



# Systèmes d'Intelligence Compétitive pour la Gestion Stratégique dans une Institution de Recherche et Développement

Roberto Penteadó

## ► To cite this version:

Roberto Penteadó. Systèmes d'Intelligence Compétitive pour la Gestion Stratégique dans une Institution de Recherche et Développement. domain\_shs.info.conf. 2001. mem\_00000036

**HAL Id: mem\_00000036**

**[https://memsic.ccsd.cnrs.fr/mem\\_00000036](https://memsic.ccsd.cnrs.fr/mem_00000036)**

Submitted on 9 Jan 2004

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

**UNIVERSITÉ DE TOULON ET DU VAR**  
**LABORATOIRE LEPONT**  
**SCIENCES DE L'INFORMATION & COMMUNICATION**

# **Systèmes d'Intelligence Compétitive pour la Gestion Stratégique dans une Institution de Recherche et Développement**

**ROBERTO DE CAMARGO PENTEADO FILHO**  
EMBRAPA

**Mémoire de Diplôme d'études approfondies (DEA) en Veilles et Intelligence  
Compétitive - DSG, présenté en septembre 2001**

**Direction du mémoire:**  
**Henri Dou**  
**Philippe Dumas**  
**Luc Quoniam**  
**Eric Boutin**  
**M. Fátima L. Stollenwerk**

**Professeur, Directeur du CRRM**  
**Professeur, Directeur du Labo Lepont**  
**Professeur du Labo Lepont**  
**Maître de Conférences Labo Lepont**  
**DEA Veille Technologique**  
**M.Sc. Gestion Technologique**

**UNIVERSITÉ DE TOULON ET DU VAR**  
**LABORATOIRE LEPONT**  
**SCIENCES DE L'INFORMATION & COMMUNICATION**

# **Competitive Intelligence Systems for Strategic Management in an Institution of Research and Development**

**ROBERTO DE CAMARGO PENTEADO FILHO**  
EMBRAPA

Monograph presented in september 2001 as part of the requirements for  
obtention of the “Diplôme d'études approfondies (DEA) en Veilles et  
Intelligence Competitive - DSG”

**Advisors:**

**Henri Dou**  
**Philippe Dumas**  
**Luc Quoniam**  
**Eric Boutin**  
**M. Fátima L. Stollenwerk**

**Professor, Director of CRRM**  
**Professor, Director of Labo Lepont**  
**Professor of Labo Lepont**  
**Maître de Conférences Labo Lepont**  
**DEA Veille Technologique**  
**M.Sc. Technological Management**

## **Abstract**

This work aims to study the creation of Competitive Intelligence Systems (CIS) for the Brazilian Agricultural Research Corporation - Embrapa communication. Such networks will contribute positively to the enhancement of the relationship and mutual knowledge between Embrapa and its clients. It also serves as an indicator on the behavior of Embrapa's competitors, basically multinational companies such as Monsanto, Ciba-Geigy and DuPont, that already have and use CIS. The monograph demonstrates that thanks to its strong strategic planning system and to its Model of Strategic Management, Embrapa is extremely well positioned to start its investments in the field of Managerial CIS. The methodology developed here can be used in other areas such as Technological Intelligence, Business Intelligence, and Macro-environment Intelligence.

Keywords: Embrapa, Competitive Intelligence, Knowledge Management, Strategic Management, Information Analysis

## Sommaire

Cet travail a comme objective étudier la creation d'un Système d'Intelligence Competitive pour les activités de communication de l'Entreprise Brésilienne de Recherche Agricole (Embrapa). Ces systèmes contribueront positivement à la potencialization du relationnement et de la connaissance mutuelle entre l'Entreprise et ses clients. Il sert aussi comme indicateur sur le comportement de ses competeurs, basiquement companies multinationales comme Monsanto, Ciba-Geigy et DuPont, qui ont déjà et utilisent cet instrument. Le projet demonstre qui, grace a son fort strategic plan et a son Modèle de Gestion Strategique, Embrapa est extremement bien positionnée pour commencer le development de reseaux d'intelligence competitive gerenciaux. La methodology ici developpée pourrait etre etendue a d'autres secteurs comme ces d'Intelligence Technologique, Economique et du Macroambient.

Mots-clés: Embrapa, Intelligence Compétitive, Gestion de la Connaissance, Administration, Strategie, Analyse de l'Information

## ACKNOWLEDGEMENTS

To Embrapa's Executive-Diretors Dante Scolari and José Roberto Peres, to the managers of the MGE and of the Strategic Objectives Paulo Fresneda, Antenor Turazi, Cristina Timponi e Marita Cardillo, to the technicians Wilson da Fonseca Júnior and Rosa Maria Alcebiades Ribeiro.

# Table of Contents

INTRODUCTION .....	09
<i>THE RESEARCH PROBLEM</i> .....	10
<i>OBJECTIVE</i> .....	12
<i>METHODOLOGY</i> .....	13
 INTELLIGENCE AND COMPETITIVITY OF ORGANIZATIONS .....	 14
<i>WHY IMPLEMENT CI AND KNOWLEDGE MANAGEMENT</i> .....	16
<i>HOW CIS WORKS</i> .....	24
Planning and Coordination .....	26
Collection, Processing and Storing Information .....	27
Analysis and Validation of Information .....	31
Dissemination and Utilization .....	32
 EMBRAPA IN BRAZIL AND OVERSEAS .....	 38
<i>RESEARCH PROGRAMS</i> .....	41
<i>TECHNOLOGIES FOR BRAZILIAN AGRIBUSINESS</i> .....	43
<i>STRATEGIC ADMINISTRATION: EMBRAPA'S THIRD DIRECTOR PLAN (PDE)....</i>	45
Agribusiness in the Future .....	46
Vision .....	46
Objectives .....	47
 CONCEPTION OF A PILOT SYSTEM OF COMPETITIVE INTELIGENCE IN EMBRAPA .....	 48
<i>THE MGE AND THE STRATEGIC OBJECTIVES OF ACS</i> .....	48
Strategic objectives .....	49
Hierarchization of CFS .....	50
<i>FRAMEWORK FOR THE CONSTRUCTION OF A PILOT CIS</i> .....	51
 CONCLUSION.....	 62
<i>RECOMMENDATIONS</i> .....	63
 BIBLIOGRAPHY .....	 65

# List of Tables

<i>Tabela I: Organizations using Competitive Intelligence Systems .....</i>	<i>07</i>
<i>Tabela II: Formal Sources of Information .....</i>	<i>28</i>
<i>Tabela III: Informal Sources of Information.....</i>	<i>29</i>
<i>Tabela IV: Project Chronogram.....</i>	<i>60</i>
<i>Tabela V: Project Budget .....</i>	<i>61</i>



# List of Figures

<i>Figura 1: Knowledge value-chain in the organizations .....</i>	<i>23</i>
<i>Figura 2: Competitive Intelligence cycle .....</i>	<i>25</i>
<i>Figura 3: Graphical representation of CI Sources .....</i>	<i>31</i>
<i>Figura 4: A Model of CIS.....</i>	<i>32</i>
<i>Figura 5: The importance of the CI Networks.....</i>	<i>33</i>
<i>Figura 6: The construction of CIS by Critical Factors of Success. ....</i>	<i>35</i>
<i>Figura 7: Embrapa's Organization Chart.....</i>	<i>39</i>
<i>Figura 8: Distribution of Embrapa and SNPA Units in Brazil .....</i>	<i>40</i>
<i>Figura 9: Matrix of Embrapa's Strategic Objectives .....</i>	<i>51</i>

# Introduction

The great Chinese military strategist, Sun Tzu (1983) said some 2,500 years ago that “if we understand and know our enemy and ourselves, we will never be placed in a situation of risk, even if we were to fight a hundred times”.

The message from the Art of War, still endures to the present day, especially in a globalized world where competition is becoming radical and even more difficult.

This maxim is one of the principles of Competitive Intelligence. According to the Penguin Wordmaster Dictionary (1987), “Intelligence” means “1- the ability to think, understand and learn from experience”. However there is another meaning in English to that word “2 - Information on your enemy”.

Herring (1986) defines intelligence as ‘the knowledge of the organization’s competitive ambience and its macro-environment as applied to the decision-making processes at strategic and tactical levels.

According to him, “a Competitive Intelligence System is the organizational process of collecting and analyzing systematically information that is disseminated as intelligence to its users in decision-making with the view of generating and sustaining competitive advantages.

Kahaner (1996) listed 6 reasons why Competitive Intelligence cannot be ignored in a multipolar and globalized world:

- Businesses are growing at a fast pace;
- Increase in volume of available information;
- Increase in the number of new competitors in the global arena;
- Former competitors are turning more aggressive;
- The rate and the force of political changes are growing;
- This is also true with technological changes.

## THE RESEARCH PROBLEM

The Brazilian Agricultural Research Corporation (Embrapa), an agency of the Ministry of Agriculture and Food Supply of Brazil, was founded on April 26, 1973. Since then it has produced numerous technologies for the modernization of the agricultural and agribusiness sectors. In the 70's, yields have increased substantially, soybean production increased by 360%, corn by 128%, wheat by 49% and rice and bean by 27%. Production efficiency has improved while production costs have plummeted and Brazil's dependency on foreign technology, inputs and genetic material has dramatically decreased.

Embrapa's mission is "to seek and implement sustainable development solutions for Brazilian agribusiness by generating, adapting and transferring knowledge and technology to benefit the whole Society." The Company consists of 37 Research Centers and 3 Special purpose Services covering the national territory. It is also responsible for the coordination of the National System of Agricultural Research. With 8,660 employees amongst them 2,063 are researchers, 52% of them hold a M.Sc. degree and 43% Ph.D. Its budget is above US\$ 280 millions per year.

Tyson (1998) described 4 stages in the evolution of competitive intelligence in the companies, *vis-a-vis* strategic planning. In the first stage are the companies with

little or no strategic planning. These companies will have no intent or activities of intelligence. In the second stage are companies with strategic planning as an isolated activity. Their intelligence activities are then aimed at specific ends and are limited. In the third stage, the companies have a well-developed process of strategic planning. At this point, Tyson affirms that the efficiency of the planning and the implementation of the Plans will demand intelligence, and the processes begin to be implemented. In the fourth and the most advanced stage, a systematic interface is created between the strategic planning and intelligence processes. At this stage, intelligence is entirely integrated into the company's life and strategic planning is efficient and continuous.

Embrapa has a solid and working strategic planning system. Taking into account the history of IC in the organizations, this places the Company in the third stage, as described by Tyson. The development of the entrepreneurial strategy calls for the necessity of the strategic monitoring of its environment, competitors and business. In the last few years, the Company has adopted measures to integrate its strategic planning systems and create intelligence initiatives.

Some of which may be found in the establishment of a Laboratory in the United States, in 1998; the Embrapa's Third Director Plan, 1999 -2003 (PDE), which places Technological Monitoring (p.34) as one of its new projects and, more recently, the Strategic Management Model (MGE) integrating management mechanisms, Embrapa Planning System (SEP), Units Evaluation System (SAU), Annual Work Plan (PAT) and the Planning, Assistance and Evaluation of the Individual Work System (SAAD). The MGE also defined the Strategic Objective Nº. 17 for the implementation of Information Management to support the Technological, Scientific, Administrative and Managerial activities.

With this in mind, Embrapa is fully prepared to start the launch and application of the techniques of systematic collecting, analyzing and storing of information. This project analyses the opportunity for the Company to begin investments in the area,

with the aim of integrating CI to the strategic planning and management processes.

## OBJECTIVE

The main objective of this project is to analyze the viability of networks of Competitive Intelligence and Knowledge Management for the Public Relations Office (ACS) of Embrapa.

The effort takes of from a pilot program of a Competitive Intelligence System (CIS) for Embrapa's Strategic Management Model, focusing on the Strategic Objective (SO) Nº. 13, "Improvement of Internal Communication" and, in a second stage, the SO Nº. 2, "Improvement of the Institutional Image of Excellence, emphasizing Research and Development (R&D)". Both SOs are managed by ACS.

Therefore, amongst the project's secondary objectives are to adapt the actual methodology of creation of CIS to Embrapa's situation and to create indexes and indicators to evaluate the evolution of ACS Strategic Objectives. The project allows for the development of a methodology for the creation of managerial CIS for the other 17 SO and promotes the use of information systems and competitive intelligence in other areas such as Scientific and Technological Intelligence, Marketing Intelligence, Product Intelligence, Competitors and Macro-environment Intelligence. As such, in contributing to the success of both Strategic Objectives of the MGE managed by ACS, it opens, at the same time, the door to the application of CI by the Company.

On developing, implementing and monitoring a system of indicators for the SO managed by ACS, focusing on internal and external clients, the project enforces an improved performance of the integration and coordination efforts and strategic actions developed in the MGE. This information contributes to the improvement of the company's performance in terms of Total Quality in, at least, 2 of the 7 Criteria for Public Management Evaluation, which integrates the Quality and Participation in

Public Administration Program (QPAP): the **Focus on the Client** and the **Information and Analysis**. Other criteria, such as, **Leadership, Strategic Planning, Process Management, Human Resources** and, the most important amongst them, **Organizational Results**, will also suffer a strong and positive impact from the strategic information systems resulting from this initiative.

## METHODOLOGY

This exploratory project aims to apply a CI initiative within Embrapa's organizational framework, more precisely in its Strategic Management Model (MGE), adapting to the different frameworks proposed by the Literature. In this way, we will also witness a clear demonstration of Tyson's affirmation in that, the company's strong and active planning system gives direction to its efforts in the search of intelligence on its markets, clients and competitors. The development of CI networks will happen as a natural extension of the strategic administration process of the Company.

The adopted methodology has 3 phases:

- 1) A conceptual phase where the Bibliographical revision on systems and models of Competitive Intelligence will be developed;
- 2) An institutional phase describing Embrapa and its Strategic Systems of Information and Administration;
- 3) A practical phase where an integration of the CIS described in phase 1 and Embrapa's systems, treated in phase 2, is proposed by developing a pilot of CIS for Embrapa's Communication.

In the following, we present the theoretical fundamentals and concepts of Knowledge Management and Competitive Intelligence and the methodology for the creation of systems of strategic information which will act as a base for a pilot CIS for Embrapa's Communication.

# Intelligence and Competitiveness of Organizations

A CIS aims to:

- Anticipate changes in the Market
- Anticipate competitor's behavior
- Discover new and potential competitors
- Learn from success and mistakes made by others
- Increase the extension and quality of acquisitions and/or partnerships
- Learn about new technologies, products and processes that concern the business
- Learn about political, legislative and regulatory changes, which may affect the business.

Dou (1995) defines 3 types of CIS:

## **1. Systems focusing on the Company's Decision-Making (Managerial)**

They are more academic, "in terms of the methodological application of Intelligence". In these systems, the decision-makers define the critical information to be monitored from the Critical Factor of Success (CFS) as defined within the organization's process of strategic thinking.

## **2. Intelligence Systems by Projects**

At the implementation phase, critical factors are determined for the project and, from them, information is stored, analyzed and validated through an intelligence process, which will allow the decision-maker to validate the main stages and the choice of technologies to be applied in the project.

At the second phase, a specific Intelligence System (IS) is established for the project. The person designated for the job will monitor the critical questions in alignment with the company's Intelligence System, to establish models, sources and information filters that will feed the project's members. In this case the overlapping between tactical and operational use of the information will be carefully observed.

## **3. Integrated Systems**

These systems combine the 2 preceding models making it possible for the decision-maker to observe directly the technical and production processes.

In this case, the IS will feed the strategic thinking process as well as develop the research and critical analysis of the information relative to the product.

Fuld (1995) states that the most qualified companies apply intelligence consistently. This became even more evident because by 1997, the most important Total Quality Award in the US, the Malcolm Baldrige Quality Award, included, as one of its necessary qualifier for classification, the search and the use of information on the external environment.

The Quality and Participation in Public Administration Program (QPAP), and the Brazilian Program for Quality and Productivity also adopt the Malcolm Baldrige Quality Award's criteria. This was also taken up by the European Community Countries. The acceptance of countries from many different continents contributes to a greater universalization of such criteria.



CI varies in its intensity in accordance to the type of company. Basic or mass consuming goods industries uses knowledge less intensely. Petroleum, Chemical, Industrial machinery and Logistics are a degree above. That of Consultancy, Communication, Software, Finance and Pharmaceutical bear greater intensity in the use of Knowledge. Research and Development organizations, such as in the case of Embrapa, incurs, by nature, an intensive use of knowledge.

To highlight the modern necessity of the companies to “manage” pro-actively its knowledge stock, Dou (1999) states that it is becoming common to find companies that knew how to produce something but lost their know-how; which posses knowledge that are of world-wide importance but do not use them; or have access to a great quantity of information but do not take advantage of it or which do not have the slightest idea of their real knowledge.

## WHY IMPLEMENT CI AND KNOWLEDGE MANAGEMENT

An Ernst & Young study involving 431 American and European executives on the advantages they achieve through the application of Knowledge Management, indicated that, more than 80% pointed out to the increase in innovative capacity, improved efficiency, better decision-making, faster response and better flexibility. More than 60% designated 3 other factors: Improved quality, reduced duplication of efforts and empowerment of employees.

The following organizations use formal systems of CI. The ones in Bold are considered Embrapa's competitors.

Table I: Organizations using Competitive Intelligence Systems

Atlantic Richfield	<b>Ciba-Geigy</b>	Citicorp
<b>Dow USA</b>	<b>DuPont</b>	General Electric
General Mills	General Motors	IBM
J.C. Penney	Johnson & Johnson	McDonald's
<b>Monsanto</b>	Nynex	Royal Dutch Shell
Sears Roebuck	Union Carbide	Texas Instruments

In a research done by phone by the Futures Group in the US at the end of 1996 (McGonagle and Vella, 1997 and Harkleroad, 1998), with 101 executives from aerospace, chemical, products and services, financial services, information services, pharmaceutical, telecommunication and public services, indicated that 80% of the companies adopted organized approaches in identifying critical information. In 1995, this number was only 68%. Based on this data, the organizers created 2 types of respondents: the eagles and the ostriches.

For 75% of the respondents, the norm is the development of intelligence on its competitors seeking to change market structures and political contexts. These companies are classified as the Eagles. They are generally in the Information technology and service industries such as: Motorola, General Electric, AT&T, IBM, 3M, Kodak and Coca-Cola.

In about 25% of the companies, the Managers do not believe that their competitors use CI against them. Researchers also detected that the percentage of executives who did not believe in this dropped from 25% to 5% from one year to the next. These are companies considered as Ostriches.

About 80% of the companies in the research have an annual budget above US\$1 billion and in 35% of them the annual budget is above US\$10 billion.

A real symbiosis between “Intelligence and Information” can be found in Japan where, in the Japanese writing, the ideogram “joho” means precisely this: intelligence and information. In the history of the Land of the Rising Sun, sharing was an imperative for survival. As such, the capacity for teamwork has become a natural trait of the Japanese culture.

Other issues considered by Ribeiro et al (1999) in the treatment of Information in Japan are:

Intrinsic and practical information is highly valued;

Information storing is continuous;

Information is extensively shared even with competitors;

The Government has an important role in the collecting and storing of information for the companies;

There are no special groups or teams specializing in the storing of information, it is carried out by all, including the Managers;

The cost of collecting information is never questioned

Most of the information is from public domain, especially documents, and information retrieval is done personally and through observation, playing a vital role in the company

A high volume of Information is collected to assure a global vision but the Japanese are inefficient in the analysis of information and the processing of which is slow. This was highlighted by an American analysts as the probable cause of Japan’s defeat in the WW2.

In France, a Country that considers information as top national priority, the government incentives the use of economical, as well as technical information networks. Ibarra et al (1999) states that, in 1995, a Committee for the Economical Competitiveness and Stability was set up, with the participation of members from the

public and private sectors. Its mission is to counsel the Prime Minister on the subject. It also attends to the information needs of the small and medium companies, promotes the integration in terms of economic intelligence between public and private sectors and develops an intelligence community through a wide diffusion of economic intelligence.

Wanderley(1998) stresses that in Brazil, there is a reduced number of organizations involved in a structured system of competitive intelligence: Petrobras, White Martins, Souza Cruz, Esso, Ipiranga, Rhodia and Coca-Cola are a few of the major companies.

However, interest has grown due to the stimulus of the National and the Public Service Quality and Productivity Programs and Awards, the Industry Capacitation Support Program (PACTI) and also the ISO 9000 Certification Program.

The Quality and Participation in Public Administration Program (QPAP - MPO, 2000) defines the criterion, **Information and Analysis** as one of its evaluation base for the Quality Management and states that “the management of information is a fundamental element for the implementation of the public model of entrepreneurial management”.

At present, the success of public and private organizations depends on its capacity to identify and process information that are relevant to the external and internal environments, promoting the organization, integrating and making available these information to their internal and external agents, in an opportune and adequate manner, turning them into an instrument for decision making.

According to QPAP (MPO, 2000), another criterion of excellence is the **Focus on the Client** factor:

To examine how the organization identifies the potential universe of its clients which, according to its competences, it must attain them with their products and services, how it evaluates practices developed to understand

these types and groups of clients and to study their needs (requirements, expectations and preferences) in relation to the products and services.

A point emphasized in this criterion is the evaluation of the client's rate of satisfaction or dissatisfaction. Some of the methods suggested are:

How the organization, in unison with its clients, accompanies the services / products performance and recent transactions, so that satisfaction and resolutions of eventual problems may be made quickly.

How the organization obtains information on the satisfaction and dissatisfaction of their clients, including focus variations of different client groups or market segments.

and the volume of complaints.

A third criterion used by QPAP, the **Strategic Planning** factor, evaluates amongst other things how the organization

analyzes the available client data - such as the level of satisfaction with the services, registry of complaints and suggestions, percentage of clients attended in relation to the actual and potential demand.

In the **Leadership** criterion, one of the objectives emphasized is the public responsibility and citizenship, the forms of "citizen's participation in the decision on public policies as well as in the monitoring of its execution". Examples of indicators include results from research made on the public and communities, image research, environmental research and sanctions received.

In the **Results of the Organization** criterion, which is the most valuable in the evaluation of QPAP, the "performance of the organization is perceived by the client, by way of indicators of satisfaction and dissatisfaction obtained in a direct research with the clients" (MPO, 2000).

According to Coelho (1999), CI will remain an advantage until 2005 as not all companies employ the system. Its principal characteristics is that it is a process that runs from top to bottom, needing the strong will on the part of the decision-makers. It starts off as a defensive system but changes to an offensive one rapidly.

The Ministry of Science and Technology, the National Institute of Technology (NIT) and the Brazilian Institute Science and Technology Information (IBICT), together with the Federal University of Rio de Janeiro and the University Aix-Marseille III created a Course in CI, the CEIC which, in 2000, is in its third year.

The program runs in Rio de Janeiro, Brasilia and now Salvador (Bahia) and Natal (Rio Grande do Norte), and has contributed to an increased interest in CI from private and public organs. Some of the CEIC 1999 participants represented the Service of Micro and Mini Enterprises Support (Sebrae), National Confederations of Industry and of Commerce (IEL Foundation), President of the Republic's Military Cabinet, Ministry of Science and Technology, Ministry of Development, Ministry of Finance, National Institute of Space Research, National Service of Dataprocessing (Serpro), Banco do Brasil, Caixa Economica Federal and Embrapa.

For Coelho (1999), CI implies in the availability of an information system which collects, analyzes, disseminates and obtains useful and pertinent information transformed into actions and decision-making, with a future vision linked to the company's objectives and its competitiveness. It monitors the external environment, the competitors and market trends and also involves the main decision-makers.

Another point to be considered in the search for competitiveness by the organization is Knowledge Management. It is defined as a process that facilitates the creating, mapping, acquisition, indexing, communicating, coding, prioritizing, organizing, storing, using, distributing, sharing, renewing, coding and applying knowledge to improve the organization's performance.

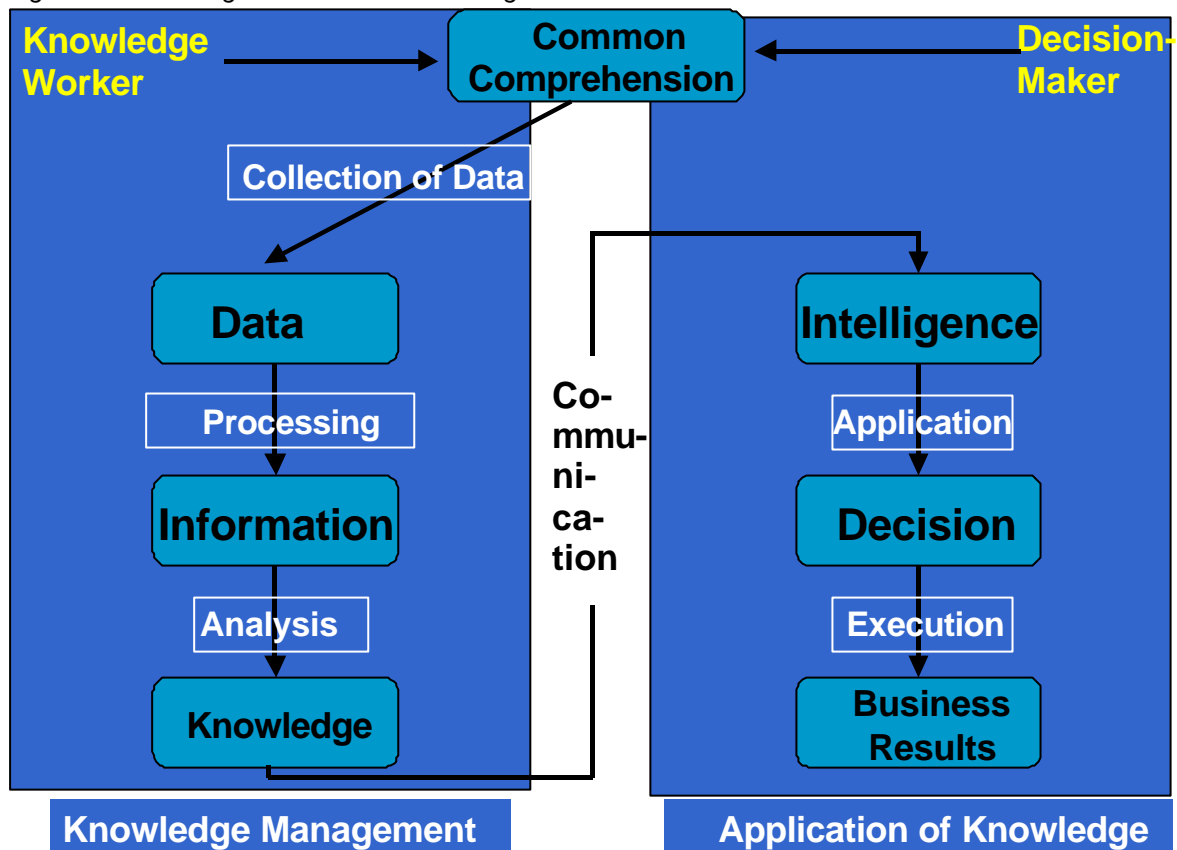
In Tom Davenport and Larry Prusak's (1998 apud Coelho 1999) definition, Knowledge Management is the administration of "experiences, values, information and opinion of specialist which allows for the evaluation and incorporation of new experiences and information. Many times this is contained within the organization, not only as documents and repertoires but also in the organizational routines, processes, practices and norms".

According to Ann Macintosh (apud Coelho 1999), "the intellectual patrimony of an organization is formed by the knowledge related to technologies, products, processes, markets and the organization, facilitating business processes to aggregate value and generate profit". In this manner, Knowledge Management will be the administration of intellectual patrimony and the knowledge process within an organization, including: to develop, apply and evaluate, transform, transfer, actualize and preserve knowledge.

In reality, nowadays, CI and Knowledge Management aggregates so that the organization may increase the use of preexisting or acquired knowledge.

With the application of these variables it is created an evaluation of the organizational knowledge process which proves to be highly beneficial to the Institution. That happens by the way of communication, as shown in Figure 1.

Figure 1: Knowledge value-chain in the organizations



Source: Powell, T.W. apud. Coelho

Therefore, in order to survive, compete and grow at the beginning of the 21st century, an organization needs to develop its own intelligence networks to enable it to respond quickly to external changes. Such networks unite information from partners, distributors, consumers and inform on the political and economical changes as well as technological and competitor shifts in the local market.

Coelho (1999) goes on to say that IC “influences the organization to make secure decisions, foresee and prevent the bigger challenges in the industry; avoid technological surprises, have a wider perspectives of the competitor’s and partners actual and future capacity and their intentions. Also it allows it to evaluate objectively its competitive position, develop new products, improve performance and sell better”.



## HOW CIS WORK

The CIS operate by means of a continuous process starting from Data that is organized and then transformed into Information which again is analyzed and transformed into Intelligence.

Stollenwerk (1999) emphasizes that a major part of the authors divide the CI's creation process into 4 basic stages:

### 1) Planning and Coordination

Sub-stages:

Contextualization of CI: focused on the business

Identification of the critical factors of success

Mapping and Prioritization of the needs of CI

Elaboration and coordination of the implementation project

### 2) Collection, Processing and Storing

Sub-stages

Identification and evaluation of information sources

Retrieval, processing and storing of information (formal)

Retrieval, processing and storing of information (informal)

### 3) Analysis, Validation and Formatting of Products

Sub-stages

Validation and complementation of information by specialists

Analysis of CI and the elaboration of synthesis

Generating CI products in accordance with the company's needs and the directors' focus.

#### 4) Dissemination and Utilization

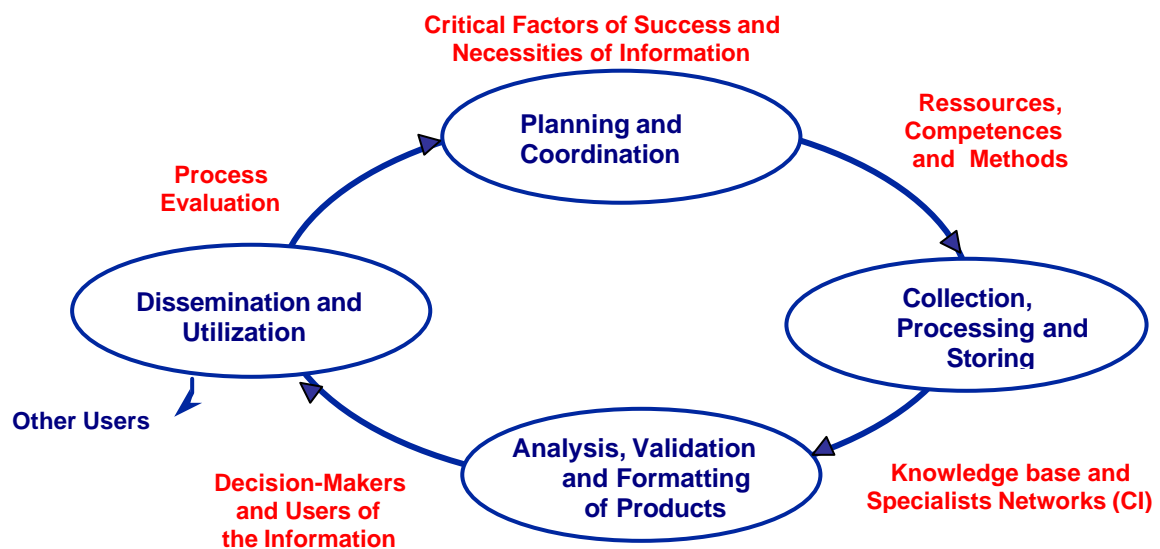
Sub-stages

Definition and implementation of CI dissemination mechanisms

Application of the decisive processes of CI

Figure 2 describes a CI system for management decisions. The construction initiates from the Critical Factors of Success (CFS) and the Information Needs. Coelho indicates that "Ronald Daniel presented this concept, in 1961".

Figure 2: Competitive Intelligence cycle



Adapted from Herring, 1997

According to Daniel (1961): “a company’s Information System must be discriminative and selective and it must focus on the factors of success. In many industries, there are usually 3 to 6 factors which determine success; this key points must function extremely well for the company to succeed”.

Rockart (1979) gave the final version of this concept in 1978-9 from MIT who defined the areas where the company must function so business can be competitive.

Coelho stated that:

critical success factors are linked to the corporate objectives. It constitutes areas that must receive constant and careful attention from the directors; its performance must be measured permanently and the intelligence system must give priority to the information linked to it.

Stollenwerk (1997) also points out to the Critical Factors of Success for an IC system such as the commitment and desire of the decision-makers; a strong internal articulation to “sell” the project; a critical mass in IC and dominating the tools of Knowledge Management and Competitive Intelligence; compensating mechanisms of evaluation of the process and the products of CI and a simple concept, based on a pilot project.

## **1. Planning and Coordination**

CI can be applied to any of the company's activity, in any department that requires treated and analyzed information. The system planning will demand determined directives and objectives, the aim of the application of Intelligence, the questions to be monitored, by whom or which department, the needs for its application and where it should be applied. All must be clearly understood as well as when it will be necessary, and where and how will be possible to obtain it.

Other questions suggested by Stollenwerk (1999):

What kind of information to look for? What are the best sources?

How to locate the sources? What methods to use to convert the information in Intelligence?

What are the profile of the decision-makers and how to communicate the results?

## **2. Collection, Processing and Storing Information**

This stage involves the search for information sources to attend to the needs surveyed at the previous stage, and the tools for the treatment and sorting of these informations.

Dou(1999) states that:

To know how to interpret a weak signal is to provide the company with an important advantage. But before interpreting a weak signal, it is necessary to first detect it. To capture weak signals demands a good strategy and versatile specialists that function well.

Information in the company can be divided into 4 big groups, as proposed by Dou (1995), using models conceived by Hunt and Zartarian (1990).

**1) Text Type or Formal Information** - represents, in general, 40% of the available information in the organization. These are structured information found in given data, books, newspapers, magazines, CD-Rom, Internet and patents.

Patents, for example, carry information not found elsewhere on competitors and their products. More than 75% of the information contained in American patents are not diffused through any other means. Patent analysis may mean:

- a) Which companies are working on state-of-art techniques; which are the leaders;
- b) Which individuals are working on state-of-art techniques;
- c) What are the countries with the latest technology;
- d) How long the companies take to use a patent; how long R&D needs to transform into profit gain;
- e) Which technology is growing or falling back; where the R&D funds are applied between the leaders of the industries;
- f) Relationships (e.g. Joint ventures) between the companies linked to similar R&D or producing the same products, relationship of research between subsidiary companies.

Coelho (1999) preseneds the formal sources of information in a table:

*Table II: Formal sources of information (Coelho 1999)*

<b>Formal Sources</b>	
Patents	Institutional Publications
Books	Catalogues
Norms	Films
Legislation	Newspapers
Magazines	Databases
Congress Abstracts	Clipping
Directories	Internet

**2) Informal or fluid information** - is information that is less structured than the first. It represents approximately 40% of the available information in the institution. In its majority, they come from outside the company through contacts with clients, providers, seminar and convention guests. They must however, circulate within the CI networks.

Dou (1999) highlighted that:

the necessity to anticipate quickly and not be taken by surprise, places the search for informal information in the heart of the company's information system. Formal information was more important a decade ago because technology moved at a slower pace and the competitors did not move to the same beat. Nowadays, everything moves faster. The necessity to have information elements fast, transforms its relationship with time. For example, it does not serve any purpose to send data quickly through the Intranet if you ask the players for voluminous and complicated reports.

*Table III: Informal sources of information (Coelho 1999)*

<b>Informal sources</b>	
Knowledge of the Company	Contractors/Suppliers
Students and Trainees	Fairs and Expositions
Congresses, Seminars, Clubs	Missions and study voyages
Service providers	Committees
Personal Networks	Job candidates

Coelho (1999) explains the advantage of informal sources citing McGonagle and Vella (1996):

- They tend to provide information that are more related to the present and the future, while the formal sources reflects more on the past;
- They give more opportunity to localize information or additional sources

- The formal sources are subjected to time limits (print and distribution);
- People are not filtered as much as the formal sources normally are.

**3) Information from Specialists** - is the company's memory, the specialist's knowledge, their situation and localization. It represents approximately 10% of total information that circulates in the company. In Embrapa, which is basically a Knowledge based organization, this kind of information has a marked importance.

**4) Information from Fairs and Congresses** - represents 10% of the available information. They come from the participation in Fairs and Congresses. Information research, visits to stands, collection of prospectus can demonstrate the competitor's tendencies in specific areas of interest. Other forms of "discovering" secrets from organizations are Papers presented at Congresses, job announcements, conversations on flights, service providers, conversations with friends and the press releases of the rival company.

Fuld (1995) divided the information sources into friendly and non-friendly types:

- Friendly sources, where it is easier to get information, are the distributors, suppliers, service providers, market research companies and governmental organizations.
- Non- friendly sources, where it is harder to get information, are the competing companies and the exclusive contractors of the competitors

However, Coelho (1999) states that there are

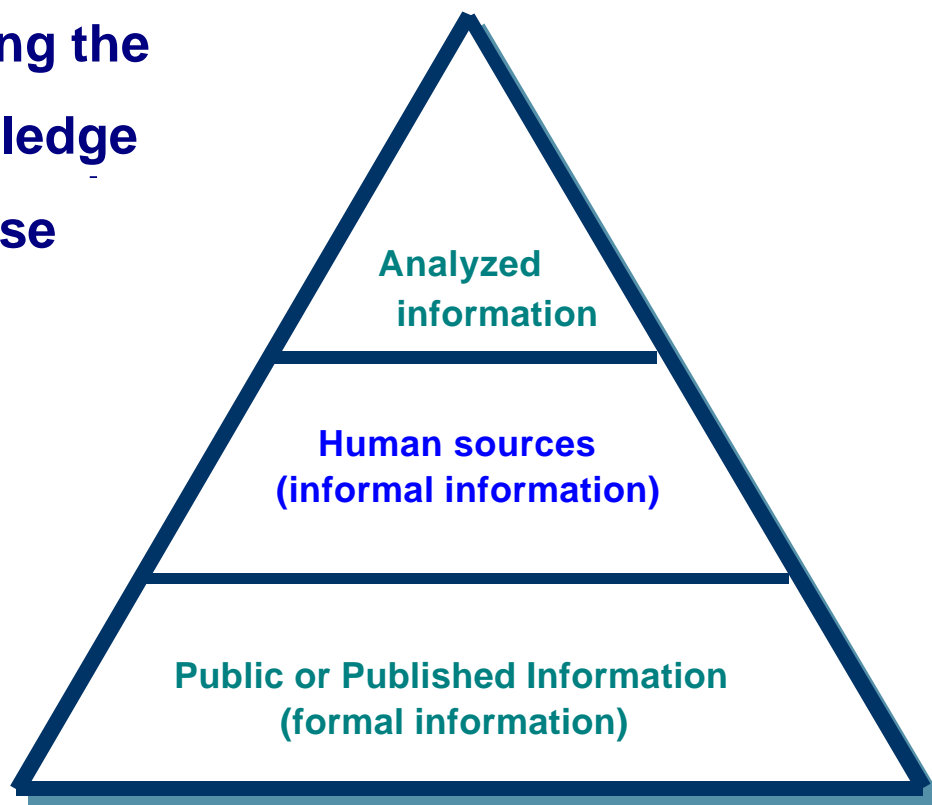
divergences between definitions adopted by Information Science and by the majority of theories in the area of CI. For the last, as general rule, primary information is informal and their publications are considered secondary. While Information Science considers primary information as those that come from original sources, without being tampered by third party in any verbal, print or electronic forms.

This last definition is also adopted in this monography.

The knowledge base of the organization is built, according to Coelho (1999), on formal published and public information and aided by informal human sources. This analyzed information, or Intelligence, is at the top of the system. See Figure 3.

*Figure 3: Graphical representation of CI sources (apud Coelho, 1999)*

## **Building the knowledge base**



### **3. Analysis and Validation of Information**

At this phase, information collected at the previous stage, many without any apparent connection between them, are analyzed by the network of specialists in the field, with the hope of verifying its consistency, establish relationships and evaluate its impact on the organization. They are then transformed into Intelligence. This is a critical phase for the system and CI.

There are various techniques and methods for CI analysis. A research between the Society of Competitive Intelligence Professionals - SCIP associates (Jaworski



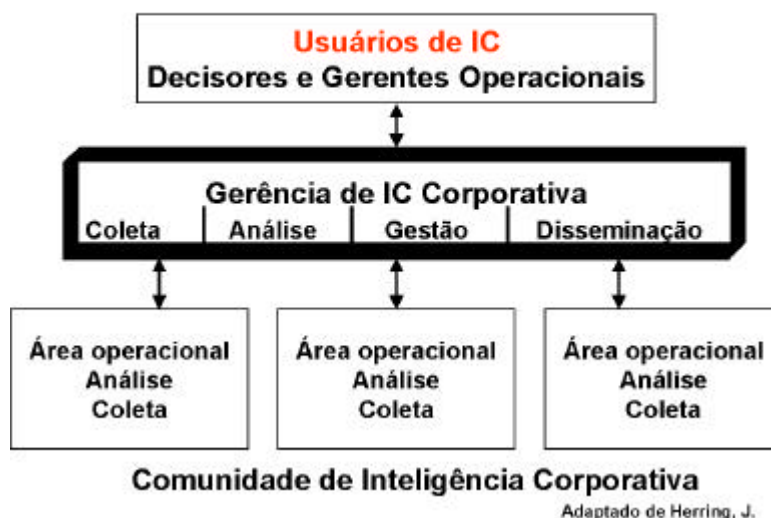
and Wee, 1998), indicated that the SWOT Matrix (Strength, Weakness, Opportunity and Threats) as an efficient method of CI. Other methods are competitor's profile, financial analysis, win-lose analysis, war games, scenarios and simulated environment.

Besides the methods mentioned by the SCIP associates research, Fuld (1995) quoted Porter's strength analysis, that is: benchmarking, cost analysis, statistics, patents, critical factors of success, trends, industry structure, dynamic competitiveness and intelligence mapping.

## 4. Dissemination and Utilization

One of the basic concepts in CI is the concept of networks. Coelho (1999) cited 2 types of networks: human and electronic. Human network is integrated by the players of the systems - decision-makers, CI manager and observers/specialists. This model of organizational network is described in Figure 4:

Figure 4: A model of CIS

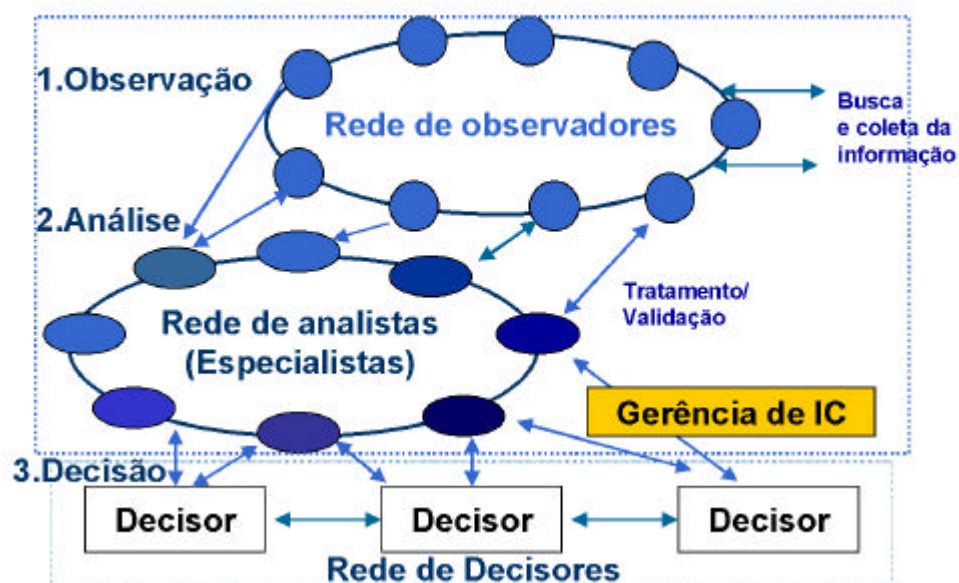


Jakobiak (1991) states that these networks, in reality, are really “assessors” which are already efficiently, aggregating value to information in the company, “even before the facilities brought on by technology”. According to his model, the human network depends on 3 different groups of participants:

- the Observers, who collect and store data;
- the Specialists (or Analysts) who validate and analyze information;
- the Decision-Maker, who uses intelligence.

Coelho (1999) adds to the model (see Figure 5), the CI manager, responsible for the coordination of these activities in the Organization.

Figure 5: The importance of the CI Networks



Stollenwerk (1999) indicates that the CIS must be conceived “in multidisciplinary networks that are non hierarchic and are organized by the Critical Factors of Success”. It provides more details on each protagonist’s role in the CI system. The Manager and/or the Coordinator of CI, which responds

by planning and managing, coordinates the implementation program at the macro level, acts as a facilitator of the process through meetings and the introduction of concepts, methods, tools and formatting of the CI products. It acts as an integrator of networks, working for its productivity and agility and represents the link between decision-makers, providers and network analysts.

The Observers act as:

receivers of trends and changes, executing the permanent monitoring of the internal and external environment. They can be linked to one or more CFS, depending on their abilities and competencies and feed the Network with information to be analyzed and validated by the Analysts.

The Analysts, according to Stollenwerk (1999):

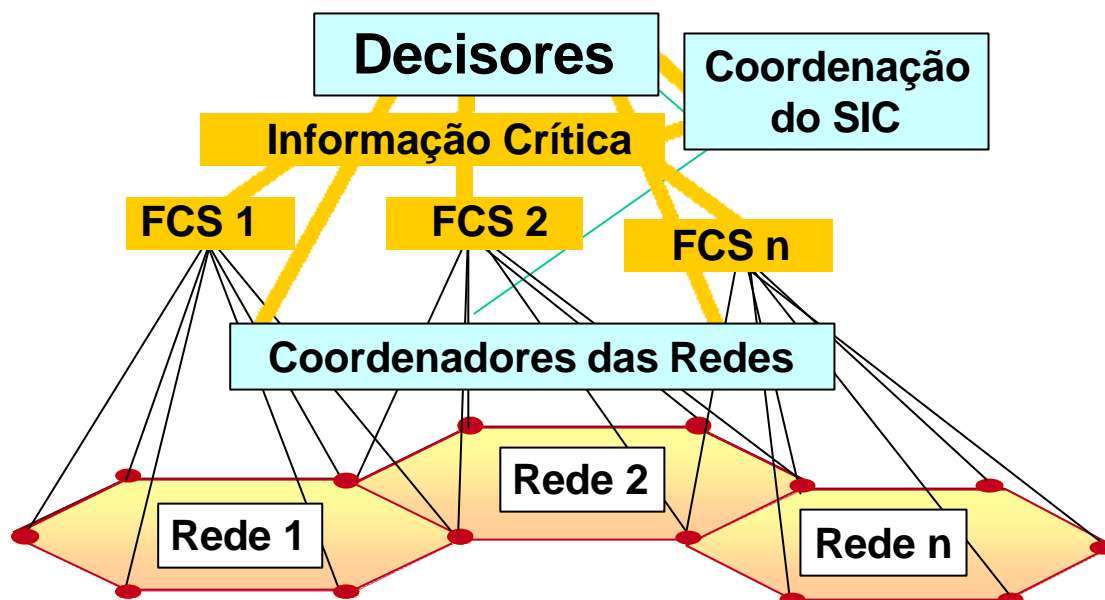
are people of known technical competency associated with the Critical Factor of Success, permanently accompanying the internal and external environment, centered in the CFS. They have the capacity to evaluate the impact of changes in the environment in competitive strategies and articulate with the external, technical and management environment of the Organization.

The Decision-makers are:

the sponsors and the main users of the CI system. They use critical information in decision-making processes focusing on the organization’s process of Strategic Planning, providing feedback to the coordination of the CIS and for the coordinators of each CI network (Stollenwerk 1999).

As proposed by Stollenwerk (1997), these personalities interact according to the figure below:

Figure 6: The construction of CIS by Critical Factors of Success



Fonte: Stollenwerk, 1997

As for electronic networking, Coelho (1999) acknowledges the importance of Information Technology “to facilitate the internal and external communication and for Knowledge Management in the organization”. She states that Information Technology may facilitate, for example, the communication between the CI network, develop feedback mechanisms with the clients, provide access to stored intelligence, support information activities and analysis, distribute CI products in the company and help create an organization that is “plugged” into Information Technology. Caution must be taken, nevertheless, in that this is not overestimated overlooking what is most important - the content and adaptation of information and the quality of the analysis”.

a) Kahaner (1996) suggested some criteria for the organization and dissemination of data in the CI network:

b) Anybody should easily feed data into the system;

- c) Anybody should easily recover data from the system;
- d) The system must be able to store all the media used (texts, figures and graphics);
- e) The support system must have the capacity to grow at the same rate and dimension as the intelligence system;
- f) Data must be categorized according to their reliability;
- g) The system must facilitate the communication based on local data, encouraging the collaborators to share their data and use the central support system frequently;
- h) Archives must be organized according to how people use the information, such as company, technology and other classification. Data should be divided in small groups and subgroups so as to facilitate accessibility to users;
- i) The support system must be protected against access by non-authorized users.

Information must be shared so that the system functions and is accessible to whoever needs it. Everyone is encouraged to contribute information, thus they too have the access to the information. Restricted access to certain private data is maintained.

Jakobiak (1992) and Tyson (1998), as adapted by Stollenwerk (1999), described some of the CI products:

- a) Special CI Reports; contained within 1 or 2 pages and deals with the question of strategy, summarizing the decision support analysis and including recommendations for action;
- b) Situational analysis; synthesizes strategic aspects of a precise situation including detailed analysis which supports specific CI reports;
- c) Monthly CI reports; deals with strategic items and news related to them. Also a topic summary of articles and notes on interviews for the decision-makers;

- d) Strategic Impact records, similar to monthly bulletin news but with an indication of strategic impact signals or tactics;
- e) Competitors profile: Carry general information about the competitors and are permanently up-dated;
- f) Monthly News and Bulletin - contains strategic and tactic information from internal and external resources.

Finally, Stollenwerk (1999) proposes a framework for the development of CIS projects:

- a) Objectives and scope (strategic question areas to be monitored and expected)
- b) Selection of information resources
- c) Selection of methods and tools
- d) Organizational Model (centralized versus decentralized, forming networks of external specialists and consultants by Critical Factor of Success, networks of decision-makers, providers, analysts and coordinator, definition of the roles, responsibilities and safe channels for dissemination of information);
- e) Definition of the infrastructure needs (equipment, access to external sources, installation of the Information network);
- f) Definition of strategy and plan for implementation (“learning by doing” versus CI auditing, parallel processes for each information type (formal and informal), mechanisms of internal and external articulation and integration of the CIS to other systems of strategic information existing or in implantation at the company);
- g) Budget proposal and allocation of Human Resources
- h) Proposal of management and process evaluation systems

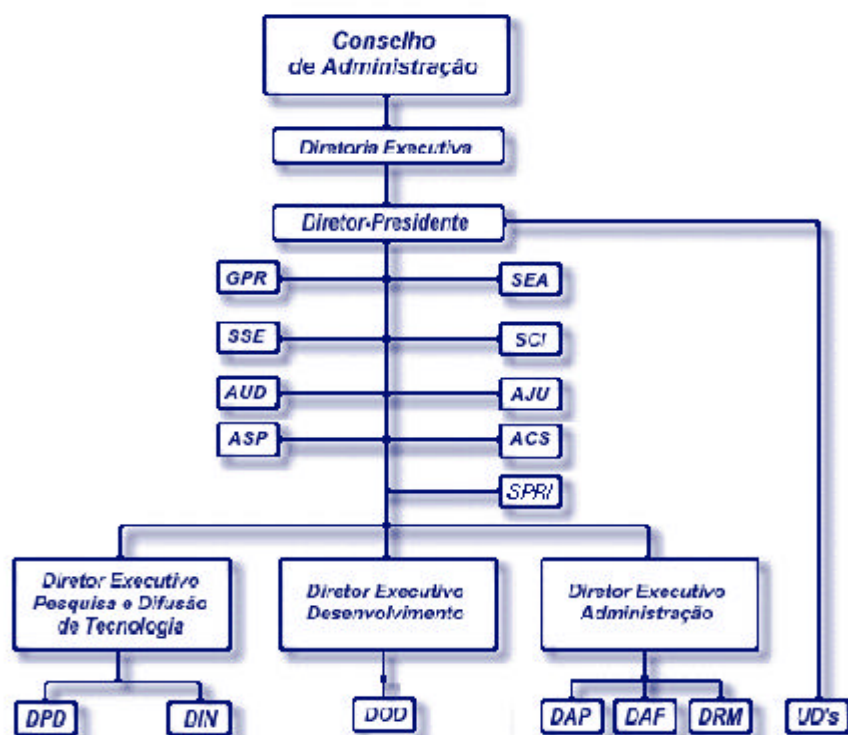
In the creation of a pilot Competitive Intelligence System for Embrapa’s Communication (CISEC), the needs of a research and development company must be adapted to these instruments.

## **Embrapa in Brazil and Overseas**

The Brazilian Agricultural Research Corporation (Embrapa), an agency of the Ministry of Agriculture and Food Supply of Brazil, was created on April 26, 1973. Its mission is to create solutions for the sustainable development of the Brazilian agribusiness by means of the generation, adaptation and transfer of knowledge and technologies, in benefit of the society. It has generated and recommended thousands of technologies for the modernization of the Brazilian agricultural and agro-industry, reducing production costs, increasing the food supply and, at the same time, preserving the environment.

It consists of 37 Centers of Research, 3 Services and 15 Central Units, distributed throughout almost all the States of the Federation, under the most different ecological conditions. As a result of massive investment in the training of human resources, it has become one of the world's main agricultural research institutions in the Tropics. Today, its 8.660 employees include 2.063 researchers; 52% of which holds a Masters degree and 43% are doctorates. The Company operates under a total budget of US\$ 280 million annually. See its organization chart:

Figure 7: Embrapa's Organization Chart



- Administrative Council
- Director-presidente
- Executive-director of Research and Technology Transfer
- Executive -director of Development
- Executive -director of Administration
- GPR - Director-President's Office
- SEA - Secretariat for Strategic Management
- SSE - Secretariat for State Agricultural Research Systems
- SCI - Secretariat for International Cooperation
- SPRI - Secretariat for Intellectual Property
- ACS - Public Relations Office
- ASP - Congress Relations Office
- AJU - Legal Advisory Office
- AUD - Internal Auditing Office
- DAP - Personnel Administration Department
- DIN - Information Technology Department
- DOD - Organization and Development Department
- DAF - Financial Administration Department
- DPD - Research & Development Department
- DRM - General Services Department
- UDs - Decentralized Units
- UCs - Central Units



Embrapa is led by an Administrative Council implemented at the end of 1997 with the crucial function of channeling the visions of the society with relationship to its institutional role, helping the company to define its macro-policies and to negotiate the means to implement it. The structure of the Council is quite simple and agile; it consists of a President, Márcio Fortes de Almeida, the General-secretary of the Ministry of Agriculture and Food Supply, a Vice-president, the Director-president of Embrapa, Alberto Duque Portugal, and 4 titular members (Orlando Boni, Dietrich Gerhard Quast, José Honório Accarini, Urbano Campos Ribeiral). The Executive Directorship is integrated with the Director-president and 3 Executive Directors (José Roberto Rodrigues Peres, Dante Scolari and Elza Angela Battaggia Brito da Cunha).

Embrapa coordinates the National System of Agricultural Research - SNPA, constituting of federal, state and municipal public and privately owned institutions. See below how this system is distributed throughout Brazil:

*Figure 8: Distribution of Embrapa and SNPA Units in Brazil*



In the area of international cooperation, Embrapa has established 275 agreements for technical cooperation with 56 countries and 155 international research institutions. In 1997, Embrapa installed, with the support of the World Bank, a virtual laboratory for the research development in state-of-the-art technology in the United States. That unit depends on the physical bases of the Department of Agriculture of United States, in Washington, permitting the researchers accessibility to state-of-the-art technology in areas such as natural resources, biotechnology, computer science and agriculture of precision.

The Company's performance, starting from a strategic vision of Research & Development in the context of the agribusiness, generates results that help to increase the productivity in the field, reduce costs, modernize the production systems and improve the quality of life.

## RESEARCH PROGRAMS

Embrapa has adopted the so-called Embrapa Planning System (SEP) since 1994. The Company considers Research and Development (R&D), as a process that involves the generation of knowledge and technologies and its transformations into products, processes and services, characterized as innovations or inventions that are directly incorporated to the productive process.

This option results from the adoption of a model centered around the demands of clients, users and beneficiaries of research and oriented to meet the needs of the market, which are identified and characterized as problems limiting the development of the agro industry.

Another of SEP's principle refers to the focus on systems, striving for an extended vision of the research problem, expressed in the incentives and multidisciplinary

projects, teamwork, optimization in the use of resources and inter-institucional partnership.

At present, SEP has 19 programs which covers the research as well as development, support and institutional development activities. They are:

**Program 1 - Appraisal, Management and Reclamation of Natural Resources**

**Program 2 - Conservation and Use of Genetic Resources**

**Program 3 - Development of Basic Research in Biotechnology**

**Program 4 - Grain Production Systems**

**Program 5 - Vegetable Production Systems**

**Program 6 - Animal Production Systems**

**Program 7 - Raw Material Production Systems**

**Program 8 - Forestry and Agroforestry Production Systems**

**Program 9 - Family Farming Production Systems**

**Program 10 - Harvesting, Postharvest, Transformation and Preserving of Farm Products**

**Program 11 - Environmental Quality Protection and Appraisal**

**Program 12 - Agricultural Automation**

**Program 13 - Rural and Regional Development Support Programs**

**Program 14 - Information Production and Exchange to Support R&D Activities**

**Program 15 - Institutional Modernization of State Agricultural Research Systems**

### **Program 16 - Institutional Management and Development**

### **Program 17 - Fruit Production Systems**

### **Program 18 - Technology Transfer**

### **Program 19 - Systems of Coffee Production**

## **TECHNOLOGIES FOR BRAZILIAN AGRIBUSINESS**

In the last 2 decades, the Brazilian agricultural production grew at a rate 3 times greater than the populational growth and production rose from 35 million tons of grains to more than 80 million tons, without the need to increase the cultivated area.

That period coincides with the existence of Embrapa. She had a decisive contribution to the impressive results of the agricultural, forestal and agro-industrial sectors and continues to invest in the best knowledge of the productive potential of the several ecosystems, improving techniques of sustainable production and developing technologies that tends to the needs of the whole agro-industry segment which comprises of 27 million people and represents 40% of the gross domestic product of Brazil (US\$ 802.9 billion).

Technologies generated by Embrapa, many in partnership with state companies of research, universities, private companies and foundations, transformed the Brazilian agriculture scenario. Some of the most prominent, according to the company's Public Relations Office (Embrapa, 2000) are:

- Meat supply in the national market multiplied by 4,5 times. The production of milk increased from 7,9 million to 20,3 million liters.
- The group of technologies that enabled the incorporation of the Cerrados into the national productive system, making the region accountable for 40% of the country's total grain production. What before was considered

“unproductive” land became one of the largest agricultural frontiers in the world.

- Biological control techniques allowed for the biological control of dozens of pests. The wheat tick, for example, was terminated and brought under control. In the case of wheat alone, the use of wasps reduced the application of insecticides by 95% and decreased the production costs significantly. The control of the soybean caterpillar alone cuts back cost in the order of 1,2 million liters of chemical insecticides. It is the largest program of environmental control in the world using only a single agent of biological control.
- Its technologies permitted the introduction of fruits in the semi-arid region. Fruit production rose from 11,5 million tons in 1973 to more than 35 million today.
- Soybean was adapted to the Brazilian conditions which has placed the Country as the second world producer of Soybean today.

Embrapa's Annual Social Balance (Embrapa, 2000) indicates that

in 1999, the Company and its partners from the National System of Agricultural Research (SNPA), introduced 64 new cultivars for rice, bean, cotton, corn, sorghum, soybean, wheat, grape, barley, jambu, cassava, banana, oat, potato, alfalfa and eucalyptus. Amongst which the Rio Grande irrigated rice, the most prominent for the wetlands of Minas Gerais, developed in partnership with the Minas Gerais Agricultural Research Company (Epamig); the BRS 4150 corn variety, especially created for the small producers in the southern region, the BRS 180 barley cultivar for brewing, for the irrigated production system of the Cerrados. The BRS Rúbea grape cultivar for juice making was also introduced. The new BRS Bonança rice cultivar, indicated for highlands of the mid-northern region, yields a production 15% above the Caiapó cultivar.

Embrapa considers the diverse media for the transfer of its research as top priority, because it believes that technology is pointless if it does not meet and serves its final destination - its potential users. The Embrapa Guide (Embrapa 1999) lists some of the results:

- In the last 5 years, it launched 3.360 new products, processes and technologies, tested by customers and users;

- In the last 5 years, it published 8.940 technical-scientific articles;
- In the same period, the Company published 8.300 technical and informative material;
- Embrapa, trained an average of 41 thousand technicians and producers a year, between 1994 and 1998;
- In the last 5 years, the Company received 515,000 visits and technical consultations, provided 36 thousand hours of courses, provided 1,100,000 laboratorial analyses for the production sector, promoted 2.852 days of field work and 19 thousand lectures, created 8.796 demonstrative units and edited 833 technical video-tapes.

The social profit registered in 1999 by Embrapa (Embrapa, 2000) was R\$ 6,4 billion, equivalent to 9,64 times its liquid operational revenue and 18,65 times its gross payroll. The technology of biological fixation of atmospheric nitrogen by diazotrophic bacterias in soybean, introduced by Embrapa, cuts back costs to some R\$1,41 billion, in one year. Its cultivars and those of its partners are present in 39,3% of the cultivated area, generating a liquid gain of R\$ 2,42 billion for the Country.

## STRATEGIC ADMINISTRATION: EMBRAPA'S THIRD DIRECTOR PLAN (PDE)

The company started the revision of its strategic projects in 1995, with the hope of providing a structure and consistency to its managerial model. In 1997, it defined its Global Politics of Administration, composing of: Research and Development, Technological Businesses and Entrepreneurial Communication.

Its Third Director Plan (PDE) deals with the reorientation of its actions to overcome new challenges presented by changes happening in the world: globalization and openings of markets; the importance of the environment; reforms at the State level; consumer's empowerment and the technological revolution.

## **Agribusiness in the Future**

The III PDE believes in a promising future for the Brazilian agro-industry. This is based in the increase in internal income of the population and the external demand, mainly in the case of China, and in the progressive retreat of subsidies, on the part of developed countries.

For the future, Embrapa believes in a Brazilian agribusiness that is:

- competitive, with a marked quality and productivity, technologically advanced, demanding technical-managerial information, promoter of employment and source of income;
- promoter of mobility among types of farmers, notably that of subsistence and of transition, migrating towards commercial agriculture;
- conscious of the potential demands of the 3 types of agricultural activities: subsistence, transition and market;
- has a growing sense of environmental conscience, committed to the natural resources, biodiversity and quality of life;
- dynamic and present in intra and intersectorial relationships of productive chains, with regionalized and diversified productions, strict observance of sustainability precepts; and
- attentive to the opportunities of strategic businesses.

## **Vision**

The strategic vision projected by the Company is to be a point of reference in Brazil and overseas, recognized for:

- excellence of its technical-scientific contribution;
- capacity to catalyze and make possible partnerships and new business of technological base;

- capacity to offer appropriate and opportune solutions for the market and for the society;
- simple and agile structure, concentrated on its objectives.

## **Objectives**

The Company's administration has as objectives, in order to execute its mission of providing possible solutions, by means of the generation, adaptation and transfer of knowledge and technologies, in benefit of the society such as:

### **Global Objective 1**

To provide technological solutions for the development of a competitive agro-industry in a global economy.

### **Global Objective 2**

To provide technological solutions for the agribusiness that promotes the sustentability of the economic activities alongside environmental equilibrium.

### **Global Objective 3**

To make possible technological solutions that contribute to cut back social imbalances.

### **Global Objective 4**

To provide technological solutions for the supply of raw materials and food that promotes health and the improvement of nutritional level and live quality of the population.



# **Conception of a Pilot System of Competitive Intelligence in Embrapa**

## **THE MGE AND THE STRATEGIC OBJECTIVES OF ACS**

Embrapa's Strategic Management Model - Corporate MGE, is the instrument that allows the Administrative Council and the Executive Directorship to accompany, in operational terms, the implantation of the III PDE (1999-2003).

MGE uses the Balanced Scorecard Methodology in looking for the alignment of objectives and goals with the improvement strategy in the general performance of the Company. It is an instrument that allows the Executive Directorship to focalize on the essential competencies and in the more important strategic objectives for which the Company should give attention and resources, in creating the bases of strategic management.

The process of the formulation of the MGE depended on the participation of a group of technicians from several decentralized units. Initially, an executive team was formed, with the unrestricted support of the Executive Directorship and the Administrative Council. This group was entrusted with the formulation and implantation of the Model. It was also given the task of sharing the process with the functional technicians at the time of implantation in each Unit. This will help link institutional goals to individual goals, creating, as such, understanding and sharing, and integrating the existent managerial mechanisms.

## **Strategic objectives**

The Company defined 19 Strategic Objectives (SO). We will look closely at 2 SO managed by the Public Relations Office (ACS) which is the object of this study.

### **Strategic Objective 2:**

To improve the image of institutional excellence, with emphasis in Research and Development (R&D)

This will see to the:

Planning, organizing, executing and generating actions that will interfere in the way individuals or groups of individuals see the Institution, which will transform and consolidate this external perception positively.

The improvement of this image of institutional excellence in R&D depends, essentially, on the competitiveness of products and services of the Company and the progress in processes of technological negotiation and entrepreneurial communication. Additionally, other attributes also have an impact on the image: excellence in administration, excellence in customer relationship, exercise of its social responsibility, an effective communication with the markets and society. All of the above attributes should project the recognition of the Company's unique identity by its favored publics.

This objective contemplates activities related with the Embrapa trademark, in the positioning of the Company before public opinion, and its reputation and institutional image and with its products and services.

Performance Indicators:

- Embrapa's image index;
- Embrapa's comparative performance index in the Press.

### **Strategic Objective 13:**

To improve internal communication

Its purpose is

to improve formal and informal internal communication, providing important and timely information to the Institution and its employees, in a comprehensible way, through the appropriate vehicles (press and other media). The internal communication should be understood as a multiple process involving leaders and employees in its search for excellent performance.

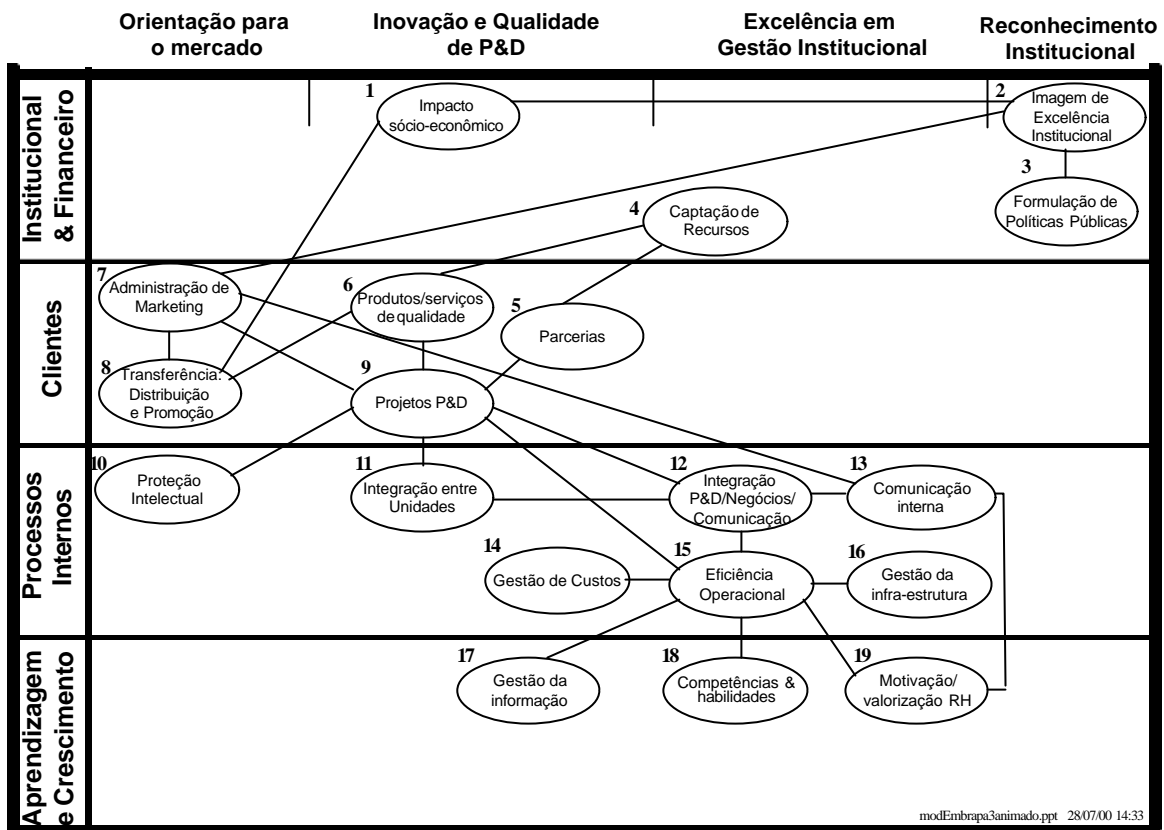
Performance Indicators:

- The index of the internal understanding of the paths and the business of Embrapa/Units;
- The index of employees' satisfaction with internal communication mechanisms.

## **Hierarchization of CFS**

The 19 strategic objectives of Embrapa, are nested and distributed in a 4 by 4 matrix, having on the horizontal plane the permanent perspectives; institutional and financial, customers, internal processes, learning and growth. On the vertical plane, the thematic areas, such as market orientation, innovation and quality in R&D, excellence in institutional administration and institutional recognition. The matrix of the Strategic Objectives results in the following picture.

Figure 9: Matrix of Embrapa's Strategic Objectives



## FRAMEWORK FOR THE CONSTRUCTION OF A PILOT CIS

According to Herring's (1997) CIS creation cycle and Stollenwerk's (1999) construction framework, we may define the pilot Competitive Intelligence System for Embrapa's Communication (CISEC):

Due to its strong and active strategic planning system, Embrapa is ready to begin implementing and developing a CI network. The company has begun a self-evaluation of its administration based on the QPAP criteria, which include solid intelligence component on its clients and the external environment. Its CI communication network aims to meet this institutional demand, proportioning the managers and decision-makers subsidies to monitor, evaluate and improve the process in question.

The initiative also attends to the Critical Factors of Success for the CIS described by Stollenwerk (1997):

**Critical Mass and Domain of tools**; is based on the specific training of the ACS technical body and the search for competency in planning, managing, analyzing and dissemination of information and of treated information - Intelligence.

It strived for a **strong internal articulation**, to “**sell**” the project and above all, the **commitment and the desire of the decision-makers**. The initial action was presented to 2 Executive Directors, for acknowledgement. Next, to the MGE team and to the strategic objective manager of Information Science and Technology and Administrative Systems. With the support of the last, the construction of a **pilot project** began in the area of communication, contemplating yet another CFS; **to begin from a simple structure**.

The players of the Competitive Intelligence System for Embrapa's Communication are well defined as: the Executive Directorship, the Heads of Central and Decentralized Units, the Managers of Strategic Objectives, of the Research and Development Programs and the Administrative Managers. The Network of Analysts and Specialists, as well as the observers' web are composed of technicians from the Public Relations Office and of the Central and Decentralized Units.

The first of the 2 Strategic Objectives administrated by the Public Relations Office (ACS), “Promote the Image of Institutional Excellency, with Emphasis in Research and Development (R&D)”, is characterized by its orientation for the external environment. The second, to “Improve the Internal Communication”, is guided basically to the internal environment.

The CI pilot project will be created to aid the Strategic Objective (SO) Nº. 13, to “Improve the Internal Communication”.

## **a) Objectives and Scope of the CIS**

### **1.1. Main objective:**

To improve formal and informal internal communication.

#### **1.1.2. Specific objectives:**

- to create conditions for dissemination of institutional information to the employees;
- to establish a channel for the exchange of experiences, information and suggestions;
- to develop appropriate vehicles - printed and oral - in proper time;
- to involve the leaders and their following;
- to supply tactical and strategic information for the decision processes;
- to facilitate good results of the institution as a whole.

### **1.2. Scope:**

CFS and the strategic questions associated to the CFS: The scope of the system embraces the Strategic Objective 13. To improve the internal communication: Its performance indicators (i.e. Needs of Information, in CI jargon) are: a) internal understanding index on the directions and the business of Embrapa and/or its Units; and, b) index of the employees' satisfaction with the internal communication instruments.

The Annual Plan of Work (PAT) of ACS foresees the following activities directly related to the SO 13:

1. To develop and improve the internal corporate communication mechanisms

1.1. To reformulate the media of corporate internal communication

1.1.1. To create and validate Embrapa's Manual of Style and Usage

1.2. To create new internal communication vehicles to enhance the agility and coverage of information

1.2.1. To support the creation of Human Resources (HR) information system.

1.3. To administrate and to produce internal vehicles of communication

1.3.1. Announcements in the sound system

1.3.2. Videoconferences of the Executive Board of Directors

1.3.3. Intranet

1.3.4. Bulletin "Folha da Embrapa"

1.3.5. Informative "Linha Direta" (Direct Line)

1.3.6. President's letter

1.3.7. Mural newspaper "Acontece"

1.3.8. Mail List of communication

1.3.9. Informative "Extra"

2. To reinforce the Administration - Employee communication

2.1. To reinforce the communication of the heads and managers with their teams

2.1.1. Internal communication Kit - Handbook and Video - others products

2.1.2. Informative “Direct line with the Team”

2.2. To reinforce the Director-President’s communication with the employees

2.2.1. Interaction program with the President on the Internet

3. To develop and to install internal communication processes to support the actions of organizational change

3.1. To plan and to execute campaigns for using better the administrative instruments of Embrapa

3.1.1. SAAD Campaign

3.1.2. Actions of internalization of the Third Director Plan of Embrapa (III PDE)

3.1.3. To disseminate the actions of Embrapa’s Ombudsman

3.1.4. Bulletin of Cost Rationalization

4. To increase the internal competence in communication

4.1. Meeting of Embrapa Communication Managers

4.2. Report on the Managers’ Meeting

4.3. To develop actions for improvement of Embrapa’s relations with its clients/citizens

4.3.1. Evaluation goals of Central and Decentralized Units (UCs and UD’s)

4.3.2. Performance of the Units in the customer/citizen relationship

4.3.3. Quality auditing in the customer/citizen relationship

4.3.4. Improvement of processes of the customer/citizen relationship service.



The several internal and external public targets in the PAT activity will be the subject of quantitative and qualitative opinion research, focus groups and field observations for evaluation of their satisfaction and understanding of the objectives and the main businesses of the Company. These indexes will be compared with the indicators of actions of the Annual Plan of Work (PAT) and the goals negotiated with the Executive Board of Directors for the Public Relations Office (ACS).

### 1.3. CIS Products

Indexes were also defined and developed to monitor performance:

#### **1. Satisfaction Index with the Mechanisms of Internal Communication (SIMIC)**

Satisfaction with 3 internal communication media - to choose - in the Headquarters and in the Decentralized Units:

Example:

At the Headquarters: Mural Newspaper (JM - PAT item 1.3.7.), Newspaper Folha da Embrapa (FE - PAT item 1.3.4.), Informative Linha Direta (Direct Line) (LD - PAT item 1.3.5.)

Methodology: Opinion research accomplished with the employees (instrument will be repeated in the Headquarters and in the UD's). Each research generates a satisfaction grade (IS) from 1 to 10.

Formula:  $(IS\ JM + IS\ FE + IS\ LD)/3 = SIMIC$

Unit of Measure: Numeral. Grade from 1 to 10.

The Satisfaction Index with the Mechanisms of Internal Communication (SIMIC) is calculated by the following formula:  $SIMIC\ Embrapa = (SIMIC\ Headquarters + SIMIC\ UD1 + \dots + SIMIC\ UD40)/41$

Unit of Measure: Numeral. Grade from 1 to 10.

## **2. Understanding Index of the Objectives and the Main Businesses of the Company/Unit (UIOMBC)**

Knowledge and Satisfaction with actions of reinforcement of the leaders' communication with the employees, in the Headquarters and in the Decentralized Units.

Example:

At the Headquarters and in UD's: Interaction program with the President (PAT item 2.1.1.)

Methodology: Opinion research with employees' sample (the instrument will be repeated in the Headquarters and in UD's). Each research generates a grade (IS) from 1 to 10.

Formula: IS interaction Program with the President = (IS Headquarters + IS UD1 +...+ IS UD40)/41

Unit of Measure: Numeral. Grade from 1 to 10.

It measures the Satisfaction with institutional actions and campaigns - instruments of Embrapa's administration

Example:

SAAD Campaign (PAT item 3.1.1.), actions of internalization of the III PDE (PAT item 3.1.2.),

Methodology: Opinion research with a significant sample of employees (the instrument will be repeated in the Headquarters and in UD's). Each research generates a grade (IS) from 1 to 10.

Formula: IS institutional actions and campaigns = [IS SAAD Campaign = (IS Headquarters + IS UD1 +...+ IS UD40)/41] + [IS Campaigns and actions of internalization of the III PDE = (IS Headquarters + IS UD1 +...+ IS UD40)/41] /2

Unit of Measure: Numeral. Grade from 1 to 10.

The Understanding Index of the Objectives and the Main Businesses of the Company/Unit (UIOMBC) of Embrapa/Unit is calculated by the following formula:

$$UIOMBC = [(IS \text{ interaction Program with the President}) + (IS \text{ institutional actions and campaigns})] / 2$$

Unit of Measure: Numeral. Grade from 1 to 10.

These indexes will be worked in 2 ways:

1) Monthly and bimonthly reports of the evolution of the indicators and of the execution of the goals of the Unit, directed for the Higher Administration and the managers of the program;

2) Strategic Impact archives indicating signs of change or reinforcement of tendencies, destined to the managers of the program to provide for the improvement of the processes.

#### **b) Selection of sources of information**

In the stage of Collection, Processing and Storage, sources will be of 2 orders; the PAT indicators, opinion research and organizational climate research. The information will be consolidated in a Lotus Notes database of internal customers.

#### **c) Selection of methods and tools**

In the next stage, Analysis, Validation and Formatting of the Products, opinion poll will be treated and processed in a statistical software - SAS - the chosen method will be the statistical analysis of quantitative and qualitative research of opinion, focus groups and field observations. The research will be trimonthly, generating 4 indicators of the evolution of the internal customers' opinion in a year. Each index will be calculated in a way that, at least, every 2 months, an item is being evaluated. The reports of their evolution will be compared to the execution of the goals of the Unit and directed to the Executive Directorship and the managers of the program.

#### **d) Organization Model of the CIS**

The main model will be decentralized, with the generation of instruments in ACS, its application in all the 40 Decentralized Units and, initially, the central processing of the answers. In a second stage, with the normalization of the application process and of the analysis of questionnaires, this methodology can be transferred to the decentralized units that manifest interest in the training. They can then conduct more refined analyses and researches, centered on their own businesses.

In the stage of Dissemination and Use of Strategic Information, all these data and results will be integrated into a unique database, the internal customers' data, that will be the foundation of the construction of the specialists' web in customer's research. This network will be installed in a Lotus Notes database in Embrapa's Intranet and will work cooperatively for the dissemination of information of interest and the technological novelties in the area.

#### **e) Definition of infrastructure needs**

Practically the entire infrastructure necessary for the assembly and operation of the CIS - software (Lotus Notes, SAS), Intranet, microcomputers - is already available. Based on the Balanced Score Card (BSC) methodology, a System of Executive Information (WebMGE), for support and accompaniment of the Strategic Administration of the Company is also being developed. WebMGE will be the ideal vehicle for the information generated by the Competitive Intelligence System.

#### **f) Definition of the strategy and the implementation plan**

The enforcement strategy will be based on "learning by doing", articulated with the managers of the Strategic Objectives, with the managers of the MGE, with the heads of Central and Decentralized Units and with the Executive Directorship. The objective is the progressive extension of the networks of CI for all the 19 SO of

Embrapa and, later on, for another priority areas of the Company, such as Technological Monitoring.

#### **g) Budget proposal and allocation of human resources**

It may be considered that, at least, 7 technicians will be involved initially with the construction of the CISEC, in the Embrapa Headquarters - the managers of SO 17, Antenor Turazi, 13, Marita Cardillo, and 2, Cristina Timponi, the coordinator of Communication Policies, Wilson Costa Júnior, ACS technician, Rosa Maria Ribeiro, and the author of the project, Roberto Penteado. The informal cooperative net of CI, integrating all the 40 Decentralized Units of Embrapa could include up to 120 professionals. The formal net, that will furnish the higher administration of the Company include about 60 participants, at least (40 Heads of the Decentralized Units, 15 heads of Central Units and the 4 members of the Executive Directorship).

The chronogram of work foresees the presentation of a project for Program 14, "Exchange and production of information in support of the research actions and development", from Embrapa Planning System (SEP), on the construction of the Pilot Network of CI in ACS, in September 2001, its development and testing until November 2003. The budget for the initiative is of the order of R\$ 45.000,00. This is shown next, in tables IV and V.

*Table IV: Project Chronogram*

<b>Date</b>	<b>Activity</b>
September 2001	Elaboration/Approval Subproject in System Embrapa of Planning (SIGER)
October 2001/November 2002	Development of Pilot Project
December 2002/November 2003	Tests and Development
December 2003/September 2004	Formatting and Thesis Defense

Table V: Project budget

Item	Ressources
Inscription at (3) University of Toulon et du Var	R\$ 4.200,00
4 air tickets two-ways to France (Toulon/Marseilles)	R\$ 8.890,00
4 participations in international congresses	R\$ 8.900,00
3 participations in national congresses	R\$ 8.400,00
Acquisition of books	R\$ 8.500,00
Acquisição of demonstraive software	R\$ 6.500,00
<b>Total</b>	<b>R\$ 45.390,00</b>

#### **h) Proposal of management systems and of process evaluation**

The process will be administered in a participative way, making massive use of Information Technology. The Internet and the Lotus Notes technology will be used, to host the Customer's database, as well as, the reports and the produced impact sheets. The database could be analyzed in many ways: in a corporate way - the consolidated satisfaction data of the entire organization - or in an individualized way, by theme and/or by Decentralized Unit. These indicators will allow a dynamic follow up and contribute to a better mutual knowledge between the Company and its customers.

## Conclusion

This exploratory work on the creation and the application of competitive intelligence systems in an organization of research and development indicates that Embrapa is ready to initiate the construction of networks of managerial Competitive Intelligence. It already has a Model of Strategic Administration (MGE) where 19 Critical Factors of Success are described (Strategic Objectives) and their respective Information Needs (Performance Indicators).

In this way, Competitive Intelligence fits very well into the initiatives for the improvement of the administration of Embrapa, thus increasing the quality of the decisions, allowing for quick response and lesser duplication of efforts. Managerial mechanisms already exist such as the Embrapa System of Planning (SEP), System of Evaluation of Units (SAU), Annual Plan of Work (PAT) and the System of Planning, Accompaniment and Evaluation of Results of the Individual Work (SAAD), to which intelligence will enjoin. On the other hand, Strategic Objectives are also being defined in the MGE, considered as Critical Factors of Success, measured by Indicators of Action that, in the CI jargon, become the Information Needs.

The Competitive Intelligence System for Embrapa's Communication (CISEC) also supports the critical factors of success for CI summarized by Stollenwerk (1999): critical mass and domain of the tools, has as a base the specific training of ACS technicians and its strive for competency in planning, administration, analysis and

dissemination of information and processed information; i.e. intelligence. The Company is also developing and already maintains support systems using Internet and integration technologies.

A strong articulation was required to “sell” the project and, above all, for the commitment and the desires of the Decision-makers. The study also points to the inevitability in the use of this instrument in a globalized and competitive world. Embrapa is prepared and the evolution of its strategic planning indicates that this is the proper moment to begin systematic investments in the development of such systems. If the Company does not yet make use of this type of systematic analysis of its macro-atmosphere, some of its competitors, like Monsanto, DuPont and Ciba-Geigy, among others, are practising it and do apply CI on Embrapa in their planning and strategic actions.

On the other hand, the creation of Competitive Intelligence Managerial Systems aligned to the Critical Factors of Success and, in particular, the CIS for Embrapa's Communication, with a strong focus on the customer, will permit the improvement of actions, processes, products and services related to this strategic objective, with a positive impact on the actions and processes of the entire Company.

Embrapa will also be positioned closer to the fourth and last stage of evolution of Competitive Intelligence in the Companies described by Tyson (1998), where there is a systematic interface between the strategic planning and intelligence processes.

## RECOMMENDATIONS

In a wider scope, one can state without the fear of a making a mistake that it is inevitable that Embrapa, an intensive knowledge company, will apply more and more instruments and tools of competitive intelligence. For that, an inherent recommendation of this work is that when the networks and the managerial intelligence



systems are developed, meeting the criteria of Embrapa's Critical Factors of Success (Strategic Objectives - SO), the Company starts to develop Systems of Competitive Intelligence for the monitoring of its environment, products, competitors and Science and Technology.

The organization of the intelligence research in the Company that is built basically around knowledge will also contribute positively to the general efficiency of the organization. In this sense, Embrapa will become closer to being a "learning organization", in the sense described by Garvin (1993):

An entity with abilities to create, to acquire and to transfer knowledge and, still, to modify its own behavior to reflect new knowledge and discoveries.

These are the fundamental processes in an organization such as Embrapa, which strives for strategic goals and objectives and maintain competitive advantages, in a context of managerial excellence.

## Bibliography

- BONFIM, Mariana G. M. *Sistemas de Inteligência Competitiva: Fonte de Vantagem Estratégica*. Monografia (Especialização em Inteligência Competitiva) - MCT/INT, CNPq/IBICT, UFRJ/ECO, 1998.
- COELHO, Gilda M. *Sistemas de Inteligência Competitiva*. In: CURSO DE ESPECIALIZAÇÃO EM INTELIGÊNCIA COMPETITIVA. Brasília: MCT/INT, CNPq/IBICT, UFRJ/ECO, 1999.
- COELHO, Gilda M. *Intelligence competitive comme support a la competitivite des entreprises Bresiliennes: formation de ressources humaines et assistance technologique*. DEA Monograph. Faculté des Sciences et Techniques de Saint Jerome - Université d'Aix-Marseille III - France, Marseilles, September 1997.
- DANIEL, R. Management Information Crisis, *HBR*, Sep./Oct.1991.
- DAVENPORT, T. H.; PRUSAK, L. *Working knowledge: how organizations manage what they know*. Boston: Harvard Business School, 1998. 199p
- DOU, Henri. *Sistemas de Inteligência Competitiva*. In: CURSO DE ESPECIALIZAÇÃO EM INTELIGÊNCIA COMPETITIVA. BRASÍLIA: MCT/INT, CNPq/IBICT, UFRJ/ECO, 1999.
- DOU, Henri. *Veille technologique et compétitivité*. Paris: Dunod, 1995. 234p.
- DUGAL, M. CI Product Line: A Tool for Enhancing User Acceptance of CI. *Competitive Intelligence Review*, Vol. 9(2). 1998.
- EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA. *III Plano Diretor da Embrapa: Realinhamento Estratégico 1999-2003*. Secretaria de Administração Estratégica. Brasília, 1998.
- EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA. *Guia da Embrapa*. Assessoria de Comunicação Social. Brasília, 1999.
- EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA. *Balanco Social da Pesquisa Agropecuária 1999*. Assessoria de Comunicação Social. Brasília, 2000.

- EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA - EMBRAPA. *Banco de Notícias* [on line]. Assessoria de Comunicação Social. Brasília. 2000. Available from Internet <<http://www2.sede.embrapa.br:8080/intranet/bn.nsf/page?openform&5F398B08B1FC8435032568120067F4E5>>.
- ERNST & YOUNG. *Creating the Value Network*; New York: Ernst & Young, 1996.
- FULD, Leonard M. *The New Competitor Intelligence: the complete resource for finding, analysing, and using information about your competitors*. New York: John Wiley & Sons, Inc., 1995. 482p.
- GARVIN, David A. Building a Learning Organization, *Harvard Business Review*, pp. 45-49. July-August 1993.
- HARKLEROD, D. Ostriches and Eagles II. *Competitive Intelligence Review*, v 9, n 1. pp. 13-19. Mars 1998.
- HERRING, Jan P. Producing CTI that meets senior management's needs and expectations. In: SCIP COMPETITIVE TECHNICAL INTELLIGENCE SYMPOSIUM, 1997, Boston: SCIP, 1997.
- HERRING, Jan P. *Measuring the Effectiveness of Competitive Intelligence: Assessing & Communicating CI's Value to Organization*. Herring & Associates and SCIP, 1996. 66p.
- HUNT, C. and ZARTARIAN, V. *Le Renseignement Stratégique au Service de Votre Entreprise*. Paris: Ed. First, 1990.
- IBARRA, A.A.R.; SILVA, F.A.; HENNEMANN, O.A.; PENTEADO FILHO, R.C.; LUCHINE, W.A.; e SOUZA, W. Inteligência Competitiva na França. In: COELHO (1999) *Sistemas de Inteligência Competitiva*; CURSO DE ESPECIALIZAÇÃO EM INTELIGÊNCIA COMPETITIVA. Brasília: MCT/INT, CNPq/IBICT, UFRJ/ECO, 1999.
- JAKOBIAK, F. et DOU, H. De l'information documentaire à la veille technologique pour l'entreprise: enjeux, aspects generaux et définitions. In: LA VEILLE Technologique. Paris: Dunod, 1992.
- JAKOBIAK, F. *Exemples commentés de veille technologique*. Paris: Éditions d'Organisation, 1992.
- JAKOBIAK, F. *Pratique de la Veille Technologique*. Paris: Editions d'Organisation, 1991.
- JAWORSKI, B. and WEE, L. C. *Competitive Intelligence: creating value for the organization. Final Report on SCIP sponsored research*. Alexandria: SCIP, 1998.
- KAHANER, Larry. *Competitive intelligence: from black ops to boardrooms -how businesses gather, analyze, and use information to succeed in the global marketplace*. New York: Simon & Schuster, 1996. 300p.
- McGONAGLE JR., J. J.; VELLA, C. M. *A new archetype for competitive intelligence*. Westport : Quorum, 1996. 225p.

- MILANI Jr., Angelo. *Base conceitual para implantação de um sistema de inteligência competitiva na Braspetro*. DEA Monograph. Faculté des Sciences et Techniques de Saint Jerome - Université d'Aix-Marseille III - France, Marseilles, September 1998.
- MINISTÉRIO DO PLANEJAMENTO, ORÇAMENTO E GESTÃO (MPO). *Curso Gestão do QPAP 2000*. Secretaria de Gestão. Brasília, 2000.
- PEREL, Mel & YOUNG, Jay T. *Technology intelligence: anticipating the innovations and breakthroughs*. Columbus: Battelle Institute, 1996.
- PENGUIN WORDMASTER DICTIONARY, Penguin Books, USA/England, 1987.
- RIBEIRO, B.B.; FREDDI, E.; CASTRO ALMEIDA, G.L.T.; HENNEMANN, L.T.; CARVALHO, M.F.; CÂMARA, O.T.F.; and SOUZA, O.A. *Inteligência Competitiva no Japão*. In: COELHO (1999) *Sistemas de Inteligência Competitiva*; CURSO DE ESPECIALIZAÇÃO EM INTELIGÊNCIA COMPETITIVA. Brasília: MCT/INT, CNPq/IBICT, UFRJ/ECO, 1999.
- ROCKART, J.F. Chief executives define their own data needs. *Harvard Business Review*, pp. 81-93, March, 1979.
- STOLLENWERK, M. F. L. *Gestão Estratégica e Inteligência Tecnológica: concepção e desenvolvimento de um sistema de inteligência tecnológica em uma empresa de petróleo*. DEA Monograph. Faculté des Sciences et Techniques de Saint Jerome - Université d'Aix-Marseille III - France, Marseilles, September 1997.
- STOLLENWERK, Maria F. L. *Sistemas de Inteligência Competitiva*. In: CURSO DE ESPECIALIZAÇÃO EM INTELIGÊNCIA COMPETITIVA. Brasília: MCT/INT, CNPq/IBICT, UFRJ/ECO, 1999.
- TYSON, Kirk W. M. *The Complete Guide to Competitive Intelligence*. Lisle: Kirk Tyson International Ltd, 1998.
- TYSON, Kirk W. M. *Competitor intelligence manual and guide: gathering, analyzing, and using business intelligence*. Englewood Cliffs: Prentice Hall, 1990.
- TZU, Sun. *A Arte da Guerra*. Trad. José Sanz. 8ª edition. São Paulo: Record, 1983.
- WANDERLEY, Ana V. M. *Concepção de um Sistema de Inteligência de Negócios para Gestão de Investimentos em Engenharia*. DEA Monograph. Faculté des Sciences et Techniques de Saint Jerome - Université d'Aix-Marseille III - France, Marseilles, September 1998.