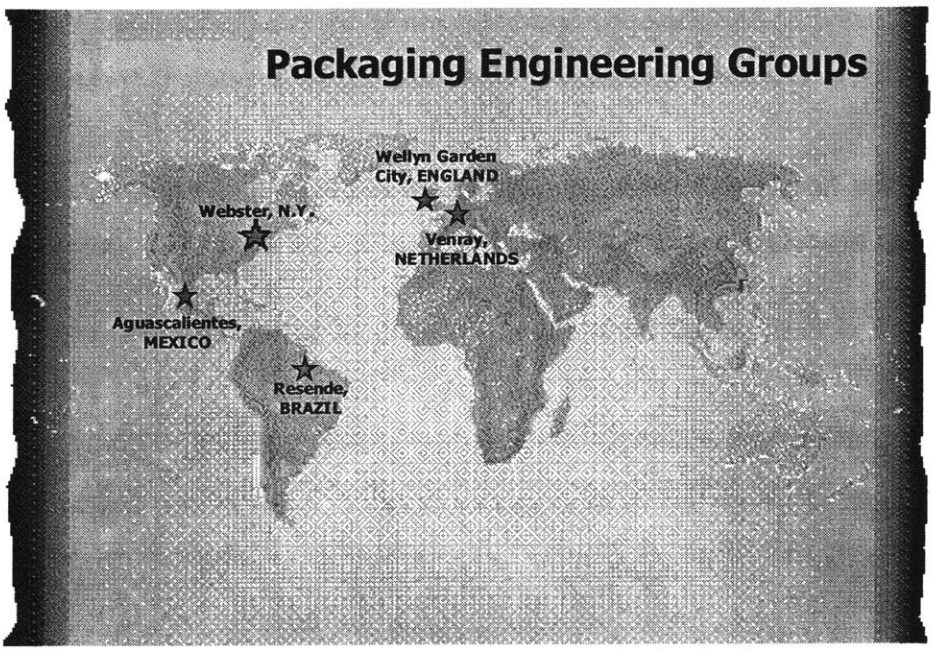


Fig. 1 - 6 Geographic Distribution of Packaging Groups

There is no formal reporting structure. However, the American and the English groups very often lead the activities of the packaging community since they define the "clean sheet" or new designs for new products. Groups in Holland, Brazil and Mexico have to keep as much as possible of the original design configuration when products are transferred to their manufacturing locations. If any change is required, a formal process of change request has to be initiated and sent to the original owner of the design in the USA or England. This process sometimes takes too long and does not provide the response required at the manufacturing site or service field.

The communication channels for interaction are limited to telephone, fax and e-mail. There are no common repositories of information shared by all the groups. The USA and England groups have some intranet sites with some data related to specifications of some packaging components and project status, but none of the different clusters of information is kept up to date. The search for information greatly depends on personal contacts and previous experience. That is, not all the information is available, and the available information is not always updated. This situation makes it very difficult for the other groups, such as Venray, Brazil and Mexico, to get the information needed to operate efficiently when domestication of materials, cost reduction opportunities or field problems arise.

There is a periodic teleconference meeting held by the Packaging Competency Center, led by USAPEG, to discuss processes and standards. This meeting happens every other month for approximately one to one-and-a-half hours. The conversation and information processing is maintained at a high level to discuss topics of general interest; it is not meant to process issues from every single project that each group is working on.

There is a lack of formal processes to communicate, process information and resolve problems when more than one site is involved. There are no formal interface mechanisms to share information, respond in a timely manner or solve problems from a distance.

1.2.3. Components of the System: The Packaging Engineering Groups

USA Packaging Group

This packaging engineering group is considered the central entity that leads the packaging organization as the Packaging Competency Center. It is primarily in charge of designing packaging solutions for new products developed in America, no matter what other markets are also targeted. It supports all new product development from consumables to entire printing and copy systems. At the same time, it provides support to the USA manufacturing operations. It is the owner of most of the standard processes used in the packaging function of the corporation. It is the design authority for packaging configuration for products developed in America (USA). It is accountable for any configuration change that is required in any of the manufacturing plants that assemble a product with their specifications. USA Packaging Engineering Group leads the Packaging Council that meets periodically with other packaging groups to improve standards and practices.

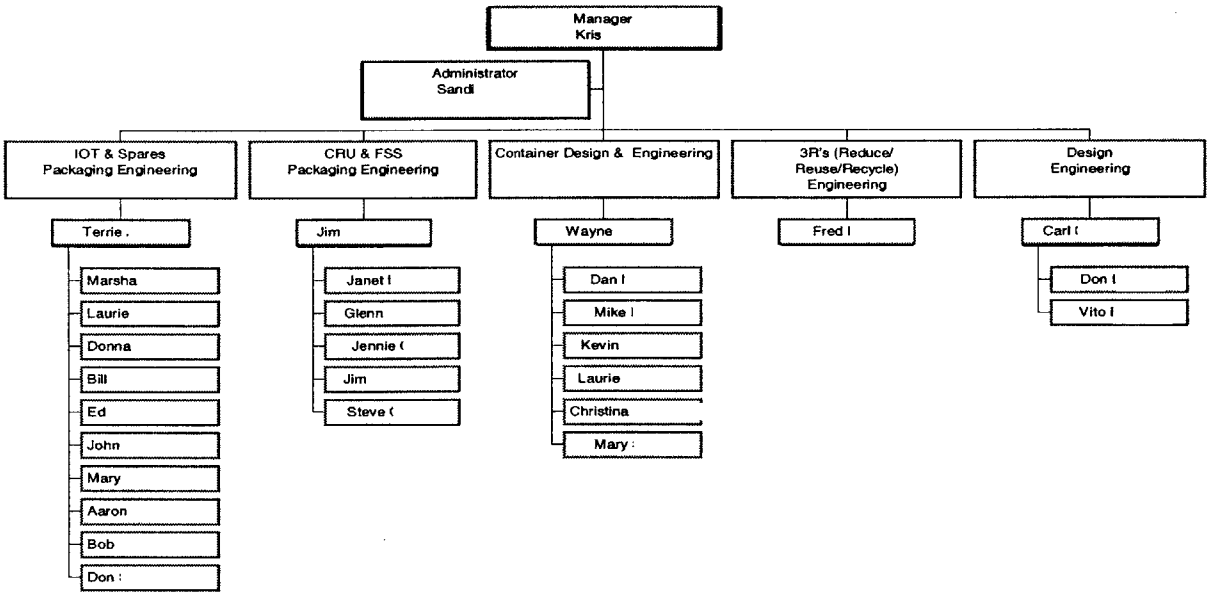


Fig. 1 - 7 Organization Chart of Packaging Group at USA

Europe Packaging Group

This group supports all the activities requiring packaging in Europe. It is an equivalent entity to the USA Packaging Group for Europe. It provides packaging design solutions to the Product Development teams in England . This group owns the designs and is responsible for maintaining configuration control of any change required by any other plant in the world that manufactures products based on their original packaging specifications. It supports manufacturing operations in Venray and Mitcheldean. OPCorp Europe Packaging Group (XEPG) is a dispersed team. It contributes to the set of standards for European packaging and it keeps the packaging community in OPCorp informed about government regulations for distribution and recycling in Europe.

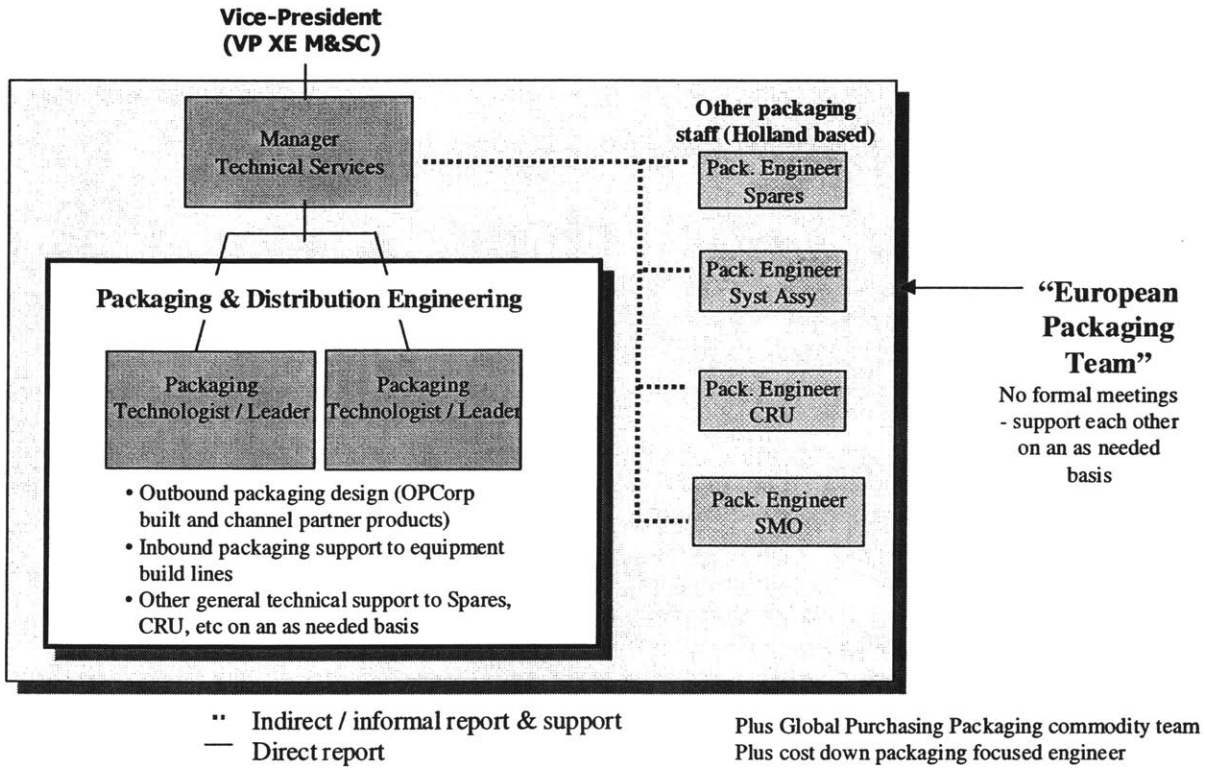


Fig. 1 - 8 Organization Chart of Packaging Group at England

Mexico Packaging Engineering Group

This packaging group was created primarily to support all the activity of product transfer to the Mexico manufacturing plant. It provides support to the re-manufacturing activity of the

plant, designing packaging solutions for products with low production volumes, such as "end of life" family lines that are no longer supported by USA or European packaging groups. It domesticates packaging configurations for Latin American markets and special requirements for Mid-East markets. It does not have authority to control the design configuration of packaging for most of the products; therefore, it constantly requests support and change authorizations from USAPEG and EPEG. However, due to the lack of formal mechanisms to follow up on change requests, sometimes local changes are implemented after being tested in their own packaging laboratory according to OPCorp's standards.

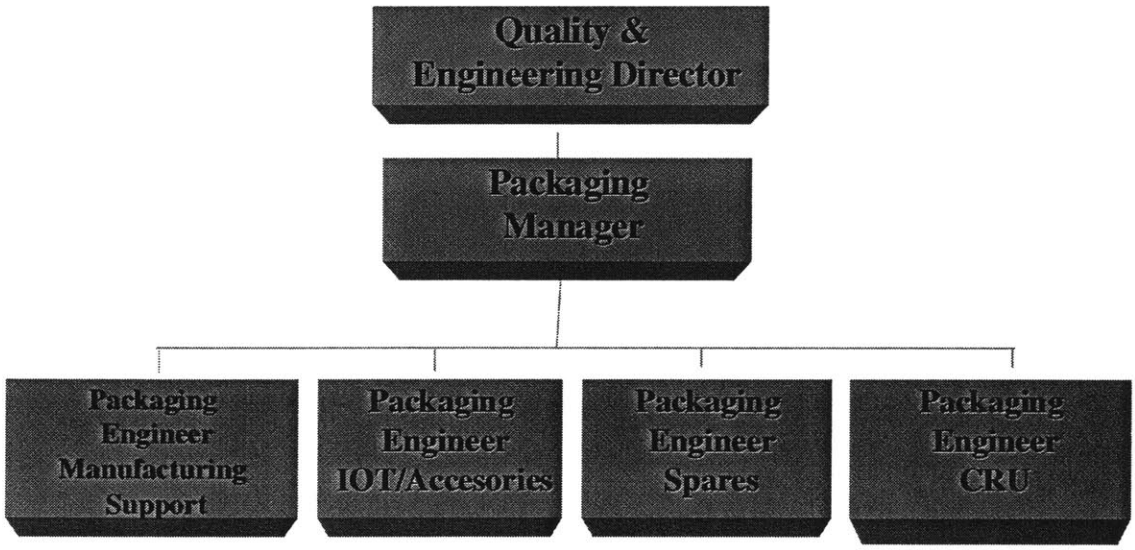


Fig. 1- 9 Organization Chart of Packaging Group at Mexico

Brazil Packaging Engineering Group

The packaging group at OPCorp Brazil is a team of dispersed members that report to different organizations. This means that they don't have a formal structure to provide packaging support as their main activity. Buyers, manufacturing engineers and field service engineers that are located in three different locations (Sao Paulo, Resende and Manaus) form the team. There is no formal organization chart, although they provide support to new manufacturing programs, on-going manufacturing and re-manufacturing like the other packaging groups described above.

1.2.4. The Functions of the System: Competency Inventory

Competency assessment is a common practice for companies that want to maintain a competitive advantage. There are several applications for competencies such as training and development, planning, and supporting organizational change efforts. In all of these areas, competencies provide the foundation of these efforts. The company will gain an advantage if it decides to invest in assessing and using competencies. Therefore, competency assessment is the bridge between strategy and management development. The main concern behind competency assessment is to determine if an organization's managers are equipped with the right competencies to carry out their jobs effectively.

The approach I will use to perform a competency analysis is the framework proposed by Galon, Stillman and Coates which suggests six stages for assessing core competencies.[14]

1st planning stage: Everyone involved has a common language and knowledge base from which to work. Packaging teams share a common language for the technical aspects of packaging design, a common language from OPCorp's Product Development Process, and basic knowledge of telecommunication tools.

2ndplanning stage: Inventories of capabilities are developed in order to determine the categories that need to be assessed. We must understand that the Packaging groups are capable of exercising all the following functions: Customer Engagement, Design, Analysis, Prototyping, Supplier Involvement, Testing and Manufacturing Support. The survey will allow us to understand better on which areas they have focused their development on through capital investment and human resource development.

3rd planning stage: This stage assesses core competencies using questions developed by experts. It translates into customer-perceived value. Areas and functions of each group will be evaluated to define which are considered strengths and which ones are better outsourced or candidates for outsourcing due to lack of competitiveness in such functions.

[14] Gallon, M. R., Stillman, H.M., & Coates, D. (1995, May/June). Putting core competency thinking into practice. Research-Technology Management,

4th planning stage: In this stage, after survey information has been gathered, candidate competencies are selected from those that were assessed as being better than the other competencies for each group.

5thplanning stage: This stage tests those candidate competencies and identifies which competencies are overlapping, which are redundant and which gaps exist where none of the groups is performing a function in a proficient manner.

6thplanning stage: This stage establishes the competencies that are not considered key and will be outsourced and the distribution of selected competencies required by geography and markets for each packaging group.

It is useful establishing some background information before applying a competency assessment:

- 1. Nature of the organization: OPCorp has a hierarchical structure, operating in a fast-moving industry where a merging of other technologies and markets is ocurring, i.e., the photographic, printing and information technology industries are merging with the photocopying industry. This is a high-tech industry, in which the pace of progress is fast and technology life cycles are short.

- 2. Purpose of competency assessment: It will serve as a basis for organizational capabilities identification and to develop plans for the management development cycle, which consists of selection, assessment, development and succession.

- 3. Several levels of the organization needed to identify competencies: The competency assessment will allow screening of middle management and engineering capabilities for operating in a virtual environment.

- 4. Definition of targeted competencies: Those related to the packaging engineering function and those related to virtual interface management in a transnational operation mode.

The survey's design itself based its principles on Wolfe's 5-step process[15] to assess competencies, and it included the following points:

1. How does the group achieve the goals? (processes used)
2. What do they do well? (capabilities, competitiveness and outsourced functions)
3. How do they work? (type of interfaces they work with)
4. How do they organize? (specific support that groups provide to different markets)
5. What skills, knowledge, and behaviors are needed in order to perform successfully? (preferred functions, communication barriers)

The actual survey for managers and engineers can be seen in Appendix A.

1.2.5. Competency Analysis

The information was gathered with two different surveys and several interviews with key people in the packaging organization. The surveys respondents were distributed as follows:

1st level: Packaging groups' competencies: four Packaging Managers from USA, Europe, Mexico and Brazil responded to the managers' survey. Two interviews were conducted.

2nd level: Information flows and communication barriers: twenty engineers from USA, England, Netherlands, Brazil and Mexico responded to the survey. Five interviews were conducted.

Evaluation Aspect	Top Management	Packaging Managers	Engineers
Capabilty Investment		X	
Group's competencies		X	
Competencies Outsourced		X	
Markets served by the packaging group		X	
Manager's role		X	

Table 1 – 1 Topics evaluated with Packaging Managers

Evaluation Aspect	Top Management	Packaging Managers	Engineers
Personal Experience		X	X
Personal Skill		X	X
Personal ability		X	X
Frequency of communication with other groups		X	X
Communication channels frequently used		X	X
Communication channels preferred		X	X
Barriers for efective remote communication		X	X

Table 1 – 2 Topics evaluated with Packaging Managers and Packaging Engineers

[15] Wolfe, M. (1998, November 4). Transitioning to a competency for pay system. Conference Proceedings of Linkage Incorporated, USA,

Processes (Commonality and Uniqueness)

Data show that the packaging function is performed with a combination of corporate processes and local practices that are not widely shared with other groups. For example, it is clear that there is a need to share more information and knowledge among the packaging teams about the local practices and the different activities in the packaging organization.

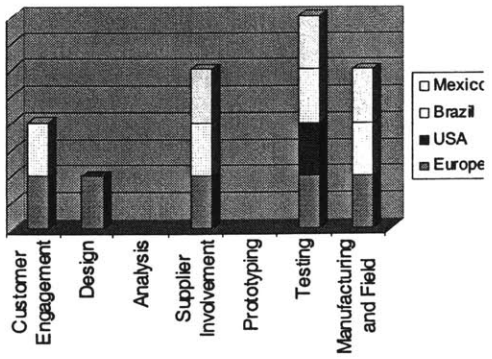


Fig. 1 - 10 Use of Std. Xerox Processes

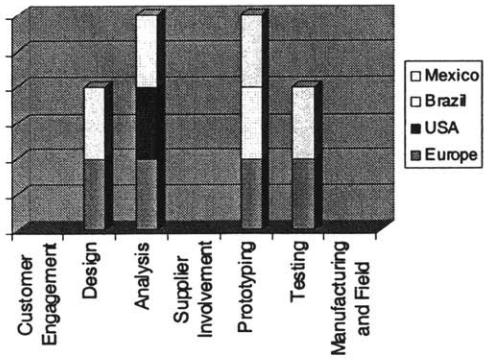


Fig. 1 - 11 Industry Practice

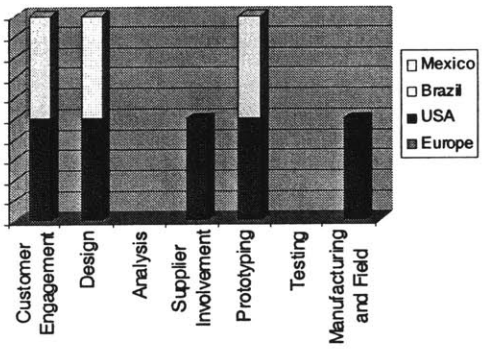


Fig. 1 - 12 Locally Generated Process

Groups' Competency

Figure 1 – 13 presents the data on capital investment, and shows that all the groups are focused on maintaining their competency in design capability, while on the other hand there is a clear effort to outsource the prototyping capability (Figure 1 – 14). Data are consistent with the self-assessment of the USAPEG and EPEG (Figure 1 – 14) about their required strengths in all the capabilities (except for prototyping) to support new programs as well as ongoing products in different parts of the world. It is important to say that USAPEG has its own packaging laboratory to do the testing of the designs, while EPEG (Europe) is stating

that they have that competency regardless of the lack of a packaging laboratory of their own. EPEG works with a local university that owns the laboratory equipment to run the test protocols.

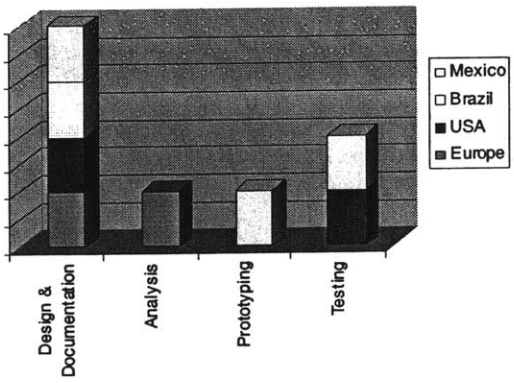


Fig. 1 - 13 Capital Investment

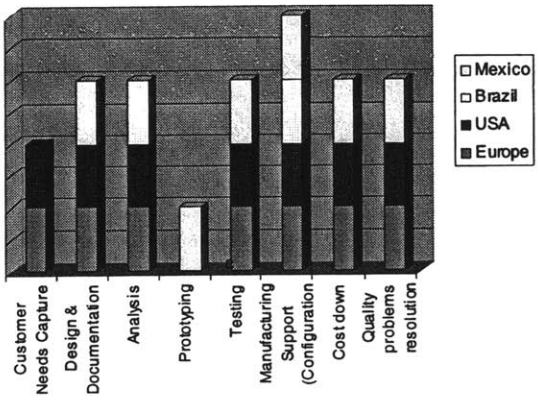


Fig. 1 - 14 Competency Strenght

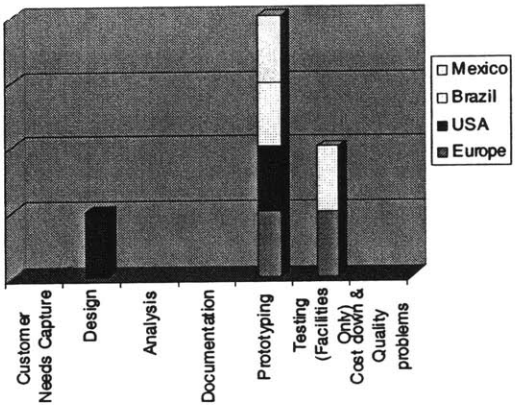


Fig. 1 - 15 Outsourced Competencies

Capabilities and Support Provided by Market

There is considerable capability overlap and redundancy in some of the activities performed for North American and Latin American markets as well as for Western Europe, while there are some unique capabilities to support operations in Eastern Europe, the Mid East and the Far East. It is clear that workload balancing is required to more efficiently support the operations in all the markets.

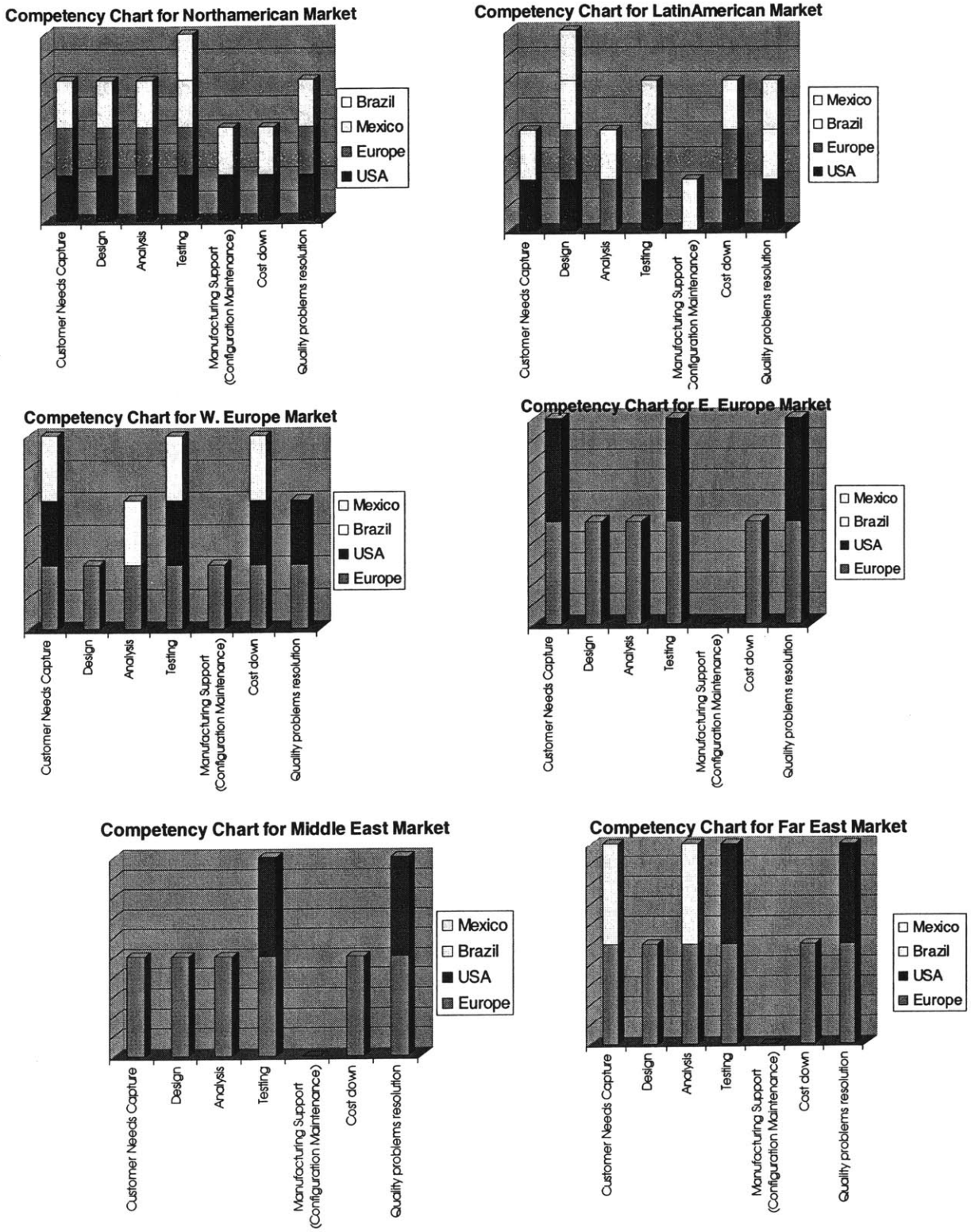


Fig. 1 – 16 Competency Charts by Region

Note that there is no manufacturing support capability shown for Eastern Europe, Mid East and Far East markets due to the fact that OPCorp no longer has manufacturing facilities in those countries. However, it is very interesting to note that USAPEG and EPEG stated that they have the capability of reducing the cost of their designs without knowing completely the materials availability at the manufacturing locations that will produce their designs, nor the local supplier capability at the manufacturing sites, outside their own regions (i.e., Mexico or Brazil).

Individual Competencies: Experience, Skills, Abilities

Individual competency is defined as the combination of experience, skills and abilities that a person has developed with training and practice.

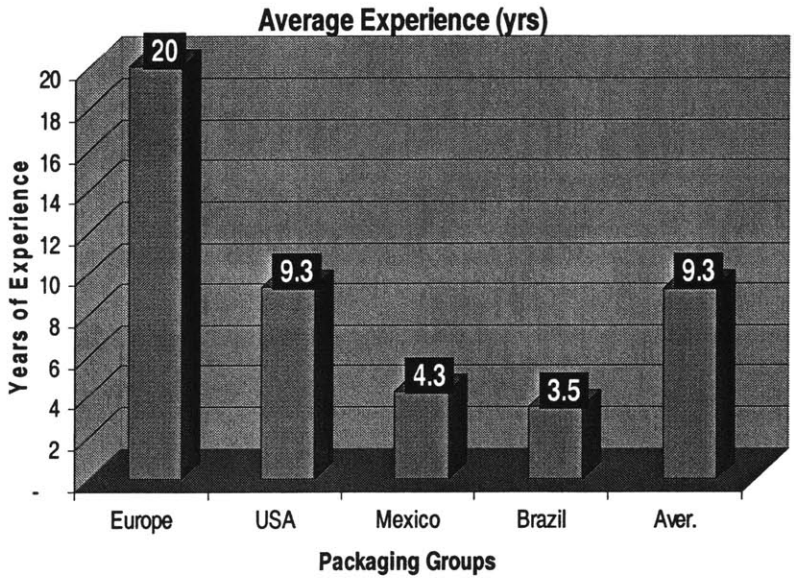


Fig. 1 – 17 Reported Average Experience on Packaging from each site.

From the data obtained from the engineers and managers about their personal experience, we found that the EPEG has, on average, the highest number of years of experience (20 years). Even though they do not have a formal education or background in packaging science, their experience in the field is even more valuable. The USAPEG has engineers with formal education in packaging science and enough experience in the field. MEXPEG and

BRAPEG are developing the skills with "on the job" training and some engineers with formal training from packaging schools such as Rochester Institute of Technology and professional societies such as the Institute of Packaging Professionals (IoPP).

Taking as a baseline the years of experience and combining them with the specific skills developed during those years, it is possible to get an idea of the knowledge accumulated in certain areas. The following chart shows a summary of the percentage of those years of experience spent by engineers on specific types of packaging.

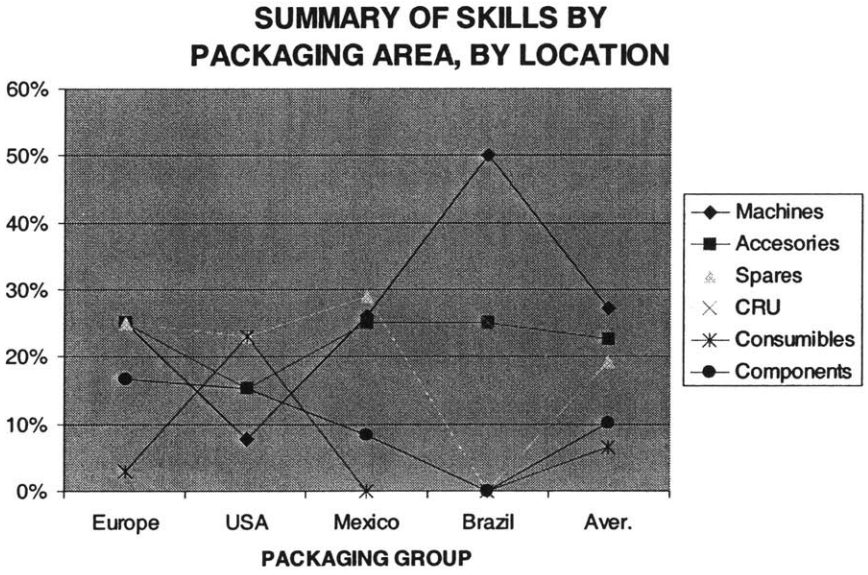


Fig. 1 – 18 Summary of Skills by Packaging Area, by Location

At the right side, the chart shows the average percentage of time spent by engineers on the different types of packaging. From the chart, an average engineer from any packaging group has worked at least 10% of his years of experience on packaging for components, around 15% on copy cartridge packaging (CRU), 20% on spares, 21% on accessories and 28% on packaging for complete systems. This is a very general statement for the whole packaging organization, and should be further analyzed to reach some conclusions about the type of competencies that each packaging group has. For instance, EPEG has a good mix of skills for the different types of packaging, except for the consumables packaging where they have very little. In fact USAPEG is the group most familiar with this type of packaging. USAPEG

has a good mix of experience in all the types of packaging required, ranging from 8% to 23%. BRAPEG has spent more of the time on packaging for machines; according to their engineers, they have not been exposed too much to packaging for consumables, components and spares. Although they have 50% of their experience in machines packaging, we must remember that they have only on average, 3.5 years of experience with no formal education in packaging science. This means that they require more support and knowledge transfer from the other groups. MEXPEG has a good mix of experience in the different types of packaging but is lacking knowledge in consumables packaging as well.

The following chart shows a summary of the abilities that engineers declared they were good at. Engineers were asked on the survey about their special abilities and preferences regarding the different stages of the packaging design process.

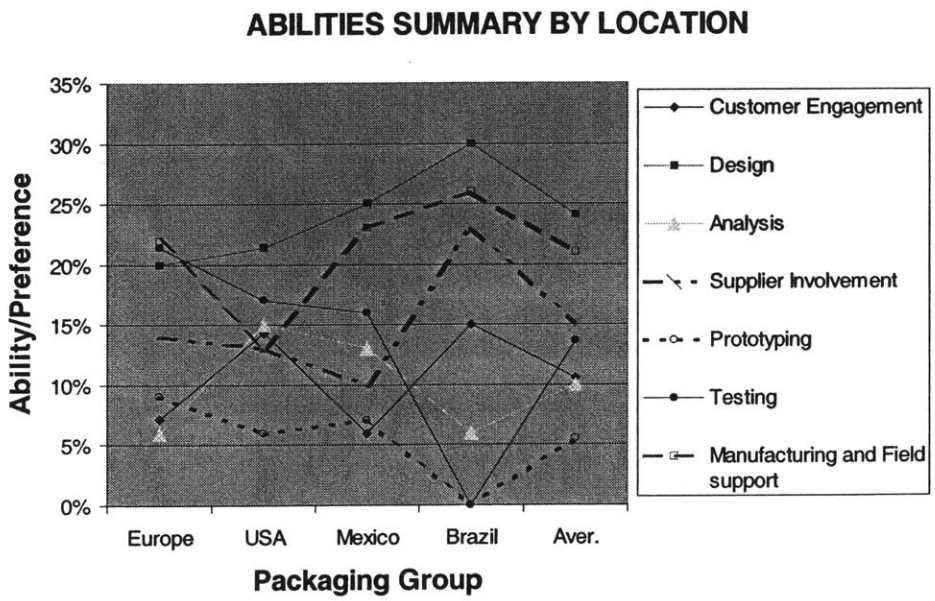


Fig. 1 – 19 Abilities Summary by Location

According to the chart data, engineers from EPEG must enjoy doing design and testing, but they do not have that preference for design analysis or supplier involvement. USAPEG engineers prefer design activity, but testing, analysis and customer engagement activities are very close in their preferences and abilities. Prototyping is the lowest item in their abilities and

preferences, which matches with the fact that they outsource the prototyping activity. MEXPEG engineers have their ability and preference concentrated on design activity and manufacturing support, followed by testing. BRAPEG engineers have a great deal of preference for design activity, but they definitely don't have too much ability or preference for the prototyping and testing activity.

The next table shows the functions with the percentages above 15% as the strongest capability within the specific group, helping to identify the abilities that differentiate the groups from each other:

SKILLS AND ABILITIES

	STRENGTH	EXISTENT	WEAK
Europe (EPEG)	Design Testing Manuf. Supp.	Supplier Involvement	Customer Engagement Analysis & Simulation Prototyping
USA (USAPEG)	Design Testing	Customer Engagement Analysis & Simulation Prototyping Supplier Involvement	Prototyping
Mexico (MEXPEG)	Design Manuf. Supp,	Analysis & Simulation Testing Supplier Involvement	Customer Engagement Prototyping
Brazil (BRAPEG)	Design Supplier Involvement Manuf. Supp.	Customer Engagement	Analysis and Simulation Prototyping Testing

Table 1 – 3 Summary of Skills and Abilities by Location

Since all the groups have a common competency strength in design, there is a question that immediately arises: is all that capability really required? To answer this question requires a brief analysis of the competencies that the packaging organization holds from each of the

packaging groups. The objective is to define how redundant or weak the whole organization's system is in terms of each of the capabilities or functions.

The following graphs and definitions show the criteria used to qualify the status of each of the functions and competencies within the packaging organization.

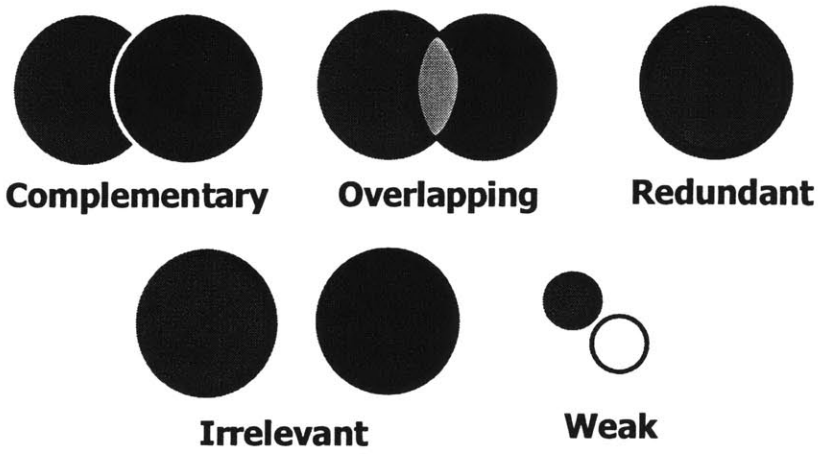


Fig. 1 – 20 Possible Relationships across Locations in Functions and Competencies

Complementary: The competency is present in more than one group, but each of them applies it to a context, customer or product that differs from the other group, which is not capable of substituting for it: for example, design competency in America will be complementary for the European packaging group.

Overlapping: The competencies of two groups are applied sometimes to the same geography, customer or product, i.e., the testing competency of USAPEG and the testing competency of MEXPEG (Mexico) may overlap for products tested for North America. In such cases the organization's system is backed up.

Redundant: The competencies of two groups are applied identically in both locations, i.e., computer analysis. This situation is only justifiable if the amount of work is enough to use fully the installed capacity for engineering analysis.

Weak: The competency is performed mainly in one site and there is no similar capability in another group that can act as a backup.

Irrelevant: The competency is not present or it is outsourced.

Table 1 – 4 provides a summary of the relationship of competencies and functions among all the packaging groups around the world. From each group (column), the highest percentages were highlighted, resulting in some interesting coincidences on capabilities and some other gaps. Therefore, there are sites that perform similar functions, such as "customer engagement", "supplier involvement" and "manufacturing support". These functions are performed for different markets and supplier groups usually located near the manufacturing location that the packaging group supports to. There are two functions that present a "redundant condition", the functions of more than one group are applied to the same markets, products and customers. "Design" and "Testing" are examples of capabilities that sometimes overlap effort and resources to resolve one specific problem. On the other hand, the "analysis" function is depending on one site's capability. This function should be reinforced. The "prototyping" function resulted again as irrelevant since no site is devoting additional resources to develop such capability and it is rather outsourced.

Competency	53%	25%	12%	9%	100%	
Customer Engagement	4%	4%	1%	1%	10%	Complementary
Design	11%	5%	3%	3%	22%	Overlapping/Redundant
Analysis	3%	4%	2%	1%	9%	Weak
Supplier Involvement	7%	3%	1%	2%	14%	Complementary
Prototyping	5%	2%	1%	0%	7%	Irrelevant
Testing	11%	4%	2%	0%	18%	Redundant/Overlapping
Manufacturing and Field support	12%	3%	3%	2.4%	20%	Complementary
Years of experience (aver.)	20	9.5	4.5	3.5	37.50	
	Europe	**USA**	**Mexico**	**Brazil**	TOTAL	

Table 1 – 4 Relationships on Competencies Across Locations

The competency was numerically defined as the product of years of experience times the percentage of time spent (skill) on a particular function, times the ability gained (from the engineers' self-assessment) divided by the sum of points from all the groups. The percentages represent the specific contribution of each group to the whole competency of the

packaging organization. In such way, EPEG (Europe) holds the highest competency value, driven mainly by their years of experience.

Packaging Function as Non-core Competency

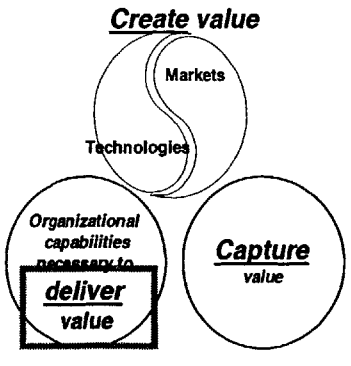
Competencies for the organization are often referred to as core competencies.

Core competencies are those capabilities in which a company does uniquely well; they have the effect of being able to create competitive advantage over the long-term.

Prof. Rebecca Henderson from MIT suggest that core competencies can be divided into the following three categories:

- Market-interface capabilities
- Infrastructure capabilities
- Technological capabilities

Market-interface capabilities are used in the marketplace and include such things as selling, advertising, consulting, invoicing, or monitoring customer satisfaction. Infrastructure capabilities concern the internal operations of the company and are invisible externally, for example, packaging engineering design. Technological capabilities are technical capabilities that provide direct support to the product or service portfolio and are divided into three subcategories: applied science capabilities that mainly derive from research; design and development capabilities such as industrial engineering; and manufacturing capabilities such as inspection and final testing.



R. Henderson, Technolgy Strategy, MIT

Fig. 1 – 21 Value Cycle

The Packaging groups provide the organizational capability of delivering value to the customer. This fact may suggest that the Packaging function is a non-core competency for the business. However, since packaging is directly related to the protection of the value that OPCorp has created for the customer, responsiveness, reliability and worldwide ownership has to be always present in such a function; these characteristics are difficult to have together all the time for certain capabilities when outsourced.

1.2.6. Information Exchange Analysis

Packaging Engineering during "Product Delivery" process

"Product Delivery Process" (PDP) is the process OPCorp uses to develop, deliver and maintain a product for the market. It is divided into six different stages: Market Attack Plan, Define, Design, Demonstrate, Deliver and Delight the customer. Each of these stages has a phase gate review that is performed by three different groups: a project team group that develops a self-assessment, an advisory team that prepares an external assessment of the project and a management group that decides the transfer of the project to the next phase.

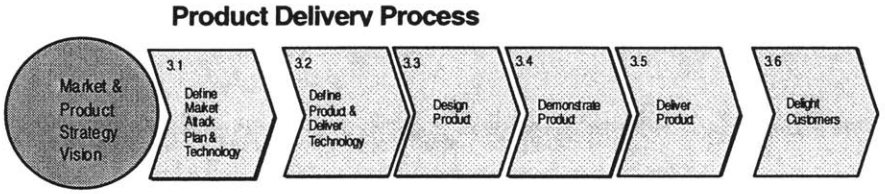


Fig. 1 – 23 OPCorp's Product Delivery Process

As mentioned above, USAPEG and EPEG are the only groups that participate in the early design phases of the "PDP" process. However, since packaging is not considered a subsystem of the product, PDP does not define a formal process to deliver such designs. Packaging groups have to chase the information required to design packaging solutions that will meet all the manufacturing, distribution, service, marketing and customer needs. This problem has been shared several times during the Packaging Technology Council, but very little has been done about it. Then, there are two kinds of problems that arise from this situation. The first are design problems that get uncovered when shipping and distribution

conditions are applied to the whole system (product plus packaging), resulting in a potential risk of slipping the program delivery until problems are fixed. The second problem is derived from the pressure of maintaining the launch date. Once design problems encountered during the shipping simulation are fixed, the packaging group is forced to deliver a tested and validated packaging solution without enough time to provide the optimum solution for the manufacturing site, or to provide a robust enough design to protect the product under extreme conditions that were not fully tested due to lack of time. These problems will be reflected in the communication pattern of the packaging groups described below.

1.2.7. Interfaces and Links of the System: Communication & Information Exchange

The interfaces of the packaging organization can be classified in four groups: customers, partners, affiliates and suppliers.

Customers are mainly the product development teams (PDTs), the marketing representatives of the business units (BUs) and the members of the integrated supply chain (ISC), such as manufacturing sites, distribution and service.

Partners are the packaging groups within the organization.

Affiliates are the groups that support the packaging organization to provide the best solutions to the customers, such as Global Purchasing (GP), Industrial Design and Human Interface (IDHI) and Environment, Health and Safety groups (EH&S).

Suppliers are the external companies that interact with the packaging organization to provide equipment, service or parts.

These definitions will help us to understand better how the interaction and interfaces are segmented during normal development projects.

Communication Practices

The chart below shows the communication frequency of different interacting groups in the packaging organization. We can see that the highest communication link is manufacturing, with 16% of the total information exchange during a project. There is a continual

communication with the manufacturing site from phase 3 to the end of the program, phase 6. As a matter of fact, the communication frequency is higher with the manufacturing and the packaging part suppliers due to the need for changes required during the real distribution cycle and/or production transfer to other manufacturing sites whose locations do not have the same materials availability or supplier capability.

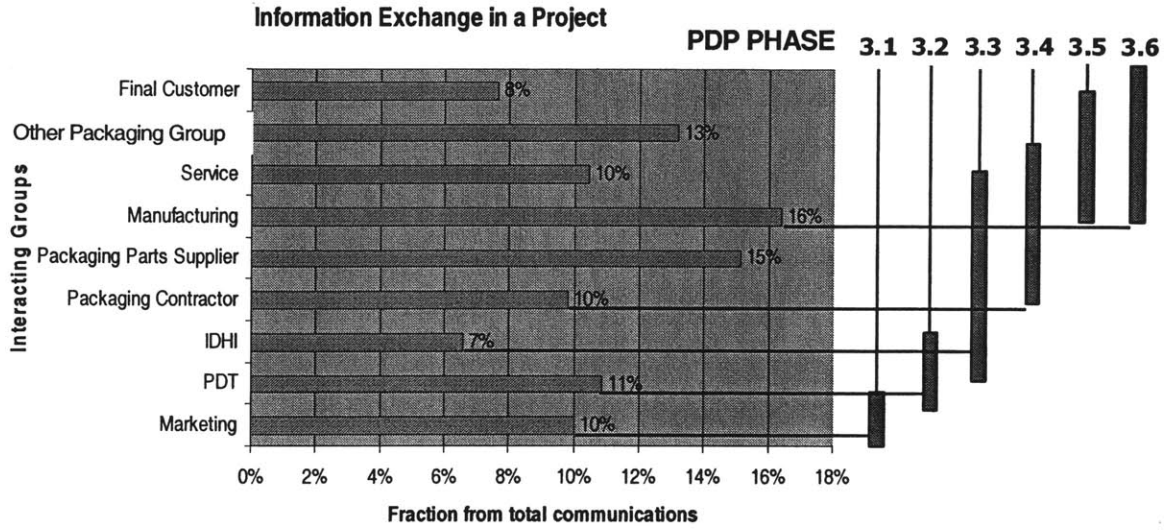


Fig. 1 – 24 Information Exchange by Product Delivery Phase.

There is a need to include formally the information requirements for packaging development in the "Product Delivery " process to design proactively. This process inclusion would prevent last minute surprises at launch time.

There is also a need to engage, in early phases of the product development, with packaging groups that will provide support to the 1st and 2nd manufacturing sites. The graph below shows how scarce the communication among the packaging groups is.

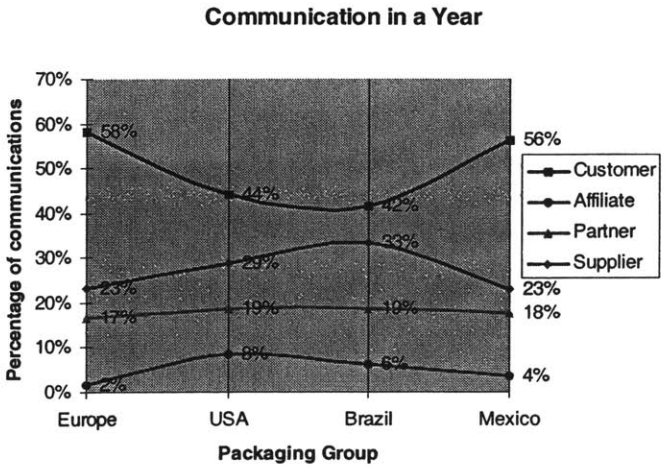


Fig. 1 – 26 Communication in a Year by Source

Communication Links

The results from the survey administered to packaging engineers and packaging managers have demonstrated that communication has been established in a very traditional way. There is a strong use of conventional channels, such as the telephone and the fax, which combined, accounted for 48% of all the communication links established during a year. Email is seen as an extremely useful tool. Unfortunately, packaging groups limit 85% of their communication to these traditional channels.

CHANNELS USED BY ENGINEERS	EUROPE	USA	BRAZIL	MEXICO	TOTAL
VIDEOCONFERENCE	0%	2%	0%	1%	3%
TELEPHONE	7%	9%	11%	9%	35%
DOCUMENT CONFERENCING	0%	2%	0%	1%	3%
INSTANT MESSAGING	0%	2%	1%	2%	4%
EMAIL	7%	10%	10%	10%	37%
BULLETIN BOARD	1%	2%	1%	0%	4%
FAX	3%	4%	3%	4%	13%
TOTAL	###	31%	25%	26%	100%

SUMMARY
1) EMAIL
2) TELEPHONE
3) FAX

Table 1 – 4 Communication Channels Used Across Locations.

The detailed information gathered from the packaging group members shows that there are very few differences in the means used to send information and to receive information.

PREFERRED CHANNELS TO SEND INFO	EUROPE	USA	BRAZIL	MEXICO	
VIDEOCONFERENCE	0%	2%	2%	3%	8%
TELEPHONE	5%	10%	8%	6%	28%
DOCUMENT CONFERENCING	0%	2%	0%	3%	5%
INSTANT MESSAGING	0%	2%	6%	1%	8%
EMAIL	9%	11%	4%	10%	34%
BULLETIN BOARD	0%	2%	2%	4%	8%
FAX	3%	4%	1%	2%	9%
	17%	32%	22%	28%	100%

SUMMARY
1) EMAIL
2) TELEPHONE
3) FAX

Table 1 - 5 Preferred Communication Channels to Send Information

The nature of most of the communication events is to transfer information. The existence of a common language, common boundary objects[16] and shared standards minimizes the need for communication to translate information. Information such as distribution channels, product weights, dimensions, production volumes, manufacturing processes, safety markings, environmental considerations, product appeal and other terms are usually shared among the interacting organizations and groups.

PREFERRED CHANNELS TO RECEIVE INFO	EUROPE	USA	BRAZIL	MEXICO	
VIDEOCONFERENCE	0%	3%	2%	4%	9%
TELEPHONE	5%	8%	8%	8%	29%
DOCUMENT CONFERENCING	0%	2%	0%	1%	3%
INSTANT MESSAGING	0%	2%	6%	1%	8%
EMAIL	8%	11%	4%	10%	33%
BULLETIN BOARD	0%	2%	2%	5%	10%
FAX	2%	3%	1%	3%	9%
	15%	31%	22%	31%	100%

SUMMARY
1) EMAIL
2) TELEPHONE
3) BULLETIN

Table 1 – 6 Preferred Communication Channels to Receive Information

However, a critical issue is discovered when we analyze the communication practices where transformation functions[9] or discussions are required. Packaging groups are limiting themselves to almost the same communication channels they use to transfer information. There is a slight change in the 3rd preferred communication channel; the fax is replaced by

[16] Paul R. Carlile, A Pragmatic View of Knowledge and Boundaries, Aug 2000
Boundary Objects in New Product Development

the videoconference. It seems that the videoconference is used as the ultimate resource to solve problems that require discussion and knowledge transformation. This finding may explain why "responsiveness" is not as high as required. If we consider that e-mail is an asynchronous channel, information process and discussion may take hours, possibly days, to arrive at satisfactory results. Although the telephone is a synchronous channel, it may not be the optimal option due to its lack of graphical representation that e-mail and other means have.

PREFERRED CHANNELS TO DISCUSS INFO	EUROPE	USA	BRAZIL	MEXICO	
VIDEOCONFERENCE	2%	3%	2%	9%	16%
TELEPHONE	5%	9%	8%	5%	26%
DOCUMENT CONFERENCING	2%	3%	0%	5%	10%
INSTANT MESSAGING	0%	2%	5%	2%	10%
EMAIL	7%	11%	4%	8%	30%
BULLETIN BOARD	0%	2%	2%	0%	3%
FAX	1%	3%	1%	1%	6%
	17%	32%	22%	29%	100%

SUMMARY

1) EMAIL
2) TELEPHONE
3) VIDEO

Table 1 – 7 Preferred Communications Channels to Process and Transform Information

Another conclusion that results from the communication practice data is that USAPEG is the group with a higher frequency of communication. Surprisingly, EPEG is the group with the lowest frequency of communication. This fact was confirmed in some of the interviews.

The results from this survey may have uncovered some of the causes of the slow response, lack of cohesion among the packaging groups, information gaps and diversity of solutions to common problems in different OPCorp locations. The following chapters propose an operation mode that certainly can help to solve the problems described above.

Before describing the new architecture of the packaging organization, approached as a socio-technical system, it is important to state as clearly as possible the new requirements and constraints of the system, the strategic capabilities required and the objectives to reach. In order to properly design the new system, it is important to find out the collective consensus

of a management sample group about current and required capabilities to improve the general operation and results of the company.

1.3. Requirements and Constraints for the System: New Company Challenges

Incumbent firms sometimes require radical strategic and operational change.[17] In order to reach goals such as cost reduced operation, faster response, and resource flexibility, the internal paradigm and the operational heritage have to be replaced by a new set of rules and a new management model. The year 2001 is representing for OPCorp the "turnaround" year.

The new requirements are to increase revenue, utilize resources with higher efficiency, and more importantly, recover customer preference through complete satisfaction. This means reliability, responsiveness, relationship and value delivery to the customer.

These objectives have to be achieved while complying with the following constraints: reduce spending, limited capital investment, travel limitation, and extensive use of telecommunications.

The new operational requirements point very closely to the capabilities held by the "transnational model" proposed by Barttlet and Ghoshal.

1.3.1. The Architectural Concept: The transnational capabilities

A sample group of mid-level managers in Mexico and the USA were asked to respond to a survey aimed at identifying how much the company's current capabilities match the capabilities described by Barttlet & Ghoshal in the book *Managing Across the Borders*. The chart below describes the topics investigated in the survey. The next paragraph will summarize the information obtained and some of the conclusions derived from them.

- Factors driving the company to the adoption of transnational capabilities
- Factors driving the industry to the adoption of transnational capabilities
- Competitors' Capabilities

[17] Christensen, "The innovator's dilemma", HBP 1999

- Competitor's Competencies
- Required Transnational Capabilities for the company's survival
- Strategic Change sequence

As mentioned in the introduction, the "transnational capabilities" are: global efficiency, local responsiveness and worldwide innovation and knowledge transfer.

Managers were asked to identify the main drivers or factors that force the equipment industry, and particularly OPCorp, to adopt transnational capabilities.

Summarizing the responses from managers' surveys , the main factors driving the industry to adopt transnational capabilities are:

Global efficiency drivers and reactions

"The drivers of Global efficiency in the office equipment industry are mainly *converging consumer preferences.* This is an *industry where there is a need for economies of scale in manufacturing.* The company is *identifying its global competencies to use them, and outsourcing to reduce cost and increase responsiveness."*

Local responsiveness drivers and reactions

"The main drivers for local responsiveness are the *local government requirements, regulations and local competitor's strategies; these factors* force the office equipment industry and the company *to increase costs to create product differentiation and nationalization and to contract or to outsource local resources to deal with local differences."*

Worldwide innovation and knowledge transfer drivers and reactions

"The main drivers for worldwide innovation and knowledge transfer are the *need to reduce time to market through knowledge synergy and best practices sharing. The company reacts by outsourcing non-core competencies and developing core competencies."*

Managers were asked to identify which transnational capabilities already exist in the company and which ones need to be augmented to trigger the "turnaround" of the company.

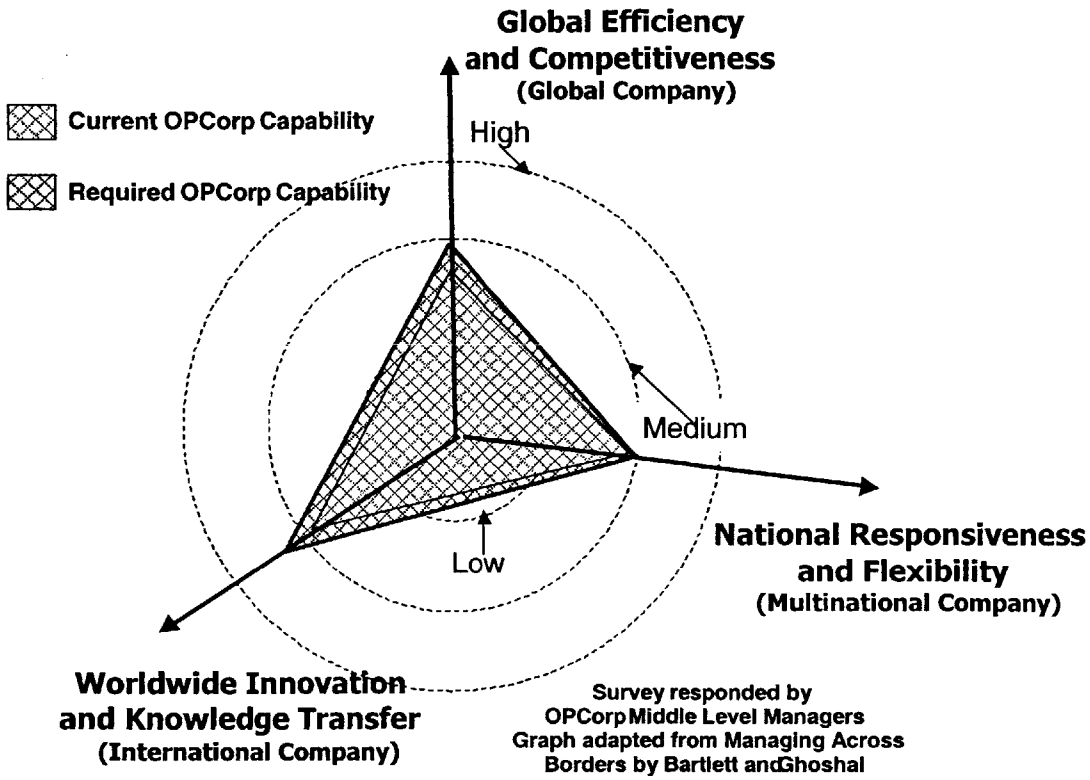


Fig. 1 – 26 Competitive Benchmarking on Transnational Capabilities

The survey asked managers to rank from low to high (1 to 3) how well the company is currently exercising transnational capabilities. Then, managers were asked to rank from low to high (1 to 3) how needed the transnational competencies are for the company's recovery. The graph above shows the results of both questions.

Managers indicated that the company needs to focus on global efficiency in the areas of product development and logistics. It needs to develop more national responsiveness in logistics and worldwide learning in product development, too.

Managers were asked to recognize the "transnational capabilities" in competitors. The competitors compared were: HP, IBM, Canon, Ricoh and Sharp. The general consensus recognized only in Hewlett Packard some of the "transnational capabilities." The mid-management sample group recognized in HP the capabilities of global efficiency and worldwide innovation, and listed marketing, product development, logistics and sales as their major competitive areas. None of the other competitors are recognized as practitioners of

"transnational capabilities," but the group highlighted the competitive advantage of Sharp in manufacturing.

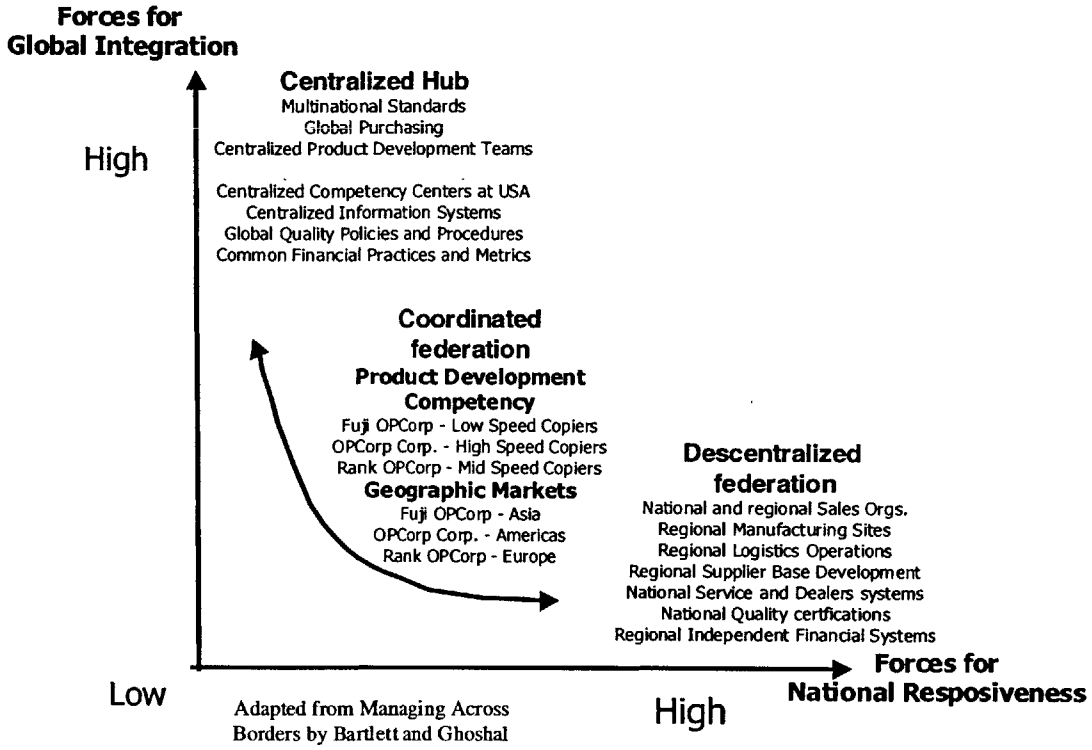


Fig. 1 – 27 OPCorp's Administrative Heritage

Based on the managers' opinions, I made a list of company attributes that I classified according to their global, multinational or international characteristics. The graph above shows some of the specific attributes and how they contribute to global integration and to the national responsiveness capability.

It is paradoxical to realize that OPCorp has all the attributes to operate globally and to be responsive to local requirements. But then the question is, what is missing to seize worldwide innovation fostering knowledge transfer? How can the company effectively exercise the transnational capabilities to recover competitiveness?

There is not a simple answer; however, this study will propose an architectural model that can articulate the existing capabilities in a controlled pilot project such as the packaging

organization, which is facing strategic and operational challenges to stay inside the corporation by providing value to the customer. The chart below shows a few of the key elements that can help to reach such a desired state, pointing strongly to the use of networked operations on the basis of virtual teams principles.

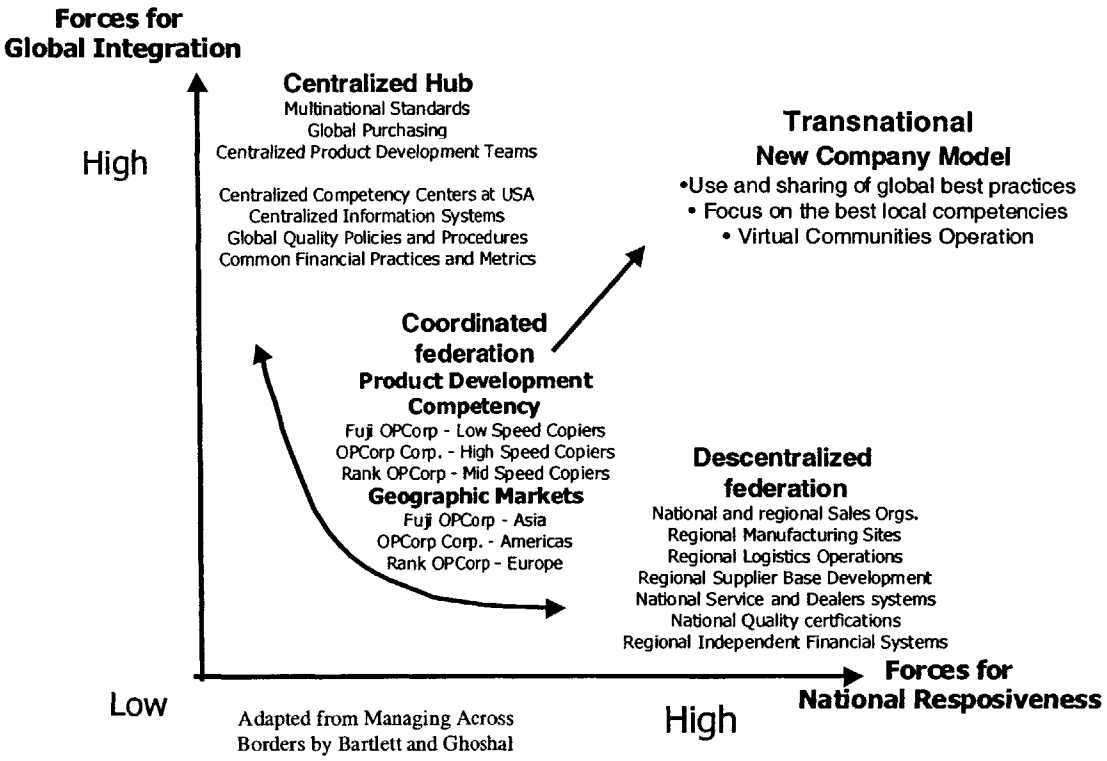


Fig. 1 – 28 Administrative Heritage Leverage to Transnational Model

1.3.2. Identified Obstacles and Challenges:

The survey also asked for the identification of the main issues for implementing an improvement change. The issues mentioned were:

For mid-level managers:

What is the change sequence of the business factors for effectively implementing a new operational model? The options were:

a) Formal structural change

b) Systems and processes change

c) Culture change: vision, values and behavior

Managers voted for: b) first, a) second and c) last.

This is definitely an opportunity area. This work will show that a good sequence to realign the company's capabilities starts at the culture and behavior level to later define the processes that will be supported by the structural change. From the architectural approach this means that function will define the form.

For Packaging Managers:

What are the transnational roles that current packaging managers are taking?

In the "Transnational Model " the characteristics of the different managers' roles are[18]:

Worldwide Business Managers working for Global efficiency:

- He/she perceives new risks and opportunities on a worldwide basis.
- He/she formulates the global strategy of the business.
- He/she architects the company's worldwide configuration of resources and assets.
- He/she is a cross-border coordinator for processes or information or resources flow.

Regional Manager working for National Responsiveness:

- He/she is a local implementer of the company's global strategy.
- He/she is a bicultural interpreter of the company's global strategy and local group opportunities.
- He/she captures the strengths of the local capabilities and leverages them beyond national boundaries for worldwide company benefit.

Worldwide functional manager working for Worldwide Innovation:

- He/she is aware of the best functional practices and barriers worldwide and tries to apply them locally and globally.

[18] Christopher Bartlett and Sumantra Ghoshal, Managing across the borders, HBSP, 1988

- He/she creates a worldwide network of contacts that serve as input/output mechanisms for knowledge sharing and innovation.
- He/she accepts and shares new processes, fostering diversity and teamwork.
- He/she is willing to help and support other sites in a timely and effective manner.

Managers were asked to estimate the time they spend in a year performing the activities described above from each management role, generating the following results about their transnational roles

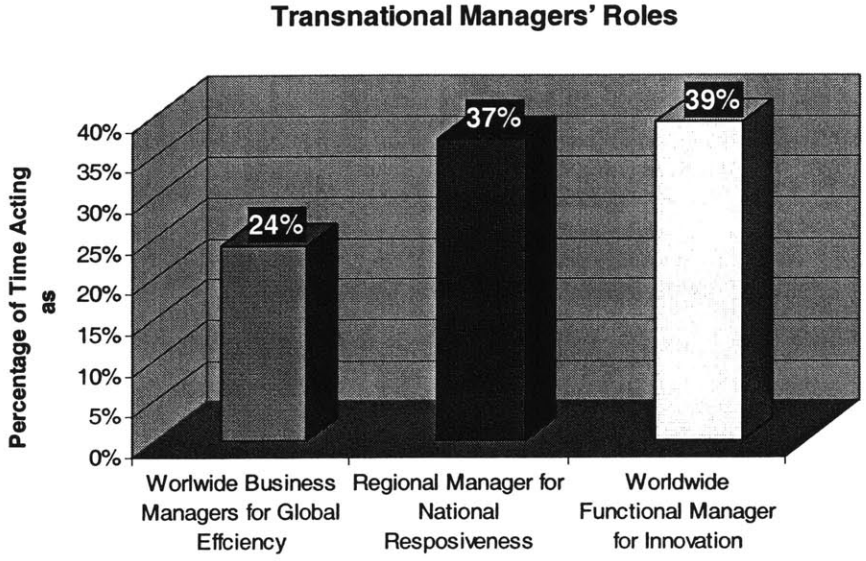


Fig. 1 – 29 Transnational Roles of Current packaging Managers.

These results help to understand that today's managers are prepared to face the "transnational" challenge. Data shows that managers are heavily focused on resolving local problems but using worldwide knowledge as much as possible to be more efficient. Note that managers need increase their knowledge on global resources and their willingness and trust to ask for support to other sites. Global efficiency has to be characterized by free flow of information and support among the different packaging groups to better utilize equipment, capital, material and human resources.

For Packaging Engineers:

Which are the main barriers that prevent the packaging groups from coordinated work and knowledge transfer with other remote packaging groups?

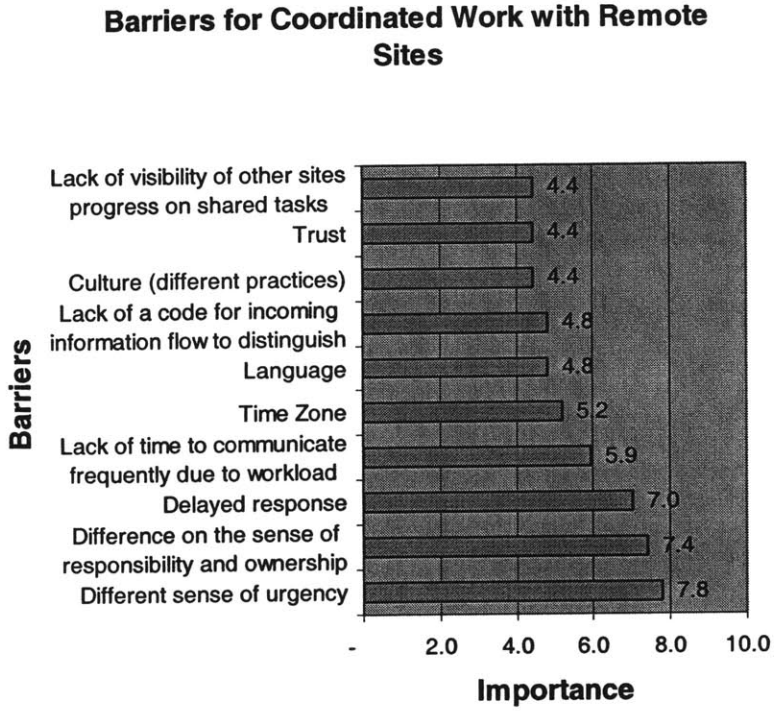


Fig. 1 – 31 Identified Barriers for Engineers

On a scale of 1 to 10, there were three factors rated above 7. All of them were related to the kind of response, the sense of urgency and ownership felt from the remote counterpart with respect to the local requirement. No culture, no language, no time zone, no visibility factors were as critical as this feeling of not being considered as important as the other's problem when help is required.

1.4. Summary of the Chapter

- OPCorp needs to change its operating mode to overcome its competitiveness crisis.
- The "transnational" operating mode is worth studying as a way to enhance competitive capabilities.

- The Packaging Organization has a centralized operation with a fuzzy structure.
- The overall competency of the Packaging Organization seems to be adequate for the Corporation's needs.
- There is a competency imbalance in the Packaging Organization that causes delayed response, and inefficient and isolated activities, which needs to be improved.
- Packaging requirements must be included in the Product Delivery Process, including all the sites involved during the life cycle of the product developed.
- There is a strong imbalance in the information exchange frequency between partners and customers, especially with the manufacturing sites. This reflects a reactive attitude in national responsiveness.
- Communication channels are limited and sometimes misused.
- Communication frequency seems to differs considerably different from site to site.
- There is a clear need for training to improve the communication practices and use of other communication channels for information transfer and especially for transformation.
- Mid-Level managers recognize the industry trend to develop "transnational" capabilities.
- Mid-Level managers indicated that more emphasis on global efficiency and worldwide learning in areas such as product development and logistics is required.
- Packaging managers are already acting as "transnational" managers with regional and functional roles.
- There are three main barriers to creating a coordinated work environment among the packaging engineering groups: delayed response, different sense of ownership and urgency.

The following chapters will address the issues and opportunities highlighted in this chapter.

2. The Transnational Packaging Network

"Developing the capacity to create and sustain global teams is the business challenge of the 21st century."

O'Hara-Devereaux & Johansen, Global Work, 1994

Socio-technical systems are both the most flexible and the most complex of systems. Machines and technology may remain the same when acquired but people do not. Therefore, socio-technical systems are a fascinating arena for a systems architect to play with. By combining human resources, hardware and software, the systems architect can decompose form and function and allocate functional elements. He can redefine interfaces, configure sub-systems that can provide different levels of flexibility and optimality and establish certain principles and arrays as platforms for modules with other elements of the system aimed for flexibility and fast response. Socio-technical systems are the perfect playground to materialize the high-level management abstractions of the business as declared in the mission, vision and goals of a company. These kinds of systems are not so tangible. As life forms, part of them can be represented, but the complete system may be described only from the results the system produces. When we talk about designing a socio-technical system, we are taking as equivalents terms such as capabilities and functions, structure and form or architecture, links and interfaces, groups or teams and modules, key capabilities and platform.

2.1. The Architect's Concept for the System

Whoever recognizes himself as a systems architect has to be able to dream. He has to be able to envision an array that nobody else has thought about. He has to be able to recognize existing elements that can be useful to create other ones or to create the next level of complexity. This is my dream about the new packaging organization at OPCorp.

This socio-technical system (the "Transnational Competency Network for Packaging Engineering at OPCorp) is a "life form." It has anatomy, physiology and psychology. Its

primary purpose in life is to serve the corporation, fulfilling requirements to protect products during the distribution cycle. It requires developing key capabilities. Such capabilities are based on the "transnational" operation model of a company. This life form, the system, will be efficient globally; it has instincts and reflexes that can respond to local requirements without wasting time by involving the whole organization or system to make decisions. However, all the elements of the system learn from local and global experiences because they all are interconnected by more than one communication channel.

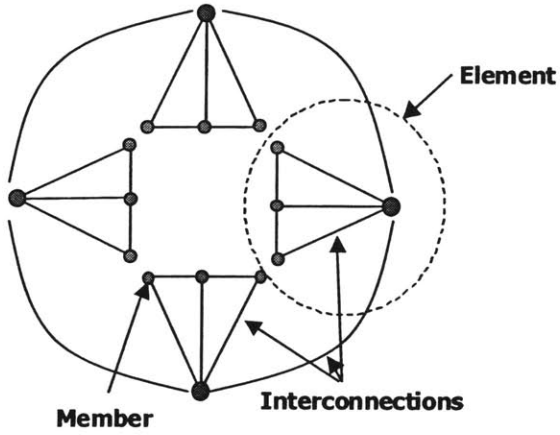
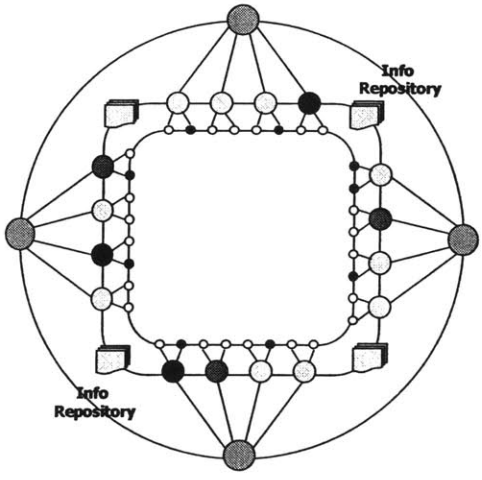


Fig- 2 – 1 Member Interconnectivity of a Networked Structure

All the elements of the system generate, store and use everybody's information. There is always information flowing, part of it "pulled in" from repositories by members of the system.



Fig, 2 – 2 Hierarchical and Network Morphologies combined in an Adaptive Model.

The other part of it is "pushed out" by members to other members of the system. There are a very limited number of hierarchical levels.

These levels are not meant to be subordinated layers but on the contrary, increasing levels of support and resources for solving the problems of the members, the elements or the whole system.

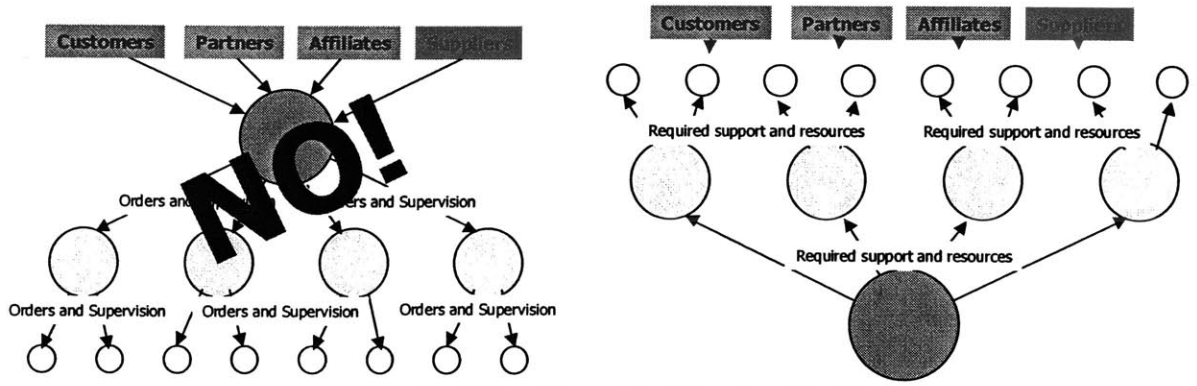


Fig. 2 – 3 New Hierarchical Structure Model

System members form part of multiple teams. Some of the teams are permanent, and some of them are temporary. The core of a team is the "purpose." If there is no purpose, there is no team. All the members of the system know the operation rules for executing technical processes and interacting with other members of the system.

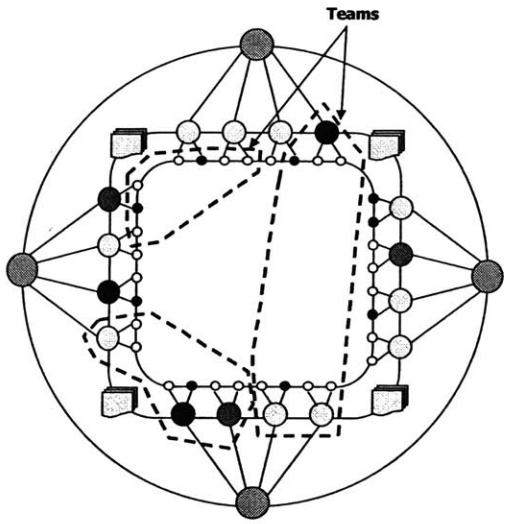


Fig. 2 – 4 Basic Structure of the Network and Adaptive Teamnets

There are multiple levels of communication so that each one has an optimum application and limitations that are properly instrumented according to the type of interaction that is required among members. Technology is a means; it is part of the anatomy, and it is not the goal. As a life form, the system is capable of performing a function without depending entirely on a unique technology or element of the body.

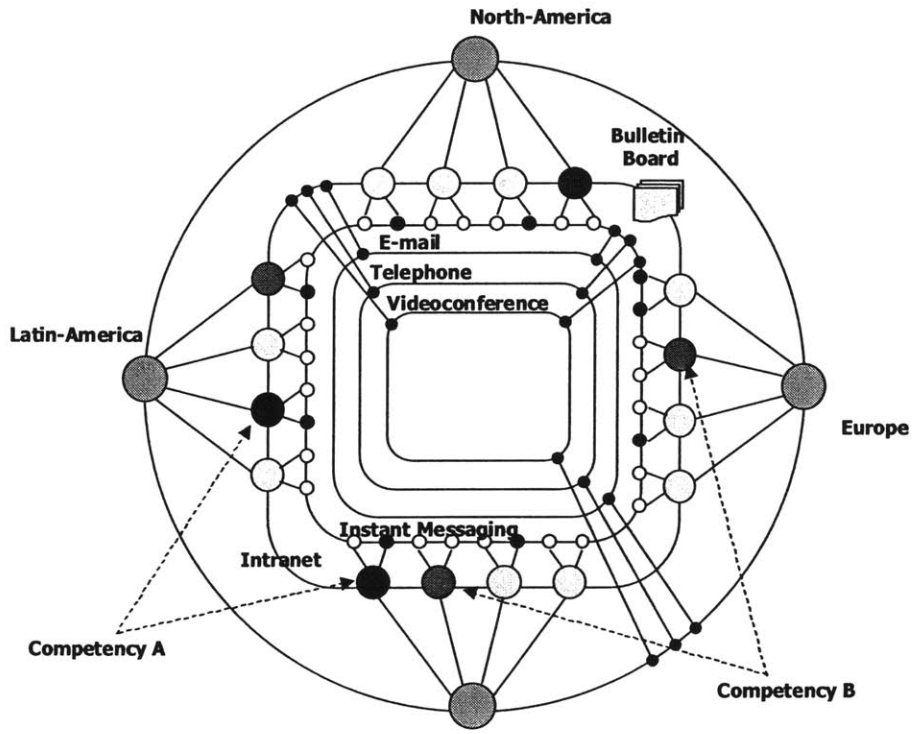


Fig. 2 – 5 Components of the Network: Competency Teamnets and Telecomm Links

The competencies of any of the elements are always complementary to each other. System's backups for specific competencies rely on such complementarities.

Part of the psychological aspect of the system is that motivation to cooperate relies on a long-term working relationship that reduces the cost of future transactions for each member of the system. Performance metrics are inter-related with others' performance. A form of 360-degree evaluations is applied, but the superior's evaluations do not weigh more than team members' and customers' evaluations. Some performance metrics will be designed around

parameters such as reliability, responsiveness, relationship and value of the interactions with the teams and the whole system.

As with any technical system, the system is as weak as its weakest point; members have to be trained in this new organizational operation mode. The use of communication protocols, flexibility for multitasking activity, and openness and tolerance to culture differences and ambiguity have to be fostered to properly work in this "living" system.

As with any living form, the system has its threatening agents, such as lack of leadership, lack of clear purpose, lack of information or information overload, lack of incentives for the members to work in a completely different structure and context, the "lock-in" of certain communication technologies that would not permit enhancing of the communication systems as needed, lack of a continual improvement process for operation rules and guidelines, etc. There is no need to say that all these factors may cause chaos, stagnation and system disintegration. However, it is important to say that the system will hardly recover from such a failure mode. Trust in such a model will be difficult to rebuild once the members have experienced the anarchy of a structure that primarily depends of the network effect of members' interdependence and common learning. That is why it is extremely important that managers, as the leaders of the system's "elements," have a clear idea of the operational concept and constantly monitor the metrics around the responsiveness, reliability, relationship and value of the interactions.

In the following paragraphs, I will cover the details of the system's concept.

2.2. The Anatomy of the System: Architectural Concept of the Transnational Network

The "Transnational" operational model proposes a new way of structuring an organization that is not one of the traditional structures from previous ages, such as the matrix structure or the hierarchical structure. The organization structure of the information age is the "network." Therefore, the "transnational model" architecture is based on a "network" structure, which is different from nomad-tribes, agricultural-hierarchy, and industrial-bureaucracies. Every major age of civilization has a signature form of organization.[19] In the Stone Age it was the small

[19] Lipnack, Jessica, Virtual Teams, working across boundaries with technology, John Wiley &Sons, 2000

group. In the industrial era it was bureaucracy. In the information era, the network is the predominant structure. Companies are learning that they need to work across traditional boundaries.

The network, a distributed form of organization, enables people to work together without being in the traditional co-located boss/employee relationship. The networked organization enables teams of people who are geographically distributed to be connected by a shared purpose and a distinctive culture of doing work together but dispersed. It's proven to be a very effective form of organization when certain key factors are well defined and established among all the members of the networked community.

Here are some advantages of the network structure[20]:

- Allows people to do things their own way in the best interest of the group.
- Enables people to be well informed.
- Balances power among all the members of the network, ruling and unifying only with the consent and agreement of the partners.
- Allows rapid change and reconfiguration of grouped capabilities.

Links are the distinguishing feature of the network community. Adding communication links to existing hierarchical or bureaucracy structures is a way to transform them into a new flexible and stable formal organization. However it is not enough, links should be added among levels and among the isolated specialties in order to start gaining "knowledge synergy." A network can reconfigure its organization by itself, depending on the tasks or projects to be done. Teams can be redefined and links re-establsihed.

At each end of a link there is a member that will be connected to other members. This way of grouping people by telecommunication links sharing a common purpose is called a "teamnet." When we talk about "teamnets," we're really talking about bringing organizations

[20] Norton, Robert, Understanding the Virtual Organization, Barron's Edu series, 1998.

together in the pursuit of a specific objective and tangible results. Teamnets are groups that work across traditional boundaries to accomplish something for the common good.

Teamnets link from marketing to distribution, new product development, sales and training, among other critical parts of the business functions. Teamnets can be considered the "living" modules of the system.

2.2.1. Decomposition of the form: Networks and Hierarchy

The key to understanding the significance of networks lies in the relationship between the part and the whole, that is, between the individual and the group, between members and their networks.

Hierarchy is a traditional way of organizing people into groups. It seems to work in some situations, and not in other situations. In human groups, the term "hierarchy" stands for two different concepts. One is the nesting of parts within wholes within larger wholes. Second is "top-down" control, the relationship of vertical command.

The first meaning of hierarchy, it is "the architecture of complexity." In organizing complexity, it filters information bottom-up and it cascades information top-down.

Hierarchy in the first sense of clustering and levels is a natural aspect of all forms of complex organization. However, hierarchy in the second sense of a superior-subordinate status structure is but one of many possible forms of human relationships.

It is the second meaning of hierarchy, the superior and subordinate relationship, which marks the profound difference between traditional hierarchy and networks.

In networks, peer-to-peer relationships predominate. This is not only true in the relations between members of a network, but in the structural relations between the members as parts and the network as a whole. Members and networks, parts and wholes, are complements.

In networks, the individual is not subordinated to the group. Nor is the group subordinated to individual interests. Individual and group are equally important, but the relationship is one of energetic tension, constantly changing to meet new situations.

In the now-emerging Information Age, peer-to-peer relationships are multiplying and diversifying. Each phone and fax is equal on the network. On a computer network, each address is the same, whether a teacher's or a student's.

Successful networks, like all complex organizations, will reflect the hierarchy structure only for clustering purposes, not for command chains. The natural effect is that people are grouped together locally. Local groups form into regional associations. National coalitions form out of regional associations. International alliances grow from national coalitions. Networks are clustered and multi-leveled. In this respect, they are like social hierarchies. Level structure is critical to understanding the potential of networks of the future, as flexible forms of complex organizations.

East and West are moving to network organizations from complementary directions. In the East, networking becomes a way to foster personal development, enhancing individual creativity, initiative, and responsibility without diminishing the traditional importance of the group. In the West, networking is used as a way of developing more cooperative and group-oriented organization without diminishing the importance of individuals.

Components of the Network:

The "Transnational Network" will have two types of basic components: social and technical.

Component	Social	Technical
Node	Individual	Computer
Link	Relationship	Telecommunication Channel
Engine	Purpose	Software

Table 2 – 1 Components of the socio-technical system

At the nodes of the network, computer and individual are the users; they are the simplest components of the system. There may be clusters or co-located groups that will be physically linked; these groups of users may be hierarchically structured for administrative purposes but not for operational work.

All the users will have links, technical and social links. The technical links are the actual telecommunication channels available to send and receive information or to interact with

other users at the nodes, but more important are the social links among the individuals. The relationship is based on the purpose of the partnership; it may be a project or common learning. Purpose is as powerful as it is intangible. Software serves this function for the technology portion of the system.

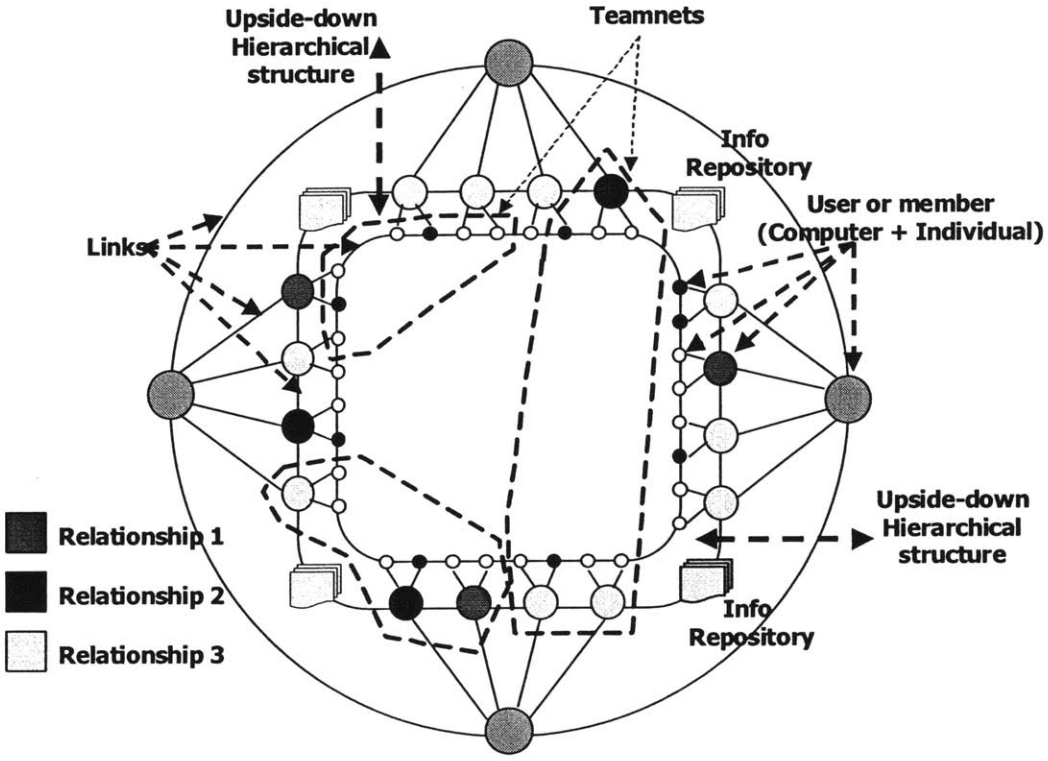


Fig. 2 – 6 Components and Relationships of the Adaptive Network

These basic components will create the rest of the derived components of the system:

information, teamnets, goals, ground rules and knowledge.

The existence of information and the need to share it are the reasons why virtual teams are formed. The virtual team, now called a "teamnet," is a temporary or permanent group of individuals, who are usually dispersed, working for a common purpose across different types of boundaries through the use of telecommunication technology.[21] These teamnets establish

[21] Lipnack & Stamps, Virtual teams, pg. 22, John Wiley and Sons, Inc., 1997.

goals and operational ground-rules that will control the information flow and the interaction among the nodes to create the knowledge they are interested in.

Teamnets

There are several ways to define a virtual team. Here, I present two of the clearest definitions I have found:

> "A group of people that work interdependently with a shared purpose across space, time and organization boundaries using technology." A collection of people becomes a group when the whole is more than the sum of the parts.[22]
>
> Virtual teaming is "goal-oriented, collaborative, knowledge intensive work undertaken by individuals separated by geography, organizational affiliation, and often culture."

I have compiled the following definition:

> As a virtual team, a "teamnet" works across space (distance), time and boundaries (hierarchy) with webs of communication technology as links, motivated by a common purpose or goal and strengthened by a "virtual environment" culture. Time and distance are problems that virtual teams are trying to address.

Virtual teams need the same things all teams need: a clear mission, an explicit statement of roles and responsibilities, communication options that serve its different needs, and opportunities to learn and change direction.

The components of a teamnet are the members, the leader (or the leaders), the competencies and the purpose.

Without purpose there is no need to form a virtual team. The underlying assumption is that there is a need that forces a company to look for competencies not locally available and form a teamnet with remote members who have such competencies. One or more members of the teamnet may take the leadership role, in a sequenced or parallel way.

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[22] Lipnack & Stamps, Virtual teams, pg. 18, John Wiley and Sons, Inc., 1997.

Members of the teamnet are characterized by the following attributes:

- Members are dispersed geographically (nationally or internationally).
- Members work apart more than in the same location.
- The team solves problems and makes decision jointly.
- Members are mutually accountable for teamnet results.
- Members interact constantly.
- Members are aware of their interdependence.

The job of the manager of a virtual team is to help the team learn how to be a virtual team and, most of all, to create ways to make the working of the virtual team visible to itself. But the most important thing to remember is that managing a virtual team is basically about managing a team. The following paragraphs will expand on the manager's role.

2.3. The Physiology of the System

Physiology has to do with the way the system operates. Functions and capabilities are directly derived from the structure and the process performed by the structure. Information flows and stocks are part of the dynamics of the system.

2.3.1. Function Decomposition: Efficiency, Responsiveness and Learning

As mentioned in the introduction, the whole purpose of proposing a new operational model is to enhance the "transnational capabilities" required to overcome the competitiveness crisis. Therefore, such capabilities become the required functions of our socio-technical system.

Global Efficiency:

A global efficiency capability assumes that there are competencies and assets in the organization with a level of specialization, which are dispersed. However, this implies that every dispersed unit has to be utilized at its optimum level to make it economically justifiable to keep it in operation. Markets are not stable, and most of the time there are unbalanced workloads among similar operations around the world. Inefficient redundancy or insufficient capacity are the results of unbalanced workloads and fixed capacity.

Networked units with similar competencies, such as engineering or design, can be balanced according to the local market's demands and global requirements. The best way to seize such ability for rebalancing the workloads is to have "complementary" competencies that can serve more than one market, depending only on the information flow and minimum extra material resources to respond to workload balance. As a result, the "constrained" capacity of the system can be diminished with more efficient results.

Local Responsiveness

Permanent link connections allow local groups to reach competencies and capabilities that are located miles away. The unique nature of the network makes members more empowered to solve local problems with the support of knowledgeable people that work on the same teamnet because they share the common goal of solving problems or share the same type of information.

In a situation that calls for increased responsiveness, flexibility and agility, the pressure to be organizationally and commercially adept falls more and more on the shoulders of the individual. This is especially the case for people in leadership roles, where the pressure to become an effective self-manager is intensifying. It is up to the individual to adapt to managing the personal and organizational impact of continuous change.

It requires a certain kind of skill to respond to sudden demands to be more flexible, cope with higher levels of ambiguity and uncertainty and to do so under growing levels of pressure. This is a new kind of skill because it requires the team members to make a change in their attitudes and their behavior to adapt to new ways of working. To succeed in the future, organizations will require growing numbers of people to become highly effective self-managers, and the skills of self-management and personal leadership will be at a premium.

Worldwide Learning

The use of shared information and knowledge repositories creates a "network effect" on learning. In addition, the sum of competencies and capabilities not necessarily co-located causes the experience to multiply by itself. In such cases, worldwide learning does not have a linear effect; it becomes an exponential effect. Numerous factors contribute to the creation

of learning communities, including optimal group size, sufficient slack time for learning, a skilled facilitator/leader, ground-rules for interaction, and, perhaps the secret recipe, ways to enhance the interdependence of the individuals. But a key aspect of successful learning communities is the development and support of "prosocial behaviors,"[23] as an understanding of the system's levels impacts our actions inside a networked community or teamnet.

2.3.2. Functionality Allocation: Virtual Teams = Teamnets

Co-located Elements or Hierarchical Teams

In a transnational organization, there is more than one location with a set of competencies. This case study includes USA, England, Mexico and Brazil. It is important not to overlook the fact that all of them are reporting to different locations and they are not able to become completely independent from such a traditional administrative structure. Compensation systems, reporting systems and value sets may differ quite a lot from site to site. Co-located members will follow certain practices that will be extraneous for other members of the network and for members of a teamnet. Co-located groups have the strongest bonding factor in the network: native culture.

Functionality re-allocation has to overcome this strong factor. As will be explained in following chapters, the establishment of a new culture that builds values and assumptions for the networked community will be crucial to reduce the effects of the different local cultures.

Virtual Teams: Teamnets for Efficiency, Responsiveness and Learning.

Functionality re-allocation is one of the advantages of the socio-technical networked system.

The networked members are able to be re-grouped according the specific needs of a specific project. The collection of skills and abilities shown in the diagnosis part of this study can be taken as a pool, where specific competencies can be selected from the different sites, depending on their proficiency or availability of resources.

[23] Digenti, Dori, Toward an Understanding of the Learning Community, Organization Development Journal, V. 16, N. 2, May 1998.

SKILLS AND ABILITIES

	STRENGTH	EXISTENT	WEAK
Europe (XEPEG)	Design Testing Manuf. Supp.	Supplier Involvement	Customer Engagement Analysis & Simulation Prototyping
USA (WPEG)	Design Testing	Customer Engagement Analysis & Simulation Prototyping Supplier Involvement	Prototyping
Mexico (XMEMPEG)	Design Manuf. Supp,	Analysis & Simulation Testing Supplier Involvement	Customer Engagement Prototyping
Brazil (XBRAPEG)	Design Supplier Involvement Manuf. Supp.	Customer Engagement	Analysis and Simulation Prototyping Testing

Table 2 – 2 Summary of Skills and Abilities by Location

For this specific case teamnets can be viewed as the collection of capabilities required for a specific purpose through the allocation of members from different sites. In such teamnets, members play an important role, not only technically but socially, too.

2.3.3. Definition of Interfaces and Links

The network components that enable team formation and knowledge building are the links. The most important links are social relationships. The next chapters will expand on this topic. The technological links that allow the flow of information, the asset of this age, are the telecommunication channels. The proper use of these channels will depend on the kind of information and the operation performed with such information: transfer or transform.

Information

The transnational network system will have two kinds of information. Stocks or repositories of information form the "pull" information type. This information is basically stored by members and available for the rest of the members on the teamnet when required. It stays there and is

pulled out on demand. Such information includes rules, protocols, standards, practices, specs, catalogs, status of projects, and historical data. There may be one or several generators for this kind of information, and there may be one or more users but there is no receptor. The other kind of information is the "push" type. This kind of information is very dynamic, characterized by flows of data through the communications channels. It has one generator and one or more receptors, who can be users as well. The clear differentiation of the kind of information and the operation to be performed with the information will certainly help a lot in choosing the proper telecommunication link.

Links

There are different ways to classify telecommunication links; some of the criteria used to classify them are their synchronization, their bandwidth and their context. The channel may be synchronous or asynchronous, and it may carry only text or text, graphics and motion.

Four kinds of technology can assist in making work coordination for virtual teams relatively simple and highly effective. These technologies are in addition to traditional means such as telephone and fax.

Video conferencing and desktop video-conferencing allow team members to see and hear one another, as though they were gathering informally in a colleague's office.

Groupware software enables teams of people to work on the same document at different times. Software programs such as Lotus Notes allow team members to share ideas and information, work together on projects, and take part in group discussions with all team members. It also allows team members to create and share documents that include text, presentation graphics, scanned images, sound, video and more. Most importantly, this software offers several levels of security so that sensitive information is not compromised when collaborating with people outside of the organization.

Newsgroups, bulletin boards and electronic mail on the Internet link to a world-wide, networked computing community with millions of users from government, business, research, industry and education.[24]

Intranets are essentially communication tools that operate by linking an organization's computers in a way similar to the Internet. It is a closed network, however, which is accessible to people within the organization (and maybe approved outsiders). Like the Internet, its users access it by means of a piece of software called a "browser," which allows them to look at pages of text and images which are hosted on a company server. The user clicks on links written into these pages to go to other pages.

The following chapters will show the criteria and rules required to use telecommunication links effectively.

2.4. Psychology of the System: Control and Alignment

It is not just a matter of investing in the latest technology and connecting different sites with complementary competencies that will make the transnational network work and develop the key capabilities and functions required to overcome the competitiveness crisis.

Every intelligent life form has its internal software that makes the system work the way it works. Principles and rules that operate all the time result in a specific behavior. The behavior is dictated by the psychology of the system. Values, rules, assumptions, processes and other artifacts control intelligent systems formed by humans. All of them are part of the culture of the system.

A new environment is being created to support relationships, not just to exchange information. Members need help to develop appropriate expectations. Then norms, styles and behaviors have to be created to set the appropriate atmosphere. Processes for team management and development have to be designed, defined, piloted, and tested. Refined team managers have to be trained in new team management strategies. Team members have to be trained in new ways of working. The culture of the organization has to be

[24] George, J. A., "Virtual Best Practice," Teams Magazine, November 1996, pp.38-45.

reshaped to support new structures and processes. Organizational structures have to be modified to reflect new team dynamics. Incentives and reward systems have to be updated to reflect new team structures and new information technology. Systems have to be built to support the teams' new management, and measurement and control systems have to be designed, too.

The leader is responsible for fostering the coordinated operation of the networked system through the culture, incentives and metrics.

2.4.1. Integration of the Subsystems: Site Teams + Teamnets + Links

In every newly formed social group, it is very important to "break the ice" and motivate the start of new relationships among the new members. One way of achieving this goal is creating mutual identification attributes between two or more persons.

In order to minimize the influence of the natural effects of being co-located, the transnational competency network will form multiple teams depending on different dimensions:

- Teamnets by product: Flinstone, Musketeer, Brookground
- Teamnets by process: clean sheet design, domestication, problem solving.
- Teamnets by competency: design, testing, and configuration.
- Teamnets by project: Green Dot, 3R´s, Virtual Teams, ISTA certification.
- Teamnets by customer: SOHO, CBU, PCDU

Every member of the organization will be part of 3 or 4 teamnets. Some of them will be operating continuously, others periodically, but all of them will help people to establish relationships derived from their commonalties and to set a primary purpose for every teamnet: mutual help and common learning.

The existence of multiple teamnets will allow definition of which parts of the system are considered a platform and which parts will be modular. This will operate more dynamically

than a matrix organization. The processes teamnets and competency teamnets will be the platform units. These teamnets will develop the standards and procedures to be used in the rest of the teamnets. The other teamnets are modular because they can change members; they may grow or resize depending on the workloads and specific competency requirements.

This array will foster the integration and flexibility of the socio-technical system to fit short-term needs, whether local or global.

The "Purpose" as the Key Factor for Integration

Researchers agree that an explicit purpose is the most critical factor in determining the success of a virtual team. What may be different is the strategy for how the team will maintain alignment around the purpose over time when they might not be able to meet together during a project. A virtual team may need more frequent and more explicit check-ins about their purpose.

2.4.2. Culture

Creating virtual teams is not as easy as pulling together a cross-functional team to solve a problem. Because the make-up and locations of the team can be quite heterogeneous, unprepared team members collide with mistrust, unrealistic or unequal expectations, cultural differences, problems with coordinating work logistics and group dynamics, and leadership issues. A clear set of values, assumptions and artifacts have to be defined and shared with the entire networked organization to overcome local culture differences.

Since we are talking of the Packaging organization at OPCorp, it is expected that "national" cultures create more conflicts in the members' interactions than "functional" or "corporate" culture.

Culture: Values

Leadership - Leadership in a virtual organization must be done through influence; it involves understanding and influencing cultural changes in the organization. It is each member's responsibility to enhance teamwork, communications, decision-making, or conflict resolution.

Trust[25] - Cooperation for coordinated work is easy to get if there is a positive relationship and high trust in all teams. Trust is extremely important in virtual teams. For many distributed virtual teams, trust has to substitute for hierarchical and bureaucratic controls. The trust formula says, "teaming depends on collaboration which depends on trust which is built through communication"; remote electronic communication, if sufficiently rich, is an alternative, however a well defined strategy to foster such trust must be present. Chapter 5 will cover in detail some important points to develop trust.

Culture: Assumptions

a) Expectation - Because each team member may have different expectations of the quality of the team project, or how much one member intends to learn from teamwork, it is hard for all team members to agree on a common vision, purpose, or goal for both commitment to the job and for understanding the job. However, it is extremely important to motivate all the members of the teams to state clearly their expectations and working assumptions.

b) Work Coordination - Work coordination will not be the responsibility of only one person but of all team members.

c) Cultural Differences[26] - People tend to believe that everyone thinks the same way and that everyone is working in the same context. There are many cultural differences among team members from different countries, regions, or districts. The differences lie in the following areas and have to be explicitly recognized by the teamnets:

- Power Distance: some team members want to take charge and make decisions, while others like more consultation.
- Uncertainty Avoidance: some team members require more time dealing with a task, while others feel too micro-managed.
- Individualism-Collectivism: some team members like to work together, while others prefer to work individually and then combine their work.

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[25] Sirkka L. Jarvenpaa, Communication and Trust in Global Virtual Teams, Grad. School of Business, Univ. of Texas at Austin
[26] G. Hofstede, Culture and Organizations, Intercultural Cooperation and its importance for survival: software of the mind, London, McGraw Hill 1991

- Masculinity-femininity: some members would like to take care of business no matter how tough it gets, while others would like to enjoy quality of life first.

- Long vs. Short team: different members have different degrees of parsimony and investment in skills and knowledge.

- Context: Some team members like to review historical data in order to make better decisions; others rely only on current data.

Many teams lack the ability to manage cultural differences, which can reduce the efficiency of teamwork.

Culture Consonance

		England	USA	Mexico	Brazil	
Power Distance	High			X	X	Employees expect little consultation from managers to take decision
	Low	X	X			Employees more participative on manager's decision
Uncertainty	High			+	X	Search of detail plans and predictable routines
	Low	X	X			Comfortable with ambiguous situations, no strong need for rules
Individualism		X	X			Prefer to act independently more than in groups
Collectivism				+	+	Value a strong identity with the group
Masculinity		+	X	X	+	Earnings, success has more importance than caring and cooperation
Femininity						Nurturing, sharing orientation
Long Term				+	+	Value persistence and thrift.
Short Term		X	X			Value more immediate physical and financial returns
Context	High			X	+	Messages have a little meaning without the understanding of surrounding context
	Moderate	X				A combination of information is required
	Low		X			Prefer more oriented fact-based information

X The Hofstede's study stated explicitly
\+ It was inferred from the Hofstede's study statements

Table 2 – 3 Cultural Differences that might be present among Members of the Network

I have extracted from Hofstede´s study the specific characteristics of each country in which the packaging groups are located to highlight the possible differences that will need to be managed within the coordinated work in the network.

Culture: Artifacts

Group Dynamics - In virtual groups, people play multiple roles, often more than in conventional teams. This is hard because these roles require greater clarification and role flexibility. Since the process is dynamic, roles are constantly changing. It is difficult for a group to shape their own ground-rules or group norms. It is required that groups create routines,

signs or customs that can differentiate the group from others and create an identification bond within the group.

Corporate Memory – Existing processes, standards, practices, and pro-formas are part of the artifacts the teamnet can use as a baseline to make explicit the culture that the group shares.

Incentives and rewards are another type of artifacts that help to reinforce the culture of the organization.

2.4.3. Incentives and Rewards to Work in a Team

A reward is anything that tends to turn on the individual.[27] Therefore, there is no single optimum reward that applies to all individuals. Reward systems need to have a positive impact on behavior, focus on serving the customer, and enhance collaboration within the workplace.

The reward system must support both team and organizational goals and objectives. The reward system should begin to stress team performance more than individual performance.

Intrinsic and extrinsic rewards must be kept in balance and adjusted according to the task.

Intrinsic rewards are rewards that come directly from doing a task itself. Extrinsic rewards are given for performing a task.

Teamnets should extensively exercise intrinsic incentives and rewards. Team identification, cooperation, common learning, and mutual support are incentives for teamnet members to work in the network.

Extrinsic incentives and rewards, such as public recognition, training, and monetary rewards should be established among the site managers to create uniform systems for the entire networked organization.

2.4.4. Metrics: Reliability, Responsiveness, Relationship and Value

[27] Lisa Kimball, Managing Virtual Teams, Team Strategies Conference, Federated Press, Toronto, Canada, 1997

Metrics are useful to monitor progress and to control performance. The transnational network metrics must be aimed to measure the desired behaviors such as Reliability, Responsiveness, Relationship and Value.[28] More detail about metrics will be discussed in Chapter 5.

2.4.5. Leader: Motivation, Control, and Solving Conflict

The leader is, along with the purpose, one of the most important factors in making the teamnet succeed. There are different terms for such positions, such as "team manager," "virtual manager," "network manager" and others.

Competencies Required

Role competencies include[29] coordinator, designer, disseminator, tech-net manager, socio-net manager, executive champion, and site bridge. They build relationships, trust, information sharing and responsiveness, and must be flexible and open to culture differences.

Roles

Leaders of virtual teams can support their teams by:

- Clarifying a unifying purpose. The only way to be sure is to make clear what that target is, and check each action for its value in attaining that purpose. On the up side, the technology environment may provide some advantages because it provides multiple ways to remind team members about purpose (as well as goals, tasks, timings) as part of the daily fabric of communication.
- Goal setting, making clear objectives and behavior and performance metrics definitions for the team, as well as clear rewards and incentives, and setting realistic expectations for the global relationship
- Establishing rules and criteria for contacting other teams
- Recognizing the team and their importance

[28] Delivering Quality Service,
[29] Lisa Kimball, Team Strategies Conference, Federated Press, Toronto, Canada, 1997.

- Encouraging members to explore questions that matter, including questions about how they are working together
- Supporting the creation of some kind of shared space (the feeling that there is an infrastructure where people are working together)
- Facilitating the coordination of the technology, work processes, and the formal organization
- Recognizing reflection as action and as legitimate work (getting the infrastructure of the organization to support the learning process)
- Supporting activities which make the informal network visible
- Recognizing the power of multiple leaders and dividing projects into parts with various direct phases of a project making use of a group's diversity

- Staying connected at all levels. Teamnets depend upon open communication. Too much or too little of any one and the effort will fail.
- Supporting conversation among team members, this is the most critical thing a leader needs to support.
- Fostering feedback. Participants need to spend more time than usual talking about the quality of their communication: communication style, quantity, frequency, clarity, etc.
- Weaving is a networking term that refers to the process of summarizing and synthesizing multiple responses in a virtual group. The weaving item or response tells people where they've been, where they are, and where they might want to go next. It can identify issues people agree upon or issues that still bring up many questions or require more information.
- Motivating participation. It's important to find ways to ground the leader's sense of what's happening besides data transfer. Facilitation is paying attention to what is happening in the team; special attention is needed to feel how interaction is working in different media.
- Moderating the pace. In asynchronous environments, pace is an important dimension to facilitate. Different team members may access the virtual environment more or less frequently.

- Reinforcing the network culture. Keep in mind that you are creating an environment to support relationships, not just to exchange information. Members develop appropriate expectations, norms, styles and behaviors that will help or hinder the atmosphere you want.

The fact is, managing a virtual team requires all the finesse and skill of managing a meeting or project.

2.5. Risk Factors of Virtual Teaming

Some of the challenges of communicating and working online are:

- Electronic communication may create information overload, a primary cause of stress in networked members. Communication protocols, along with filtering devices, are required. The simple act of indicating message priority in the email header helps people get to the most important communication first.

- The problem for managers is to motivate people at a distance. The problem for remote staff is to deal with increased autonomy and reduced feedback. Group communication processes are required to sustain trust and retain personal presence through interaction.

- Working most of the time in a teamnet fosters the feeling of communicating with a computer and not with other human beings. This can lead to a loss of self-regulation, causing offensive online communication, which is quite unlike how the person would behave face-to-face.

- Travel is still considered a key factor to contribute to the success of the teamnet. When members are extremely dispersed, however, extensive travel wastes time, consumes money, and disrupts families. Intranets and telephones combine to provide enough synchronous and asynchronous bandwidth to replace 80% of organizational travel with results-oriented communication. Everyone in the organization can learn the knowledge and skills to work online.

- Networked interaction can strengthen the organization's relationships, but it may also highlight fundamental cultural differences. There are several human characteristics that are taken-for-granted, such as sense of time; power and information are quite different. Training in cross-cultural working is now a necessity. Today's internal intranets are only a way station to tomorrow's virtual or extended intranets, which will link international teams into dynamic work groups.

- Managers have the problem that when people don't have the skills to work effectively in a teamnet, they tend to blame the technology. Skill development for working online, or the budget to provide it themselves is required.

- Existing communication and work skills, developed over years of face-to-face, collocated work, do not transfer to and sustain high performance online work.

- Team efforts linking people in developing and developed countries have a higher failure rate than those linking people in two or more developed countries.

- Existing research suggests that the reason for global team failure is directly related to the difficulties of building trust and positive relationships. Research and experience also demonstrate that e-mail and other electronic means of communication, which people think will bridge those boundaries, actually are fraught with complications.

- Research reveals that about 50% of global teams fail to attain their goals.[30]

2.6. Success Factors for Teamnets

There are several suggestions that experts have to increase the possibilities of success for a virtual organization set-up. Collaborative virtual teamwork requires 90% people and 10% technology; this fact makes the social factors more critical than the technological.

Jessica Lipnack defines five basic principles to make the teamnet succeed[31]:

- Clarify a unifying purpose

[30] http://www.grovewell.com
[31] Lipnack, Jessica, Organizing for the Future: Networking Blurs Hierarchical Boundaries, Total Quality Newsletter, 1999

- Identify independent members
- Create voluntary links
- Recognize the power of multiple leaders
- Stay connected at all levels

Other lessons learned from other studies are:

- Moving control ownership to influence relationships[32] is a key factor to empower teamnet members
- Keep the project visible
- Avoid or reduce communications delays
- Keep team members visible
- Augment text-only communications with graphics
- Use computer supported cooperative work technologies where possible
- Establish ground rules or group norms
- Take time out for self-assessment
- Recognize people
- Learn from the team's experience

Factors in Building a Productive Network Environment Based on Trust

There are several aspects needed to build a productive environment for virtual teams.[33]

- Teaming depends on collaboration, because collaboration entails sharing information, knowledge and views with other people.

- Communication builds trust; the amount of communication correlates positively with the opportunity to calibrate others and thus to build trust.

[32] Lipnack & Stamps, Sources of Power and Authority, Virtual teams, pg. 147, John Wiley and Sons, Inc., 1997.

- Trust formula: teaming depends on collaboration, which depends on trust, which is built through communication; remote electronic communication, if sufficiently rich, is an alternative.

- The first component of trust is predictability.

- Members need the chance to display our trustworthiness so the team can trust us (or vice versa).

- A fellow work team member is trustworthy if he or she behaves as follows:

    - Acts in our and the team's best interests
    - Be truthful
    - Keeps his or her promises or tells us when he or she can't keep them
    - Respects the citation and /or protection of information we sent him or her
    - Shares mutually-valuable information with us

- Virtual team leaders and members need to be very visibly trustworthy.

2.7. Benefits and Applicability of the Adaptive Network

Existing network communities have proven some of the benefits of properly established systems. Some of them are:

- Coordination costs fall when committed people align around the same goals
- Shortened cycle and response time for problem solving
- Increased innovation
- Leveraged learning
- Increasing the span of communication increases the span of influence
- People can be recruited for their competencies, not just physical location
- Fostering cross-functional and cross-divisional collaboration
- Increased ability to initiate and contribute to projects across organizational boundaries

[33] Michael Kossler and Sonya Prestridge, Geographically Distributed Teams.

- Allocation of competent resources where they are not located
- Capture a lifetime's experience and re-use it
- Retrieval of historical knowledge and practices from past projects
- Learning from experiences and helping people stop repeating others' mistakes
- Recruitment of new people into projects to get them up to speed and make them contribute quickly

So the virtual team is a strategy for success. By employing virtual teams, people can do things that are impossible within the traditional operational model, whether global, multinational or international. Virtual teams can spread better practices and faster connections of sites with different competencies into self-organizing, knowledge sharing networks of professional communities. Virtual teams can facilitate the balance of workloads, the complement of competencies and the reduction of response time to problems and projects.

2.8. Summary of the Chapter

- Socio-technical systems are the most flexible and the most complex, too.
- This socio-technical system (the "Transnational Competency Network for Packaging Engineering at OPCorp) is a "life form." It has anatomy, physiology and psychology.
- The "transnational model" architecture is based on a "network" structure.
- The networked organization enables teams of people who are geographically distributed to be connected by a shared purpose and different culture of doing work together but dispersed.
- The "Transnational Network" will have two types of basic components: social and technical.
- As a virtual team, the "teamnet" works across space (distance), time and boundaries (hierarchy) with webs of communication technology as links, motivated by a common

purpose or goal and strengthened by a "virtual environment" culture. Time and distance are problems that virtual teams are trying to address.

- The components of a teamnet are the members, the leader (or the leaders), the competencies and the purpose.
- Networked units with similar competencies, such as engineering or design, can be balanced according the local market's demands and global requirements.
- The unique nature of the network makes members more empowered to solve local problems.
- The creation of shared information and knowledge repositories creates a "network effect" of learning.
- Functionality re-allocation is one of the advantages of the socio-technical networked system.
- The most important links are the social relationships.
- The clear differentiation of the kind of information and the operation that needs to be performed with such information will certainly help a lot to choose the proper telecommunication link.
- Principles and rules that operate all the time result in a specific behavior. The behavior is dictated by the psychology of the system.
- The existence of multiple teamnets will allow definition of which parts of the system are considered platforms and which parts will be modular.
- A set of values, assumptions and artifacts must be defined and shared with the entire networked organization to overcome local culture differences.
- Teamnets should exercise extensively intrinsic incentives and rewards. Team identification, cooperation, common learning, and mutual support are incentives for teamnet members to work in the network.

- The transnational network metrics must be aimed to measure the desired behaviors such as Reliability, Responsiveness, Relationship and Value.

- The leader is, along with the purpose, one of the most important factors in making the teamnet succeed.

- Collaborative virtual teamwork requires 90% people and 10% technology; this fact makes the social factors more critical than the technological.

- Trust formula: teaming depends on collaboration, which depends on trust, which is built through communication; remote electronic communication, if sufficiently rich, is an alternative.

- By employing virtual teams, people can do things that are impossible within the traditional operational model, whether global, multinational or international.

3. Anatomy of a Transnational Teamnet

"The structure of an organization's collaboration network has significant impact on its ability to produce emergent results, and ultimately on its very ability to adapt."

James A. Highsmith III, Adaptive Software Development.

In this chapter I will describe how the "transnational adaptive network" will be formed. The intent of this chapter is to serve as a guide for the people that will be involved during the project of building the new structure for the packaging organization. To help them understand the new grouping that no longer depends on physical location but customer's and project requirements, and competency distribution. This chapter also helps to understand the importance of maintaining in-house expertise to interface with outsourcing services. Many corporations fail when implementing outsourcing projects because the lack of a core team that keeps control and coordination on the supplier activities linked with preserved function inside the company, OPCorp should not experience such as pitfall when looking for efficiency in its Packaging Organization.

3.1. Elements of Adaptive Transnational Network: Teamnets + Purpose + Links

In the new "Transnational Packaging Competency Network" the reporting structure has changed to a bottom-up supporting relationship, where "customers" (Business Units, Integrated Supply Chain and Service), at the very top, are the most important part of the structure. The Manufacturing Technology organization, suppliers and affiliates support the activity of the different packaging teamnets. One of the key teamnets on the network is the "Manager/Leaders' teamnet." This teamnet is responsible for creating the environment to make the new networked structure work. The new organization structure is changing from a "centralized model" (see Packaging Competency Center in Chapter 1) to an "adaptive network."

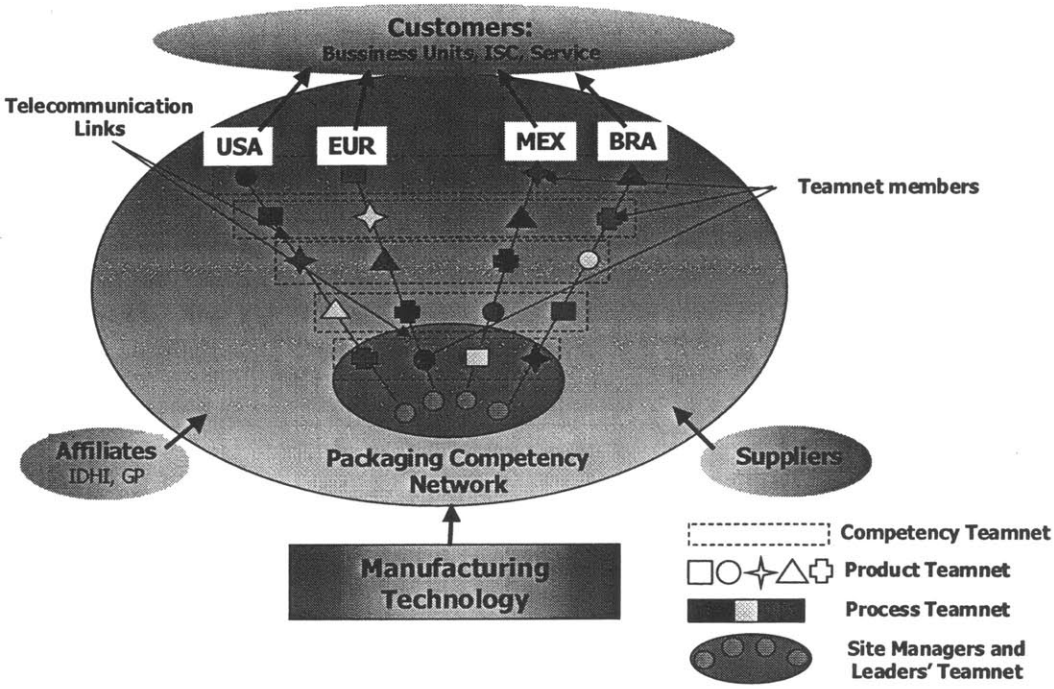


Fig. 3 - 1 New Structure for the Packaging Competency Organization

The basic components of the network are the "virtual teams" or "teamnets." The teamnets will be formed by people from multinational packaging groups that are the "core team," and the members of external organizations, such as the customer's organization, and the affiliate's and supplier's organizations, will form the "support team" within the teamnet. A teamnet's social part is formed by the people, and the technological part is formed by the links. The following chart shows in detail the composition of the teamnets.

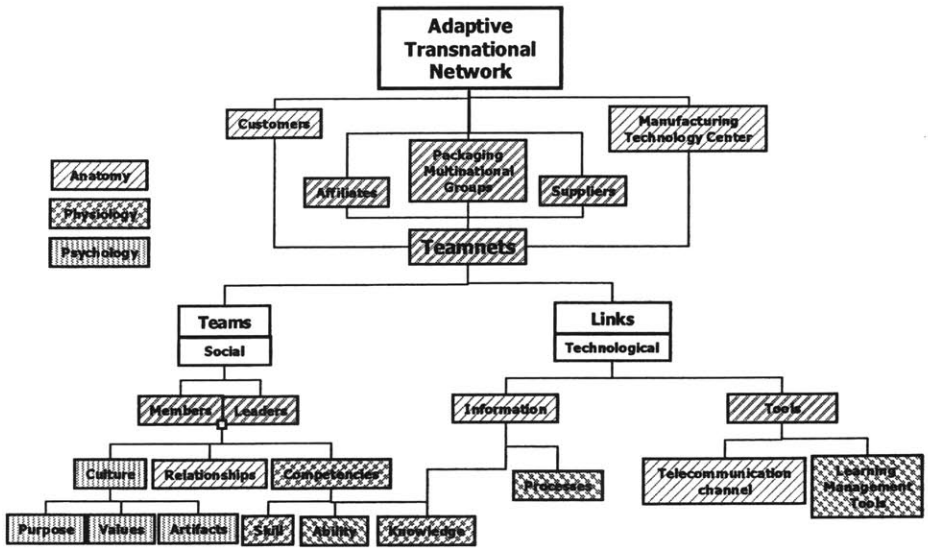


Fig. 3 – 2 Components of the Adaptive Transnational Network

3.1.1. Corporate Sponsor

The corporate sponsor for the restructuring project of the packaging organization will be the Vice President of Module Delivery and Technical Operation and Manufacturing Technology, to whom the Packaging Organization reports. He is currently considering outsourcing the packaging capability. This document will help him to explore other possibilities to make manufacturing support activities more efficient without losing control or coordination. The packaging activity can be considered systemic and not modular since it depends on others' innovative inputs. Therefore, based on Chesbrough's framework that shows that a systemic capability is extremely difficult to outsource without losing a considerable amount of coordination, the corporation has to look for other options with attributes from "the virtual company" model such as innovation and responsiveness. The following paragraphs will explain the nature of the "adaptive network" based on virtual teams principles operating inside the corporation already.

3.2. People

The following chart shows the names and areas of responsibility of the people that will be part of the adaptive networked organization.

USA	
Member	**Responsibility**
Terrie	Manager
Bill	IOT Packaging/Spares
Ed	IOT /Packaging
Mary	IOT Packaging
Janet	Consumables Packaging
Glenn	InkJet Packaging
Jennie	CRU Packaging
Steve	Consumables Packaging

Brazil	
Member	**Responsibility**
Jorge	New programs
Milton	Current programs
Maristela	Remanufacture
Alexandre	Removals

Europe	
Member	**Responsibility**
Alan	Manager
Barry	Inbound & Outbound equipment packaging
Paul	Inbound & Outbound equipment packaging
Gerhard	Spares
Peter	Product Assembly support
John	CRU
Pieter	Toner & Photoreceptors

Mexico	
Member	**Responsibility**
Benjamin	Manager
Rosalba	CRU
Jaime	IOT/Accessories
Benjamin	Manuf. Support
Gustavo	Spares

Table. 3 - 1 List of Members of Packaging Organization

As shown in Chapter 1, there is an overall good blend of experience levels, backgrounds and abilities that make the organization capable of supporting worldwide development, manufacturing and logistics operations. Virtual work will help to share more tacit knowledge around the packaging organization. That is why it is important to understand the new competencies required to interact at a distance to solve problems and increase learning.

3.2.1. Members' Virtual Work Competencies[34]

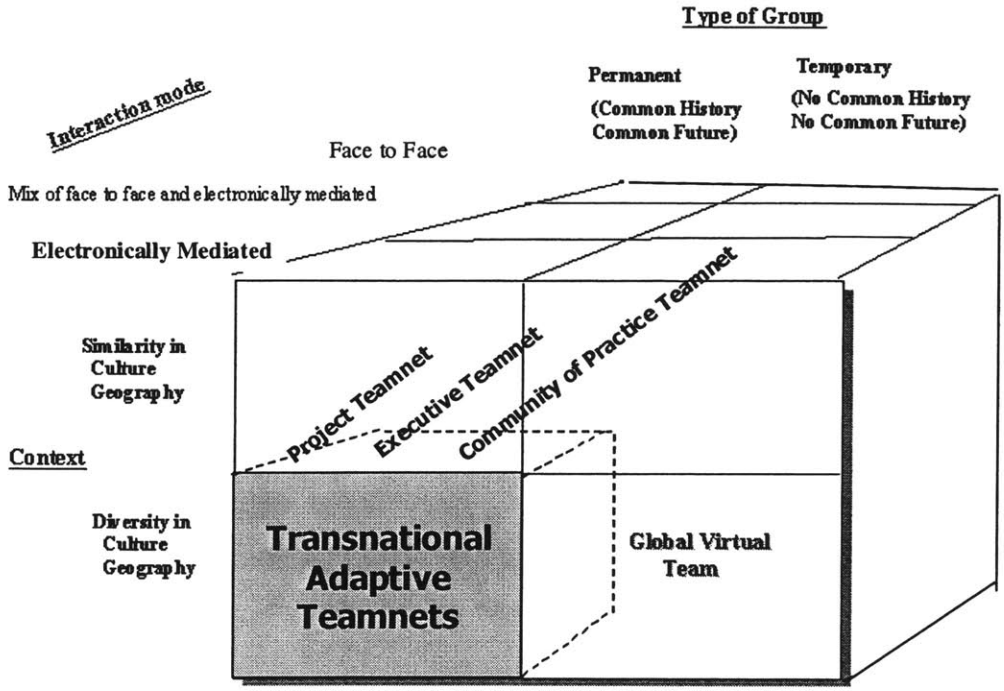
All the members of the adaptive network will have to develop their skills in the following competencies for virtual work.

- ***Project management:*** ability to plan, monitor, report and control
- ***Networking:*** knowing the organization, people and communication protocols
- ***Use of telecommunication technology:*** selecting proper media to communicate, accessing new technologies, knowing how to conduct remote meetings
- ***Self management:*** knowing how to prioritize goals and work, setting limits, creating opportunities for learning, improving work methods
- ***Boundary management:*** understanding cultural differences, building and accepting different practices
- ***Interpersonal awareness:*** being aware of interaction techniques, collecting and providing feedback, supporting team learning

3.2.2. Virtual Teams = Teamnet

There are several types of virtual teams depending on the context, the communication media and the culture commonality of the groups. In our case, all the teams will be electronically mediated, diverse in culture and geography, with a little common history and definitely a common future helping the corporation to overcome the competitive crisis it is experiencing like many other companies in the world.

[34] Duarte; L Deborah, Mastering Virtual Teams, Jossey-Bass Publishers, 1999



Source: Modified from Jarvenpaa's model for Global Virtual Team, Communication and Trust in Global Virtual Teams, Graduate School of Business, University of Texas atAustin

Fig. 3 – 3 Type of teams

Within the "Adaptive Transnational Organization" there will be three different types of teamnets, classified depending on the general purpose of the team.

Executive teams are made up of managers who are on the team because of their position in the organization. These teams are usually semi-permanent teams with responsibility for specific divisions or functions in the organization.

Project teams are created around a specific task. Members of the team are selected based on their role and expertise in relation to that task. These teams are created for the life of the project.

Community of practice teams support people who are working on common tasks or in the same professional field and who can benefit from sharing experience.

Membership in these teams is voluntary. These teams don't usually have specific deliverables but instead are focused on learning.

As explained in Chapter 1, there are some cultural differences that may affect communication and participation among the members from different sites, but they will share the same purpose, problems and technical language needed to strengthen the relationships that are established.

Teamnets

Multiple teamnets will be formed to facilitate an adaptive operation, providing flexibility, responsiveness and common learning. The "platform" teamnets will be process and competency focused. These teamnets will be the denominated "communities of practice" in charge of improving processes and building knowledge related to the packaging discipline. The following teams are the "platform" teamnets:

- Teamnets by process: clean sheet design, domestication, problem solving
- Teamnets by competency: design, testing, and configuration

CUSTOMER ENGAGEMENT PROCESS TEAMNET

Member	Site	Responsibility
Ed	US	IOT /Packaging
Steve	US	Consumables Packaging
Peter	E	Manuf. Support
Alexandre	B	IOT /Packaging

DESIGN PROCESS TEAMNET

Member	Site	Responsibility
Terrie	US	Manager
Glenn	US	InkJet Packaging
Alan	E	Manager
John	E	CRU
Benjamin	M	Manager
Jorge	B	IOT /Packaging

ANALYSIS AND SIMULATION PROCESS TEAMNET

Member	Site	Responsibility
Mary	US	IOT Packaging
Jaime	M	IOT /Packaging

TESTING PROCESS TEAMNET

Member	Site	Responsibility
Bill	US	IOT Packaging/Spares
Jennie	US	CRU Packaging
Barry	E	IOT /Packaging
Pieter	E	Toner & Photoreceptors
Benjamin	M	Manuf. Support

SUPPLIER INVOLVEMENT PROCESS TEAMNET

Member	Site	Responsibility
Janet	W	Consumables Packaging
Gerhard	E	Spares
Gustavo	M	Spares
Milton	B	Manuf. Support

MANUFACTURING SUPPORT PROCESS TEAMNET

Member	Site	Responsibility
Paul	E	IOT /Packaging
Rosalba	M	CRU
Maristela	B	Manuf. Support

Process Focused Teamnets

Table. 3 - 2 Platform Teamnets and Members

The other virtual teams will be "modular" teamnets; they will be formed and grow according the workloads and competency requirements of the projects. Members of these teams are temporarily working on those project-based teamnets. The following teams are the "modular" teamnets:

- Teamnets by product: Flintstone, Musketeer, Brookground, Lerma
- Teamnets by project: Green Dot, 3R´s, Virtual Teams, ISTA certification
- Teamnets by customer: SOHO, CBU, PCDU

CONSUMABLES TEAMNET

Member	Site	Responsibility
Janet	US	Consumables Packaging
Steve	US	Consumables Packaging
Pieter	E	Toner & Photoreceptors
Glenn	US	InkJet Packaging

CRU TEAMNET

Member	Site	Responsibility
John	E	CRU
Rosalba	M	CRU
Jennie	US	CRU Packaging

IOT TEAMNET

Member	Site	Responsibility
Ed	US	IOT /Packaging
Barry	E	IOT /Packaging
Paul	E	IOT /Packaging
Jaime	M	IOT /Packaging
Jorge	B	IOT /Packaging
Alexandre	B	IOT /Packaging
Mary	US	IOT Packaging

MANAGEMENT TEAMNET

Member	Site	Responsibility
Terrie	US	Manager
Alan	E	Manager
Benjamin	M	Manager

SPARES TEAMNET

Member	Site	Responsibility
Gerhard	E	Spares
Gustavo	M	Spares
Bill	US	IOT Packaging/Spares

MANUFACTURING SUPPORT TEAMNET

Member	Site	Responsibility
Peter	E	Manuf. Support
Benjamin	M	Manuf. Support
Milton	B	Manuf. Support
Maristela	B	Manuf. Support

Table 3 – 3 Modular Teamnets and Members

There will be a third type of teamnet. The site managers and the virtual leaders of every existing teamnet will form an "executive team" to maintain the flow of resources and support to the teamnets, to resolve conflicts and share learning about the adaptive strategy being deployed.

3.2.3. The Teamnet Leader

The teamnet leader has been identified as a critical role within the network structure. As every co-located team has a captain, a distributed networked group of people working for a common purpose has a teamnet leader.

The role of the teamnet leader may be seen as a new job description, or as a set of skills that managers, in general, need to develop and begin applying.

One function of the teamnet leader is to communicate the vision for the project to the group, particularly at the start. He must be able to relate that vision to the larger organization's purpose and help the group translate that vision into specific goals, strategies, objectives, processes and tasks. These processes will be described in Chapter 4.

The leader makes sure the environment is ready for that team to learn to work well together with their common goal very clearly defined.

The teamnet leader acts as liaison between the teamnet and other teamnets, between the teamnet and the "executive" teamnet, between the teamnet and the rest of the corporate structure, and finally, between the teamnet and the "outside world." The teamnet leader sets up not only the communication pathways between the members of the group, but also the communication of the group back to the formal hierarchy, including customers, affiliates and suppliers.

The teamnet leader will lead the group into the processes. But once the processes take place, the teamnet leader role changes to one of encouraging others to take leadership roles as indicated by the work tasks. The leader has the responsibility of recognizing and encouraging the development of potential leadership. It is the responsibility of each member of the network to recognize and respond to his or her chance for leadership. But since this is a new game, players need to learn (and sometimes make up) the rules as they go along.

It is the role of the teamnet leader to bridge the miles of distance between members, organizational boundaries, cultural differences, hierarchy levels, and perceptions to encourage diversity, enriching the group's perspective.

The teamnet leader facilitates the communications of the group. This means employing methods from no-tech face-to-face to high-tech conferencing, using a range of support and technologies and their combinations, too.

The teamnet leader must have skills in moderating the communication of online applications with multiple users. The moderation role begins with an understanding of a range of technologies and the ability to determine their appropriate use.

The teamnet leader catalyzes discussions around questions, challenges members to question perspectives, and continues to push the discussion deeper. The nature of the manager's role in this context would be that of a facilitator.

The teamnet leader will help to resolve conflict caused by different viewpoints or the power balance.

Leadership Principles for the Adaptive Team[35]

All the competencies described above can be demonstrated through the following practices:

- Stay visible and in action
- Identify the adaptive challenge
- Regulate distress
- Maintain disciplined attention
- Rely on distributed intelligence
- Encourage leadership from all members
- Encourage robust communication
- Create learning obligation

Sirkka Jarvenpaa, a famous researcher on virtual team dynamics, has found some of the key practices in real successful teams[36]:

- The leadership role emerges after an individual had produced something or exhibited skills, ability, or interest critical for the role.
- The leadership role is not static but rather rotated among members, depending on the task to be accomplished.
- Those taking leadership roles maintain a positive tone, such as sending a private message to a member who failed to complete an assignment, rather than singling her out with a message to the entire team.

On the other hand, he recommends avoiding:

- Negative posturing on the part of the elected leader and by other key team members.
- Leaders chosen not based on their greater level of experience than the other members, but because they are the best communicators on the team (the first to communicate or sent the largest number of messages).
- Appointed leaders engaging in negative rather than positive reinforcement--complaining about other members' lack of participation, complaining about too little communication, comparing the team unfavorably to other teams, or sending messages of complaint describing the work as "extremely frustrating."

For managing in the virtual environment, teamnet leaders need to plan strategically, maintain an extraordinary number of relationships, manage personnel and other resources, all in a widely dispersed, even global, environment.

The New Management Mind Set

There are some management paradigms that traditional managers have to change to become more prepared to lead a virtual team.[37]

From	To
Face-to-face is the best environment for interaction and anything else is a compromise.	Different kinds of environments can support high quality interaction. What matters is how you use them.

[35] Duarte, L. Deborah, Mastering Virtual Teams, Jossey Bass Pub. 1999
[36] Sirkka L. Jarvenpaa, Communication and Trust in Global Virtual Teams, Graduate School of Business, The University of Texas at Austin, JCMC 3 (4) June 1998
[37] Metasystems Design Group and Catalyst Consulting Team, "Boundaryless Facilitation", 1999

Collaboration is what happens when teams interact at a fixed time and space.	Collaboration happens in an ongoing, boundaryless way.
Being people-oriented is incompatible with using technology.	Using technology in a people-oriented way is possible and desirable.
When the communication process breaks down, blame the technology.	When the communication process breaks down, evaluate your management and interaction strategies, not just the technical tool.
Learning to manage virtual teams is about learning how to use the technology.	Learning to manage virtual teams is about understanding more about teams and the collaboration process.

Source: M.D. Group & Catalyst Cons. Team, Boundaries Facilitation,
Table 3 – 4 Required Paradigm Change

The leadership of current LinDoE-X's managers is close to the new requirements of the virtual leader, but more emphasis has to be placed on the learning of work coordination at a distance. Delegation and empowerment are familiar terms for all the people in the packaging organization, but "rolling" leadership and virtual interaction have to be further developed. Managers and team leaders have to be trained in telecommunication technologies, virtual interaction and learning management of dispersed teams. This change in management style has to be learned from someone already exposed to this new working model. It is highly recommended to have the training in an actual hands-on virtual environment through distance seminars or workshops. There are several consulting firms and experts that are fully focused on helping organizations to cross the chasm of this disruptive technology. Dori Digenti at Learning Mastery, Martha Haywood at Management Strategies Inc., Jessica Lipnack and Jeffrey Stamps at NetAge Inc., Cornelius Grove & Associates (grovewell.com), Meg Hartzler at Destra Consulting Group, and Deborah L. Duarte as an independent consultant are some of the alternatives that can be considered for training the new leaders of the adaptive transnational network.

According to Cornelius Grove & Associates, "...the challenge of being at distant sites, in different time zones, and from divergent cultural backgrounds creates obstacles well beyond those of mono-cultural co-located teams. About 50% of all virtual teams fail to obtain their

goals." Therefore the responsibility for the virtual team leader is even higher than being a traditional team leader.

3.3. Information

This list is only a general approximation of the information that the packaging organization uses, and it is intended to serve as an example of the information flow management proposed to avoid information overload and promote telecommunication effectiveness.

- **Project related:** customer requirements, design specs, drawings, artworks, testing reports, progress reports
- **Operation related:** standards, practices, operating guides, performance metrics
- **Management related:** capability development, strategic resource management, decision making, performance monitoring

	Constantly Daily	Periodically Weekly/Monthly	Every project phase	Seldomly
PROJECT RELATED				
Customer Requirements		Push Out	Pull In	
Design Specfications	Push Out	Pull In		
Drawings/Models		Push Out	Pull In	
Reports		Pull In		
OPERATION RELATED				
Industry Standards				Pull In
Company Standards				Pull In
Local Practices				Pull In
Operation Guides			Push Out	Pull In
Performance Metrics		Push Out	Pull In	
MANAGEMENT RELATED				
Capability Development Plans				Pull In
Strategic Resource Management			Push Out	
Performance Monitoring & Benchmarking		Pull In		

Table 3 – 5 Type and Nature of information handled by Packaging Organization

From the diagnosis performed in Chapter 1, we concluded that packaging groups from different sites should be more open to sharing their "locally generated" practices to improve the overall operation of the organization. From data gathered in the interviews, we discovered that packaging groups don't know what the other groups are doing and what the decision process is to decide on multinational packaging configurations. In order to increase the amount of information sharing among the groups, it is necessary to establish the nature of the information: "pushed out" or "pulled in." The chart shows the different types of information and how its proper classification can help to diversify the use of channels to communicate and to avoid e-mail, voice-mail and meeting overload while increasing the amount of information available in the system.

Once the information has been classified, the specific links to transfer it and transform it can be selected.

3.4. Link Mechanisms

According to Walther's social information processing theory,[38] computer-mediated communication does not differ from face-to-face communication in terms of the capability of social information exchange, but rather in terms of a slower rate of transfer. Other studies have concurred that communication is more a function of the context, setting, and timing than the characteristics of the media.[39] That may be one of the most important reasons why the proper channel has to be selected depending on the type of context and timing that is required for effective communication and work coordination.

Virtual teams try to deal with two factors: distance and time. The key is to use multiple media to offer many pathways for interaction and the development of relationships. The following matrix illustrates some of the information and communication technologies that support virtual teams working together with anyone, at anytime, from anywhere.

[38] Walther, 1997
[39] Markus, 1994; Ngwenyama & Lee, 1997; Parks & Floyd, 1996; Zack, 1993

Same place (co-located) Same time (synchronous)	INFO NATURE	Different place (distributed) Same time (synchronous)	INFO NATURE
•Face-to-face meetings	PO	•Audio (telephone) conferencing	PO
•Computer-supported meetings	PO	•Video conferencing	PO
•Open Space Technology (PCs, Electronic Whiteboards)	PO	•Virtual Meetings,	PO
		•Instant messaging	PO
		•Document Conferencing	PO
		•Open Space Technology (NetMeeting, Proshare)	PO
Same place (co-located) **Different time (asynchronous)**	**INFO NATURE**	**Different place (distributed)** **Different time (asynchronous)**	**INFO NATURE**
•Library (resource center)	PI	•Voice mail	PO
•Document Center Databases	PI	•Electronic mail	PO
		•Bulletin Board	PI
PI = PULLED IN INFORMATION		•Computer conferencing	PI
PO = PUSHED OUT INFO		•Groupware (Intranets)	PI

Table 3 – 6 Classification of communication channels

It is important to realize that when people are dealing with asynchronous communication, the receiver has the opportunity to control the information flow if more "pulled in" channels are used. This advantage has to be taken with caution; discipline has to be generated to periodically access "pulled in" information and to promptly respond to the requirements of other members of the net.

3.4.1. Existing Channels at OPCorp

Summarizing the information presented Chapter 1 about current communication practices, we can observe from the chart below that the information transfer function depends highly on the "pushed out" channels such as e-mail and telephone. This situation creates an obvious problem of information overloading since the receiver does not have control of the information flow. A bulletin board is the third option for receiving information, but it is used only 9% of the time. There are two other problems derived from these communication practices. The first problem is the use of the fax to transmit technical information. This channel is not fast or reliable or clear enough to transmit graphical-technical information. Although it is used only 13% of the time, the fax should be considered an obsolete technology nowadays. The second problem is the use of the telephone to send information. The telephone is good for synchronous interaction when graphical or written information is not critical. The telephone is used 28% of the time to transmit information; almost a third of

the information is transmitted with a high potential for the problem of information misunderstanding due to the lack of graphical and written information.

Transfer				Transformation	
Send Info	Channel Nature	Receive Info	Channel Nature	Process Info	Channel Nature
Email	PO	Email	PO	Email	PO
Telephone	PO	Telephone	PO	Telephone	PO
Fax	PO	Bulletin Board	PI	Videoconference	PO

PO = Pushed Out Channel
PI = Pulled In Channel

Table 3 – 7 Classification of Channels currently used by Pack. Organization

For the transformation function, there are more complex problems. The use of e-mail to process or discuss information is an extremely slow channel to get consensus and to resolve conflict. The asynchronous nature of e-mail makes the decision-making process too bureaucratic, and it creates overloading and uncoordinated participation, making it difficult to concentrate in a sequenced and logical form. E-mail is used 30% of the time to discuss information. This fact may explain the lack of responsiveness perceived by some packaging groups.

The telephone is used 26% of the time. Again, the information filtering of this channel makes the discussion of technical information difficult when used with no other graphical communication tool.

Videoconferencing is used only 16% of the time. It is recommendable to increase its usage to make the transformation function of information more effective. One option to explore is to extend videoconference communication to desktop videoconferencing. I will expand on this option on the recommended channels section.

Bulletin Board, Web Pages on Intranet

The data gathered showed a limited usage of bulletin board and web pages on the intranet. As a matter of fact, most of the packaging groups have a bulletin board page or web page

posted, but the web pages and bulletin boards are completely independent and they are not linked to each other in any way. The intranet sites are difficult to find and they are not always up to date due to the fact that they are not official channels for communication.

Here I describe some of the advantages of increasing the usage of such communication tools. The initial reason for having an intranet is that it increases people's access to the organization's information assets. Web pages provide members of the organization access to documents that can be searched, and that may include text, graphics, and multi-media. Knowledge and information are linked to a person. People can link intranet pages to web conferences, document conferencing or even e-mail. It's easy for people to communicate around shared data and common tasks and goals. People can create intranet pages fully explaining their proposals, creating interest. They form their own informal working relationships with distant colleagues that cross departmental boundaries.

With bulletin board and discussion forums, concepts are defined and refined online and the work is conducted online.

The organization can formally create distributed teams and projects. Intranets mean that distance becomes irrelevant in selecting the right people for the job. Managers can have the information and communication tools to get the skills from Europe, North America and Latin America for projects, and cut down on travel in the meantime.

Intranets create accelerated online work and communication. The ready interpersonal communication they enable creates new patterns of relationships within the organization.

The packaging organization can benefit from sharing a common intranet web page and bulletin board where all the "pulled in" information can be stored and shared with all the members of the adaptive network and where discussion of the communities of practice can take place.

3.4.2. Suggested Channels to Communicate

Increasing the effectiveness of communication makes it easy to enhance responsiveness and common learning. That is why the following proposal is crucial to technologically set up the network structure to be adaptive, responsive and reliable.

Transfer				Transformation	
Send Info	**Channel Nature**	**Receive Info**	**Channel Nature**	**Process Info**	**Channel Nature**
Bulletin Board	PI	Bulletin Board	PI	Telephone	PO
E-mail	PO	E-mail	PO	Videoconference/DVC	PO
Telephone + DocConf	PO	Telephone + DocConf	PO	Telephone + DocConf	PO
				Computer Conferencing	PI

PO = Pushed Out Channel
PI = Pulled In Channel

Table 3 – 8 Proposed channels to enhance communication effectiveness

1) The first recommendation is to increase the usage of intranet web pages and bulletin boards to transfer (send and receive) information. This channel will help to reduce information overload, but it requires discipline from the senders to properly post the information to be shared on a periodic basis. The title block and the responsibilities have to be clearly stated to facilitate the retrieval of information.

2) The second recommendation is to use a combination of telephone and document conferencing to deliver technical information. This combination will allow the team to decrease the filtering of the telephone for graphical content and to increase the context of the document conferencing.

Document Conferencing

Document conferencing is the connection of two or more computer systems, through which information flows. This information can be in the form of text, graphics, digitized sound, or digitized video. However, sound and video are not necessarily required for data conferencing. Whiteboards or applications that allow multiple computers to add, remove, or edit documents simultaneously, are an example of document conferencing without sound and video.

3) The third recommendation is to increase communication through desktop videoconferencing. The fast development of technology is forcing prices to drop rapidly, which enables more people and companies to afford high speed broadband lines to connect computers with videoconference capability.

Desktop Videoconference

Desktop Videoconferencing (DTVC) combines personal computing with audio, video, and communications technologies to provide real-time interaction from a typical personal computer, and the interaction embodies communications between groups of people from singular points (desks with computers). The cost is relatively low and declining, due to the use of typical personal computer technology and added peripherals of a lower cost. There are also pre-packaged DTVC systems, with both camera and microphone embedded within the monitor itself, and video adapters integrated into a system's motherboard. For a low-end system, the price to fully upgrade to have full DTVC capabilities would run between $2000-$3000, which includes the cost of establishing a high speed ISDN line.

4) The fourth recommendation is to use the combination of telephone and document conferencing to discuss technical data and to resolve conflict. The increase of content and context will help considerably to reach a faster understanding of all the viewpoints and to come up with the best agreement in a shorter time than with e-mail messages going back and forth.

5) The fifth recommendation is to use computer conferencing. The combination of instant messaging with document conferencing produces a good combination of either synchronous or asynchronous communication that remains recorded in a groupware application. This tool enables knowledge build-up. The coexistence of content and context provides the members of the teamnet with the possibility of retrieving conversations through search engines that can look for content, time or owner of the knowledge. This application is described in the next chapter when I talk about learning management.

It is important to realize that communication and work coordination is better when multiple channels are used. The combined channels complement each other and provide an

information overlap that helps to build coherent communication and misunderstanding reduction.

3.5. Virtual Teams and System Maturity

3.5.1. Value Proposition

The value proposition of "virtual teams" is to enable organizations to group required competencies for a project or a function, recruiting the best people to do the job regardless of location, time zone or organization. Flexibility and responsiveness are the main characteristics of virtual teams.

3.5.2. Technology Maturity

We must remember that a virtual team is considered a socio-technical system. Maturity assessments will not be done only for the technology part of the virtual team but for the whole concept.

Virtual teams may be considered a disruptive technology to the traditional co-located teams for projects. We can say that the virtual team can be considered in the final part of its "ferment" stage. The following points will confirm this statement.

S curve

The "s curve" chart below shows that the virtual team is still in the ferment stage of the curve. The definition of a "dominant design" is proposed but not completely proven. Most of the literature and research describe virtual teams as a combination of telecommunication tools, dispersed highly competent professionals and dedicated software call "groupware." Consultants affirm that 50% percent of the virtual teams can attain their objectives, which means the results of the virtual teams are outperforming traditional co-located teams but with low reliability.

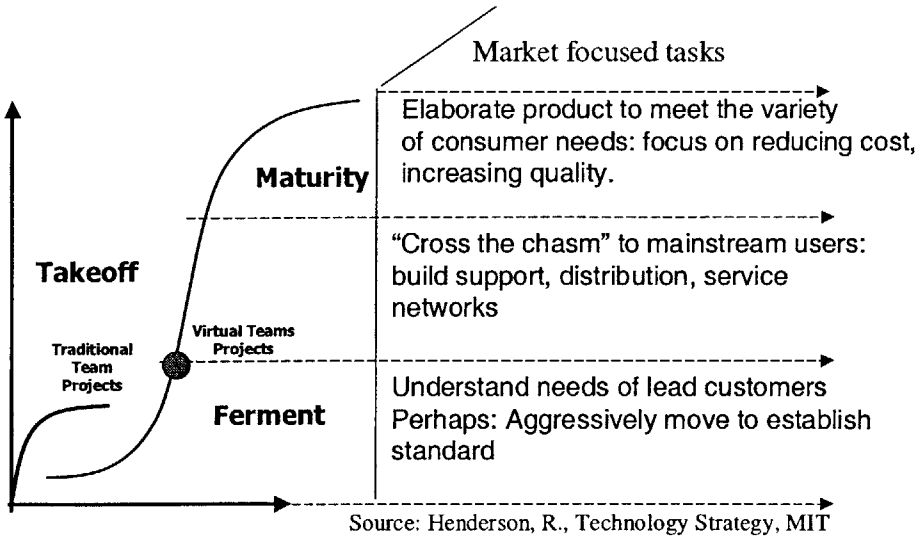


Fig. 3 – 3 Technology S-Curve for Virtual Teams

Adoption Curve

Early adopters, such as software and automotive companies, are convinced of the advantages of the virtual teams, but other companies and managers are still hesitating to rely on dispersed teams communicating by computer technologies to execute critical projects. International divisions or work, where parts of high complexity systems are developed by different companies in the world and then finally integrated in the parent company, are forcing companies to increase coordination through telecommunication instead of traveling and co-location of people. Telecommunication technology is being developed very rapidly to increase bandwidth, incorporating image and video to provide more context to the relationships established through computers. However, professional competence and processes to deal with virtual work are still in development. Management mind-set is the most difficult aspect to change.

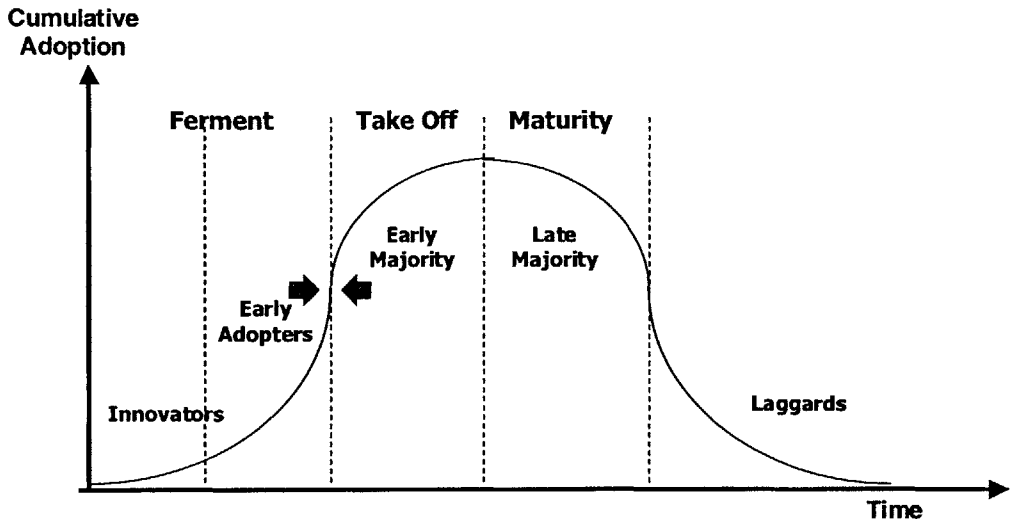


Fig. 3 – 4 Adoption Curve for Virtual Teams

Dominant Design

Virtual teams technology is still defining the new paradigms. As shown on the chart, very few aspects of virtual team technology have been fully proven. There is a lot of literature published and research in progress. Although many definitions and frameworks have been established, only very few of them are the same all across the research and consultant community (i.e., working principles, competencies required, values required). Companies pioneering the virtual teams arena are trying different models and formulas to increase the possibilities for success. Some authors affirm that trust can be developed only through telecommunications and others deny any success possibility if face to face contact is not exercised at least twice a year. Some authors are convinced that the "trust oriented" framework is more effective than the "task oriented" framework. The dominant design is not fully developed yet.

New Paradigms		
Not Completely Defined	**Defined**	**Fully Proven**
Task Oriented vs Trust Oriented framework		
	Working Principles	Working Principles
	Application Fields and Advantages	
	Topology of network and teams	
Training for the new competencies	Team Members Competencies	Team Members Competencies
Mind Set change strategy	Leader Competencies	Leader Competencies
	Team dynamics	
Most efficient combination of telecom	Individual Telecommunication Technologies	
	Critical processes	
Tacit knowledge capture and Knowledge Reuse	Software Facilitator: GroupWare	Knowledge build up
	Culture: Charter & Values	Culture: Charter & Values
Virtual Teambuilding	Social Context replacement	
	Intrinsic Rewards	
Extrinsic Rewards		
Economic model		

Table 3 - 9 New paradigms of the Virtual Teams Technology

3.5.3. Network externalities

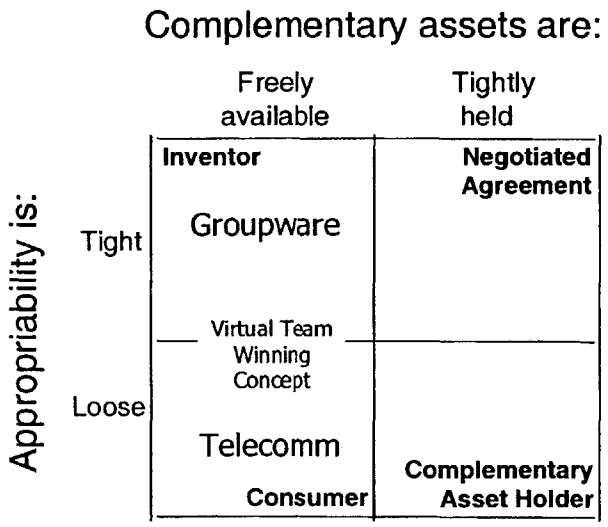
The technology to create the network effect is there. The mind set is not yet. There are not enough consultant businesses or companies dedicated to providing a full solution for virtual teams strategy yet to propagate the model and to change the "co-location" paradigm. Once the "co-location" paradigm is defeated, companies will start to foster the empowered network concept. Positive results are every day more encouraging. Market and competitive pressures are accelerating this network, outsourcing and partnering effect.

3.5.4. Complementary assets

Complementary assets are extremely loose and dispersed. Telecommunication companies are the owners of the infrastructure, but key technology is not only there, because telecom manufacturers, computer companies, software developers and service providers, all are stakeholders that contribute to the growth of these technologies.

3.5.5. Appropriability

We can consider that the company that creates the winning concept for the virtual team and is capable of translating it into a software suite such as "virtualteams.com" would be able to capture some value from the technology.



Source: Henderson, R. , Technology Strategy, MIT

Fig. 3 – 5 Appropriability vs. Complementary Assets for Virtual teams technology

3.6. Summary of the Chapter

- The new "Transnational Packaging Competency Network" has a bottom-up supporting structure where customers are the top priority.
- The basic components of the network are the teamnets.
- Teamnets have a social and a technical part; they are socio-technical systems.
- The corporate sponsor of the "Transnational Packaging Competency Network" strategy is the Vice President of MD and Technical Operations.
- Members of the packaging organization are technically excellent, but will be required to update their competencies for virtual work and self-management.

- There will be three types of teams: executive teams, project teams and communities of practice.
- Project teams are modular; communities of practice are the platforms of the organization.
- Every member of the organization will be part of three teamnets.
- The leader is one of the key elements in the success of a virtual team strategy.
- Managers and teamnet leaders will form the executive teamnet and will be trained in a virtual environment.
- There are three types of information flowing on the network: project related, operation related and management related.
- Information will be classified in detail to identify the best channel options to transfer and transform it effectively.
- There will be a change in communication practices, broadening the range of channels to be used for communication and coordination of work. The combination of communication channels will be fostered to increase context and clarify content.
- The use of "pulled in" channels will be promoted to reduce information overload syndrome.
- The "virtual team" technology is in its ferment stage. No dominant design has been proven and there are still new paradigms to define.

4. Physiology: Work Coordination and Learning Management

"Knowledge about work is best acquired through work"

Martha Haywood

This chapter will describe the operation mode of the "transnational adaptive network." As a part of the linking mechanisms, business processes that cross functions and group boundaries have to be designed. Some researchers still consider the implementation process and cross-boundaries procedures as a technical part of socio-technical virtual teams.[40] Given the characteristics of adaptive team dynamics and the process mapping obtained from the surveyed functions in Chapter 1, a general job design for the teamnet's members will be defined. Operating rules for the team will be established as a baseline for specific behaviors expected from all the members, which will be improved as the project progresses. Criteria for selecting the proper communication link, depending on the operation type, will be established to improve communication effectiveness and the protocols required to avoid information overload. Operations and processes can be generalized and extrapolated for the case of interaction with outsourcing entities.

The adaptive network must have a learning management process that assures the permanent growth of the organization. Tools proposed by experts for achieving such goals are described.

4.1. Adaptive Team Dynamics[41]

The Packaging Organization has to explore the possibility of incorporating a new working process into the existing team processes in OPCorp, such as the Problem Solving Process and Process Improvement Cycle. The Adaptive Management process can be incorporated into these processes to enhance the participation and learning of the members of the teamnet. The Adaptive Management process defines four stages of task dynamics:

1. Inception: generation of ideas to define goals and overall plans

[40] Hacker, M.E., Identifying Critical Factors Impacting Virtual Work Group Performance, Manag. Virtual Enterprises, IEMC 1999
[41] Duarte, L Deborah, Mastering Virtual Teams, Jossey-Bass Publishers, 1999

2. Problem Solving: choosing adequate means to solve problems and issues

3. Conflict Resolution: Since every member is motivated to participate and to propose solutions to solve problems there may be different approaches to the same issue. This stage involves the resolution of conflicts between those different cultural and organizational perspectives.

4. Execution: team performance and task execution and success in overcoming barriers

On the other hand, Adaptive Management includes a social dynamics process as well. This social dynamics process is very similar to the principles of interaction that OPCorp has established in its "Quality Leadership" program. The stages are: inclusion, role definition, power resources allocation, and interaction and participation.

4.2. Work Allocation Process for Packaging Organization

The new structure proposes a less hierarchical organization. This implies that the strategic decision process, which allocates workloads and projects over the whole organization, has to be redesigned. One option is to involve, from the beginning of the project, all the packaging groups from the manufacturing sites or markets that will participate in any stage of a product delivery cycle. Whether manufacturing sites are "Lead Manufacturing" units, "Second" sites or remanufacturing sites, the related packaging group has to take part in the teamnet that will develop the packaging solutions for the different sites, if required. This is a top management issue to be discussed and solved and it is outside the scope of this work. The process dynamics that this work will be covering is focused on the result of this workload allocation. Once the manufacturing sites have been identified and site groups appointed, the teamnet has to be formed and the goal set for the project.

4.3. Teamnet Operation Guide

The following steps are the basic structure of the process that is proposed to set the initial structure of a teamnet.

1) Problem/opportunity statement and customer identification

2) Mission and purpose and identity name of the team

3)Team member identification

Key People List

Name	Organization	Location
...	...	...

Contact Information

Name/Organization	Medium	Address
...	...	...

Fig 4 – 1 Structure of a Teamnet's Member List

4) Goal definition

5) Process identification

Processes for reaching the goals have to be identified as well as the champion of the process. Every process will be broken down into tasks and expected results from them.

Process Elements by Goal

Goal	Tasks	Results
...	...	...

Process Leadership

Name	Process Role
...	...

Fig. 4 – 2 Structure of Process vs. Goal, Task vs. Process charts

6) Roles[42]:

Once the processes are selected, every member has to have an active role in the teamnet. Lipnack declares, "Virtual teams are leader-full not leader-less," and defines different parallel roles on a teamnet: team coordinator, information disseminator, tech-net manager, socio-net manager and executive champion. Some of the roles may be redefined or consolidated depending on the number of members of the team and the level of proficiency in each of the teamnet dynamics (technical, social and procedural).

[42] Lipnack, Jessica, Virtual teams, people working across boundaries using technology, John Wiley & Sons, 2000

7) Tasks

Every task will have a scheduled time, a leader and a result. A summary of tasks and members is recommended as a master resource allocation matrix.

Task Timing

Task	Start	Finish
...	...	...

Task Leadership

Tasks	Leadership
...	...

Responsibility Matrix

	Member A	Member B	Member C
Task 1	x	x	x
Task 2		x	x
Task 3		x	

Fig. 4 – 3 Structure of Process vs. Goal, Task vs. Process charts

8) Meeting/Media Management

With all the tasks defined and times assigned, interaction sessions will be scheduled defining the media selected to assure communication effectiveness.

Media Plan

Media	Type	Interaction	Frequency	Location
...	...	...	...	...

Members/Media Matrix

	Member A	Member B	Member C
Medium 1	x	x	x
Medium 2	x		
Medium 3	x		x

Fig. 4 – 4 Structure of Process vs. Goal, Task vs. Process charts

4.3.1. Virtual Job Design

Every member will have to play three roles (not necessarily simultaneously), performing the following functions:

- Shifting role as a teamnet leader:
    - facilitates the problem solving process (PSP)
    - coordinates the decision making process
    - coaches rather than giving orders
    - supports team processes

- As an administrative employee:
    - works as a member of the self-directed team (teamnet)
    - supports activities of process improvement
    - communicates as frequently as possible for the execution of the PSP
    - keeps databases updated and supports other team members as required
    - provides constant positive feedback to all team members to foster learning

- As a technical specialist:
    - operates as an adviser and coaches the team on his specific area of competence
    - shares technical expertise and teaches the team how to conduct technical activities
    - leads any process improvement action focused on his area of expertise

4.3.2. Operating Agreements and Ground Rules

Every teamnet will have to develop its own operating agreements at the time the team charter (purpose, goals and processes) is established, but the following ground rules will be the baseline for the whole transnational network and may be taken as a model for the specific teamnets' agreements.

Each teamnet member will be expected to:

- Collaborate effectively with other team members
- Make the team goal a higher priority than any other personal objective
- Provide help to other team members when needed and as appropriate

- Acknowledge every message and be responsive with all team members
- Keep promises made or communicate any change with opportunity
- Demonstrate a realistic understanding of his roles and responsibilities
- Be willing to share information and feedback openly
- Demonstrate leadership to solve problems, resolve conflict and foster learning.
- Be open, tolerant and respectful of differences
- Use fact-based judgments

Additional guidelines need to be developed for telephone and videoconference meetings, timeframes for returning phone calls, e-mail protocols, and approval work flow.[43]

4.4. Telecommunication Links Guide

4.4.1. Criteria for Selecting the Media of Communication

One of the major problems detected in the diagnosis presented in Chapter 1 was the abuse of certain communication technologies and the misuse of others. The following paragraphs will define some principles that should be used to select the proper communication means and increase the effectiveness of communication and work coordination, avoiding information overload.[44] Some of the criteria used to define the proper communication channel are the interaction level required, the context level, the manageability of the information and the speed of interaction required.

Access Control

[43] Duarte, L. Deborah, Mastering Virtual Teams, Jossey-Bass Pub. 1999.
[44] *Heike Franz, The Impact of Computer Mediated Communication on Information Overload in Distributed Teams,* Proceedings of the 32nd Hawaii International Conference on System Sciences - 1999

The amount of information that a teamnet's member handles will be considerably higher than the traditional amount for a collocated employee. It has been demonstrated by several research studies of "Computer Mediated Communication" that information overload increases when virtual teams are officially implemented. That is why it is extremely important to distinguish the type of information that will be managed. This will be to the benefit of each of the members of the teamnet.

There are two types of information: pushed and pulled.

The "pushed" information is characterized by the little receiving and process control that a user has over it. Telephone calls, unprioritized e-mail, faxes, and instant messaging are examples of it.

The "pulled" information is characterized by the access and process control that a user has over it. Electronic bulletin boards, ftp sites, document control systems, groupware databases, intranets and web pages are examples of it.

It is extremely important to distinguish the type of information generated, in order to smartly decide what means will be used to share it with other team members. The urgency of interaction and the confidentiality or interest level of the information have to be taken into consideration to select whether information will be posted on a "pull" repository to be accessed on demand, or if the information has to be sent by e-mail to specific people with priority marking.

Context Level

Information content is, sometimes, very context dependent. The context may be social or physical. Physical context is important to knowledge management because knowledge is highly contextual. Context binds messages and pieces of information together to form meaning and thus provides infill to a map or body of knowledge. It includes situations, relationships, assumptions, expectations and prior events. We might say that adding context to information is one of the transformations from information to knowledge. Forwarded e-mail and groupware databases provide information context. Social context is extremely important because it provides additional information on the current situation and the background of the

participants in the communication, such as professional background, experience, feelings and mood. This context helps build social relationships. Videoconferencing and personal web pages provide more social context than telephone or e-mail alone.

Manageability Level: Sort, Classify and Retrieve

Some information channels are easier to manage. Content, chronological order and other attributes are useful to control but some channels are not very capable of doing it. It is not easy to manage the information going through channels such as voice mail, fax, instant messaging, and videoconferencing. E-mail, bulletin boards, and groupware channels are more capable of storing and retrieving information in a more selective way.

Speed of Interaction: Synchronous or Asynchronous

Time is a key factor for interaction, thus synchronous is the best way to get an immediate response. However, synchronous channels are useful if time domains are the same or at least there are some common windows of working time used to communicate between two or more groups. Asynchronous channels allow teams to deal with different time domains, where interaction won't be immediate, but at least workflow can "follow the sun."[45]

4.4.2. Protocols to be Used

Availability Standard

There should be a table, such as the one shown below, where every member of the teamnet will show the time and the preferred method through which he can be reached. This will allow the rest of the team to know what are the most feasible times to interact with another member who will promptly respond to the communication request.

Member Name	Available Time	Preferred Method of Communication
Benjamin	9:00 – 14:00 EST & 16:00 – 18:00 EST	Email, Desktop Conferencing
Jaime	9:00 – 14:00 EST & 16:00 – 18:00 EST	Email, Telephone

Table. 4 – 1 Members availability chart

[45] Haywood, Martha, Managing Virtual Teams, Artech House, 1998

Information Transfer Rules

E-mail protocols are written guidelines for the use of e-mail, developed and periodically revised by the members of any working group that uses e-mail frequently. E-mail protocols are especially important for any working group that is multicultural (including people from different professional backgrounds) and rarely meets face-to-face.

We need to recognize the difference between pushing information at people, through e-mail, and letting them pull it in when they need it from databases and online conferences. We experience more information overload when information is pushed at us, because we're not in control.

E-mail protocols are important because:

- E-mail uses letters and numbers exclusively. No emotional context is provided.
- E-mail promotes democratic, non-authoritarian communication because overt indicators of prestige, knowledge, experience, rank, background, gender, age, and so forth, are absent.
- E-mail denies all opportunity for synchronic (quick back-and-forth) dialogue and immediate feedback. People who infrequently use, or are disinclined to use, e-mail for any reason are easily forgotten by frequent users in their working group: "Out of sight, out of mind."
- People are presumed slow to respond to e-mail requests.
- Its usefulness for building and maintaining warm relationships is low.
- E-mail is dominated by the more adept computer users.
- E-mail is vulnerable to system breakdowns and equally ill-timed upgrades.
- E-mail makes every type of activity and relationship potentially more efficient, including the development of misunderstandings, cross-cultural clashes, and other conflicts.

E-mail Overload

A study of Fortune 1000 workers found that "today's corporate staffs are inundated with so many communications tools - fax, electronic mail, teleconferencing, postal mail, interoffice

mail, voice mail - that sometime they don't know what to do first." The 2000 survey confirms that in the three years since the original was written, overload has gotten worse. The more e-mail people receive, however, the greater the proportion of junk.

Some reasons found by researchers are that people usually don't know how to use e-mail responsibly. Too much is copied 'for information' or as replies to large distribution lists. People are distracted by the incoming flow of messages when they check e-mail every time that the computer blinks, telling the user that something new has arrived. We need to impose our own human pace so we feel more in control and, therefore, less stressed.

Some measures have been recommended that might help to alleviate the problem:

- Define specific times to check mail
- Use of filtering tools
- Distribution lists should be limited to a certain number of receivers
- Distribution list should "expire" automatically after a certain time period to enforce regular updates

Acknowledgement Standard

Close feedback loops are required to maintain a system within control. The sender has to know what the status of the message sent is by looking at the header title of his replies received. An acknowledgement protocol is proposed to provide visibility and set expectations for interaction using the title header of the "REPLY" message. The following keywords are recommended:

- IR = I received it, I will read it
- IRIR= I received it and I read it
- IRBY= I received it, I will be back to you
- IRAU = I received it and I will act upon it

E-mail Priority Standard

In order to respond adequately to an e-mail message without browsing all the messages, it is necessary to classify the urgency and the importance of the message on the title header of the message. Some of the recommended keywords for such purpose are:

Importance

- Fyi = For your information
- Ntr = You need to read it
- Fya = For your action

Urgency

- 1 = Now
- 2 = Today
- 3 = This week
- 4 = At your leisure

Information Transformation (Interaction) Rules

It is important to define certain rules to maximize the results of synchronous communication. Rules to provide physical and social context have to be followed.

Physical context[46]

Physical context helps communication to include body language and surrounding environment. Martha Haywood describes some important aspects to provide physical context through interactive media such as videoconferences and document conferencing. Some of them are related to the position and angle of the video-camera, size of fonts for documents, and the backgrounds and window size of the images transmitted.

Social Context: Web Pages, Agendas

Social context helps to know more about the people or the background of the situation being discussed. Web pages with personal, project or company information are

[46] Haywood, Martha, Managing Virtual Teams, Artech House, 1998

extremely useful to provide extensive information that cannot be shared in detail during meetings. Agendas are crucial to set expectations and results in a virtual meeting.

4.5. Learning Management Process

It is extremely important that a community of practice increases knowledge for every member of the team. Therefore, learning has to be managed and processes and tools have to be in place for such purposes. First of all, the team as a learning community has to have "prosocial"[47] behavior. Team members have to be non-defensive, open, questioning, willing to make mistakes, able to work with others very different from themselves, and to continually learn from their experience. A successful learning community is based on the inclusion of all members. The networked community can sustain learning only by building members' interdependence. There are two tools that can be used as the main processes to maintain learning growth. The first is defined by Dori Digenti.[48] She proposes a Personal Learning Network (PLN). A PLN consists of a goal of mutual learning cooperation among the different skilled people of a group. This tool has three steps:

1) Definition of the areas of knowledge needed as a mind map

2) Identification of the individuals with such knowledge, and how they fit on the map

3) Development of a plan to contact such people through the engagement of valuable communication links

The second tool, proposed by Knowles, is basically a "learning trading." Knowles proposes formalizing the trading through "Learning Contracts." The Learning Contract will include:

1. Outlining learning objectives
2. Defining learning activities
3. Establishing learning resources

[47] Dori Digenti, Learning Mastery, Toward an Understanding of the Learning Community *Organization Development Journal*, V. 16, N. 2, May 1998.
[48] Digenti, D., Collaborative Learning: A core capability for Organizations in the New Economy, Reflections, Vol1, Num. 2

4. Designing the learning evaluation
5. Defining roles and responsibilities
6. Signing a commitment contract

Electronic group collaboration tools support teamwork in that what goes on when members in the team use those tools can be captured, stored, and reused by other members in the team. This is called 'knowledge management.' Three things that make knowledge management especially significant today are need, awareness (growth of interest in virtual teaming), and accessible technologies (electronic collaboration tools).

Two of the most useful electronic tools to achieve this sharing and capturing of knowledge are groupware and computer conferencing, both "computer mediated communications."

Groupware

After corporate networking in the late 1980s, and groupware in the early to mid-1990s, intranets are the third, and on account of the widespread acceptance of the underlying Internet protocols, the most decisive technology to fuel the emergence of the online workplace.

Groupware systems can be separated into two very broad categories:

1. Informal and creative interactions to encourage group communication. Some groupware tools provide support for workers who need to cooperate in order to accomplish their tasks. These are usually casual and improvised group interactions. Electronic-mail systems fall into this category, as does any document management tool. Information interactions do not mean there are no goals or deliverables. The implication is the lack of rigid structures and requirements in accomplishing the task or deliverables.
2. Products and systems that have strict structures, policies, and procedures. These enhance the communication and delivery procedures by making sure all intermediate steps are accomplished and all constraints are satisfied.

Good groupware should have these functions:

- structure the information
- receive additional information
- select information to navigate the way through an accumulation of data (support of users' orientation)

There are other groupware tools such as Computer Supported Collaborative Work. However, the new virtual organization requires some maturity before introducing a more complex process tool. The main objective of CSCW is to provide work group applications, which require multi-user application access and control, and coordination of all users' activities. It is essential to provide a collaboration environment that is strongly oriented toward real work group operation in terms of emulating real working sessions and awareness of audiovisual communications among the partners.

Computer Conferencing[49]

This computer-based process is a mature technology, the enabler of the virtual, online teamwork performed by today's distributed, knowledge-based organizations. This 20-years-old technology, also known as bulletin boards, data conferencing, web conferencing, or groupware, is the foundation of products called "Lotus Notes," "ProShare," and "Teamshare."

Computer conferencing has special importance for knowledge management for the simple reason that when a team uses computer conferencing to collaborate, a permanent, shareable record of what they write and send to each other is created. That record captures the knowledge that the team created and applied to its work, and is the basis for managing the team's knowledge for future uses. This permanent, shareable record is not created when people use collaboration tools such as telephone, e-mail, or audio and video conferencing.

Computer conferencing achieves the following:

- Knowledge about work can be best acquired (learned) through work itself. Dialogue is knowledge. Dialogue is captured by computer conferencing.

[49] Dr. John Gundry, Dr. George Metes, Team Knowledge Management: A Computer-Mediated Approach, December 1996

- Enables cross-functional collaboration amongst specialist skill groups.
- Co-ordinates a geographically distributed team's activity and reduces the cost and inconvenience of traveling.
- One of the great advantages of computer conferencing as a knowledge management tool is that it retains context. Within its major structuring by subject, a computer conference is stored in chronological sequence; it represents the history of a project or program, providing excellent clues as to what is going on or what went on. No other communication tool conveys the context of communication as well as computer conferencing.
- In contrast to teams using the telephone, audio conferencing, video conferencing or even e-mail, eventually these computer conference records will not just be text, but also video and audio clips.
- Computer conferencing conveys context and structure.
- Typically the knowledge management process involves capture, organization and storage, sharing and leverage. Computer conferencing allows teams to perform the entire process of knowledge management.

Available Groupware Products to Consider

Microsoft NetMeeting for Windows 95/ Windows NT is an Internet telephone tool that combines voice and data communications, video conferencing, real-time application sharing, file transfer, a full-featured shared whiteboard, and text-based chat. The shared whiteboard lets you brainstorm ideas or sketch out a design. Application sharing lets you open an application on one computer and share it with all connected computers, even when the connected computers do not have that application installed. On an intranet, you might have the voice connection over the office phone system and the data connection over the LAN. For more information, visit http://www.microsoft.com/netmeeting/.

Lotus Notes is a pioneering product that combines e-mail, a document-oriented database system, group discussion facilities, and the ability to replicate databases, sending copies to local workstations, remote work sites, and wherever else they might be needed. The basis of Notes' popularity is not any or all of these features but the way they can work together to help the teams work together. Notes and its competing products have been described as a way to

"get information out of your brain and make it accessible to everyone else." Everyone's mind holds information. A groupware product gives people the means to share their thinking.

4.6. The Maturity Model

Teamnet Maturity Model	ADHOC	BASIC	STANDARIZED	OPTIMIZED
GOALS	Unclear	Existent	Defined	Defined
Objectives	Unstated	Stated	Documented	Documented
Project specifications	Undefined	General	Aligned	Aligned
PROCESSES				
Standards	Not available	In place	Improved	Proven
Business processes	Misaligned	In revision	Aligned	Optimized
Corporate memory systems	Nonexistent	Inadequate	Working	Being used
Communication	Push	Push	Push/pull	Pull/push
Management	Supervision	By objectives	By results	By results
TOOLS				
Electronic Communication	No access	Reliable	Reliable	Optimized
Hardware/Software	Insuficient	Uncompatible	Compatible	Effcient
Metrics	Nonexistent	Unreliable	Reliable	Controlled
SKILLS				
Electronic Communication	Untrained	Trained	Used	Chossen
Communication	Unprioritized	Prioritized some times	Prioritized always	Effectively managed
Distance Work	Unexposed	limited understanding	Existent	Coordinated
Resources estimates	Unaccurate	Close	Accurate	Reliable
Relationship/Trust	Unexistent	Iniated	Selective	Generalized

Table 4 – 2 Maturity Model for Virtual Team Strategy

The Maturity Model is a tool that will help to identify the operation progress of the Transnational Adaptive Network. It is formed by four different levels that define the condition of four key areas to control. Those areas are: Goals and Charter, Processes, Tools and Skills.[50] The periodic use of the Maturity Model allows to identify gaps and specific actions aimed to reach a higher level of performance. This tool will help to monitor an control the development of human resources, processes and investments.

4.7. Summary of the Chapter:

- Physiology of the system describes the processes and the way the adaptive systems will work.

[50] Haywood, Marthe, Managing Virtual Teams, Artech Pusblishing 1998

- The "Adaptive Management" process has to be added to OPCorp's existing tools for excellence of team performance, especially for "teamnets."

- The key processes for the adaptive network are:

    - Adaptive Management process
    - Workload Allocation process
    - The Teamnet Operation Guide
    - The Telecommunication Operation Guide
    - The Learning Management process

- Once work allocation is defined, a teamnet has to setup the basic information structure for the team to work. A Member list, goals, processes, tasks, schedule and responsibility matrix must be defined and agreed upon.

- All teamnet members will define their own operating rules and agreements.

- A Telecommunication Guide shall be used to maximize communications effectiveness.

- The Learning Management process shall be applied to maintain the knowledge sharing and learning exchange among the members.

- Computer Mediated Communication will enable the management of links and knowledge for the adaptive transnational network.

5. Psychology and Control: Culture and Reward System

"Whoever desires constant success must change
his conduct with the times."
Niccolo Machiavelli

"Tis not the strongest of the species that survive, nor the most
intelligent, but the one most responsive to change."
Charles Darwin

As human beings, we do not behave without reason. Every action we perform is backed up with a motivation to do it. Therefore, a socio-technical system, formed by a technological part and a human component, must have a reason to exist and to behave the way it does. This chapter will deal with the main factors that drive the behavior of virtual teams. Factors such as purpose, culture and reward systems are key elements to align all participants with the strategy and the paradigm change. As mentioned already, researchers have found that purpose is the most critical factor in determining the success of a virtual team. What is variable is the way the team will be maintained in alignment with such a purpose. That is why it requires a well thought out process that includes values and artifacts as well as a very well designed reward system coherent with the job design, group dynamics and the expected results to be rewarded.

5.1. Purpose: Mission and Vision

5.1.1. Mission: Why Are We Here?

We design packaging engineered solutions to protect OPCorp's products during distribution to preserve the value that customers have paid for.

5.1.2. Vision: How Do We See Ourselves?

We are a responsive organization that delivers reliable and cost-effective solutions for the integrated supply chain to protect the products they deliver to customers. We maintain a

productive relationship with our internal customers and affiliates, which enables us to solve problems and exploit opportunities anywhere, anytime. We do this through an adaptive packaging engineering network that brings together seamless competencies around the world and keeps the working pace constant and the learning constantly growing.

5.1.3. Goals and Objectives

The main goals and objectives of the packaging network are centered around the main transnational capabilities explained in previous chapters.

Local Responsiveness

- Enable the start of packaging designs earlier, involving all packaging groups from the different manufacturing sites that will produce the product around the world.
- Speed up the development time for all packaging in Product To Market process (Virtual Packaging Designs).
- Reduce response time considerably for support requested by manufacturing or service, enabling the local packaging group to act interdependently with the packaging network.
- Exploit all the opportunities that local conditions provide to reduce cost and time to market without sacrificing customer loyalty or global efficiency.
- Waste free factories
- Identification of solutions to support zero to landfill and waste free factories

Global Efficiency

- Identify the best practices to enable convergent packaging designs.
- Develop a high level of synergy in the packaging network and drive productivity.
- Tight integration with Global Purchasing & Transnational Packaging Network
- Common database and web based access for all packaging drawings
- Centralized interface for packaging drawing graphics
- Expand 3R's activity to cover all Packaging Network deliverables.

Worldwide Learning

- State-of-the-art, certified labs that enable the move toward becoming the preferred supplier for full packaging solutions (design, test and document)
- Sharing process knowledge, skills and best practices
- Product Value Chain knowledge
- Competencies, complement and growth

5.2. Existing OPCorp Culture

Before new culture concepts are introduced into any organization, it is necessary to analyze the kind of existing values and processes that shape the current culture. Some of them can be leveraged to introduce new paradigms and some of them might be barriers that have to be removed in order to change mental models. That is why it is important to review first the existing cultural concepts that the corporation has to define how different they are from the concepts that will be introduced. The existing culture at OPCorp is characterized by:

- Relentless customer focus, customer is first
- Quality defined as "full satisfaction of customer requirements"
- Continual search for improvement of business metrics such as Quality, Cost and Delivery
- Balance between long-term goals and short-term objectives
- Leadership through quality tools: facts, analysis, actions for results
- Open and participative management style to share problems and solve them jointly
- Win-win management philosophy
- Structured problem approach to understand them and solve them
- Environment that fosters continuous improvement
- Decision making process systematic and based on facts applied by all personnel

- People are empowered to make decisions based on these structured processes to solve problems (Problem Solving Process) and to improve quality (Quality Improvement Process).
- Teamwork is the key to solve problems efficiently.

5.3. Teamnet Culture

Fortunately, the existing corporate culture is a fertile ground where the networked organization concepts are not contradicting each other but rather complement each other. This fact will facilitate the way new concepts are linked to existing culture.

5.3.1. Common Values

The new cultural values of the adaptive networked organization are based on a collaborative environment that facilitates work coordination at a distance. The values have been taken from the collaborative climate concept of Edward Marshall[51]; they have been centered on the key concepts to be evaluated in the new organization, such as Relationship, Reliability, Responsiveness and Value.

Values for Relationship: respect for people, honor, integrity, communication, trust, openness, tolerance of difference, recognition, alignment and consensus

Values for Reliability: predictability, keeping promises, trust, responsibility and accountability

Values for Responsiveness: availability, collaboration, and ownership

Values for Value: Acting in team's interest, truthfulness, information protection and growth

5.3.2. Assumptions

[51] Marshall, E. Transforming the way we work: The power of collaborative workspace, Anacom Books, 1995

There are three classes of assumptions we will study. The first class consists of cultural assumptions of an ethnic and geographic nature. The second includes traditional work operation assumptions (we call them "negative" or "myths"). The third class involves the required assumptions for operating in a virtual environment (we call them "positive").

Ethnic and Geographic Assumptions

In Chapter 2, it was mentioned that some research has already identified some general differences in globally distributed teams based mainly on several cultural assumptions related to concepts such as power distance, uncertainty avoidance, individualism-collectivism, masculinity-femininity, long-short term and context. Based on Hofstede's conclusions, we can observe that teamnet managers will have to be very intelligent to handle situations that imply any of those cultural assumptions. The only cultural coincidence among the different packaging groups is the one related to masculinity.

Culture Consonance						
		England	USA	Mexico	Brazil	
Power Distance	High			X	X	Employees expect little consultation from managers to take decision
	Low	X	X			Employees more participative on manager's decision
Uncertainty	High			+	X	Search of detail plans and predictable routines
	Low	X	X			Comfortable with ambiguous situations, no strong need for rules
Individualism		X	X			Prefer to act independently more than in groups
Collectivism				+	+	Value a strong identity with the group
Masculinity		+	X	X	+	Earnings, success has more importance than caring and cooperation
Femininity						Nurturing, sharing orientation
Long Term				+	+	Value persistence and thrift.
Short Term		X	X			Value more immediate physical and financial returns
Context	High			X	+	Messages have a little meaning without the understanding of surrounding context
	Moderate	X				A combination of information is required
	Low		X			Prefer more oriented fact-based information

X The Hofstede's study stated explicitly
\+ It was inferred from the Hofstede's study statements

Fig. 5 – 1 Cultural differences based on Hofstede's research

Traditional Work Operation Assumptions: Myths

The following assumptions are based on opinions of people who are not familiar with the principles of virtual teams management and from the responses gathered from the survey on barriers to having good communication and work coordination at a distance.

- Virtual team members cannot be left alone because they are not self-directed.
- Virtual team members cannot be trusted.

- I cannot manage, coach or mentor someone I cannot see.
- The complexity of technology used to interact in virtual teams is really high.
- Building trust is relatively unimportant in a virtual environment; the process and the results themselves are most important.
- A good virtual team leader speaks at least three languages and travels a lot.
- Different sense of urgency of the remote members
- Different sense of responsibility and ownership among remote people
- Delayed response from remote members

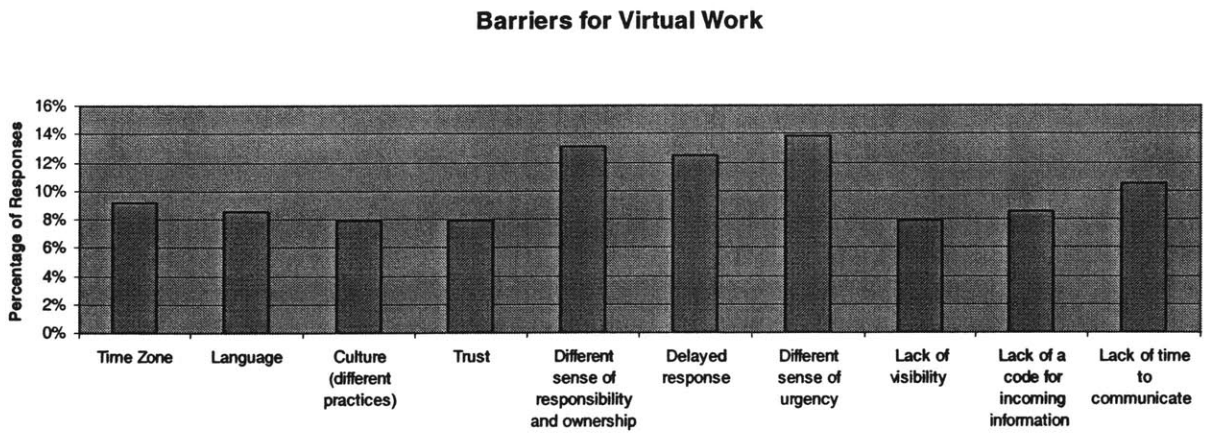


Fig. 5 – 2 Barriers identified from the survey applied to packaging engineers

Some other researchers have identified initial assumptions in teams that are identified as barriers or centrifugal forces to maintain team cohesiveness. The centrifugal forces found for global teams[52] are:

- cultural differences
- geographic dispersion
- coordination breakdown

[52] http://mies.cs.depaul.edu/

- loss of "teamness"
- loss of communication richness

Required Positive Assumptions

All the traditional work operation assumptions described above have to be replaced by the following concepts aimed at developing trust and cooperation in a dispersed team. The key value of trust in virtual teams has been broadly discussed. Whether trust has to be presumed or built is one of the ultimate discussions of practitioners, researchers and consultants.

Trust Focused vs. Task Focused

There are two opposite theories that center on the success of a virtual team on different values. The first theory[53] (from consultants) says that trust has to be present before the task is initiated. This theory urges the need to start the project with a face-to-face meeting; it makes the building of trust greatly dependent on this event. One consultant firm, Grovewell, affirms that only 50% of virtual teams attain their goals due to the lack of proper building of trust. On the other hand, the other theory[27] (from a researcher) says that trust has to be presumed.

Swift Trust

Trust requires time and action to strengthen it in a self-fulfilling fashion. However, projects are temporally limited; trust to cooperate cannot depend on such a time function. Therefore, "people have to wade on trust rather than wait while experience gradually shows who can be trusted on what: trust must be conferred presumptively or *exante.*"[54]

Jarvenpaa's study[55] describes a number of communication behaviors and member actions that distinguished global virtual teams with high trust from global virtual teams with low trust.

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[53] www.grovewell.com

[54] Meyerson, D, Weick, K., Kramer, R, Swift Trust and temporary groups, Trust in Organizations: Frontiers of Theory and Research, Thousand Oaks, Sage Publications.

[55] Jarvenpaa, Sirkka L, Communication and Trust in Global Virtual teams, GBS, University of Texas at Austin, JCMC, 1998

Encouraging such behaviors and actions on the part of members of global virtual teams might help to foster a climate conducive to the existence of trust:

- Social communication
- Communication conveying enthusiasm.
- Coping with technical and task uncertainty.
- Individual initiative.
- Predictable communication
- Substantive and timely response
- Leadership

Some of these behaviors will be described in more detail in the following paragraphs where the dynamics required for the teamnet are defined.

5.3.3. Artifacts:

Within the category of artifacts, which are the tangible elements of the culture, we can include what some authors describe as the "centripetal forces." These centripetal forces are the factors used as tools to help the integration of global teams and their culture. I have classified those forces and other artifacts that can be used, depending on the type of liaison that they create.

Identity

- Team name: Synapses (from connection in Greek)
- Detailed team member directory
- Personal web pages

Incentives

- A Virtual Teamwork Award has to be created.
- Reward system for virtual team members (see more detail in following paragraphs)

Common Forms and Structures

- Ground rules
- Collaborative technologies
- Development methodology
- Training and competencies
- Managerial techniques

Social Interfacing

- Telecommunication best practices
- Teambuilding remote activities

5.3.4. Group Dynamics

The culture must result in a clear behavior characterized by the following factors:

- Social exchanges must appear to facilitate trust early on in the team's existence.
- The team members encourage each other in the task.
- The team develops schemes to deal with technological and task uncertainty, such as:
    - A scheme of numbering systems for e-mail messages so that all members can be aware if they have missed a message.
    - Another scheme is simply informing other members in advance of the times they will be working or will be unavailable to work.
    - Exchanging many messages to clarify and develop consensus on the requirements of a task.
- Members of the team don't have to wait to be told what to do or simply wait for others to make the important decisions.
- Members have initiative in pushing the project forward.
- Members develop self-commitment to participation.

- Members characterized by initiative make topic suggestions instead of asking for suggestions.
- Members volunteer instead of asking for volunteers.
- Even though a leader emerges, the majority of the members take initiative at different times.
- Predictable communication demonstrates presence, and presence maintains the confidence of other members.
- Members explicitly set an expectation of how regularly messages will be sent. Thus, this does not necessarily mean communicating frequently, but having a regular pattern of communication established.
- The members forewarn one another about upcoming absences.
- Members receive explicit and prompt responses that their messages are thoroughly read and evaluated.
- Members elaborate relevant feedback on others' contributions.
- The team divides the work; each member contributes to the work of the others. Even less adept members (either due to language or technical challenges) manage to contribute positively.
- The leadership role within the team is constantly changing. It moves easily from one member to another (and hence from one geographic site to another).
- Participation is truly voluntary and unencumbered by peer group pressure.
- Each member brings his or her own network to the meeting. This personal network is activated quickly if the need arises.

5.4. Metrics: Reliability, Responsiveness, Relationship and Value

There are two ways to measure performance: behaviors or results can be either counted or judged. In measuring team performance, the most important point is for the team members to develop an understanding of what is expected of them and understand how they will be measured.

Three types of sources for the metrics are[56]:

- Organizational measures centered around results
- Team design depends on the process selected, and then metrics will be derived from selected process measures. Competencies and skills are key indicators of process capability.
- Individual team member accomplishments that support the team. These metrics will be focused to measure behavior that contributes to team performance.

This will result in three types of metrics for the packaging teamnets.

- **Results based metrics**: quality, cost and delivery

These metrics are taken directly from the corporate metrics to measure performance for all organizations.

- **Process based metrics:** Competency levels scale

These metrics will be based on the type of competencies brought to the team and the competencies developed during the project. Competencies will be divided into core competencies, support competencies and teamwork competencies. Each of them will have three levels: entry, accomplished and advanced. The competencies will be assessed at the beginning, during the project and at the end of the project or the time period established to evaluate the added value of the team. The chart below shows an example of the evaluation profile of competencies.

[56] Viken, Kjetil, Team Measurement: some why´s, whats and hows, CSWT report.

	Leader			Administrative						Technical						Teamwork			
	Coaching	Communicate	Resolve Conflict	Project Management	Networking	Use of telecommunication technology	Self management	Boundary Management:	Interpersonal awareness	Customer engagement	Design	Analysis & Simulation	Test	Manufacturing Support	Quality and Productivity	Responsiveness	Reliability	Relationship	Value
Advanced Level Skill																			
Accomplished Level Skill																			
Entry Level Skill																			

Based on the chart presented in Crandall, N Fredic, Work and Reward in the Virtual Workplace, 1998.
Fig 5 – 3 Process/Competencies Development Metric Chart

- **Behavior based metrics:** Reliability, Responsiveness, Relationship and Value.

The chart below is an example of the evaluation chart that will be used in a 360° appraisal for developmental purposes, not for evaluation or reward.

Capability Metric	Linking Skill	Behavior
Relationship	Team	Develop balance in their
Relationship	Team	Encourage respect, understanding and trust among team
Reliability	Work Allocation	Allocate work to people based on their capabilities and
Reliabilty	Active Listening	Listen before deciding
Reliabilty	Communicatin	Keep team members up to date on a regular
Responsiveness	Problem Solving and	Are available and responsive to people's
Responsiveness	Participative Decision	Involve team members in problem solving of key
Value	Delegation	Set an example and agree to high quality work standards with the
Value	Objectives Setting	Set achievable targets with the team but always press them for improved
Value	Interface	Coordinate and represent team

An Overview, by Charles Margerison and Dick McCann, 1993, p. 10. Copyright 1993 by Prado Systems Limited.
Fig. 5 – 4 Behavior Metric Chart for 360° appraisal review

Another set of indicators to evaluate the virtual behavior of the members through a 360° appraisal might be as follows:

- **Relationship:** level of conflict prevention or resolution
- **Value:** Use of communication protocols, learning provided, support to solve other's problems
- **Reliability:** number of times acknowledged, number of times delivering a request, actual time of delivery vs. time promised to deliver

- **Responsiveness**: time to acknowledge, time to respond

Result based metrics and behavior based metrics are to be weighted differently depending on the state of behaviors and results. Behavioral measures should also be emphasized when the current performance is a long way from the final goal of performance in time. Behaviors should be the focus in cases where the relevant behaviors are socially sensitive or if poor results are caused by new conditions of the job. On the other hand, results should be the focus when the performers are already skilled in the behavior or if the behaviors and results are already related.

All these metrics have to be known and agreed upon by all the teamnet members at the time goals, objectives and individual competency inventory have been established.

5.5. Rewards and Incentives to Work in a Team:

"The most powerful human motivator of all is the desire to be proud of ourselves in the pursuit of something we care about." [57] A reward is anything that tends to turn on the individual. [58] The goal is to insure positive movement as much as possible.

In a virtual environment, rewards should stress that both individual and team start and finish the tasks.[59] The reward system must support both team and organizational goals and objectives. The reward system should begin to stress team performance more than individual performance. A reward system must also reinforce the critical "us attitude" for a team environment to exist. That is why the best reward system is probably one in which the team members participate in the design and development of the reward system. Rewards that are not valued by the team member will have less impact on the continuation of desired performance.[60]

It is extremely important that the organization's current policies and procedures support a compensation system; if not, the virtual model is doomed to failure.

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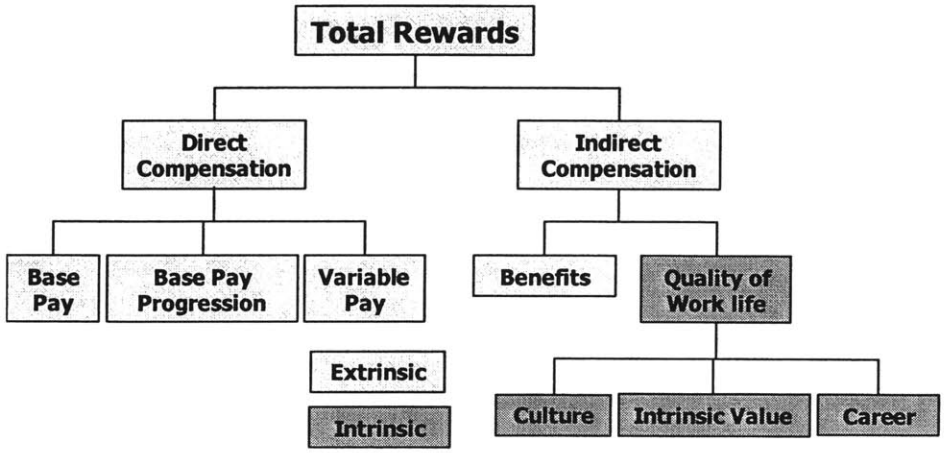
[57] Shelton, KInterview with Charles Garfield: Peak Performers. 1994, May) Executive Excellence,

[58] Rincover, A. Motivation Ownership and Rewards. Internet: http://www.healthcareweb.com/doctor/motivate2.html

[59] Heneman, R. L., & von Hippel, C. (1995). Balancing group and individual rewards: Rewarding individual contributions to the team. Compensation & Benefits Review

[60] Andrews, Charles G., Factors that impact multicultural team performance.

At the time that a reward system is designed, the management team has to be aware of the fact that intrinsic and extrinsic rewards must be kept in balance and adjusted according to the task; too much emphasis on money can negate intrinsic rewards.



Source: Crandall, N. Fredic , Wallace, Marc, Work and rewards in the Virtual Workplace

Fig. 5 - 5 Reward structure suggested for a Virtual Team system

5.5.1. Intrinsic Rewards and Motivators

In order to highlight the importance of intrinsic rewards or motivators we can refer to Maslow's pyramid levels of interest for satisfactors. Abraham Maslow believed that humans have five basic needs: physiological, safety, social, esteem, and self-actualization. Social needs include the need to be accepted and to be part of a group. People have a need to belong, and teams help fulfill this need. Esteem needs include recognition and acknowledgment from others; a good reward system will contribute to this need. The need for self-actualization includes the need to accomplish established goals. Identification of clear team goals and the accomplishment of those goals can contribute to this need. Maslow's three higher needs can be positively impacted by well-designed and supported team systems.

Individuals participate in a social network because they are personally interested in the subject or cause. When they have that personal interest, the energy they invest, their motivation, comes from inside, not from an outside source telling them what to do. The more an individual thinks about the reward, the less interest is given to the adequate execution of the actual job.

Team members need to "get to know" the needs of other team members so they can fulfill their intrinsic needs. Management needs to address the needs of the employees as well as possible, even if it is only to provide support and the opportunity for the development of intrinsic motivators.

The best rewards center on ownership. Employees need to feel that they own the job. Employees in return must accept accountability for their decisions. Intrinsic rewards or motivators create a positive feedback loop that leads to a feeling of accomplishment, which reinforces the intrinsic motivators and results in greater accomplishments.[61]

Multi-cultural Motivators[34]

One study that confirms the importance of intrinsic motivators is a study by Charles Andrews. The commonality existing among the interests from different cultural perspectives in participating in a team is extremely interesting. Andrews conducted research among undergraduate, graduate and doctoral students to define what kind of factors would make the individual willing to participate or remain part of a team. His findings are quite remarkable because, regardless of the nationality or culture, they were very repetitive and consistent. They could be summarized in the following factors:

- common interest of the team members
- sense of responsibility and duty ownership of the team members
- comfortable environment to work
- willingness to interact, share learning and help others
- doing something interesting and challenging
- peers' mutual recognition

[61] Nelson, B. Rewarding People. Executive Excellence, 1994, October
[34] Andrews, Charles G., Factors that impact multicultural team performance.

Intrinsic Rewards	
• getting something done	• authorization to choose fellow workers
• getting air time to give opinion	• being agreed with
• greater emotional challenge	• being heard
• growth professionally	• being supported
• having something of value to add	• being understood
• learning something new	• being right
• more responsibility	• being laughed with
• participation in decision making	• camaraderie
• peer recognition	• completing a task from start to finish
• personal growth	• empowerment
• philosophy of "People First"	• feeling intelligent
• recognition	• feeling accepted
• respect	• feeling powerful
• satisfactorily completing a task or job	• feeling important
• schmoozing (chat idly)	• feeling that "I can make a difference"
• team membership	• flexible hours
• well-informed	• planning
• working on something interesting	• freedom to act without competing
• working on something involving	• freedom to do well for team members
• working on something exciting	• fun
• working on something satisfying	• getting a free lunch
• working on something personally challenging	

Source: Charles G. Andrews, Factors that Impact Multi-cultural teams.

Fig. 5 – 6 Intrinsic Motivators

5.5.2. Extrinsic Rewards and Metrics

Extrinsic rewards have to be carefully designed to avoid interference or distracting attention from the intrinsic motivators, but at the same time, since there is a higher level of competency required of the people, extrinsic rewards have to be aimed at motivating the development of new skills. Effort has to be rewarded with more than self-pride.

Extrinsic Rewards	
• certificates	• skill training
• fame	• status
• money	• trips
• prizes	• trophies
• rewards	

Source: Charles G. Andrews, Factors that Multi-cultural teams.

Fig 5 – 6 Extrinsic Motivators

Crandall redefines the complete context of work and rewards in virtual teams. The following chart shows how the traditional reward structure has changed the reward concepts. Some concepts for the virtual structure have been adapted for this specific case.

Rewards	Traditional	Virtual
Base Pay	Grade Structure	Skill-base
Base Pay Progression	Seniority	Skill development
Objective Variable Pay	Quota	Team results
Subjective Variable Pay	Performance appraisal	Behavior metric
Benefits	Provided by company	Shared with the company
Recognition	Minimal use from management	Peer to Peer

Adapted from Work and Rewards in the Virtual Workplace
by Fredic Crandall and Marc J. Wallace

Fig. 5 – 7 Comparison of Reward Structures: Traditional vs. Virtual

Traditional vs. Virtual Messages

Reward Component	*Traditional Message*	*Virtual Message*
Base pay	"This is the relative value of your job based on external labor market survey comparisons and internal job evaluation."	"This is the value of personal skills and capacities you bring to the organization."
+		
Base pay progression	"This represents one more year with the company."	"This represents the greater depth and breadth you have added relative to our core business processes."
+		
Variable pay	"This is a privilege of membership, typically restricted to executives, managers, and salespeople."	"This is your share, as a business partner, in our success as a business."
=		
Total cash compensation	"Here's what you're entitled to."	"Here's what you have earned."
+		
Benefits	"Don't worry, we've taken care of it."	"We're sharing risk and accountability as business partners."
+		
QWL	"Do what you're told. We need your labor--not your ideas."	"We need your mind and involvement. You are empowered to make decisions."
+		
Career opportunity	"Stay loyal and you'll have a job for life."	"You and the company are mutually responsible for your career. We will offer opportunity as business demands. You must constantly renew and grow your skill set."
=		
Total rewards	"This is what you are entitled to."	"This is your share of success as a business partner."

Table from the book Work and Rewards in the Virtual Workplace
by Fredic Crandall and Marc J. Wallace

Fig. 5 – 8 Messages of the traditional and virtual reward systems

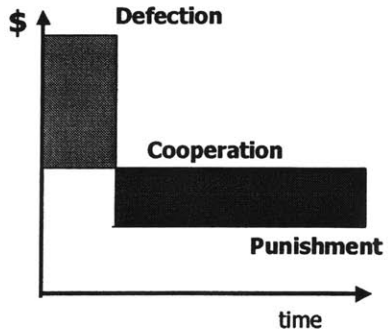
The chart above, extracted from Crandall's book, clearly shows how the new reward system is transferring more responsibility and accountability to the virtual employee, not only in the work itself but also in the time to take risks and make decisions.

Developing a comprehensive reward system requires building a complete economic model of the virtual system. This economic model is outside of the scope of this work. However, it is important to point out some key aspects that need to be considered when designing the reward systems and linking the metrics for this specific case defined in earlier sections of this chapter.

- As the equation shows, it should be a balance between cash compensation, quality of work-life and career development. If cash compensation is less than career development (translated as training), there is a high risk of losing the employee because his skills are in high demand in the job market. The value of the employee is greater than the pay he is receiving for his value. The opposite, when the cash compensation is higher than the career development, may cause skill stagnation in the employee and results will decay later on.

- Career plans are more important than ever. The skill set, now the responsibility of the employee, has to match the future needs of the company. Constant communication about the plans and projects of the company have to be shared to allow the employee to update his skill set in time to be ready when required.

- With the virtual reward systems there is a clear trend toward more generalized use of



Source: R. Gibbons, Strategy and Organization, MIT 2000

relational contracts, based on trust and mutual communication. The temporary gain that an employee might get by defecting is lower because now risk and accountability are shared, which is an advantage for the employer.

5.6. Summary of the Chapter

- The purpose of the Packaging Adaptive Network is described through the mission and vision of the new organization. It is structured around the key factors of Responsiveness, Reliability, Relationship and Value.
- Objectives and goals are aimed at reaching the strategic capabilities of local responsiveness, global efficiency and worldwide learning.
- The existing corporate culture is a fertile ground to seed the complementary values of virtual teams.
- The cultural assumptions are a blend of ethnic paradigms and traditional work beliefs that have to be replaced entirely by a positive and enthusiastic set of assumptions and actions such as swift trust and tolerance of diversity.
- More than one type of artifact has to support the extrinsic symbols of a new culture, the virtual work culture.
- Culture has to be reflected in the group dynamics, which are represented by the behaviors and interactions of the teamnet members.
- There will be three types of metrics: results based, process based, and behavior based metrics.
- Intrinsic and extrinsic rewards must be kept in balance and adjusted according to the task; too much emphasis on money can negate intrinsic rewards.
- There is a need to restructure the economic model of the entire reward system to link it to the policies and procedures of the company.

6. Key Enablers for Transnational Network Implementation

"I'd like to be like Xerox, just do it better than anybody else as often as you can."
Butch Davis, on coaching the Miami Hurricanes

The information presented in this work was a real challenge for me to blend. Research studies on virtual teams, systems engineering theory, and state of the art management literature combined with actual information about the practices of the Packaging Engineering Organization have been an interesting material for creating something new. However, inside this stream of information and concepts there should be a summary of opportunities that the "Transnational Packaging Engineering Network" (TPEN) has to pursue; a summary of challenges that have to be overcome and a summary of key enablers that need to be achieved.

This won't be either an easy endeavor or a fast process. It is a strategy that has to be carefully implemented because it represents a new way of working, breaking old paradigms and forcing people to abandon comfort areas such as co-located relationships and direct social exchange.

This chapter will capture the opportunities that the new model can exploit, the challenges that the corporation will face to implement this new organizational practice and the key enablers that are required to support the start up and continual operation of the Transnational Packaging Competency Network.

It is important to point out that the concepts presented on this work can be applied not only to the operation of the Packaging Organization, but can be easily extended to other opportunity areas of the corporation where flexibility and responsiveness are key factors to maintain customer satisfaction.

6.1. Strategic Opportunities, Challenges and Key Enablers

6.1.1. Strategic Opportunities

Effectiveness of the New Model

Fast response to corporate global requirements and local customer needs represent the effectiveness of the "Transnational Packaging Network" concept. It will provide fundamental "adaptive" capability to the organization. Global efficiency and worldwide learning are important, though complementary, objectives, too. The same way supply chains are trying to eliminate buffers and response delays, innovation systems such as the product development organizations, including the Packaging Engineering Organization, are required to reduce cycle time and time to market.

Costs/Benefits of the New Model

Chapter 2 listed some of the benefits that the transnational networked model can provide to the organization, but we can highlight the main benefits that will result from an adequate operation of the new model:

- Shorter cycle and response time
- Better selection of human resources and competencies
- Flexible and better allocation of workloads and local requirements

It has been proved that companies that have been able to adapt and reinvent their business models are the ones maintaining growth. These benefits will be, eventually, converted to financial benefits, but as with any strategy, there has to be an initial investment and a well executed plan to start generating a payback and a greater benefit later on.

The cost of technology may not be as high as the training cost. As mentioned in previous chapters, a "remote work culture" training has to be implemented previous to any virtual activity.

Risks of Not Adopting the New Model

The natural risk of not modifying the strategic structure of the company is the current competitive crisis and the loss of market presence due to lack of timely response to customer immediate needs.

Ability of the TPEN to Modify Current Organization's Structural Disadvantages

A centralized and hierarchical structure is characterized by multi-level information filtering. Today, the USAEPG acts as the centralized entity that prioritizes the support activities to allocate resources to provide answers to the rest of the groups. Once the support requests have been prioritized, information is filtered through their local perspective and experience about problems and markets they are more familiar with, and biased decisions are made because engineering and design authority is centralized in a remote site. The connected network enables information to flow through different pathways. Although coordination has to be wisely managed, and because it is harder to control than in a hierarchical structure, the processes have to be designed to provide the proper sequence of activities and check points that are needed to get the required actions and outputs for local customers.

It fosters competency growth in the members of the network and provides flexibility to allocate workloads due to the interconnected capabilities and the free flow of information. It will allow the local packaging groups to make decisions more quickly by sharing information with the whole network, getting input from the people of the teamnets and exercising the empowerment, ownership and accountability every local group has through teamnet communication.

6.1.2. Strategic Challenges

Feasibility

Feasibility will depend on two factors:

- Top management conviction about the strategic advantage of the virtual networked model and their full support to change culture of the organization
- Voluntary participation of the current packaging organization on the TPEN

Radical Change

Why would the corporation buy such a radical change?

Only the businesses that are capable of re-inventing their business model, such as the ones that are incorporating the Internet as another sales channel, are able to recover competitiveness. New capabilities such as responsiveness, efficiency and learning are perfectly supported by the network structure that takes advantage of technology and new processes.

If the corporation continues with traditional static structures, sooner than later it will be beaten by agile competitors that will be able to react faster to requirements and demand changes.

Radical change requires a serious, thorough process to discard old practices that hold growth down and keep the valuable principles of business that have to support the new ways of working.

Every radical change has a great risk but greater rewards if applied correctly. Look at Nokia, HP, and City Bank, among other examples, which have been able to adapt themselves to new market conditions and seize new technologies to change the way they do business.

The Main Stakeholder

The main stakeholder of the TPEN is the Vice President of Operations Technology. Looking for efficiency and setting the direction for a new business model, a top executive with enough power and authority has to define the goal to change processes in such way that responsiveness and efficiency are the key capabilities of such corporate organizations as the Packaging Engineering Organization. **The radical change has to start top-down.** The main interest of the VP for TPEN is the increase of the competence scope of all packaging groups by sharing remote functionality and capabilities, enhancing the response of this corporate support organization at no cost increment and setting the formula for flexibility, learning and growth.

How can he sell this concept to his peers and superiors in terms of a VP?

The only way a VP can sell this concept to his peers is through **results**. Metrics such as responsiveness, reliability and value have to be acknowledged as the measures of competitive performance.

Outsourcing Option

Can some positions be outsourced and maintain function, process and control?

It was mentioned in one of the chapters that according to Chesbrough, outsourcing is good to increase incentives for innovation, but control and coordination may be lost in some way. It is necessary to define how ownership and responsiveness would be maintained if the main packaging functions were outsourced. Competence development could be another area where growth would be affected as well if too many packaging functions were outsourced. Key functions such as design, manufacturing support and team coordination have to be kept as part of the company.

Backup Plan

Change has to be carefully planned and executed. Re-structuring costs are high if the organization has to go back to the old traditional model. Pilot programs are essential to disseminate the new culture and make sure there is no return to old practices. The best backup plan is to do it gradually and execute it properly with people willing to make it happen because they are convinced.

6.1.3. Strategic Key Enablers

Top Management Conviction

Top management has to recognize that **hierarchical structures are not operative** anymore in keeping up with the pace of responsiveness that the market is demanding.

More Than One Sponsor

More than one top executive has to sponsor the redesign of the organization. The need to **pilot the new model**, defining the boundaries of the controlled model and the interfaces with

the traditional structure in such way that the networked and traditional structures do not interfere with each other.

A Business Re-engineering Process Strategy

This is a complete **business re-engineering**; therefore, structures have to be designed based on the new processes that depend on virtual principles. Top management has to be convinced of the new organizational model in order to withstand temporary shortfalls that this disruptive technology may experience.

6.2. Transition Opportunities, Challenges and Key Enablers

6.2.1. Transition Opportunities

Current Product Transfers

There are specific product transfers from one manufacturing site to another at this moment that require more than one location's support. These are excellent opportunities to invite people to define the new virtual work environment that requires constant interaction at a distance and remote support. Crisis situations are the best to create a new way of operation.

6.2.2. Transition Challenges

Time Constraint

Time to implement the product transfer is extremely short. Training and strategy deployment through the pilot project have to be executed in the short term.

6.2.3. Transition Key Enablers

Virtual Culture Awareness Training

No work or team can be formed before an initial phase of **training on "Virtual Culture"** has been taught.

Teamnet Pilot Project

It is important, once the virtual culture training is done, to start the **pilot project** in a division that requires transnational capabilities. This division can be the Consumables division.

Voluntary Members for Pilot

It is fundamental that participants of the pilot project are **voluntary members** who show their commitment and interest in the "virtual" project.

Visibility of the First Outcome of the Teamnet to the Organization

People with an idea start talking and soon a new virtual team is on its way to formation. Regardless of how it begins, a team grows in three basic dimensions: people, purpose and links. A purpose statement and a team directory summarizing key early outcomes are **the team's first outcome.**

The Checklist

A suggested checklist have been generated to help to the planned execution of the operation restructure.

Phase 1	Phase 2	Phase 3
1.Team Concepts	1.Purpose Flow	1.Virtual Teams Principles Taxonomy
2.Virtual Team Name	2.Process Elements by Goal	2."Stressed S" Team Process
3.Statement of Purpose	3.Task Deadlines	3. McGrath Task Circumplex
4.Overall Results	4.Responsibility Matrix	4. Cooperation/Competition Gauge
5.Delivery Dates	5.Task Leadership	5. Individual/Group Gauge
6.Location	6.Process Leadership	6. Task Factors
7.Key Goals	7.TeamFlow Model	7. Media Characteristics Chart
8.Key People List	8.Distance Gauge	8. Task Timing
9.Team Size and Bands of Involvement	9.Media Palette	9. Hierarchy Ruler
10.Contact Information	10.Media Plan	10.Network Organization Chart
11.Team Types	11.Members/Media Matrix	11.Virtual Team Web Book
	12.Virtual Team Handbook	

6.3. Structural Opportunities, Challenges and Key Enablers

6.3.1. Structural Opportunities

Capacity vs. Demand

The growing capacity of the TPEN is higher and faster than the growing capacity in the hierarchical centralized structure. The learning of new competencies through collaborative technology enables all the members to acquire new skills and experience. Furthermore, it allows the incorporation of external agents (whether hired, contracted or outsourced) to more quickly capture the processes, status and contexts of the projects to start adding value to the teamnets sooner.

The pilot program will allow the company to sense the real headcount required as more projects are being incorporated into the new way of working.

The flexibility of workload allocation will provide enough of a buffer to detect the signals of capacity shortage in time to increase the headcount by looking for the best candidates, regardless of location.

Capacity and Size Adjustments

Teamnets are adjustable mechanisms. The network enables the organization to form teams with the desired capabilities. One member of the organization can work in up to three teams (two is the recommended workload). This architecture creates multiple possibilities to support products, projects and processes.

Bottleneck Free Operation

Today's centralized operations cause the work to be done in a linear, sequential way. Most of the decisions have to be made at USAPEG. Network architecture with teamnets allows the organization to take a different pathway to gather information and get recommendations or consensus to make a decision locally, where the problem has to be resolved. Collaborative tools will share all the information available and will create a memory of context and information considered in making a decision.

6.3.2. Structural Challenges

Capacity and Size Adjustments on Demand

The managers will receive the new local or global requirements for projects, new products or support to discuss them in the executive team and allocate resources globally among the teamnets.

Technology and Competencies Balance

Most of the packaging sites must have an agreed minimum level of telecommunication channels. A standard has to be established at the beginning of the strategy by the site managers to define the basic channels (e-mail, computer conferencing and telephone) and the augmented channels (desktop videoconferencing, bulleting boards, web pages and others), and to establish communication flexibility and set the best communication practices of the teamnets.

6.3.3. Structural Key Enablers

Selection of the Best Competent Members Interested in the Project

The members of the first teamnet must be volunteers, interested in the new concept and willing to try new ways to work collaboratively at a distance. All the people have to know the contributions and competencies that each of the members is providing to the team.

Leader and Manager

Managers are the administrative heads of the local groups. They provide all the resources for the members in one location. Thus, they are the ultimate providers of feedback, incentive and performance development plans for the members of the packaging organization. They are the existing managers at each group's location.

The leader is an appointed person when a teamnet is formed. He is selected from and by the teamnet members. A clear process and attributes are defined to choose the best leader to start up the teamnet operation. We have to remember that the leader is part of the executive team, and he will ask for the required resources from the managers to have the teamnet working in the best conditions. The leader has to be recognized by the teamnet members and everybody has to understand his role as a coach. The leader role will be rolling around

the teamnet once the members of the team feel comfortable with the ground rules and processes of the teamnet.

Telecommunication Tools

A wide variety of telecommunication channels, and their combinations, have to be identified at the beginning of the operation of the teamnet. The criteria of usage have to be agreed upon and followed to improve communication effectiveness.

6.4. Operational Opportunities, Challenges and Key Enablers

6.4.1. Operational Opportunities

Elimination of the Current Decision-making Bottleneck

The networked process will allow the organization to eliminate bottleneck points, but processes have to account for providing enough checkpoints and sequence to avoid any omission errors in making decisions.

Responsiveness and Ability + Experience

In an isolated silo system, the capacity to respond in a timely manner depends greatly on experience and the ability to understand the "spirit of the process." The networked organization has all those experienced nodes available to respond as quickly as if they were at the location where the problem is.

Packaging as a Process

With network organizations, there is more visibility of the different capabilities and information required to design and to support a packaging solution. The network allows more people to participate from the concept stage to the reuse and recycle stages. It requires, therefore, the clear understanding of a comprehensive process that involves all stakeholders from the global view to the local view, from the design perspective to the service perspective.

Existing Process to Select the Best Possible Leader and to Share the Leadership

No more will an imposed leader be heading a group. The leader must be recognized to be appointed as a leader of a teamnet.

Existence of Corporate Memory

Collaborative technology will definitely help to build a corporate memory to reuse knowledge and increase the learning potential of the Packaging Engineering Organization.

6.4.2. Operational Challenges

A Deliberately Created "Third Way"

Members of productive teams take the time to develop and, over time, to refine understandings about their working procedures: how to communicate via various media, make decisions, handle conflict, keep everyone constantly "in the loop," etc. They deliberately create a new **micro-culture** for themselves, an alternative "third way" not dominated by one culture, one location, one faction, or even one leader.

Minimum Level of Governance Required by a Centralized or Lead Group to Maintain Coordination

The executive teamnet will act as a "centralized" entity that will coordinate activities and allocation of resources. The executive teamnet will meet regularly (weekly) to monitor the activities and needs of all teamnets. The executive teamnet will be formed by managers and leaders who are generally non co-located.

Process That Integrates Global and Local Requirements

The executive teamnet will define the criteria of autonomy for local groups to make decisions that may affect global efficiency and vice versa. These criteria will be used by all the teamnets supporting products, projects and processes.

The Pressures of Local Objectives May Override the Collaborative Nature of the TPEN

The collaborative nature of the network is aimed to faster resolve local objectives. Global efficiency will have to be discussed as well, but responsiveness is one of the primary capabilities teamnets are created for. Global Purchasing will have to play a very important role to maintain global efficiency in material acquisition.

A Higher Level of Complexity

The network structure certainly represents a higher level of complexity. Such complexity is not easy to manage from the beginning all at once. An additional level of complexity, where you have multiple manufacturing sites (through the life cycle of the product) and different scopes of responsibilities (from GP to local FPP) and functions (PDT, Pack. Eng., Manuf. Eng.), will be very likely to have frequent conflict because of different interests and perceptions. However, the new model cannot be discarded because of the probability of conflicts. The current centralized structure has conflicts as well. The network will facilitate the communication of the different perspectives, but conflict resolution capabilities will have to be demonstrated by the teamnet leader and sometimes by the executive teamnet.

Who is maintaining the overall focus on strategic capabilities?

The elevation process will be:

- Peer to Peer
- Peer to Teamnet Leader
- Teamnet Leader to Teamnet
- Teamnet Leader to Executive Teamnet
- Executive Teamnet to Manager of Packaging Organization
- Manager of Packaging Organization to VP of Technical Operations

6.4.3. Operational Key Enablers

- Availability of standard and protocols
- Process definition and maturity model

- Responsibility charts, role charts, media plan, member directory
- Change of performance metrics: responsiveness, reliability, relationship, value
- Collaborative technology infrastructure to support virtual teams

6.5. Cultural Opportunities, Challenges and Key Enablers

6.5.1. Cultural Opportunities

The Ultimate Evaluation

The site manager is the administrative coordinator of the packaging members at that location. He is in charge of providing the resources required locally to complete the members' work. He establishes the objectives of the member with input from the teamnets the member works with. The manager is then responsible for gathering all the evaluation data (360° evaluation) to finally elaborate the final evaluation and feedback to the member. Career development plans are defined by the manager along with the packaging member with input from the teamnet leader.

Vacant Positions:

Since the network and teamnet are adaptive, the first option to back up a vacancy is reallocating members of the packaging organization. However, if capacity is marginal and more headcount is required, the contract, outsourcing or hiring options are valid for filling the position. The time required to train the new people will be lower due to the existence of the collaborative knowledge database that will allow them to get familiar with processes, products, projects and teamnet operations.

Turnover Effect on TPEN

People in the TPEN certainly will develop more skills and competencies than a traditional co-located employee. Turnover may increase but not immediately. Turnover can be managed as explained in the paragraph above, but it is not expected to be an issue in the short term.

6.5.2. Cultural Challenges

Coaching Role of the Manager

There should be constant communication of the manager with the different teamnet leaders. The manager is the home-base leader that is always monitoring the performance of the people at his location to provide support and resources. His role should be always planning, monitoring, providing feedback and controlling in coordination with the teamnet leader and the other site's managers.

Virtual Teambuilding for Cultural Difference Understanding

Searching for new ways of building teams, now virtually, I asked the opinion of some experts. Jan Klein, Professor at MIT Sloan, focused on Virtual Team research, says about closing cultural gaps::

"As for how to address the issue, the best way is to talk about the cultural differences between the team members. There are a number of team building exercises that help people surface difference but the best way is just to make it ok within the team to clarify cultural misunderstandings and to openly talk about them. Many people tend to shy away from such discussion for fear they will fuel stereotypes... just make sure the team members understand that there are differences within each culture and that the stereotype may not apply to everyone."

Are purpose and culture enough to maintain alignment of the local members?

No, the executive teamnet and sponsors have to maintain the focus of teamnets. Constant monitoring and reporting about the decisions made and group dynamics have to be generated to the executive teams and sponsors to keep the teamnets on track.

Will existing Packaging Engineering members with their paradigms, comfort zones and scotomas be able to create a new working culture?

That's why it is extremely important that the pilot group is formed by volunteers. In such way, the first group can identify the major barriers and suggest how to attack them to define

whether people will have the disposition to change their paradigms and routines. It is possible that some people see it as very difficult at the beginning, but if that becomes the "modus operandis," then it becomes part of the reward system to motivate them to accelerate the learning and acceptance curve.

Communication to Bridge Cultural and Perception Differences in Sense of Urgency

One response is to suggest that the virtual team must work these agreements out at the start of the project, or whenever they arise as an issue. In other words, team members will be asked to collectively create a process and timeline for response when a remote member needs help. But these kinds of agreements are usually easy to make and hard to keep. If the team agreements are made, and then are not followed through on, someone has to call attention to this gap and it needs to be addressed as a team.

Virtual team staff will require maturity and association to quickly establish a balance.

The requirements for real successful teams in Xerox have been:

- Build mutual trust and respect, recognizing the competencies and value added of each member
- Allow for job enrichment and enlargement
- Provide time for personal discussions
- Attend teambuilding sessions
- Obtain self esteem and self worth by understanding of roles and contributions
- Understanding of cultural diversity

These are characteristics that have to be developed in teamnets as well using virtual teambuilding activities as part of the job description.

6.5.3. Cultural Key Enablers

The existence of written goals, objectives, job descriptions and coherent metric and reward systems are key.

Training sessions at different levels have to be designed for all the people that will participate in the virtual work environment. Levels such as:

- Virtual Culture and the new organization model
- Virtual Interaction: telecommunication technology and virtual socialization
- Virtual Collaborative Tools

Team building activities have to be an integral part of the virtual work routine. Dori Digenti explains:

"First, the organization only hurts its own efforts by demanding that people allocate additional personal time for teambuilding; it has to be part of the process of the team's work. Some of the new collaborative team spaces can be designed to include a place for informal chat and personal exchange. Periodic F2F meetings will cement the personal connections made online. Part of this personal connections process can be enhanced by good facilitation. But it is unrealistic to think that we can just create a "virtual cafe" and people will chat there. The skillful use of synchronous meetings can help make stronger personal connections, as will the use of rituals. For example, in the C3 LearnNet (formerly CLN), we start our monthly virtual meetings (we have created a ritual of "Third Thursday" meetings) talking about the weather that day from where everyone is located. It is a mundane topic, but safe, and it crosses cultures well. This creates a casual atmosphere, and often some interpersonal joking and chatter takes place."

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Appendices

Appendix A
Managers' Survey

Competency Inventory

1) Your packaging group consists of

- ☐ Co-Ops (resident student)
- ☐ Contracts
- ☐ Employees

2) Please mark what is the source of the processes you are using in your group

	Internal Company's	Industry Practice	Your own
Customer Engagement	☐	☐	☐
Design	☐	☐	☐
Analysis	☐	☐	☐
Supplier Involvement	☐	☐	☐
Prototyping	☐	☐	☐
Testing	☐	☐	☐
Manufacturing and Field support	☐	☐	☐

3) Please mark the type of equipment you have had as priority to keep investing to maintain competitiveness of your group.

- ☐ Design
- ☐ Analysis
- ☐ Prototyping
- ☐ Testing

4) What kind of competencies are the strength of the group?

- ☐ Customer Needs Capture
- ☐ Design
- ☐ Analysis
- ☐ Testing
- ☐ Manufacturing Support (Configuration Maintenance)
- ☐ Cost down
- ☐ Quality problems resolution

5) What kind of activities are you outsourcing?

- ☐ Design
- ☐ Analysis
- ☐ Documentation
- ☐ Prototyping
- ☐ Testing
- ☐ Process improvement

6) What are the markets that your group is working for during the different product delivery process? Mark with an "X"

	North America	Latin America	Western Europe	Eastern Europe	Mid East	Far East
Customer Needs Capture	☐	☐	☐	☐	☐	☐
Design	☐	☐	☐	☐	☐	☐
Analysis	☐	☐	☐	☐	☐	☐
Testing	☐	☐	☐	☐	☐	☐
Manufacturing Support (Configuration Maintenance)	☐	☐	☐	☐	☐	☐
Cost down	☐	☐	☐	☐	☐	☐
Quality problems resolution	☐	☐	☐	☐	☐	☐

Appendix A – Continued

Competencies: Experience, skill, abilities.

7) Your personal experience

- ☐ Background and formal education
- ☐ Years of experience in packaging

8) Mark the type of packaging area you have worked on or managed

Machines	☐ Inbound	☐ Outbound
Accesories	☐ Inbound	☐ Outbound
Spares	☐ Inbound	☐ Outbound
CRU	☐ Inbound	☐ Outbound
Consumibles	☐ Inbound	☐ Outbound
Components	☐ Inbound	☐ Outbound

9) Mark the type of special ability or activity preference you have

- Customer Engagement ☐
- Design ☐
- Analysis ☐
- Supplier Involvement ☐
- Prototyping ☐
- Testing ☐
- Manufacturing and Field support ☐

1.1.1.1.1 Communication Links

10) Rank from 0 (none) to 5 (constant) the frequency of your communications in a year with the following groups:

- Marketing ☐
- PDT ☐
- IDHI ☐
- Packaging Contractor ☐
- Packaging Parts Supplier ☐
- Other Packaging ☐
- Manufacturing ☐
- Service ☐
- Final Customer ☐

11) What are the channels most frequently used in a month in your remote communications with the following groups? Select 3 of them in frequency order 1 (low) to 3 (high)

	Video Conference	Telephone	Document Conferencing	Instant Email messaging	FTP/ Bulletin Board	Fax
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

Appendix A – Continued

12) What would be your preferred communication channel *to receive info* when face to face meeting is not possible. Select 3 of them in frequency order 1 (low) to 3 (high). Select 3 of them in preference order 1 (low) to 3 (high). You can repeat number if you consider combination of channels is required.

	Video Conference	Telephone	Document Conferencing	Instant Email messaging	FTP/ Bulletin Board	Fax
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

13) What would be your preferred communication channel *to send info* when face to face meeting is not possible. Select 3 of them in frequency order 1 (low) to 3 (high). Select 3 of them in preference order 1 (low) to 3 (high). You can repeat number if you consider combination of channels is required.

	Video Conference	Telephone	Document Conferencing	Instant Email messaging	FTP/ Bulletin Board	Fax
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

14) What would be your preferred communication channel *to process info* when face to face meeting is not possible. Select 3 of them in frequency order 1 (low) to 3 (high). Select 3 of them in preference order 1 (low) to 3 (high). You can repeat number if you consider combination of channels is required.

	Video Conference	Telephone	Document Conferencing	Instant Email messaging	FTP/ Bulletin Board	Fax
Marketing k				☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐			
Final Customer	☐	☐	☐	☐	☐	☐

15) Mark the PDP stage that in your experience has the highest need of interaction with each following groups

	1	2	3	4	5	6
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

Appendix A – Continued

16) Rank from 1 (low) to 3 (high) the major obstacles and barriers for you to communicate effectively with other sites out your country

- ☐ Time Zone
- ☐ Language
- ☐ Culture (different practices)
- ☐ Trust
- ☐ Difference on the sense of responsibility and ownership
- ☐ Delayed response
- ☐ Different sense of urgency
- ☐ Lack of visibility of other sites progress on shared tasks
- ☐ Lack of a code for incoming information flow to distinguish important/non-important, urgent/non-urgent matters to work on.
- ☐ Lack of time to communicate frequently due to workload
- ☐ OTHER: Please explain

17) Rank from 1 (low) to 3 (high) the frequency in a year that you perform the following activities:

- ☐ You perceive new risks and opportunities on worldwide basis
- ☐ You formulate global strategy of business
- ☐ You architect the worldwide company´s configuration of resources and assets
- ☐ You are a crossborder coordinator for processes or information or resources flow
- ☐ You are local implementer of global company´s strategy
- ☐ You are bicultural interpreter of company´s global strategy and local group opportunities
- ☐ You captures the strengths of the local capabilities and leverage them beyond national boundaries for the worldwide company benefit
- ☐ You are aware of worldwide best functional practices and barriers and try to apply them locally and globaly
- ☐ You create a worldwide network of contacts that serve as input/output mechanisms of knowledege sharing and innovation
- ☐ You accept and share new processes, fostering diversity and teamwork
- ☐ You are willing to help and support other sites in timely and effective manner.

Appendix B
Leaders' Survey

Transnational Diagnosis

1.1) Rank from 1 (low) to 3 (high) each of the following factors that you consider importatnt as driving forces for the Corporation to look for global effciency

- ☐ converging consumer preferences
- ☐ need of economies of scale in manufacturing
- ☐ strategies and approaches of global competitors
- ☐ increasing development costs
- ☐ OTHER: _____

1.2) Rank from 1 (low) to 3 (high) how you think they are affecting the office equipment industry?

- ☐ converging consumer preferences
- ☐ need of economies of scale in manufacturing
- ☐ strategies and approaches of global competitors
- ☐ increasing development costs
- ☐ OTHER : _____

1.3) Rank from 1 (low) to 3 (high) how strong are the following reactions of the company.

- ☐ reduction of product portafolio
- ☐ increased product commonality
- ☐ increased efforts to create alliances and partnerships
- ☐ identifcation and use of global competencies
- ☐ outsourcing to reduce cost and increase responsiveness
- ☐ OTHER: _____

2.1) Rank from 1 (low) to 3 (high) each of the following factors that you consider important as driving forces for the Corporation to look for local responsiveness

- ☐ differences in local consumer preferences
- ☐ national infrastructures
- ☐ local goverment requirements and regulations
- ☐ local competitor's strategies and approaches
- ☐ OTHER: _____

2.2) Rank from 1 (low) to 3 (high) how you think they are affecting the office equipment industry?

- ☐ differences in local consumer preferences
- ☐ national infrastructures
- ☐ local goverment requirements and regulations
- ☐ local competitor's strategies and approaches
- ☐ OTHER: _____

2.3) Rank from 1 (low) to 3 (high) how strong are the following reactions of the company.

- ☐ increased cost to create product differentiation and nationalization
- ☐ difficulty to apply global standards
- ☐ need to develop local market capabilities
- ☐ contract and outsource local resources to deal with national infrastructure
- ☐ empower local groups to resolve problems
- ☐ increased communication with headquarters to receive direction
- ☐ OTHER: _____

3.1) Rank from 1 (low) to 3 (high) each of the following factors that you consider important as driving forces for the Corporation to look for worldwide innovation and knowledge transfer

- ☐ shrinkage of corporation structure
- ☐ use of the best global competencies to increase resources efficiency
- ☐ need to reduce time to market through by knowledge synergy and best pratices sharing.
- ☐ higher availabity of telecommunication resources to share knowledge and foster innovation
- ☐ OTHER: _____

3.2) Rank from 1 (low) to 3 (high) how you think they are affecting the office equipment industry?

- ☐ shrinkage of companies structure
- ☐ use of the best global competencies to increase resources efficiency
- ☐ need to reduce time to market through by knowledge synergy and best pratices sharing.
- ☐ higher availabity of telecommunication resources to share knowledge and foster innovation
- ☐ OTHER: _____

3.3) Rank from 1 (low) to 3 (high) how strong are the following reactions of the company.

- ☐ oursourcing Non-core competencies and develope core competencies
- ☐ searching for specialized competencies throughout the corporation to raise integral efficiency
- ☐ increasing of virtual spaces and telecommunication channels to share knowledge and foster learning
- ☐ OTHER: _____

4.1) What do competitors seem to have an advantage over our company ? Mark with YES or NO as many you think they are capable of

	Global Efficiency	National Resposiveness	Worlwide innovation
HP	☐	☐	☐
Cannon	☐	☐	☐
Mita	☐	☐	☐
IBM	☐	☐	☐
Ricoh	☐	☐	☐
Sharp	☐	☐	☐

4.2) What do you think are the sources of this advantage?

	Marketing	Product Development	Manufacturing	Logistics	Sales	Service
HP	☐		☐	☐		☐
Cannon	☐		☐	☐		☐
Mita	☐		☐	☐		☐
IBM	☐		☐	☐		☐
Ricoh	☐		☐	☐		☐
Sharp	☐		☐	☐		☐

5.1) Rank from 1 (low) to 3 (high) each of the areas on the level of the strategy capability that the our corporation demonstrates

	Strategic Capability		
	Global Integration	National Responsiveness	Worldwide learning and innovation
Dimensions			
Marketing	☐	☐	☐
Product Development	☐	☐	☐
Manufacturing	☐	☐	☐
Logistics	☐	☐	☐
Sales	☐	☐	☐
Service	☐	☐	☐

5.2) Mark the areas that you think our corporation requires more capability for the turnaround.

	Strategic Capability		
	Global Integration	National Responsiveness	Worldwide learning and innovation
Dimensions			
Marketing	☐	☐	☐
Product Development	☐	☐	☐
Manufacturing	☐	☐	☐
Logistics	☐	☐	☐
Sales	☐	☐	☐
Service	☐	☐	☐

6) In your opinion, what's the sequence that change type is required to effectively energize the "turnaround" of the company? Order from 1 to 3.

- ☐ Systems and Processes change
- ☐ Formal Structural change
- ☐ Culture change: Vision, values and behavior

Appendix C
Engineers' Survey

Competencies: Experience, skill, abilities.

1) Experience

- ☐ Background and formal education
- ☐ Years of experience in packaging

2) Skills (Mark which type of packaging have you worked on)

Machines	☐ Inbound	☐ Outbound
Accesories	☐ Inbound	☐ Outbound
Spares	☐ Inbound	☐ Outbound
CRU	☐ Inbound	☐ Outbound
Consumibles	☐ Inbound	☐ Outbound
Components	☐ Inbound	☐ Outbound

3) Mark the type of special ability or activity preference you have

Customer Engagement	☐
Design	☐
Analysis	☐
Supplier Involvement	☐
Prototyping	☐
Testing	☐
Manufacturing and Field support	☐

3.1.1.1.1 Communication Links

4) Rank from 0 (none) to 5 (constant) the frequency of your communications in a year with the following groups:

Marketing	☐
PDT	☐
IDHI	☐
Packaging Contractor	☐
Packaging Parts Supplier	☐
Other Packaging	☐
Manufacturing	☐
Service	☐
Final Customer	☐

5) What are the channels most frequently used in a month in your remote communications with the following groups? Select 3 of them in frequency order 1 (low) to 3 (high)

	Video Conference	Telephone	Document Conferencing	Instant Email messaging	FTP/ Bulletin Board	Fax
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

Appendix C – Continued

6) What would be your preferred communication channel to receive info when face to face meeting is not possible. Select 3 of them in frequency order 1 (low) to 3 (high). Select 3 of them in preference order 1 (low) to 3 (high). You can repeat number if you consider combination of channels is required.

	Video Conference	Telephone	Document Conferencing	Instant Email messaging	FTP/ Bulletin Board	Fax
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

7) What would be your preferred communication channel *to send info* when face to face meeting is not possible. Select 3 of them in frequency order 1 (low) to 3 (high). Select 3 of them in preference order 1 (low) to 3 (high). You can repeat number if you consider combination of channels is required.

	Video Conference	Telephone	Document Conferencing	Instant Email messaging	FTP/ Bulletin Board	Fax
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

8) What would be your preferred communication channel *to process info* when face to face meeting is not possible. Select 3 of them in frequency order 1 (low) to 3 (high). Select 3 of them in preference order 1 (low) to 3 (high). You can repeat number if you consider combination of channels is required.

	Video Conference	Telephone	Document Conferencing	Instant Email messaging	FTP/ Bulletin Board	Fax
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

9) Mark the PDP stage that in your experience has the highest need of interaction with each following groups

	1	2	3	4	5	6
Marketing	☐	☐	☐	☐	☐	☐
PDT	☐	☐	☐	☐	☐	☐
IDHI	☐	☐	☐	☐	☐	☐
Packaging Contractor	☐	☐	☐	☐	☐	☐
Packaging Parts Supplier	☐	☐	☐	☐	☐	☐
Other Packaging	☐	☐	☐	☐	☐	☐
Manufacturing	☐	☐	☐	☐	☐	☐
Service	☐	☐	☐	☐	☐	☐
Final Customer	☐	☐	☐	☐	☐	☐

Appendix C – Continued

10) Rank from 1 (low) to 3 (high) the major obstacles and barriers for you to communicate effectively with other sites out your country

- ☐ Time Zone
- ☐ Language
- ☐ Culture (different practices)
- ☐ Trust
- ☐ Difference on the sense of responsibility and ownership
- ☐ Delayed response
- ☐ Different sense of urgency
- ☐ Lack of visibility of other sites progress on shared tasks
- ☐ Lack of a code for incoming information flow to distinguish important/non-important , urgent/non-urgent matters to work on.
- ☐ Lack of time to communicate frequently due to workload
- ☐ OTHER: Please explain

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