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# **Development of a Balanced Scorecard Tool to Restructure the Information System at CENC**

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## **Abstract**

The Centro de Electroencefalografía e Neurofisiología Clínica (CENC) is a small health care organization operating in sleep disorders. Due to the growing strength of its rivals and problems caused by previous managers, the company is now facing a need for organizational changes.

This thesis has developed a management support tool based on the balanced scorecard (BSC) framework with four perspectives to define the CENC's strategy and to re-design its information system (IS). This application also aimed at testing the appropriateness of the framework for a small and medium enterprise (SME), given that previous literature has not addressed this subject.

The implementation of the BSC required the definition of the organization's mission, visions, values and strategy, strategic objectives and the choice of measures for each perspective, as well as the design of a strategy map. Results from the application of the BSC framework were used to propose a change in the current IS at CENC, and it was proposed a IS architecture based on data warehousing and on online analytical processing.

The BSC proposed might be useful and flexible, as it deliver more information in a faster way, helps the strategic management of the company and helps to overcome some flaws in the IS. Nevertheless, the implementation of this approach is expected to demand major changes in the clinic's working culture and procedures in the first years of its application. As consequence, the BSC can be applied, with certain limitations to a SME, giving them a competitive edge against their rivals.

## **Keywords**

Healthcare, balanced scorecard, information system, management support system, performance measures, SME

## **Resumo**

Centro de Electroencefalografia e Neurofisiologia Clínica (CENC) é uma pequena empresa de saúde na área das doenças do sono. Devido ao aumento da força dos rivais, e a erros causados por anteriores gestores, a empresa enfrenta a necessidade de fazer algumas mudanças.

Esta tese desenvolveu e analisou um sistema de auxílio à gestão, baseado no modelo do balanced scorecard (BSC) com quatro perspectivas para definir a estratégia e reestruturar o sistema de informação (SI) no CENC. A tese também testou se modelo proposto é apropriado para uma pequena e média empresa (PME), visto que a literatura não aborda este tema.

A implementação deste modelo requer a definição da missão, visão, valores e estratégia da empresa, a definição dos objectivos estratégicos e indicadores para cada perspectiva e o desenho do mapa estratégico com ligação de causa efeito. Os resultados da aplicação do modelo de BSC foram utilizados para propor alterações no SI do CENC, como tal foi proposto uma nova arquitectura do SI baseada em data warehousing e processamento analítico on-line.

O modelo de BSC pode ser útil e flexível, permitindo o fornecimento de mais informação de uma forma mais rápida, ajudando a gestão estratégica da empresa e ajudando a ultrapassar falhas no SI. No entanto, a utilização deste modelo causa grandes alterações na cultura de trabalho e em procedimentos nos primeiros anos da sua aplicação. Como consequência, o modelo de BSC pode ser aplicado, com algumas limitações, a uma PME, promovendo uma vantagem competitiva em relação aos seus rivais.

## **Palavras chaves**

Saúde, balanced scorecard, sistema de informação, sistema de apoio à gestão, indicador de performance, PME

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## List of abbreviations

ADSE	<i>Direcção-Geral de Protecção Social aos Funcionários e Agentes da Administração Pública</i>
AIE	Applied Information Economics
APIC	Army Performance Improvement Criteria
ARSL VT	<i>Administração Regional de Saude de Lisboa e Val do Tejo</i>
BSC	Balanced Scorecard
CENC	Centro de Electroencefalografia e Neurofisiologia Clínica, Lda.
DSS	Decision Support Systems
EFQM	European Foundation for Quality Management
EIS	Executive Information Systems
GSS	Group Support Systems
IS	Information System
IT	Information Technologies
MBNQA	Malcolm Baldrige National Quality Award
N.A.	Not Available
OLAP	Online Analytical Processing
PT-ACS	<i>Portugal Telecom – Associação de Cuidados de Saúde</i>
SAMS	<i>Serviço de Assistência Médico-Social dos Sindicatos Bancários</i>
SME	Small and Medium Enterprise

## 1. Introduction

In this chapter we describe the *Centro de Electroencefalografia e Neurofisiologia Clínica, Lda.* by analyzing its internal and external environment. We also point out the main objectives of this thesis and its structure.

### 1.1. Internal Environment

The *Centro de Electroencefalografia e Neurofisiologia Clínica, Lda.* (CENC) was founded in 1983 by Dr. Teresa Paiva, who currently owns and manages it. Although the CENC is located in Lisbon, its patients come from all parts of the country, including the islands of Açores and Madeira.

With a labor force composed by seven full-time employees, and twenty six collaborators working in part-time (twenty four doctors, one computer technician, and an accountant), the CENC can be considered a Small and Medium Enterprise (SME), and more specifically a small health care provider. Its core business is within the area of sleep disorders, but this organization also provides health care services in other medical areas like neurology, psychiatry, pneumology, pediatrics, internal medicine, neuropsychiatry, clinical neurophysiology and psychology.

Dr. Teresa Paiva is one of the most successful and well-known specialists in the country in her area of expertise. Since she is the most important physician in the clinic, as shown in one of the result of an internal survey present in Appendix III – Some Satisfaction Survey Results Figure 19, the CENC can be considered one of the most prestigious sleep disorder clinics in the country.

This fact enables the clinic to have a large number of patients interested in procuring its services, expressed by a one year long waiting list, and as the manager indicates, its activities have been growing in the past years.

As a health care provider, the CENC puts a large amount of effort into fulfilling most of the patients' needs, as proven in the satisfaction survey results present in Appendix III – Some Satisfaction Survey Results Figure 23 and Figure 25 (and thus delivering care with quality). As Treacy et al. (1997) point out, such organizations can be categorized as customer-intimate organizations.

This approach not only reflects on the company's working culture, where CENC's staff tries to establish a bond between them and the client, so that they feel more comfortable while being treated, but also in the clinic's infrastructure.

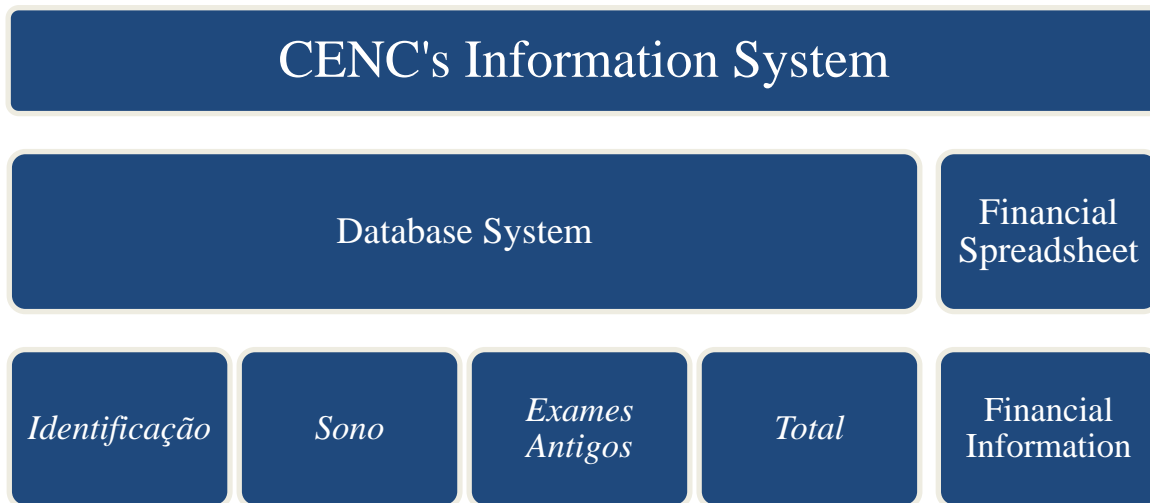
The organization's building gives the patients a unique atmosphere because of its unusual design, which resembles a normal family house. This warm and comfortable environment, as shown in Appendix III – Some Satisfaction Survey Results Figure 21, is very much appreciated by the clinic's patients because some exams require the patient to stay overnight.

This unique aspect of the clinic can be considered as a major edge over its rivals, since the other competitors have hospital-like infrastructures, that are not as appealing as the one offered by this organization.

Besides providing a good infrastructure, the CENC also has good accessibilities, but provides a poor parking capacity for its patients, as shown in Appendix III – Some Satisfaction Survey Results in Figure 20 and in Figure 22.

At another level of the organization, and to manage the clinic's activities, the CENC has an information system (IS) composed by two separate elements, a fragmented database system to

manage the clinic's medical activities and a spreadsheet to manage the financial information, as shown in Figure 1.



**Figure 1** – Composition of the CENC's current information system

The database system is composed by four separate databases, named *Identificação*, *Sono*, *Exames Antigos*, and *Total*, with no interaction amongst them, and as such does not allow the manager to obtain the require information to manage the unit, as well as it does not allow for having an holistic point of view of the clinic's activities.

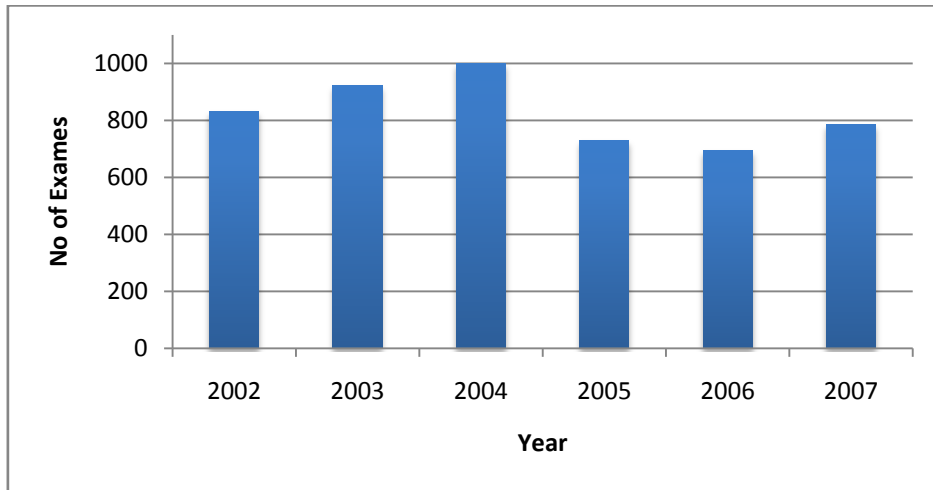
The *Identificação* database has information concerning patients' identification, such as their names, addresses, phone numbers, the clinic's unique identification number, etc. The *Sono* and *Exames Antigos* databases have information about some of the exams done in the clinic since 1994. And the *Total* database also has information about the patient's identification and diagnosis.

After analyzing the database descriptions and the information found in Appendix II – Information Available on the Databases, it is possible to conclude that the CENC's IS only provides information about patients and exams but there is no information about the medical consultations held in the clinic.

Beside this, the database has no financial information regarding the exams like the cost of the exam, the money paid by the patient and the money covered by health care subsystems or health insurance companies.

To support this fact, we extracted the information about the number of exams done in the clinic per year since 2002. As shown in Figure 2, the number of exams done per year does not fluctuate much, and has an average value of 827.

Although the information provided by the databases indicates this, the manager knows that the activity of the clinic has been growing, since she notices an increase in the clinic's activities.



**Figure 2 -** Number of exams preformed in the clinic per year

**Note:** All data used in this chart was retrieved using the integrated database.

In addition to the lack of information available on the databases, the information that is available has many entries in blank, which might potentially mislead analysis of activity of the clinic.

To manage the databases, the manager uses two different kinds of software: one to manage the patient's information and another to manage the information about the medical exams. This fact means that there is a great fragmentation of the information, leading to an even greater difficulty in managing all the information.

The financial spreadsheet has all the information available on a normal financial report, such as operating revenue and expenses and non-operating revenue and expenses.

Due to the poor quality of the database system and since there is no integrated system in the clinic, the manager does not complement the financial information with the one provided by the IS. This fact makes the manager give more relevance to the financial information.

Another problem with the existing IS is that, like in most small organizations, staff still keeps a record of medical consultations and patient satisfaction surveys on paper, thus rendering the timely gathering of information for a better management of the clinic impossible.

To summarize, the information present on the IS is very incomplete and fragmented and there is no easy way to get summarized information about the clinic's activities.

Besides that the organization faces a lack of a defined and structured strategy, which makes the management of this company even harder for its manager, as there is no well thought-out statement defining the future of the clinic.

Also the lack of a strategic vision of the clinic has prevented the manager to have a different approach to the clinic's management. This way, the manager has no other option but to apply a management technique that has a short term management scope.

As for the financial situation of the CENC, although it reports profit, the clinic struggles with some financial problems caused by previous management, like the existence of debt to the government, because the previous manager did not pay the bills in time, forcing the current management to pay them as well as the fines related to the delay in payment.

## 1.2. External Environment

As a health care provider in the area of sleep disorders, the CENC has two types of competitors. The ones associated with hospitals like *Santa Maria* Hospital (equipped with two sleep laboratories), the *Pulido Valente* Hospital (equipped with one sleep laboratory), the British Hospital, the CUF Hospital, the Air Force Hospital, the *S. José* Hospital. And small clinics like the Sleep Clinic, the neurologist *Manuel Gonçalves* and some other sleep laboratories that are about to open.

Due to a high incidence of sleep disorders in the Portuguese general population and an increase in the prevalence of insomnia with age, reported in Ohayon et al. (2005), the clinic's activities have grown in the past years.

Although the CENC is one of the most respectful clinics in the country, this may change with the growing strength of the clinic's rivals, due to the appearance of new sleep laboratories associated with hospitals with financial groups such as the *Grupo José Mello* or the *Caixa Geral de Depósitos* supporting them.

To compete with its rivals and to provide access to private patients to consultation and medical exams, the clinic has protocols with some health care subsystems (SAMS (*Serviço de Assistência Médico-Social dos Sindicatos Bancários*), ARSL VT (*Administração Regional de Saude de Lisboa e Val do Tejo*), ADSE (*Direcção-Geral de Protecção Social aos Funcionários e Agentes da Administração Pública*), PT-ACS (*Portugal Telecom – Associação de Cuidados de Saúde*), and *Porto de Lisboa*) and some health insurance companies (*Médis*, *MultiCare*), which enable access to the clinic at most advantageous conditions.

Although the clinic provides a regular quality-price service and has the described protocols just mentioned, there are still some patients that cannot afford them, either because of their level of income or because the most expensive exams are not covered by either health care subsystems or by health insurance companies.

Although the clinic's manager has already requested the inclusion of these exams in the existing protocols, this request has been denied. So, in order to provide health care services to a larger group of patients, the clinic needs sometimes to lower its prices, thus lowering its profit.

Given the fact that many exams and consultations are done using health care subsystems and health insurance companies protocols, there is another external factor to take in account when managing the clinic, which is the fact that the money covered by the protocols is paid with a four to six month delay.

## 1.3. Objectives of the thesis

Bearing in mind all the external and internal factors mentioned above, and adding the problems caused by previous management, the company is now facing a need for organizational changes.

For this purpose and to improve the management of CENC, the manager needs a restructured IS and a management support system that can provide her with a summarized and complete report of the organization's activities.

Given this context, this thesis aims at developing a decision aid tool to improve the management of the clinic. We intend to develop a management support system that integrated the current IS within a restructured and more complete IS that could help the manager to have a better perception of the strategy of the organization and to improve its activities. We also intend to analyze its adequacy to the CENC's profile.

The proposed management tool consists of a performance measurement tool based on the balanced scorecard (BSC) framework, which is a strategic planning, management and information system that helps organizations to align their business activities to their vision and strategy. This tool helps to improve the internal and external communications, and helps to monitor the organizational performance against strategic goals.

Many studies have been made about the BSC framework, some being applied to health care organizations. Those which have focused on health care organizations, have applied the BSC model to large or medium health care organizations. We propose to test the use of a BSC framework in CENC which is a small/micro health care organization; and we aim at finding whether the framework differs in its application to small and medium organizations.

Another important aspect of this thesis is that it also tests how the BSC system should be used to create an IS that integrates the one currently used at CENC, and what kind of changes should be made on the current system so that this system can be autonomous and effective.

The thesis is structured as follows. In the second chapter we explain what a health care organization is and what kind of role a management system plays in its success.

In the third chapter we examine what kind of management support system frameworks are used in SMEs, their limitations and why we select the BSC framework.

In the fourth chapter we describe the BSC framework in detail for a large organization, for a large health care organization and for a SME. At the end of this chapter we describe the framework we propose for the CENC.

In the fifth chapter we apply the BSC framework proposed for the CENC by defining the clinic's mission, vision, values and strategy, conceptualizing the main objectives for each BSC perspective and creating the respective measures and by designing the CENC's strategy map.

In the sixth chapter we discuss the way the BSC framework implementation will influence the restructuring of the clinic's IS.

In the seventh chapter we evaluate the whole BSC framework development process by analyzing how it relates to the ones in the literature, how it benefits the CENC, what kind of limitations it has, how it points out the management weakness of the CENC and what kind of new information it brings us.

## **2. The Role of Management in Health care Organizations**

### **2.1. What is a Health care organization?**

Health care organizations are often described as unique or at least different from other industrial organizations. Shortell et al. (2006) summarizes features where the health care organization can differ from other organizations:

1. The work done in these kinds of organizations is variable and complex;
2. There is little tolerance for ambiguity and error;
3. The work is highly interdependent, requires a high degree of coordination and a high level of specialization;
4. Health care organizations normally belong to a health care system that is regulated by government.

As indicated, most of these organizations belong to health care systems, so it is important at this point to clarify what a health care system is.

According to the World Health Organization (1998), a health care system is “a formal structure for a defined population, whose finance, management, scope and content is defined by law and regulations. It provides for services to be delivered to people to contribute to their health”. In Portugal the health care system is defined as a “mix of health services, where public, private and social entities coexist and act in an integrated manner, directed towards the needs of health care users” (Ministry of Finance, 2003).

Although many authors tend to qualify health care organizations as unique, a search in an introduction to management book like Capon’s *Understanding Organizational Context* (2004) tells us that health care organizations are classified within the general service industry, and as such we may expect that many of the rules that are applicable to these organizations can be applied in health care organizations.

To support this idea Shortell et al. (2006) indicate that despite the unique characteristics of these organizations, it is the “confluence of professionals, technology and task attributes that make the management of health care services organizations a particularly challenging job”. This kind of challenge can be found in other service organizations.

Nevertheless, we should never neglect the importance of the doctor-patient relationship in a health care organization, since it plays a major role in its success. There has to be a great trust bond between the doctor and the patient, so that the final diagnoses can be as accurate as possible.

### **2.2. Managing a Health Care Organization**

Bearing in mind what was previously said, it is clear that, as in any organization, management plays one of the most important roles in private or public health care services, mostly because since the early 90’s there has been a lot of changes in the health care environment, such as declining reimbursement, cost escalation, excess capacity, changes in the global economy, and consumer pressures. Furthermore there is a growing diversity and differentiation in the health care industry that leads to the creation of new specialties, in both public and private sectors (Jayaweera et al. 2006).

To manage these environmental changes, Diogo (2004) and more recently Barros, et al (2007) pointed out that the Portuguese government is developing the so called public/private partnerships (PPP) and many other reforms such as:

1. The creation of Family Health Units (USFs);
2. Redefinition of the network of emergency services provided by both PCCs and hospitals;
3. Closing of several hospital maternity departments;
4. Construction of new hospitals under PPP;
5. Transforming Hospitals that continue to be managed by civil service rules (and are known as *Hospitais SPA* into public enterprises (*Hospitais EPE*);
6. Long-term care network;
7. The adoption of alternative management models, specifically more entrepreneur models (*novas soluções de gestão*);
8. Modification of the pharmaceutical policy (specially the drugs' policy).

As shown, the Portuguese government is making an attempt to adopting alternative management models, to ensure that the organizations are able to change their management culture and adopt decision tools, that improve the strategic management of organizations, so that today's Portuguese health care organization can prosper in a dynamic environment.

For a better understanding of the strategic approach concept, we must first define what strategic management is. Dobson et al. (2004) state that strategic management is a "clear sense of an organization's objectives and a sense of how it will achieve these objectives", or in the words of Goodstein, Nolan and Pfeiffer (1992) strategic management is "the process by which the guiding members of an organization envision its future and develop the necessary procedures and operations to achieve that future".

So, to ensure the organization's success, the manager has to think strategically, and as Shortell et al. (2006) point out, there are seven key aspects to which a manager should dedicate a good deal of attention:

- The external environment – It can be defined as all of the political, economic, social, technology and regulatory forces that influence the organization, as well as Porter's Five force model;
- The vision/mission/goals – It concerns all the major tasks that have to be done, and the kind of technologies and human resources that are needed;
- The strategies – They are the plans designed to achieve the organization's vision/mission/goals;
- The level of differentiation – It is the way that the organization competes with its rivals;
- The level of integration – It defines the manner in which the organization coordinates all its specialized functions;
- The level of centralization – It is the manner in which the organization displays its physical structure;
- The ability to adapt to changes – It is the way the organization reacts to changes.

Regardless of the skills of the organization's manager, it is imperative to use of such tools to help management and to improve management quality. Some of these tools rely on information technologies (IT), because "excellent IT and high-quality health care are closely linked" (Bates, 2002).



For this purpose many types of computer-based information systems (IS) have been developed to support decision making, including decision support systems (DSS), group support systems (GSS) and executive information systems (EIS) (Martinsons et al. 2007).

DSS are designed to increase the speed and accuracy of data analysis, while reducing costs, enabling the effective and efficient analysis of large volumes of quantitative data. They were originally developed as tools for managers, but they are now also used by many non-management employees such as sales people and purchasing officers. DSS are particularly valuable tools in complex situations, where decision makers need to analyze multiple sources of data.

GSS typically facilitate brainstorming, idea organization and evaluation, and consensus formation, but they also help managers to identify new ideas from their employees.

EIS are intended specifically for executives, they have been used to monitor and communicate company performance data and to scan the business environment. They enable managers to extract data on key performance indicators quickly and cleanly, and thus support the information gathering phase of the decision-making process.

In some health care organizations the adoption of these kinds of systems was based on necessity, so each hospital service has its own system. While making organizations increasingly dependent on IT, this approach created a necessity for integrating applications (Johannesson et al., 2000), otherwise a large-scale adoption of these systems would be doomed from the beginning, since the interaction between different services or different hospitals would become very hard.

Despite the growing necessity in IT and respective IS implementation, "health care has invested at least 50% less of its gross revenues in information technology than other information-intensive industries like banking. Furthermore, while banking has international standards for exchange of data, medicine does not. As a result, one can go to an automated teller in Tokyo or Moscow and withdraw money with a card, but going to a health care provider in one of these locations with a serious medical issue would be a rather different experience" (Bates, 2002).

In other words with the lack of investment in IT sometimes the information needed for a patient does not exist, or does not arrive on time.

Although true, this fact does not only occurs because of the lack of investment in IT solutions, it is also a consequence of the status of the health care services. They are local independent services and there is a legislative barrier that prevents the integration and unification of the health care IS.

Also, unlike in the banking industry, the different languages used in different countries are a huge barrier for the adoption of a global approach for IS in health care. This fact is mainly due to the extreme importance of the doctor-patient relationship, which is drastically affected by the difficulty in communication caused by the use of different languages.

Another reasons for health care organizations not to have changed their approach to IT is that the health care environment has a small competition level, consequently and as Bates (2002) states these organizations "usually have good financial performance", thus they do not change their approach regarding IT.

Although it may seem that a management system would be better suited for a large hospital, there is a growing need of implementing these of systems in small clinics, like the *Centro de Electroencefalografia e Neurofisiologia Clínica, Lda*. One of the main reasons is that clinics, like most

Small and Medium Enterprises (SMEs) suffer from resource constraints and management weaknesses (Gray et al. 2000). Smith et al. (2007) summarized these limitations:

- SMEs often have only a limited overview of the markets in which they operate, leading to a lack of control over their competitive position;
- SMEs have limited resources so they cannot cope with the fluctuations in cash flow that late payment inevitably brings;
- SMEs are unable to drive the market, but instead, must react and adapt to market changes over which they have no influence;
- SMEs rely solely on internal or financial planning as their main approach to preparing for the future.

Bergin-Seers (2007) add:

- SMEs are normally resource restrained in comparison to large firms meaning that they are limited in how they compete with large firms;
- The owner–manager is the key driver shaper of the firm and the sole decision-maker, making the business performance dependent on one or two individuals.

In consequence the decision to adopt such systems has to be carefully analyzed, because “IT adoption in a clinical environment depends on the fit between the attributes of the individual users (e.g. computer anxiety, motivation), attributes of the technology (e.g. usability, functionality, performance), and attributes of the clinical tasks and processes (e.g. organization, task complexity)” (Ammenwerth, et al, 2006). It is also important to remember that “60 – 70% of all software projects fail, leading to enormous loss of money within health care and also to loss of confidence on IT from the side of users and managers” (Ammenwerth et al. 2006).

Despite management limitations SMEs there are some authors, like Papakonstantinou et al. (1995) and Zachman, (1987), that indicate that the adoption of these systems may benefit the organization because SMEs tend to represent their data using a variety of conflicting data models and schemas, while users want to access all data in an integrated and consistent fashion, and as such the adoption of integrated IT solutions may solve these problems.

Although an integrated solution may solve the problem, Zachman, (1987) points out that for the decision maker to have all the necessary information we not only need an integrated solution, but also a well structured one.

As consequence, in today’s health care environment there is a growing need to adopt management support systems based on IT both in large organizations or in SMEs and the CENC is not an exception.

The lack of information provided the current CENC’s IS, the lack of management knowledge and experience of its manager and the growing force of its rivals makes it even more urgent for the implementation of a management support system in the clinic that can monitor its activities and help the manager to make informed decisions.

Nevertheless, this kind o approach needs to be carefully analyzed, because in the CENC's case, there is a poor awareness of the strategic vision of the organization, this way the gathering of information can be difficult and the implementation of such a tool very hard, due to the lack of relevant management information.

### 3. Review of Methods

As said in the previous chapter, there are three different types of computer-based information systems, but in our opinion the one we believe that best fits the CENC's requirements is the EIS, because as Martinsons et al. (2007) point out, the EIS system "helps the directive decision maker to make decisions quickly without encountering too much cognitive complexity", and this is one of the main aspects that the CENC's current manager is looking for.

So in this chapter we do a quick review of the most relevant EIS performance measurement system frameworks, compare them and choose one of them to see if it is possible to fit it to the CENC's unique profile, and if its application answers to the objectives set in this thesis.

To discuss on whether we should choose a specific management support system framework, we must first assess how the clinic is currently being managed.

At present the CENC is managed based on financial information, which "isn't well suited for organizations that live in a rapidly changing environment", such as the health care environment, because it focuses on "short-term gains at the expense of long-term value" and sometimes the information provided "is not relevant to many levels of the organization" (Niven, 2002).

The current management approach is not well suited for today's health care organizations. Consequently, we will now assess what kind of frameworks are available that can help the management process, and choose the one we find relevant to apply and test.

Bergin-Seers (2007) did extensive research on EIS frameworks and points out several frameworks available on the market. These frameworks are the Deming model and the Total Quality Management movement that bring greater focus to the importance of non-financial approaches and a management approach for implementing improvement activities, the quality award models for managers, such as the Malcolm Baldrige National Quality Award (MBNQA) and the European Foundation for Quality Management's (EFQM) Excellence model, that integrate both financial and non-financial approaches and the integrated and balanced model approach to measurement such as the BSC.

Bergin-Seers (2007) in his research also points out that for SMEs (in which we include CENC), there are some requirements that the support system has to meet:

1. Provide financial and non-financial results;
2. Provide information about the internal and external environment;
3. Provide an integrated approach;
4. Provide relevant management information.

Hence, he found that the models that best fit these requirements were:

1. The BSC;
2. The MBNQA;
3. The EFQM;
4. The Results and Determinants Matrix;
5. The Performance Prism.

On the following sub-chapters we describe each one of the frameworks mentioned above, and in the end we compare them and choose the one we think better suits the CENC's profile.

### **3.1. The Balanced Scorecard**

The balanced scorecard (BSC) is a “strategic planning and management support system framework used to align business activities to the vision and strategy of the organization, to improve internal and external communications, and to monitor organizational performance against strategic goals” (Balanced Scorecard Institute, 2007c). To achieve its goals it gives a set of measures that provide top managers a “fast but comprehensive view of the business” (Kaplan et al., 1992).

The Balanced Scorecard framework contains a collection of financial and nonfinancial measures. In this approach Kaplan & Norton introduced three non-financial perspectives, the customer satisfaction, the internal business process, and the learning and growth. In their Balanced Scorecard approach they also emphasize the linkage of measurement to strategy and the cause and effect connections.

### **3.2. The Malcolm Baldrige National Quality Award**

The US congress established the MBNQA program in 1987 to “recognize U.S. organizations for their achievements in quality and performance and to raise awareness about the importance of quality and performance excellence as a competitive edge. [...] Three awards may be given annually in each of these categories: manufacturing, service, small business, education, health care and nonprofit” (National Institute of Standards and Technology, 2007).

All the organizations that submit an application to this award are judged “to be outstanding in seven areas: leadership, strategic planning, customer and market focus, measurement, analysis, and knowledge management, human resource focus, process management, and results” (National Institute of Standards and Technology, 2007).

Although the MBNQA is an award, it can be seen as a management support system framework because for an organization to be able to participate in the award, it has to meet several standardized quality requirements, shown in Figure 3, that are meant to help the manager improve the organization’s managements, and quality of service.

### **3.3. European Foundation for Quality Management’s Excellence Model**

The Excellence model was developed by the European Foundation for Quality Management (EFQM), and it is a management model for excellence which can be applied to any organization to evaluate qualitatively its performance. It enables private, public and voluntary sector organizations to compare their performance and provides a method for measuring improvements in performance over time. It is an internationally recognized model which has been used by many organizations to drive improvements since 1991 (Warwick District Council, 2007).

### **3.4. Results and Determinants Matrix**

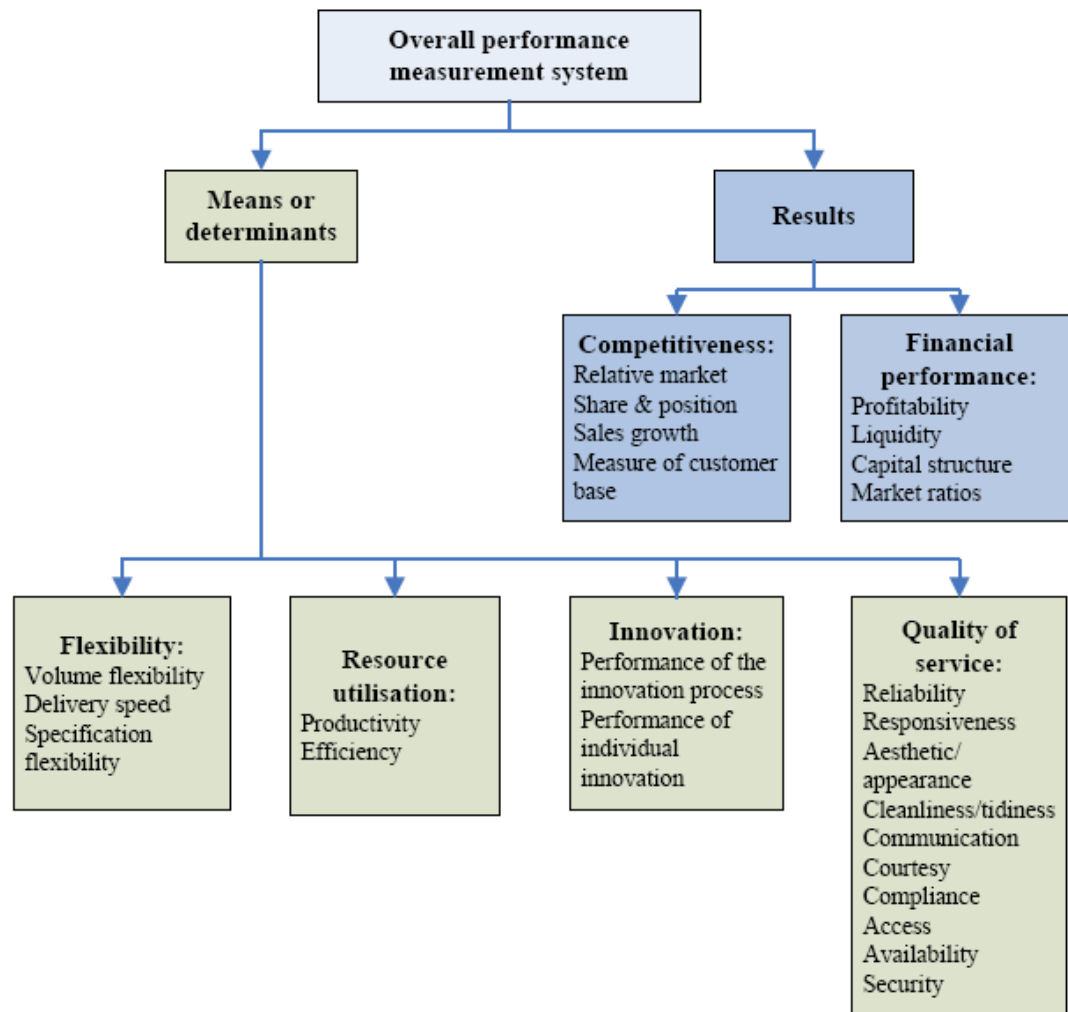
This framework was introduced in Fitzgerald et al. (1991). The authors emphasize that the performance measures selected by any service-based business should be founded on the strategic intentions of the firm and that managers should gather information by using both financial and non-financial measures in order to obtain richer feedback for better control of the business.

To measure the performance in the service industries, Fitzgerald et al. (1991) define six generic performance dimensions: the competitive performance, the quality of service, the flexibility, the

resource utilization, the innovation and the financial performance. These dimensions are divided into two groups, results and determinants, as illustrated in Figure 4.

Categories and items	Point values
<b>The Driver</b>	
1.0 Leadership Senior executives' success in creating and sustaining a quality culture	<b>90</b>
1.1 Senior executive leadership	45
1.2 Management for quality	25
1.3 Public responsibility and corporate citizenship	20
<b>The system</b>	<b>75</b>
2.0 Information and analysis Measures the effectiveness of the company's collection and analysis of information for quality improvement and planning	
2.1 Management of information and data	20
2.2 Competition comparisons and benchmarking	15
2.3 Analysis of uses of company level data	40
3.0 Strategic planning Deals with the effectiveness of integration of quality requirements into the company's business plan	<b>55</b>
3.1 Strategic development	35
3.2 Strategic deployment	20
4.0 Human resources development and management Refers to the company's efforts to realise the full potential of the workforce quality	<b>140</b>
4.1 Human resource planning and evaluation	20
4.2 High performance work systems	45
4.3 Employee education, training and development	50
4.4 Employee well being and satisfaction	25
5.0 Process management Acts as a gauge of the effectiveness of the company's systems for assuring quality control of all operations	<b>140</b>
5.1 Design and introduction of products and services	40
5.2 Process management – product and service production and delivery	40
5.3 Process management – support services	30
5.4 Management of supplier performance	30
<b>The measure of progress</b>	
6.0 Business results Refers to the company's results in quality achievement and quality improvements, demonstrated through quantitative methods	<b>250</b>
6.1 Product and service quality results	75
6.2 Company operational and financial results	130
6.3 Supplier performance results	45
<b>The goal</b>	<b>250</b>
7.0 Customer focus and satisfaction Measures the effectiveness of the company's systems to determine customer requirements and demonstrated success in meeting them.	
7.1 Customer and market knowledge	30
7.2 Customer relationship management	30
7.3 Customer satisfaction determination	30
7.4 Customer satisfaction results	100
7.5 Customer satisfaction comparison	60
	<b>1000</b>

**Figure 3 - The Malcolm Baldrige National Quality Award criteria (Loomba et al., 1997)**



**Figure 4 - Core elements of the results and determinants matrix (Bergin-Seers, 2007)**

### 3.5. The Performance Prism

The Performance Prism was introduced to the scientific community in Neely et al. (2002), and consists of five interrelated facets.

The first facet is the stakeholder satisfaction and is meant to encourage managers to identify who are the important stakeholders and then clarify their wants and needs.

The second facet relates to strategies, and addresses the question – what are the strategies required to ensure that the wants and needs of the stakeholders are satisfied?.

The third facet, processes, deal with the generic processes that underpin most organizations and that should be put in place in order to allow the firm's strategies to be delivered.

The fourth facet of the prism, is capabilities, and addresses the question – What are the capabilities required to operate the business processes?

The final facet is the stakeholder contribution, and is meant to recognize the importance of the firm's relationship with their stakeholders.

The inter-relationships among the five components of the prism helps managers to understand the factors that drive performance, and in this way helps the managers to analyze their operations for performance improvement purposes

### **3.6. Comparative Analyzes of the Different Frameworks**

All the frameworks previously described have the same goal, to guide organizations to excellence by providing to the organization's manager a structured framework that can help them enhance the organization's quality.

In order to choose the framework to test we need to balance their advantages and limitations and see how well they match the CENC's management requirement.

The MBNQA and EFQM excellence models are very similar to each other, but only the EFQM model is "clearer about human resource management and has two criteria devoted to this dimension – People Management and People Satisfaction" (Tummala et al., 1996).

Although these two models provide direction for business improvement through the self-assessment process and measurement of performance and organisational operation in a holistic way, they do not assist with the elaboration and evaluation of the strategy, and they both focus on a short-term management scope, whereas the BSC, the results and determinants matrix and the performance prism do (Balanced Scorecard Institute, 2007b) (Fernandes et al., 2006) (Bergin-Seers, 2007).

Since one of the major problems that the clinic faces is the poorly structures strategy, the limitations pointed out above make it hard to choose one of these frameworks as the one to be implemented in CENC.

In the results and determinants matrix framework, the value is created for customers via human and other resources, which flow through the process of designing, producing and delivering a service (Fitzgerald et al., 1991); however as Bergin-Seers (2007) points out, this approach does not guide process development and monitoring towards the achievement of stakeholder outcomes and does not have a holistic approach to process, whereas the BSC and performance prism does.

Since the CENC is a customer-intimate organization, it is also an organization driven by process excellence, because when it comes to health care one of the best ways to achieve a high customer satisfaction, is by providing the best service possible. In this way, it is very important for the CENC's manager to monitor the clinic's internal processes.

Since the results and determinants matrix framework does not allow the manager to have a holistic view of the clinic's internal processes, we consider that this framework is not the best solution for the CENC.

Neely et al. (2001) believe that their prism is an improvement on the BSC as it recognizes the different types of stakeholders, such as employees, regulators and community, enhancing the model complexity. By doing so we think that the most appealing framework and the one that matches all the CENC's management requirements is the BSC.

But besides the facts presented earlier, there are other aspects of the BSC framework that makes its implementations in the CENC even more appealing.

The first aspect is that the scorecard can be used at different levels, for the whole organization, a sub-unit, or even for the individual employee, making the BSC a very flexible tool. For each level, the BSC approach identifies the key components of operations, sets goals for them, and finds ways to measure progress toward achieving these goals (Von Bergen et al., 2004).

Also as Von Bergen et al. (2004) point out, the BSC approach helps to mobilize change through executive leadership, because by building a strategy focused organization the BSC usually involves significant culture change. By aligning the organization to its strategy the BSC makes the organization

evaluate their current organizational structures, lines of reporting, and policies and procedures to ensure that they are consistent with the strategy.

The BSC approach uses tools such as strategy maps, cascaded scorecards, and strategy grids that integrate strategy with the operational tasks that employees perform daily. This ensures that tasks are done in ways that support the strategies.

Smith et al. (2007) state that, although there are studies that suggest that there are significant difficulties implementing such a resource intensive system in an environment where resources are typically scarce, if the organization's culture is flexible, dynamic and willing to take risks to succeed, there are some advantages to implement a BSC.

They also state that, in this case, the companies tend to have few employees and generally flat structures, making both management and process visibility likely to be high. These characteristics should facilitate the communication process and help to ensure that every employee is aware of what is happening and why.

Another reason why BSC should be implemented in SME, such as the CENC, is that a great proportion of its value comes from the formalization of the strategic vision and associated strategic objectives and priorities of an organization, which is normally weakly addressed in SMEs (Andersen, 2001) (Fernandes et al., 2006).

As pointed out earlier, the BSC also incorporates not only a feedback around internal business process outputs, but also adds a feedback loop around the outcomes of business strategies, making the definition of the organization's strategy a continuous process. This creates a "double-loop feedback" process in the balanced scorecard.

To finalize, we think it is relevant to point out that recent estimates suggest that a whopping 50 percent of the Fortune 1000 has a performance management system (Balanced Scorecard) in place (Niven, 2002).

After pointing out the advantages of the implementation of the BSC framework in an organization, we decided to test the use of the BSC framework to study and conceptualize its implementation in CENC. This kind of management framework has never been done in this organization, and we consider that it is a useful tool to apply to a real world problem, such as to try to improvement management tools at CENC. Furthermore we will also adapt the BSC model to the unique characteristics of the clinic and its internal and external environment, and we will build a roadmap for its integration in the current IS, mentioning all the additions and alterations that we think are necessary so that the manager can take full advantage of an effective BSC.

In the following chapter we describe the existing BSC frameworks and the one we will develop for the CENC.



#### 4. Proposed Method – The Balanced Scorecard

This chapter summarizes the elements required to develop the BSC model to CENC. It starts by describing how different organizations apply it so that it can fit into their unique characteristics.

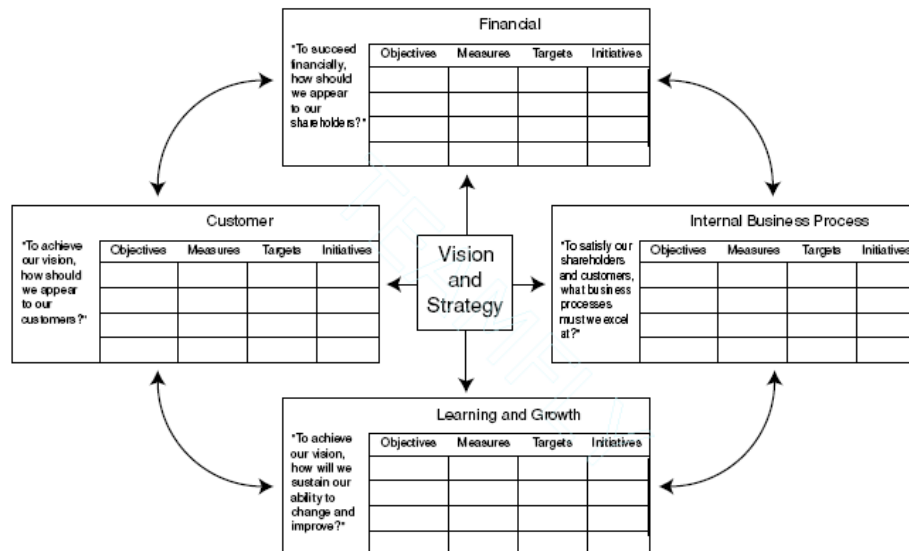
To do so we first defined what a BSC is and analyzed its limitations. Afterwards we indicated how large organizations build their BSC, how health care organizations have been applying it and how it should be implemented in a SME. Finally we described how we propose to build the balanced scorecard for the CENC.

##### 4.1. What is a Balanced Scorecard?

As described in the previous chapter the balanced scorecard (BSC) is a “strategic planning management tool and information system used to align business activities to the vision and strategy of the organization, improving internal and external communications, and monitoring organizational performance against strategic goals” (Balanced Scorecard Institute, 2007c).

Originally this tool was the result of a year-long research project with 12 companies at the leading edge of performance measurement, conducted by Robert Kaplan, a professor at Harvard University, and David Norton, a consultant also from the Boston area. In their words the BSC gives a set of measures that gives top managers a fast but comprehensive view of the business (Kaplan et al., 1992).

To achieve that goal the BSC system takes into account, not only financial measurements, but also “operational measurements on customer satisfaction, internal processes and the organization’s innovations and improvement activities” (Kaplan et al., 1992), always bearing in mind the organization’s vision and strategy, since this is the center of the balanced scorecard system (Niven, 2002), as can be seen in Figure 5.



**Figure 5 – The Balanced Scorecard Framework (Niven, 2002)**

Although some studies, such as Niven (2002), Kaplan et al. (2001), Gao et al. (2006) and Osama (2006), mention that in certain organizations the implementation of the BSC is made using more than four perspectives, in Kaplan et al. (1992) the balanced scorecard used only four perspectives,

customer perspective, the internal process perspective, the learning and growth perspective and the financial perspective. This fact shows the remarkable flexibility of this method.

Since there is more than one perspective at stake, we will start by clarify what each perspective stands for. Niven (2002) points out that:

- The Customer perspective answers two critical questions: “Who are our target customers?” and “What is our value proposition in serving them?”
- The Internal Process perspective of the Scorecard is where we identify the key processes of the firm, and how we can improve in order to continue adding value for customers and, ultimately, shareholders.
- The Learning and Growth perspective includes employee training and corporate cultural attitudes related to both individual and corporate self-improvement, and so-to-speak this perspective is the enabler of the other three perspectives.
- The measures in the Financial perspective tell us whether our strategy execution, which is detailed through measures chosen in the other perspectives, is leading to improved bottom-line results.

Throughout time there have been some modifications to the BSC, besides the adoption of a different number of perspectives. According to the literature there are three generations of BSC (Gao et al., 2006), (Wikipedia, The Free Encyclopedia, 2008a) (Wikipedia, The Free Encyclopedia, 2008c).

The first generation BSC appeared in the early 1990s and combined financial and non-financial indicators with the four perspectives. At this point the indicators could or could not have cause-and-effect linkage.

The second generation BSC appeared in the mid 1990s and has put some emphasis on cause-and-effect relationships between measures and strategic objectives. At this point the BSC became a strategic management tool, using a strategy map to illustrate the linkage between measures and strategies.

The third generation BSC appeared in the late 1990s and was all about developing strategic control systems by incorporating destination statements and optionally two perspective strategic linkage models (“activity” and “outcome”).

As mentioned earlier, there are some BSC frameworks that have more than the original four perspectives or with four perspectives that are not the same as the ones originally proposed. For example in Kaplan et al. (2001) the BSC for a public-sector organization has five perspectives, the internal process perspective, the learning and growth perspective, the support legitimizing authorities perspective, the value/benefit of service perspective and the cost of providing services perspectives. Also in Kaplan et al. (2001) the BSC for non-profit organizations has four perspectives, the customer perspective, the internal process perspective, the learning and growth perspective and the donors’ perspective.

#### **4.2. Can the Implementation of the BSC Framework be Unsuccessful?**

Following available evidence, the BSC no doubt delivers improvements over what existed before (Kaplan et al., 1992) (Niven, 2002) (Santiago, 1999). According to Von Bergen et al. (2004), it has been proven that, any organizational intervention that places attention on activity performance

measurement triggers performance improvements, this kind of phenomenon is called the Hawthorne effect. Consequently, if the analysis of the success of the BSC is done too early, a positive result may be caused by the Hawthorne effect and not from the effectiveness of the BSC.

Despite the adoption of the BSC framework has been a success in many organizations, there have been cases where implementation of the balanced scorecard has been a failure. Von Bergen et al. (2004) and Wicks et al. (2007) point out several factors that can justify the failure of the implementation of the BSC framework:

1. Inconsistent or half-hearted application of the BSC or unwillingness to consider the BSC a dynamic process of self-improvement; and as David Norton (one of the creators of the BSC) points out “the biggest mistake that organizations make is thinking that the scorecard is just about measures. Quite often they will develop a list of financial and non-financial measures and believe they have a scorecard. This, I believe, is dangerous.”;
2. Measures that do not focus on strategy. This is a common problem because organizations tend towards some new non-financial measures, but fail to align them adequately with strategy;
3. Existence of organizations that might do better by focusing on one or more measures, rather than having a balanced emphasis in each of the four areas, because different strategies have different requirements for success;
4. The BSC assumes employee commitment but does not emphasize the employee perspective;
5. The BSC is founded on a management philosophy that is based on control rather than commitment;
6. The BSC assumes that trade-offs are necessary to solve problems, rather than emphasizing win-win solutions;
7. The BSC is developed at the executive level, but not communicated or cascaded down through an organization. Without effective communication throughout the organization, a balanced scorecard will not spur lasting change and performance improvement.

#### **4.3. Building a Balanced Scorecard Framework for a Large Enterprise**

As Niven (2002) and Pinero (2002) points out, the Balanced Scorecard is ideally created through the translation of the organization’s strategy into objectives, measures, targets, and initiatives in each of the BSC perspectives.

It is important to emphasize that the concept of balance is central to this system, because it is one of the properties that differentiates this tool from other performance measure frameworks. Specifically we should pay attention to the following:

- Balance between financial and nonfinancial indicators of success;
- Balance between internal and external elements of the organization.

In Kaplan et al. (1992) the terms lag and lead indicators were used for some measures. Let us clarify what they are: lag indicators represent the consequences of actions previously taken, while lead indicators are the measures that lead to—or drive—the results achieved in the lagging indicators (Niven 2002).

Consequently, in the original BSC there was another factor to take into account when developing a BSC, which was the balance between lag and leading indicators. This classification only served to

introduce causality to the BSC, but since the introduction of strategy maps these indicators were no longer needed (Andersen, 2004).

To start the implementation of the BSC first we must clearly define the organization's mission, core values, vision, and strategy, since they are the bases of an effective BSC (Niven, 2002) (Syed et al., 2007).

Although this seems to be easy to do, sometimes there is a lot of confusion when it comes to defining them, so it is very important to understand what we mean by the organization's mission, core values, vision, and strategy.

Mission is what one wants to achieve by starting the business. This must be reexamined and refreshed periodically if an organization is to remain dynamic (Small Business Notes, 2008).

Values are clear in everything one does, how one operates. Articulating values provides everyone with guiding lights, ways of choosing among competing priorities and guidelines about how people will work together (Small Business Notes, 2008).

Vision is what keeps the organization moving forward, even against discouraging odds. For example, a business may envision a community where every person has access to their product. Vision is the most powerful tool of motivation in an organization. If it is vivid and meaningful enough, people can do astounding things to bring the organization's vision to life (Small Business Notes, 2008).

The strategy, or strategic plan as it is sometimes called, is still a fairly high level look at the key milestones which need to be achieved if the mission is to be accomplished (Walking With Leaders, 2008).

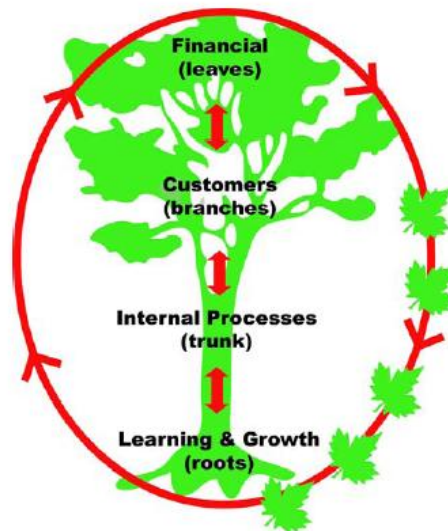
To craft a good strategy "it must be understood by all of the organization's employees, it must lead the organization to a unique and valuable position in the market, it always demand trade-offs in competition and it must crystallizes the organization's way of thinking on basic issues" (Niven, 2002).

After defining the organization's mission, core values, vision, and strategy, we must breakdown the strategy into its component parts through the objectives and measures chosen in each perspective.

A well-designed BSC should describe the strategy through the objectives and measures chosen, these measures should link together in a chain of cause-and-effect relationships from the performance drivers in the Learning and Growth perspective all the way through to improved financial performance as reflected in the Financial perspective, as it is illustrated in Figure 6.

Although the measures should link together, it is very important to first create performance objectives for each perspective of the BSC, and afterwards create the measures and link them together. Niven (2002) points out that, the best way to do this is to examine each perspective of the BSC in the form of a question:

- Financial perspective: What financial steps are necessary to ensure the execution of our strategy?
- Customer perspective: Who are our targeted customers, and what is our value proposition in serving them?
- Internal Process perspective: To satisfy our customers and shareholders, in which processes must we excel?
- Employee Learning and Growth perspective: What capabilities and tools do our employees require to help them execute our strategy?



**Figure 6 – Cause and effect relationship between perspectives (Hill et al., 2005)**

As it has been said before it is important to create objectives and measures for each of the four perspectives, so let us examine them separately.

#### **4.3.1. Financial Perspective Objectives and Measures**

Some critics find financial indicators unnecessary, since they don't improve customer satisfaction, quality, cycle time and employee motivation, and that the financial numbers result from the operational actions.

However, Kaplan et al. (1992) point out that this is not really true since "financial control system can enhance the organization's quality system, rather than inhibiting it, and that operational improvement don't always produce good financial performance".

A good example of this is the case of the NYSE electronics during 1987 to 1990, where in this period their outgoing defect rate dropped from 500 part per million to 50, on-time delivery improved from 70% to 96% and yield jumped from 26% to 52%. Despite this breakthrough improvement in quality, productivity and customer service, the organization's profit during this period showed little improvement.

Consequently, a well-constructed BSC cannot be complete without financial objectives and measures. And they are even more important to organizations of the private-sector, where profitability is always a key criterion of success.

To better develop this perspective it is important to analyze historical financial data, and understand the organization goals, so that the management can determine if specific financial changes would place the organization in a better position in the future (Shutt, 2003).

Sometimes organizations need to include additional financial-related data, such as risk assessment and cost-benefit data, in this category (Balanced Scorecard Institute, 2007c).

#### **4.3.2. Customer Perspective Objectives and Measures**

To have a better understanding of what kind of indicators should be used in this perspective, many organizations tend to choose one of three “disciplines” described in Treacy et al. (1997):

- Operational excellence – Organizations that make hard choices to stay ahead of the competition;
- Product leadership – Organization that aren’t content with a “new and improved” strategy, instead they focus on creating an endless flow of innovative products that offer customers unmatched functionality;
- Customer intimacy – Organizations that offer their customers a total solution that include a unique range of superior services so that customers get the greatest benefit from the products offered;

After choosing what kind of “discipline” fits the organizations better, the next step should be to “articulate goals for time, quality, performance and service, and then translate the in to measures” (Kaplan et al., 1992).

#### **4.3.3. Internal Processes Perspective Objectives and Measures**

Metrics based on the internal processes perspective allow managers to know how well the business is running, and whether its products and services conform to customer requirements (Balanced Scorecard Institute, 2007c).

Another point of view that has to be addressed in this perspective is the way that customers see the organization, i.e. the internal processes should not create a bad image for the organization.

It is common to see organizations focusing on processes that are directly related to their value proposition, but when elaborating a BSC the other processes should not be ignored, because sometimes, even if they do not related to the organization’s value proposition, they can influence it.

#### **4.3.4. Employee Learning and Growth Perspective Objectives and Measures**

Kaplan and Norton emphasize that learning is more than training, learning also includes things like “mentors and tutors within the organization, as well as that ease of communication among workers that allows them to readily get help on a problem when it is needed” (Arveson, 1998).

This perspective includes employee training and corporate cultural attitudes related to both individual and corporate self-improvement, as such they are the enablers of the other ones (from the other perspectives). To facilitate the measure selection process the organization should identify the differentiating competencies that it needs to achieve its strategy.

Also it is important to mention at least one measure related to employee training initiatives. It is important to do so because many times “investing in competency development and personal development planning yields results in the form of greater productivity” (Niven, 2002).

#### **4.3.5. Data Dictionary**

After choosing the measures for each of the four perspectives, they should be carefully analyzed in order to evaluate their adequacy. In his book Niven (2002) provides us with some criteria that experience and research have proven to be effective in helping evaluate and choose measures.

These criteria are the following:

- They should translate the organization’s strategy into actions through the performance measures

- Almost all of them should be calculated mathematically,
- The information required to calculate the performance measures should be easily accessed
- They should be understood by all employees, so that they can know whether a high value for the measure is good or bad
- They should not create a situation in which focusing on certain measures actually hinders your ability to compete
- They should accurately describe the objective in question
- All measures should be well defined.

When the selection process is complete a data dictionary should be created which provides the necessary background information to quickly defend the measure chosen and answer any question.

Niven (2002) states that the data dictionary should have the following entries:

- **Measure Background**
  - Perspective: Displays the perspective the measure falls under.
  - Measure number/name: All performance measures should be provided with a number and name. The number is important if we intend to create a reporting system.
  - Owner: Central to the idea of accountability is the establishment of owners for each and every measure
  - Strategy: Displays the specific strategy the measure will positively influence.
  - Objective: Every measure was created as a translation of a specific objective. Use this space to identify the relevant objective.
  - Description: Captures the essence of the measure so that anyone reading it will be able to quickly grasp why the measure is critical to the organization
- **Measure Characteristics**
  - Frequency: How often performance on this measure should be reported?
  - Unit type: This characteristic identifies how the measure will be expressed. Commonly used unit types include numbers, dollars, and percentages.
  - Polarity: When assessing the performance of a measure, it is important to know whether high values reflect good or bad performance
- **Calculation and Data Specifications**
  - Formula: Provides the specific elements of the calculation for the performance measure
  - Data source: Every measure must be derived from somewhere
  - Data quality: Place to comment on the condition of the data used when reporting Scorecard results
  - Data collector: person who provides the actual performance data
- **Performance Information**
  - Baseline: Users of the Balanced Scorecard will be very interested in the current level of performance for all measures.
  - Target
  - Target rationale: For people to galvanize around the achievement of a target, they need to know how it was developed and that while it may represent a stretch, it is not merely wishful thinking on the part of overzealous executives

- Initiatives: Template to map current or anticipated initiatives to specific performance measures

#### 4.3.6. Strategy Map

After creating the data dictionary, one should design a strategy map/ strategic linkage diagram, a tool discovered by Kaplan & Norton, while working with organizations to define the BSC. As Niven (2002) states this graphical map should also be complemented with a short narrative articulating the map.

At first the design of a strategy map was a mere part of the elaboration of the BSC, but the relevancy of this process has grown, and now it is the central theme of the balanced scorecard (Wikipedia, The Free Encyclopedia, 2008b). This was to be expected because the combined use of the BSC with strategy maps ensures that the effectiveness of the strategy is constantly monitored (Kaplan et al., 2004).

Kaplan et al. (2004) points out a number of benefits of the elaboration of a strategy map such as:

- It provides a vehicle for the full discussion of the organization's strategy, and develops it systematically;
- It might help avoiding the trap of creating a strategy that exists more in words than in execution;
- It can help make the strategy one that should drive the entire organization;
- It helps the employees to identify powerful assets — most of them intangible — that are vital sources of value creation;
- It might show how to align key intangible assets with critical processes, including: operations management, customer management, innovation, and regulatory and social processes.
- It might expose gaps in the existing strategy

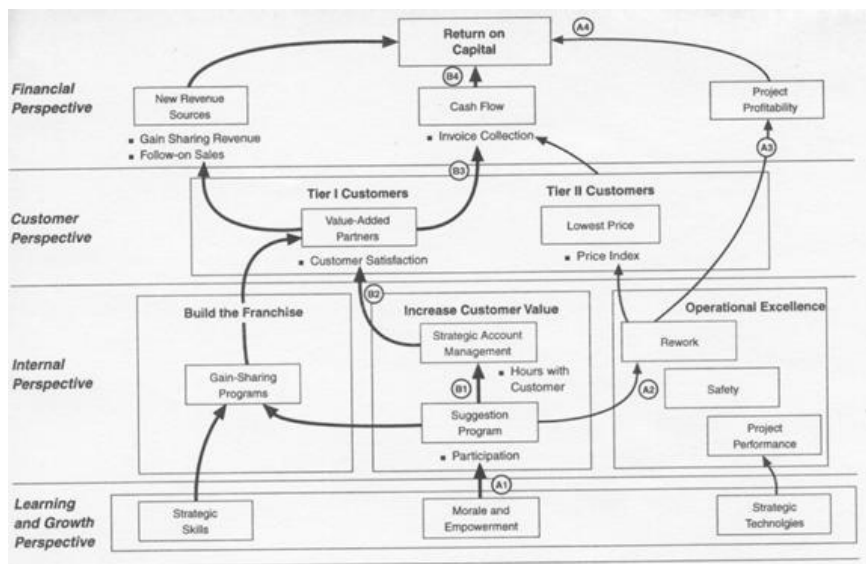


Figure 7 – Example of a strategic map (Jacobs, 2004)

#### 4.4. Building a Balanced Scorecard Framework for a Health care Organization

As discussed before, it is possible to implement a BSC in large companies, but in our case, there is another matter that needs to be addressed, which is the use of this model in a health care organization.



The first paper that related this framework to health care was published in 1995 (Zelman et al., 2003), and since then there have been several papers published about the subject.

Shutt (2003) states that “during the 21st century the success of a health care organization will depend on the ability of top executives to balance quality and customer satisfaction with adequate financing and long-range goals”. It should be clear by now that this might be potentially enhanced by the usage of the BSC (which might be relevant depending on the context).

Pineno (2002) has the same line of thought, but he finds “cost managing to be one of today’s most important challenges in health care”, and points out that the BSC can be very useful in this area, since it can help decision-making in strategic roles such as equipments investments, mergers opportunities, and operational roles like processes-improvement initiatives, and financial and non-financial performance indicators.

In addition the growing adoption of IS in health care organizations can also be a fact to consider, since it helps the BSC framework to become an effective tool (Syed et al., 2007).

As consequences of the qualities of the BSC framework pointed out throughout this thesis, the BSC has been adopted in several health care settings such as hospitals and medical centers in the United States, Canada, United Kingdom, Sweden, Australia New Zealand, and Taiwan (Balanced Scorecard Institute, 2007a) (Robertson, 2007) (Gao et al., 2006) (Kollberg, 2007) (Sriratanaban et al., 2004).

Despite all the positive aspects, the implementation of the BSC hasn’t always been successful. Syed et al. (2007) think that this fact should be expected, since the BSC implementation depends not only on selecting measures, but also on “how leadership, supervisors, and employees gain knowledge about the status of the balanced scorecard metrics”.

Zelman et al. (2003) also point out that medical staff relations and quality of care are difficult to measure, and that it is critical to have valid comprehensive and timely information to achieve the full potential of the balanced scorecard.

Each health care organization has a different approach to this framework, but all authors agree that the first step in its implementation is the clear definition of mission, vision, values and strategy.

After this step, it is important to choose the perspectives that will be used. For example, Gao et al. (2006) in their research found that most health care companies use four perspectives, like in Kaplan et al. (1992), but chose to change their names to better represent the health care environment and their business strategies. It is possible to see all Gao et al. (2006) findings in Table 1.

Pink, et al (2001), Robinson (2001) and Hill et al. (2005) also found the modification of the names of the perspectives to be a common procedure.

Although the number of perspectives used in the BSC can fluctuate, the most common approach to in health care is the one with four perspectives, it is important to find out what kind of information those perspectives give -- the manager. This can be attained by translating each perspective into a query, as showed in

Table 2.

While answering the query it is important to bear in mind that we are dealing with a health care provider and as such, they can have special indicators (

Table 3) that normally do not apply to the common BSC applications, or with such relevance.

**Table 1 – Different perspectives found on 22 examples of BSC (Gao et al., 2006)**

	<b>Number of examples</b>	<b>Percentage</b>
Financial (and Synonyms)	19	86
Customer (and Synonyms)	17	77
Internal Business Process (and Synonyms)	20	91
Learning and Growth or Innovation and Learning (and Synonyms)	11	50
Other perspectives	14	64

**Note:** All 22 organizations were health care organizations

**Table 2 – Some questions that might be explored (Hill et al., 2005)**

<b>Perspective</b>	<b>Question that should be answered</b>
Financial	How do we need to perform financially to achieve our mission?
Customer	How do we meet the need/expectations of our community, patients and physicians?
Internal Business Process	At which business and health care delivery processes must we excel?
Learning and Growth or Innovation and Learning	What kind of culture, skills, training and technology are we going to develop to support our processes?

**Table 3 - Health care Focus and Metrics (Wicks et al., 2007)**

<b>Perspective</b>	<b>Health care Focus</b>	<b>Health care Metrics</b>
Financial	Maximizing revenues and managing costs	Clinical, operational, and financial indicators
Customer	Patient metrics, volume, and market share to increase ambulatory presence and the promotion of health and wellness	Patient satisfaction survey scores; patient safety; Joint Commission accreditation; expanded clinical services; coordinated clinical care centers; increased ambulatory volume
Internal business and processes	Cycle and turnaround times to enhance efficiency	Time to admission; length of stay; number of physicians connected to hospital clinical ISs
Learning and growth	Employee learning, innovation, and growth	Vacancy and turnover rates; employee development plans; employee satisfaction

#### **4.4.1. Financial Perspective**

As the name and the query present in Table 2 indicates, this perspective is intended to evaluate the financial performance of the organization, and how this is affecting the goals required to fulfill its mission and vision.

The financial perspective of the BSC yields a snapshot of the organization's past and present bottom-line. To improve this perspective it is important to analyze historical financial data, and understand the company's goals, so that the management can be able to determine if specific financial changes would improve the position of the organization in the future (Shutt, 2003).

Being a health care provider Hill et al. (2005) present us with some examples of measures that can be present in this perspective, such as days cash on hand, commercial mix, net revenue increase cost per patient day, salary and benefit expense and nursing staff productivity.

#### **4.4.2. Customer Perspective**

In this perspective, as shown on the query present on Table 2, the managers have to identify the customer and market segments in which the organization will compete (Kaplan et al., 1996). The measures used in targeting these areas often are customer satisfaction, customer retention and acquisition, and market share.

In the ever-changing world of health care, identifying the customer becomes more complex each year, however many customer satisfaction surveys are available for management to use in determining where satisfaction can be improved (Shutt, 2003).

Hill et al. (2005) point out some measures that can be included in this perspective- These measures might be a loyalty index, time to treating provider, courtesy and respect, patient engagement and inpatient satisfaction. It is important to notice that these measures have to be present in the customer satisfaction survey, so that they can be a reliable measure.

#### **4.4.3. Internal Business and Processes Perspective**

As pointed out earlier, the BSC requires the identification and measure of critical internal processes. To achieve this goal it has the internal business and processes perspective, where management is required to target processes in which continued excellence has an impact on customer satisfaction and is influential in achieving financial objectives.

As Shutt (2003) points out, the BSC "differs from traditional strategies" because it compels the organization to "monitor and improve established business processes and to identify entirely new processes needed to meet customer and financial objectives", because as Kaplan et al. (1996) states, the reengineering and/or initializing of new processes may be required to meet the goals of the organization.

Although every organization has its unique way of competing with their rivals, thus having unique internal business processes, there are some measures that normally appear in this perspective. As Hill et al. (2005) indicate the contractual allowances, MD engagement index, responsiveness, medical error rate and waiting time, are good examples of this kind of measures in health care providers.

#### **4.4.4. Learning and Growth Perspective**

While in the customer and internal-business process perspectives we identify the critical factors for the current and future success, in the learning and growth perspective we aids the organization in determining what capabilities will be required, so that the demands of future customers can be attained (Kaplan et al., 1996).

Kaplan et al. (1996) identifies three principal sources of organizational learning and growth: employee re-skilling, information technology and systems and organization procedure and routines. However, there is other information that may need to be developed in health care companies such as nursing staff turnover, staff turnover, staff loyalty index and medical error policy (Hill et al., 2005).

#### **4.4.5. Strategy Map**

After deciding which perspectives to use and translating the organization's mission, vision and strategy into objectives measures, it is important to create a strategy map with those measures.

This strategy map will help the whole organization to understand the BSC, and its reason to exist. If any questions arise it is important to have a data dictionary.

There are several examples of strategic maps, such as the ones form the Alaska Native Tribal Health Consortium (Alaska Native Tribal Health Consortium, 2005), the Northern Sydney Central Coast Health (Northern Sydney Central Coast Health, 2008), the Rural Health Resource Center (Hill et al., 2005), and the US Veterans Administration (Process Design Consultants Inc., 2007), that can prove useful as examples to elaborate a strategy map for an health care organization.

#### **4.5. Using the Balanced Scorecard Framework in a Small and Medium Enterprise**

Since the CENC can be considered a SME, it is importance to know if the BSC is appropriate for this kind of organization, because when the balanced scorecard was conceived it was meant to be used in big enterprises.

As Andersen (2001) points out, the "link between an organization's approach to strategic planning and business performance exists in both big and small organizations". So it is reasonable to assume that, since the BSC is a tool which is meant to support strategic management, it should be possible to implement it in a SME.

Another aspect that makes this kind of tool appropriate for a SME is the fact that, as pointed out earlier, the BSC can be used at different levels, showing a remarkable flexibility. For each level, it identifies the key components of operations, sets goals for them, and finds ways to measure progress toward achieving these goals (Von Bergen et al., 2004).

Also as Von Bergen et al. (2004) point out, the BSC approach helps to mobilize change through executive leadership, by building a strategy focused organization the BSC. Also by aligning the organization to its strategy this framework makes the company evaluate their current organizational structures, lines of reporting, and policies and procedures to ensure that they are consistent with the strategy.

Smith et al. (2007) state that, although there are studies that suggest that there are significant difficulties implementing such a resource intensive system in an environment where resources are

typically scarce, if the organization's culture is flexible, dynamic and willing to take risks to succeed, there are some advantages in implementing a BSC.

They also state that, in this case, the companies tend to have few employees and generally flat structures, making both management and process visibility likely to be high. These characteristics should facilitate the communication process and help to ensure that every employee is aware of what is happening and why.

Also as Atkins et al. (1997) point out the implementation of a strategic management tool, such as the BSC, may facilitate the development of more complex management structures that are needed as small firms grow.

Another reason why this framework should be implemented in SME is that a great proportion of the value of the balanced scorecard comes from its use to formalize the description of strategic vision and associated strategic objectives and priorities, and its impetus to the development and application of more effective strategic and general management, which are both weakly addressed in this kind of organization (Andersen, 2001) (Fernandes et al., 2006).

As Andersen (2001) states, the implementation of a BSC in a SME should be done in the same way as in a big enterprise. The only thing that is different is the duration of the process, which should be quicker due to a less complex organizational structure and to the small number of employees.

Fernandes et al. (2006) points out, "there is very limited systematic research done on BSC applications in small and medium scale enterprises", so on this thesis we develop a BSC framework for a SME and analyze the problems that are associated with this task and we also identify the kind of changes that the organization's IS need so that the BSC tool can be effective.

#### **4.6. A Balanced Scorecard framework for CENC**

We propose to develop a BSC framework for CENC so as to answer to the objectives defined for this thesis. However, due to the small size of the organization and the low quality and quantity of information available, the design of the BSC model for the clinic had to start from scratch.

As pointed out in the previous chapter, according to Andersen (2001) the implementation of the BSC in a SME should be done following the same steps as those meant for a large organization. This way the CENC's BSC will be implemented according to what was described in section 4.4.

In CENC we propose the implementation of a 2<sup>nd</sup> generation BSC, with four perspectives just like the one initially proposed in Norton et al. (1992).

We chose this approach because, as Gao et al. (2006) point out, most of the health care organizations that implemented this framework used only these four perspectives and as such we think that this approach is the most widely studied. Besides this fact, and due to the organizational context mentioned in section 1, we think that the implementation of additional perspectives would probably increase the complexity of the model, thus making it harder to implement in the CENC.

Although we intend to implement a BSC framework similar to the one presented by Norton et al. (1992), we propose a slight variation of this framework differing from the first only in the names of the perspectives. This approach is fairly common in health care, because as Pink et al. (2001), Robinson (2001) and Hill et al. (2005) point out, these versions only aim at improving the representation of the health care environment.

So the BSC we propose will have (as indicated before) four perspectives: the finance perspective, the community and providers perspective, the clinical and business perspective and the learning and growth perspective, as shown in Figure 8.



**Figure 8 – Balanced Scorecard for CENC**

The implementation of the CENC's BSC will begin with the establishment of the organization's vision, mission, values and strategy. Afterwards we define the main objectives for each perspective and respective measures. We also create a data dictionary to compile all the information regarding the measures used. In the end we design the clinic's strategy map with the cause and effect linkage between measures, as shown in Figure 9.

As can be seen in Figure 9 the implementation of the BSC is an iterative process with a double-loop feedback mechanism. This mechanism, as reported earlier allows the manager not only to evaluate if the measures used are the best ones to monitor the clinic's performance, but also helps the reevaluation of the organization's mission, visions, values and strategy, in order to see if it is adequate to the present situation of the company.

As Niven (2002) points out, this reviewing process of the BSC is normally made once a year and usually involves changes in objectives and measures rather than changes in the organization's mission vision, values and strategy. Mainly because changes in objectives and measures come from the growing experience in the use of the BSC and the changes in the organization's mission vision, values and strategy come from radical changes in the organization's environment.



**Figure 9 – Blueprint for the implementation of the BSC at the CENC**

To gather all the information we needed to develop the BSC framework for CENC we used participatory methods such as a series of meetings, e-mail exchanges and phone calls with the clinic’s manager, because as pointed out in previous chapters, Dr. Teresa Paiva, as the owner–manager, is the sole decision-maker. Some key points in the interaction with Dr. teresa Paiva were:

1. Meeting with the clinic’s manager to understand the current situation of the clinic and to understand its management needs;
2. Meeting with the manager to retrieve the clinic’s databases and to understand what kind of information the current IS provides;
3. Exchange of e-mails and phone calls to gather information about the clinic’s mission, vision and strategy;
4. Meeting to retrieve additional information for the definition of the CENC’s mission, vision, values and strategy;
5. Meeting to validate the clinic’s CENC’s mission, vision, values and strategy we proposed and to gather more information in order to develop the main objectives for each BSC perspective and respective measures;
6. Meeting to present the manager with the objectives and measures proposed, and to gather information for the data dictionary, such as baselines and targets for the measures;
7. Meeting to gather information to complete the data dictionary;
8. Exchange of e-mails to get the final feedback about our proposal from the clinic’s manager.

## **5. Application of the Balanced Scorecard to CENC**

In this chapter we present the results from applying the BSC framework to CENC. To this end first we define the CENC's mission, vision, values and strategy. According to these aspects we define the main objectives for each perspective and design the measures needed to accomplish such objectives. To facilitate the understanding of the measures we also create a data dictionary. In the end we design the organization's strategy map with cause and effect linkage of the measures.

### **5.1. Mission**

Opened since 1983, the *Centro de Electroencefalografia e Neurofisiologia Clínica, Lda.* (CENC) is a multidisciplinary clinical center that integrates the latest medical trends, with a humanist and humanitarian style of developing health care services. In other words, the CENC tries to make the patient feel unique and special, while being diagnosed and treated according to international clinical standards.

### **5.2. Values**

CENC is committed to:

- Keep patient's satisfaction as high as possible;
- Give patients a warm and pleasant atmosphere;
- Provide the best medical service;
- Give a fast and complete diagnose.

### **5.3. Vision**

*The Centro de Electroencefalografia e Neurofisiologia Clínica, Lda.* aims to be:

- A clinical and teaching center of reference, in the sleep disorder area;
- A place of innovation;
- A growing medical center, that not only provides service in the sleep disorder area, but also in other areas, such as cognitive processing, pneumology, obesity, fibromyalgia and neuro-feedback.

### **5.4. Strategy**

As mentioned earlier, the CENC is a private health care organization located in Lisbon, with its core business is in the area of sleep disorders.

As a health care provider, CENC can be qualified as a customer-intimate organization, because of its unique atmosphere, that resembles a family house and because the clinic's staff concentrate all their efforts on delivering care to patients in a warm and comfortable environment.

This fact is very important because sometimes the clinical exams require the patient to sleep in the clinic, and the existence of a comfortable and family-like atmosphere makes the patient more at ease and gives the CENC a good competitive advantage.



The reputation of Dr. Teresa Paiva in this clinic makes it one of the most respected sleep disorder clinics in the country, since she is one of the most successful and well-known specialists in the country in the sleep disorder area.

The growing pressure of its rivals, due to the opening of new sleep laboratories funded by big investment groups, such as the *Grupo José Mello* or the *Caixa Geral de Depósitos*, and the problems caused by the previous management, has recently forced the owner and current manager to have a more hands-on approach to the clinic's management.

After a meeting with the CENC's manager, it was clear that the main problems that affected the clinic's management were:

1. The lack of relevant information provided by the clinic's IS;
2. The lack of a defined and structured strategy for the clinic.

Given this context, the BSC framework helps to provide information to aid the manager of the clinic: this thesis aims to provide simple, effective and structured information to help the management of the clinic.

Besides the development of the management tool, the manager of the clinic wants to diversify the clinic's medical services it provides. The new medical activities include the following areas:

1. Cognitive processing;
2. Pneumology;
3. Obesity;
4. Fibromyalgia;
5. Neuro-feedback.

This strategy is meant not only to compensate the entrance of new rivals to the external environment, but also to improve financial situation of CENC (situation achieved under previous managers of the clinic).

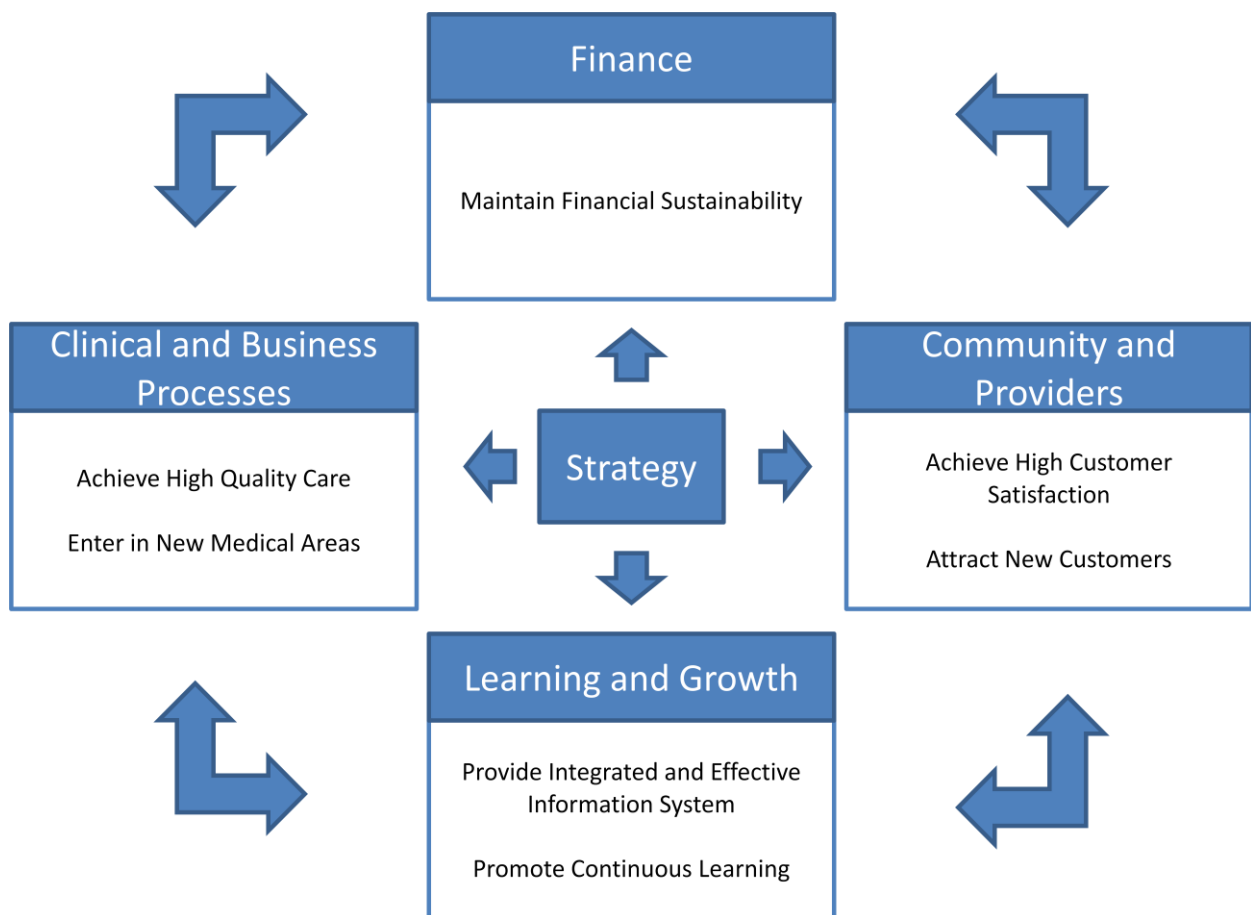
To sum up, the main strategic objectives of CENC are to:

1. Provide a health care service with great quality;
2. Maintain the patients satisfaction as high as possible;
3. Diversify the clinic's medical activities;
4. Correct the management problems created by previous managers;
5. Improve the clinic's IS and management system.

### **5.5. The CENC's Objectives and Measures**

After establishing the CENC's mission, vision, values and strategy, and the names of the four perspectives, it is important to define objectives and measures for each perspective.

So after carefully analyzing the clinics strategy, we proposed a series of objectives to the clinic's manager. After meeting with the management, some changes were made to that proposal in order to ensure the management needs and to eliminate measures that could not be implemented. The final objectives proposed for each perspective are represented in Figure 10.



**Figure 10 – CENC's objectives for each perspective**

After establishing the main objectives for the perspectives, the BSC framework required the creation of measures so that the BSC system can be used to analyze the clinic performance. These measures were inspired by the information available and from examples of other health care organizations such as the Alaska Native Tribal Health Consortium, the Northern Sydney Central Coast Health and the Rural Health Resource Center.

In the following sub-chapters we present the final measures developed and approved with the clinic's manager.

### 5.5.1. Finance Perspective

As the name indicates, this perspective is intended to evaluate the financial performance of the clinic, and how it is affecting the goals required to fulfill the CENC's mission and vision.

In CENC the main objective for this perspective to achieve the organization's mission and vision is:

1. Maintain financial sustainability

As explained previously, it is not only necessary to establish objectives, but also to translate them into measures, and to create targets for those measures.

To maintain profit the following measures were selected:

F01: Clinic's profit

F02: Clinic's debt

F03: Clinic's operating costs

On the following table we will summarize the information regarding the main objectives for this perspective, the measures used to evaluate the accomplishment of the objectives and the code name for each measure.

**Table 4 – Finance perspective objectives and measures**

Objective	Measure
Maintain financial sustainability	F01: Clinic's Profit F02: Clinic's debt F03: Clinic's Operating Costs

### 5.5.2. Community and Providers Perspective

In this perspective of the BSC, managers identify the customer and market segments in which the CENC will compete. As it has said before the CENC is a customer-intimate organization, and as such this perspective is one of the most important. In order to attain this objective, it is very important to carefully analyze the customer satisfaction surveys, and to choose which kind of indicators should be included in this section.

To achieve the CENC's mission and vision, the main community and providers perspective objectives are:

1. Achieve high customer satisfaction
2. Attract new customers

To achieve a high customer satisfaction we will use the following measures:

CP01: The number of recurring patients

CP02: The level of customer satisfaction

CP03: The number of complaints

To see how well the CENC is attracting new customers we will measure:

CP04: The number of new patients

CP05: The number of media quotes

CP06: The number of linked collaborators

**Table 5 – Community and providers perspective objectives and measures**

Objective	Measure
Achieve high customer satisfaction	CP01: The number of recurring patients CP02: The level of customer satisfaction CP03: The number of complaints
Attract new customers	CP04: The number of new patients CP05: The number of media quotes CP06: The number of linked collaborators

### 5.5.3. Clinical and Business Processes Perspective

In this perspective the manager is required to identify and measure critical internal processes. Management is also required to target processes in which continued excellence has an impact on customer satisfaction and is instrumental in achieving financial objectives.

In the CENC the main objectives for this perspective are:

1. Provide high quality care
2. Enter in new areas of medical expertise

To provide a high quality care service, the following measures were selected:

CBP01: The number of patients on the waiting list

CBP02: The time a patient needs to get an appointment

CBP03: The time in the waiting room

To analyze if the CENC is entering in new medical areas, the following measures were selected:

CBP04: The number of new exams

CBP05: The number of patents created

**Table 6 – Clinical and business processes perspective objectives and measures**

Objective	Measure
Provide high quality care	CBP01: The number of patients on the waiting list CBP02: The time a patient needs to get an appointment CBP03: The time in the waiting room
Enter in new areas of medical expertise	CBP04: The number of new exams CBP05: The number of patents created

### 5.5.4. Learning and Growth Perspective

While the customer and internal-business process perspectives identify the critical factors for the current and future success, the learning and growth perspective aids the organization in determining what capabilities will be required to meet the value demands of future customers.

In the CENC the main objectives for this perspective are:

1. Provide effective, integrated information support
2. Provide continuous learning

To provide effective, integrated information support the following measures were selected:

LG01: The level of database integration

LG02: The level of changes made in the IS

LG03: The number of entries filled in the database

To ensure a continuous learning we will analyze:

LG04: The number of publications on journals of reference

**Table 7 – Learning and growth perspective objectives and measures**

Objective	Measure
Provide effective, integrated information support	LG01: The level of database integration LG02: The level of changes made in the IS LG03: The number of entries filled in the database
Promote continuous learning	LG04: The number of publications on journals of reference

### 5.6. Data Dictionary

After deciding the main objectives and related measures for each perspective, according to what was said in previous chapters, we needed to create a data dictionary. This data dictionary is composed of a series of tables, one for each measure, that contain all the information needed to provide the background to explain the choice of the measure and to answer any questions that may arise.

Since the CENC is a small organization, some of the entries proposed by Niven (2002) will not be used because they are not relevant in this organization. So the entries that we propose for the data dictionary are the following:

- **Perspective** – Displays the perspective the measure falls under;
- **Measure name and number** – All performance measures should be provided with a number and name. The number is important if we intend to create a reporting system;
- **Objective** – This space is meant to identify the relevant objective;
- **Description** – This item is meant to capture the essence of the measure so that anyone reading it will be able to quickly grasp why the measure is critical to the organization;
- **Frequency** – How often performance on this measure should be reported;
- **Unity** – This characteristic identifies how the measure will be expressed;
- **Polarity** – When assessing the performance of a measure, it is important to know whether high values reflect good or bad performance;
- **Formula** – Provides the specific elements of the calculation for the performance measure;
- **Data source** – The place where the information required comes from;
- **Data quality** – Condition of the data used when reporting scorecard results;
- **Data collector** – Person who provides the actual performance data;
- **Baseline** – Current level of performance;
- **Target**
- **Target rational** – Item where the manager shows how the targets were developed and that while it may represent a stretch, it is not merely wishful thinking

If the measure requires additional information than is not present in the current IS nor in paper support, the baseline and target fields will be set to N.A. (not available), or in some cases with some values that probably won't match the reality of the clinic. In this case it would be important to revise these measures in the future to complete the missing information.

The target field is somewhat simplified and not very accurate due to the lack of information and management knowledge of the clinic's manager.

It important to point out that if some measure is automatically acquired without any sort of formula the formula filed will not exist.

Also since Dr. Teresa Paiva is the most important person in the clinic, most of the information needed for the BSC is gathered by her.

**Table 8 - Measure F01: Clinic's Profit**

<b>Perspective:</b> Finance	<b>Measure number/name:</b> F01 / Clinic's Profit		
<b>Objective:</b> Maintain financial sustainability			
<b>Description:</b> Profit generally is the making of gain in business activity for the benefit of the owners of the business. As such, and since the CENC is a private organization, the analysis of the variation of profit is a good financial indicator.			
<b>Frequency:</b> Monthly	<b>Unity:</b> €	<b>Polarity:</b> High values are good	
<b>Formula:</b>			
<b>Data Source:</b> Financial database			
<b>Data Quality:</b> High	<b>Data Collector:</b> Dr. Teresa Paiva		
<b>Baseline:</b> 2000	<b>Target:</b> 5000 in December 2008		
<b>Target rationale:</b> With the growing number of exams and appointments made in the clinic in the near future it is expected that the clinic's income will grow, as will the profit			

**Table 9 - Measure F02: Clinic's Debt**

<b>Perspective:</b> Finance	<b>Measure number/name:</b> F02 / Clinic's Debt		
<b>Objective:</b> Maintain financial sustainability			
<b>Description:</b> Since debt is what the CENC owes, it is always important to know how well the debt is being paid, and a good way to analyze that is to see how the debt oscillates during a certain period of time.			
<b>Frequency:</b> Monthly	<b>Unity:</b> €	<b>Polarity:</b> Small values are good	
<b>Formula:</b>			
<b>Data Source:</b> Financial database			
<b>Data Quality:</b> High	<b>Data Collector:</b> Dr. Teresa Paiva		
<b>Baseline:</b> 30000	<b>Target:</b> 0 in December of 2008		
<b>Target rationale:</b> Since the clinic is a organization that generates profit, the existing debt was caused by a poor management of previous managers, this was it is expected that the new manager will pay the existing debt in the short run.			

**Table 10 - Measure F03: Operation Costs**

<b>Perspective:</b> Finance	<b>Measure number/name:</b> F03 / Operating Costs	
<b>Objective:</b> Maintain financial sustainability		
<b>Description:</b> For a commercial enterprise operating costs are those which are the same whether the organization is closed or running at 100% capacity.		
<b>Frequency:</b> Monthly	<b>Unity:</b> €	<b>Polarity:</b> small values are good
<b>Formula:</b>		
<b>Data Source:</b> Financial database		
<b>Data Quality:</b> High	<b>Data Collector:</b> Dr. Teresa Paiva	
<b>Baseline:</b> 45000	<b>Target:</b> 35000 in December 2008	
<b>Target rationale:</b> N.A.		

**Table 11 - Measure CP01: Recurring Patients**

<b>Perspective:</b> Community and Providers	<b>Measure number/name:</b> CP01 / Recurring Patients	
<b>Objective:</b> High customer satisfaction		
<b>Description:</b> The analysis of the number of recurring patients can indicate if patients are satisfied with the clinics services, because normally if a patient does not like a certain clinic service, he will not ask for its' services again		
<b>Frequency:</b> Twice a year	<b>Unity:</b> Counts	<b>Polarity:</b> High values are good
<b>Formula:</b> Number of patients that visited the clinic during the period of time under analysis and that have had previous appointments		
<b>Data Source:</b> Clinic's integrated database		
<b>Data Quality:</b> High	<b>Data Collector:</b> Ana Coutinho, Isabel Barradas, Ricardo Pereira and Sofia Rebocho	
<b>Baseline:</b> N.A.	<b>Target:</b> N.A.	
<b>Target rationale:</b> N.A.		

**Table 12 - Measure CP02: Number of Complaints**



<b>Perspective:</b> Community and Providers		<b>Measure number/name:</b> CP02 / Number of Complaints	
<b>Objective:</b> High customer satisfaction			
<b>Description:</b> The number of complaints is a proxy for patient's satisfaction, so if we want a high patient satisfaction, the number of complaints should be as low as possible			
<b>Frequency:</b> Annually		<b>Unity:</b> Counts	<b>Polarity:</b> Small values are good
<b>Formula:</b>			
<b>Data Source:</b> Clinic's integrated database			
<b>Data Quality:</b> High		<b>Data Collector:</b> Ana Coutinho, Isabel Barradas, Ricardo Pereira	
<b>Baseline:</b> N.A.		<b>Target:</b> N.A.	
<b>Target rationale:</b> N.A.			

**Table 13 - Measure CP03: The Level of Satisfaction**

<b>Perspective:</b> Community and Providers		<b>Measure number/name:</b> CP03 / The level of Satisfaction	
<b>Objective:</b> High customer satisfaction			
<b>Description:</b> It is important to know the general level of satisfaction of the patient. A good way to analyze this is to see the percentage of people that have a general level of satisfaction above 3			
<b>Frequency:</b> Annually		<b>Unity:</b> Percentage	<b>Polarity:</b> High values are good
<b>Formula:</b> Level 1 – Bad Level 2 – Regular Level 3 - Good		Level 4 – Very Good Level 5 - Excellent	$\frac{N_{I3} + N_{I4} + N_{I5}}{N_{Total}} * 100$
<b>Data Source:</b> Clinic's integrated database			
<b>Data Quality:</b> Low		<b>Data Collector:</b> Ana Coutinho	
<b>Baseline:</b> N.A.		<b>Target:</b> N.A.	
<b>Target rationale:</b> N.A.			

**Table 14 - Measure CP04: The Number of New Patients**

<b>Perspective:</b> Community and Providers		<b>Measure number/name:</b> CP04 / The Number of New Patients	
<b>Objective:</b> Attract new customers			
<b>Description:</b> The number of new patients is given by the number of patients that made their first appointment in a certain period of time. This kind of measure is important since the competition in this field is growing so the manager needs this type of information.			
<b>Frequency:</b> Twice a year		<b>Unity:</b> Counts	<b>Polarity:</b> High Values are good
<b>Formula:</b>			
<b>Data Source:</b> Clinic's integrated database			
<b>Data Quality:</b>		<b>Data Collector:</b> Ana Coutinho, Isabel Barradas, Ricardo Pereira	
<b>Baseline:</b> 3		<b>Target:</b> 1	
<b>Target rationale:</b> N.A.			

**Table 15 - Measure CP05: The Number of Media Quotes**

<b>Perspective:</b> Community and Providers		<b>Measure number/name:</b> CP05 / The Number of Media Quotes	
<b>Objective:</b> Attract new customers			
<b>Description:</b> When attracting new patient it is very important to advertise the clinic, so that the potential patient can be aware of the existence of the clinic and its quality of service. A good way to do that is this is by setting the media's attention on the work made in the clinic.			
<b>Frequency:</b> Once a year		<b>Unity:</b> Counts	<b>Polarity:</b> High Values are good
<b>Formula:</b>			
<b>Data Source:</b> Additional database			
<b>Data Quality:</b> Low		<b>Data Collector:</b> Dr. Teresa Paiva	
<b>Baseline:</b> To be collected		<b>Target:</b> N.A.	
<b>Target rationale:</b> Since the owner manager and most important physician of the clinic, Dr. Teresa Paiva, is going to launch a new book, it is expected a high media coverage is expected and with that an increase of media quotes about the clinic.			

**Table 16 - Measure CP06: The Number of Linked Collaborators**

<b>Perspective:</b> Community and Providers		<b>Measure number/name:</b> CP06 / The Number of Linked Collaborators	
<b>Objective:</b> Attract new customers			
<b>Description:</b> To provide a good service the clinic has to attract collaborators capable of dealing with the problems the clinic's physicians can not solve.			
<b>Frequency:</b> Twice a year		<b>Unity:</b> Counts	<b>Polarity:</b> High Values are good
<b>Formula:</b>			
<b>Data Source:</b> Additional database			
<b>Data Quality:</b> High		<b>Data Collector:</b> Dr. Teresa Paiva	
<b>Baseline:</b> 26		<b>Target:</b> 28	
<b>Target rationale:</b> With the increase in patients the clinic needs to have more outside collaborators.			

**Table 17 - Measure CBP01: The Number of Patients on The Waiting List**

<b>Perspective:</b> Clinical and Business Processes		<b>Measure number/name:</b> CBP01 / The Number of Patients on The Waiting List	
<b>Objective:</b> High quality care			
<b>Description:</b> When it comes to internal processes it is very important to analyze the number of patients on the waiting list, because if this number is high, it will indicate that there is a great number of people interested in being treated in the clinic. However it is important to keep the value not very high because if it is very high it will indicate that the patient has to wait a lot of time for an appointment, and it is likely that that patient will cancel the appointment. In this case the clinic might try to increase human resources			
<b>Frequency:</b> Twice a year		<b>Unity:</b> Counts	<b>Polarity:</b> High values are good
<b>Formula:</b> Number of patients that have an appointment scheduled for a date that proceeds the date when the analyzes are done			
<b>Data Source:</b> Clinic's integrated database			
<b>Data Quality:</b> High		<b>Data Collector:</b> Ana Coutinho, Isabel Barradas, Ricardo Pereira	
<b>Baseline:</b> N.A.		<b>Target:</b> N.A.	
<b>Target rationale:</b> N.A.			

**Table 18 - Measure CBP02: The Time To Get An Appointment**

<b>Perspective:</b> Clinical and Business Processes		<b>Measure number/name:</b> CBP02 / The Time To Get An Appointment	
<b>Objective:</b> High quality care			
<b>Description:</b> When it comes to internal processes it is very important to analyze the time a patient needs to get an appointment, because if this value is very high because it is likely that that patient will cancel the appointment.			
<b>Frequency:</b> Twice a year		<b>Unity:</b> day	<b>Polarity:</b> Small Values are good
<b>Formula:</b> (date of an appointment if it was made in the day of the analyses) – (date of the analyses)			
<b>Data Source:</b> Clinic's integrated database			
<b>Data Quality:</b> High		<b>Data Collector:</b> Ana Coutinho, Isabel Barradas, Ricardo Pereira	
<b>Baseline:</b> 90		<b>Target:</b> 90	
<b>Target rationale:</b> Although the objective here is to reduce the time in the waiting list, it is important to observe that most of the patients want to be treated by Dr. Teresa Paiva, so there is a limitation to this reduction, which is the number of patients that Dr. Teresa Paiva can treat in a year.			

**Table 19 - Measure CBP03: The Time in The Waiting Room**

<b>Perspective:</b> Clinical and Business Processes		<b>Measure number/name:</b> CBP03 / The Time On The Waiting Room	
<b>Objective:</b> High quality care			
<b>Description:</b> Since this is a health care organization, it is very important to ensure that a patient stays as little time as possible in the waiting room. To analyze this aspect we calculate the difference between the time the patient started the consultation or exam and the time the appointment was really scheduled.			
<b>Frequency:</b> Four times a year		<b>Unity:</b> Minutes	<b>Polarity:</b> Small Values are good
<b>Formula:</b> (Time a patient starts treatment) – (Time the patient was supposed to start treatment)			
<b>Data Source:</b> Clinic's integrated database			
<b>Data Quality:</b> High		<b>Data Collector:</b> Ana Coutinho, Isabel Barradas, Ricardo Pereira	
<b>Baseline:</b> N.A.		<b>Target:</b> N.A	
<b>Target rationale:</b> N.A.			

**Table 20 - Measure CBP04: The Number of New Exams**

<b>Perspective:</b> Clinical and Business Processes		<b>Measure number/name:</b> CBP04 / The Number of New Exams	
<b>Objective:</b> New areas of medical expertise			
<b>Description:</b> Since one of the main objectives of this clinic is to expand its boundaries in terms of medical expertise, it is very important to know how many exams are related to new medical areas.			
<b>Frequency:</b> Annually		<b>Unity:</b> Counts	<b>Polarity:</b> High Values are good
<b>Formula:</b>			
<b>Data Source:</b> Clinic's integrated database and Additional database			
<b>Data Quality:</b> High		<b>Data Collector:</b> Ana Coutinho, Isabel Barradas, Ricardo Pereira	
<b>Baseline:</b> 0		<b>Target:</b> 2	
<b>Target rationale:</b> Since the adoption of new medical expertise is not already in place, it is impossible to know how the potential customers will react to this situation.			

**Table 21 - Measure CBP05: The Number of Patents Created**

<b>Perspective:</b> Clinical and Business Processes		<b>Measure number/name:</b> CBP05 / The Number of Patents Created	
<b>Objective:</b> New areas of medical expertise			
<b>Description:</b> Since the manager of the clinic wants to expand the clinic to new areas, some of which with new medical approaches, it is important to keep a close look at the number of patents created, so that the manager can have an idea of how innovating the clinic is being developed.			
<b>Frequency:</b> Annually		<b>Unity:</b> Counts	<b>Polarity:</b> High Values are good
<b>Formula:</b>			
<b>Data Source:</b> Additional database			
<b>Data Quality:</b> Low		<b>Data Collector:</b> Dr. Teresa Paiva	
<b>Baseline:</b> 0		<b>Target:</b> 1	
<b>Target rationale:</b> Since the adoption of new medical expertise is not already in place and the creation of patents is related to this subject, it is impossible to know how many patents will be created, although the manager is expecting the creation of one patent in the near future.			

**Table 22 - Measure LG01: The Level of Database Integration**

<b>Perspective:</b> Learning and Growth		<b>Measure number/name:</b> LG01 / The Level of Database Integration	
<b>Objective:</b> Provide effective, integrated information support			
<b>Description:</b> This measure is meant to evaluate the changes in the clinic's database architecture, that in the end will lead to an architecture that enables the use of an effective BSC			
<b>Frequency:</b> Four times a year		<b>Unity:</b> Level	<b>Polarity:</b> High Values are good
<b>Formula:</b> Level 0 – No integration Level 1 – Integration of the existing databases		Level 2 – Addition of the financial and additional database Level 3 – Creation of a data warehouse □ database	
<b>Data Source:</b> Additional database			
<b>Data Quality:</b> High		<b>Data Collector:</b> Dr. Teresa Paiva	
<b>Baseline:</b> Level 0		<b>Target:</b> Level 1 – December 2008; Level 2 – February 2009; Level 3 – August 2009	
<b>Target rationale:</b> The integration of the database is not a time-consuming initiative, but the change in mentality and culture of the staff may be, so we think that the time targets are big enough to get the staff ready to deal with the changes.			

**Table 23 - Measure LG02: The Level of Changes in the Software**

<b>Perspective:</b> Learning and Growth		<b>Measure number/name:</b> LG02 / The Level of Changes in the Software	
<b>Objective:</b> Provide effective, integrated information support			
<b>Description:</b> This measure is meant to follow all the changes in the clinic's software in order to perfect it			
<b>Frequency:</b>		<b>Unity:</b> Level	<b>Polarity:</b> High Values are good
<b>Formula:</b> Level 0 – No alterations Level 1 – Alterations to the software to fit it with the Clinic's database integration		Level 2 – Create the software to manipulate the financial and the additional database Level 3 – Creation of the monitor and integrator software Level 4 – Creation of the BSC software	
<b>Data Source:</b> Clinic's IS			
<b>Data Quality:</b> High		<b>Data Collector:</b> Dr. Teresa Paiva	
<b>Baseline:</b> Level 0		<b>Target:</b> Level 1 – December 2008; Level 2 – February 2009; Level 3 and Level 4 – August 2009	
<b>Target rationale:</b> Since the database integration is not viable without the respective software we set the same time targets as the ones for the measure of the level of database integration.			

**Table 24 - Measure LG03: The Number of Entries Filled**

<b>Perspective:</b> Learning and Growth		<b>Measure number/name:</b> LG03 / The Number of Entries Filled	
<b>Objective:</b> Ensure staff competency			
<b>Description:</b> If all the entries in each form are filled with complete information provided by the database, it will have better quality and relevance. Besides that, since this is a customer-intimate organization, the knowledge of the patients' information is very important, so that CENC can provide a better service			
<b>Frequency:</b> Four times a year		<b>Unity:</b> Percentage	<b>Polarity:</b> High Values are good
<b>Formula:</b> Number of entries filled / Total number of entries			
<b>Data Source:</b> Clinic's integrated database			
<b>Data Quality:</b> High		<b>Data Collector:</b> Automatically retrieved by the IS	
<b>Baseline:</b> N.A.		<b>Target:</b> 100% in August 2009	
<b>Target rationale:</b> We think that almost one year is enough to convince the staff that the only way to have a good management support system is by having a complete IS.			

**Table 25 - Measure LG04: The Number of Publications**

<b>Perspective:</b> Learning and Growth		<b>Measure number/name:</b> LG04 / The Number of Journal Publications	
<b>Objective:</b> Develop an environment of improvement			
<b>Description:</b> The number of publications on journals of reference from the CENC's physicians and collaborators is a good indicator of an innovative environment, since it normally requires research, and to be published it has to have some kind of innovating information.			
<b>Frequency:</b> Once a year		<b>Unity:</b> Counts	<b>Polarity:</b> High Values are good
<b>Formula:</b>			
<b>Data Source:</b> Additional Database			
<b>Data Quality:</b> Low		<b>Data Collector:</b> Dr. Teresa Paiva	
<b>Baseline:</b> 4		<b>Target:</b> 6 in 2009	
<b>Target rationale:</b> N.A.			



### 5.7. Strategy Map and Cause and Effect Linkage

After defining all the clinic’s objectives and respective measures, the BSC requires the design of a strategy map for the CENC and the creation of a cause and effect linkage.

The strategy map presented in Figure 11 shows the objectives previously defined for each perspective, the measures for each objective and the cause and effect that link each objective. This strategy map is inspired in the structure of the one made for the Alaska Native Tribal Health Consortium (Alaska Native Tribal Health Consortium, 2005) that can be found on Appendix I – Examples of Strategy Maps.

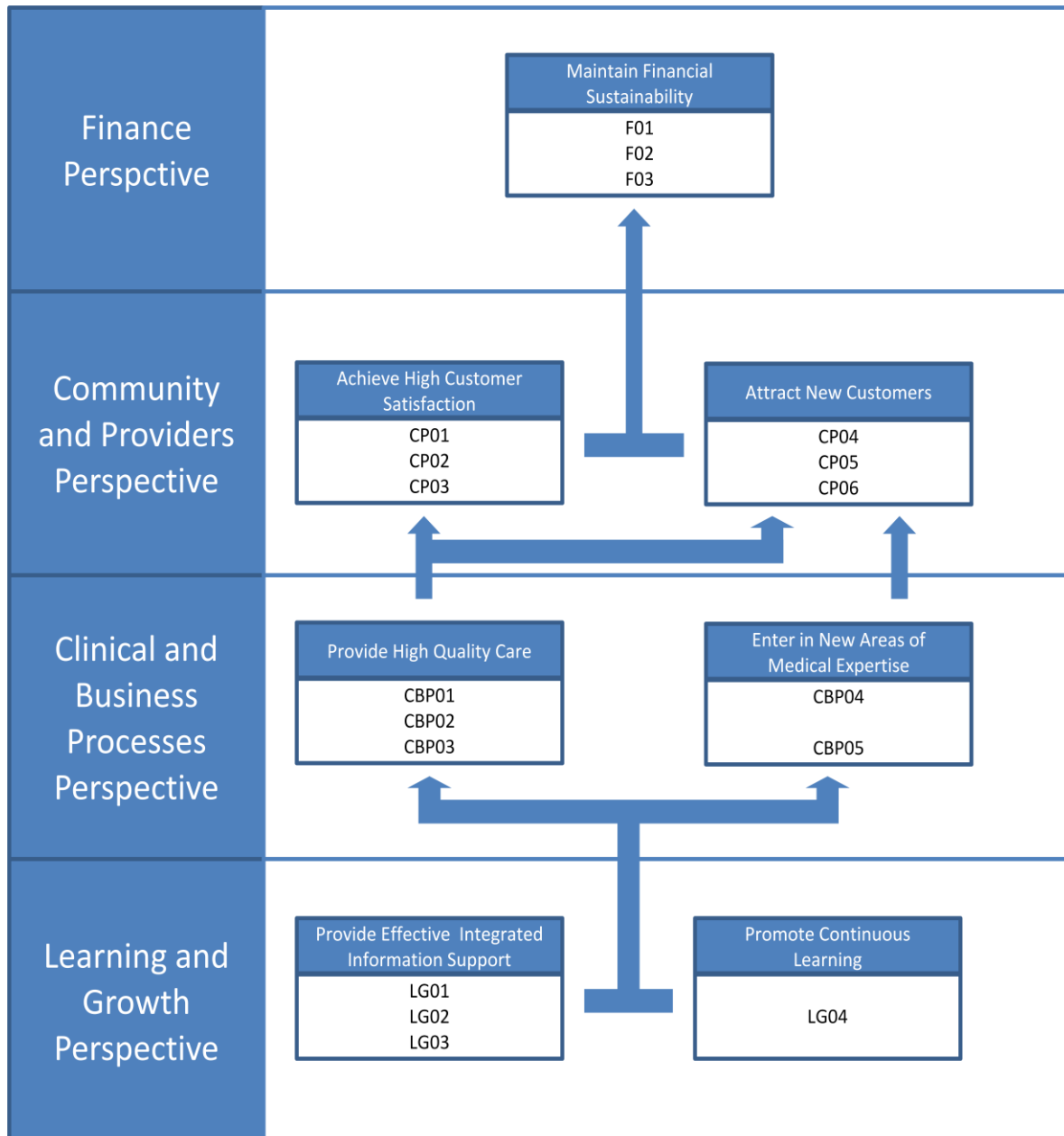
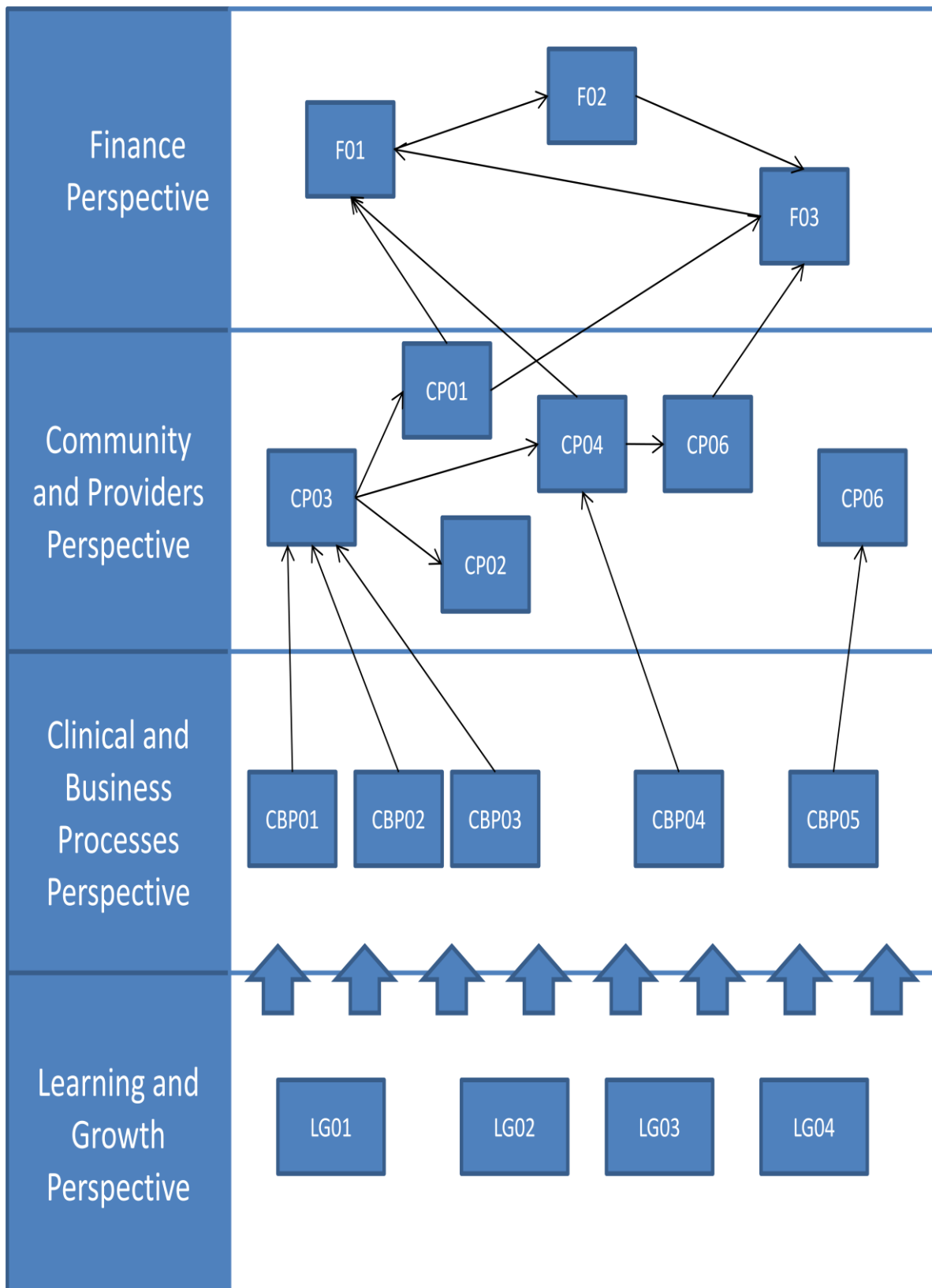


Figure 11 – CENC’s strategic maps with objectives and measures

In Figure 11, the cause and effect linkage is only related with the main objectives for each perspective. Thus the objectives for the learning and growth perspective influence all other objectives, and in particular it directly influences the objectives for the clinical and business processes

perspective. Also the enhancement of quality of care will not only increase patients' satisfaction but might also attract new patients to the clinic. The increase of the clinic's medical expertise and the increase of the patients' satisfaction is expected also to attract new patients. The increase in patients' satisfaction and the attraction of new clients will be critical for the financial sustainability of the clinic.



**Figure 12 – CENC's strategic maps with cause and effect linkage between measures**

The strategy map represented in Figure 12 shows the cause and effect linkage that relate each measure. Unlike Figure 11, in Figure 12 the cause and effect linkage is made from measure to measure, with the exception of the learning and growth perspective measures, because as discussed earlier, they are the enablers of the other measures, and as such they interact directly or indirectly with all the other measures.

As indicated in Figure 12, if the time a patient has to wait until he/she gets a consultation or exam, the time a patient stays in the waiting room and the number of patients on the waiting list are reduced, and this will imply a growth in the general level of satisfaction of the patients.

If the level of satisfaction of the patient grows, the number of recurring patients might also grow. But the growth in satisfaction can also cause a growth in the number of new patients, because if a patient is satisfied with the service it is normal for that patient to recommend the same organization to his/her friend in need. That growth in recurring patients will cause a growth in income, with consequential growth in profit.

In Figure 12 the adoption of new medical areas translates in the growth in new types of exams and in the growth in number of patents. The growth in the number of new exams will cause an increase in the number of new patients and with that the growth in income and in number of people working in collaboration with the clinic. The increase in number of patents will enhance the media awareness, and with that the number of quotes in the media.

The growth in number of recurring patients and the growth in number of new patients, in addition with the growth in number of linked collaborators will cause a growth in operational cost, which will decrease the profit.

As seen in the Figure 12 the growth in profit will help the clinic to pay the existing debt, thus reducing the operating costs.

To summarize in this chapter we defined the clinic's mission, vision, values and strategy, which were not well described, and needed to be so that the BSC framework could be developed. Based on the clinic's strategy we defined the main objectives for each of the four perspectives, and created measures to ensure that those objectives could be achieved. After choosing the measure we elaborated a data dictionary containing the following information: perspective; measure name and number; objective; description; frequency; unity; polarity; formula; data source; data quality; data collector; baseline; target; target rational. In the end we design the CENC's strategy map with cause and effect linkage between measures.

On the following chapter we will discuss the impact this framework will have on the clinic's information system.

## **6. Integrating the Balanced Scorecard Framework with the Information System**

According to de Waal (2001), “one of the management challenges that organizations need to address is embracing information transparency in order to have the required information available at the right time”, to make well-informed decisions, and to take actions.

If we relate this idea to the BSC framework, we can observe that the best BSC system, i.e. the best implementation of the BSC framework in a IS, will be the one where the IS provides good information for management.

Classe (1999) and Niven (2002) note that paper and pencil, or simple spreadsheet tools might be what one needs to start applying a BSC framework and to achieve success. However if one decides to make the method an integral part of the business, automation will usually be necessary, meaning that the CENC’s BSC should be integrated with the clinic’s IS, to make sure that it gathers all the information needed, with the best quality and timely.

This does not imply the use of sophisticated tools and a big budget to benefit from the BSC framework. Niven (2002) points out that a homemade solution that focuses on the organization’s intranet (internal network of computers) can, at a relatively low cost, display and manipulate the BSC results without the costs and responsibilities of a formal Scorecard software solution.

This homemade solution can be easily created because as Papakonstantinou et al. (1995) point out, after selecting the measures and designing the strategic map for the BSC, it should be easy to identify “gaps between existing and desired business processes and information technology infrastructure”.

Despite this fact, the integration process can get complicated if the Balanced Scorecard didn’t point out the necessity of an explicit strategy, and if it was not understood by the entire organization (Ricciardi, 2005).

In the case of the CENC, the problem pointed out before is not really an issue since it is a small organization with a small number of employees. Another fact that helps this process is the fact that the clinic’s manager is the most important member of the clinic, and with most knowledge about it.

Since the objective of this chapter is to provide the necessary information so that the BSC framework can be integrated in the IS, we start by assessing the current IS. Afterwards we build a roadmap for the implementation of the new information system. To this end, we identify the problems we need to solve so that the BSC system can be effective and explain step by step the way to solve them.

### **6.1. Current Information System Overview**

As pointed out earlier in section 1, the CENC’s current IS is composed by two separate elements, a fragmented database system and a spreadsheet to manage the financial information.

The databases only provide information about patients and exams that have Dr. Teresa Paiva as the physician in charge, and the information available is very incomplete with many entries with fields in blank.

In addition to manage the information available in the databases the clinic has two separate software applications. One to manage the clinic’s patient information and another one to manage the information about the exams made in the clinic. The financial spreadsheet contains all the information available in a normal financial report.

Also the clinic’s staff still books appointments, exams and elaborate patient satisfaction surveys in paper, which makes the analysis of this information slow.

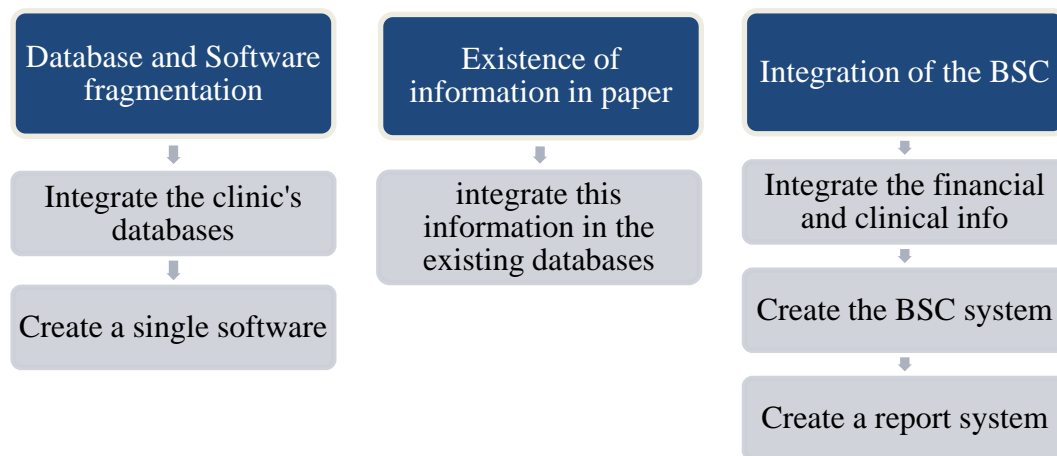
As it can be seen the current information system has a low quality and quantity of information that makes the management of the clinic even harder.

## 6.2. Roadmap for a Future Information System

As noted earlier, to have an effective BSC system, the integration of the BSC framework with the IS has to be autonomous. For this purpose we provide a roadmap for the implementation of the BSC, with the necessary changes in the current IS, so that it can provide the BSC all the information it needs with minimal human interactions.

To integrate the BSC in the IS, it is very important not only to solve the problem that affects the current IS, but also to be aware of the problems that the implementation of the BSC will bring, such as making all the information available needed to calculate all the BSC measures, and creating a report with all the relevant output information.

All the problems and solutions regarding the implementation of the BSC in the CENC are summarized in Figure 13.



**Figure 13** – Summary of the problems and respective solutions for the implementation of the BSC

### 6.2.1. Database Integration

To address the first problem (the fragmentation of the database), we propose the creation of an integrated database system with a single software, which would aggregate key information from all four databases in a single database, giving the manager the possibility of accessing information in a fast and simple way.

We have gathered those databases and started by treating the information. Because of the sleep clinic's privacy policy, the first step in order to obtain the sleep clinic's databases was the creation of an algorithm capable of encrypting the names of all patients that had an entry in those databases. Since all of the databases were on Microsoft Access, this algorithm was created using Microsoft Visual Basic, and a XOR encryption algorithm was used, where XOR encryption stands for the logical exclusive or function (Wilson, 1998), to encrypt the information. We selected the algorithm posted by L. Sebastian, which is like most XOR algorithm, but it doesn't contain any special characters, like symbols (CodeToad.Com, 2001), making the usage of the resulting encrypted string feasible and easy to implement.

The XOR algorithm uses a key string or password to encrypt the string we want. This encryption is made by representing each letter/ symbols/ numbers of the text we want to encrypt and of the key as a number from 0 to 256, this number is called the ASCII number. After this the numbers are converted into binary, and the 0's and 1's of the key are xored against the 0's or 1's of the text. If the text string is bigger than the key string, the key is repeated. The result of a xor operation is demonstrated on

Table 26. The resulting binary code is converted back to ASCII number, and afterwards into a string (RustySpigot.com, 2008).

**Table 26 – XOR operation**

A	B	A XOR B
0	0	1
0	1	0
1	0	0
1	1	1

After the acquisition of the initial encrypted databases and since they only have information regarding the clinic's patients and exams done in the clinic, we recommend that the integration should be made according to each exam, i.e. the database should be restructured in order to have all the information of the patient and all the information of the exams done by that patient aggregated.

This kind of approach has its benefits since it enables the database user to have a quick access not only to the patient's information, but also to the information of the exams done by that patient and its outcome. For this to be true, the users interface should be modified, so that when a user searches for a given patient, all the patient's information should appear on screen, and a link to the patient's exams and results. Consequently, it is imperative that the clinic's staff should be well prepared to deal with those changes.

Although the changes proposed previously would improve the management quality of the clinic, it should be clear that that would only be true if the clinic's staff gather all the information prompted by the system.

### **6.2.2. Incorporating Paper Information in the Information System**

The second problem that needs to be solved is the existence of information on paper that does not exist in digital format.

To solve this problem we propose the addition of new entries to the integrated CENC's digital query form, i.e. adding to the integrated database all the entries regarding the scheduling of the medical appointments and exams, and information about the patients' satisfaction. The new entries that should be added in accordance to the BSC information:

1. The time the appointment or exam was scheduled;
2. The time the patient was received by personnel staff;
3. Time until the appointment or exam;
4. Existence of any kind of complaint;

## 5. Level of satisfaction.

It is important to point out that although we propose the addition of fields regarding the patient's satisfaction, this shouldn't cause the clinic to stop the elaboration of satisfaction surveys, because these entries are meant to help the manager get a quick and summarized view of the patient's satisfaction level.

Also the time until the appointment or exam should be filed by the clinic's staff when a patient makes an appointment.

### **6.2.3. Integrating the Balanced Scorecard Framework in the Clinic's Information System**

The integration of the BSC in the clinic's IS is a more complex problem than the other ones discussed until now, because it implies a change of the database architecture, changes on the user interface, the creation of a software capable of extracting the information from the databases and creating a report system with all the information about the measures previously proposed.

As mentioned before, the BSC cannot be an effective management system unless the information required is gathered on time and with a good level of quality.

So to provide the BSC the information needed we propose the addition of two new databases, one for the financial information and one with entries that will help the BSC system calculate the measures that need information that are neither available on the integrated database nor on the financial database.

The financial database should have the normal information that exists in a monthly financial report, and that currently can be found in the financial spreadsheet.

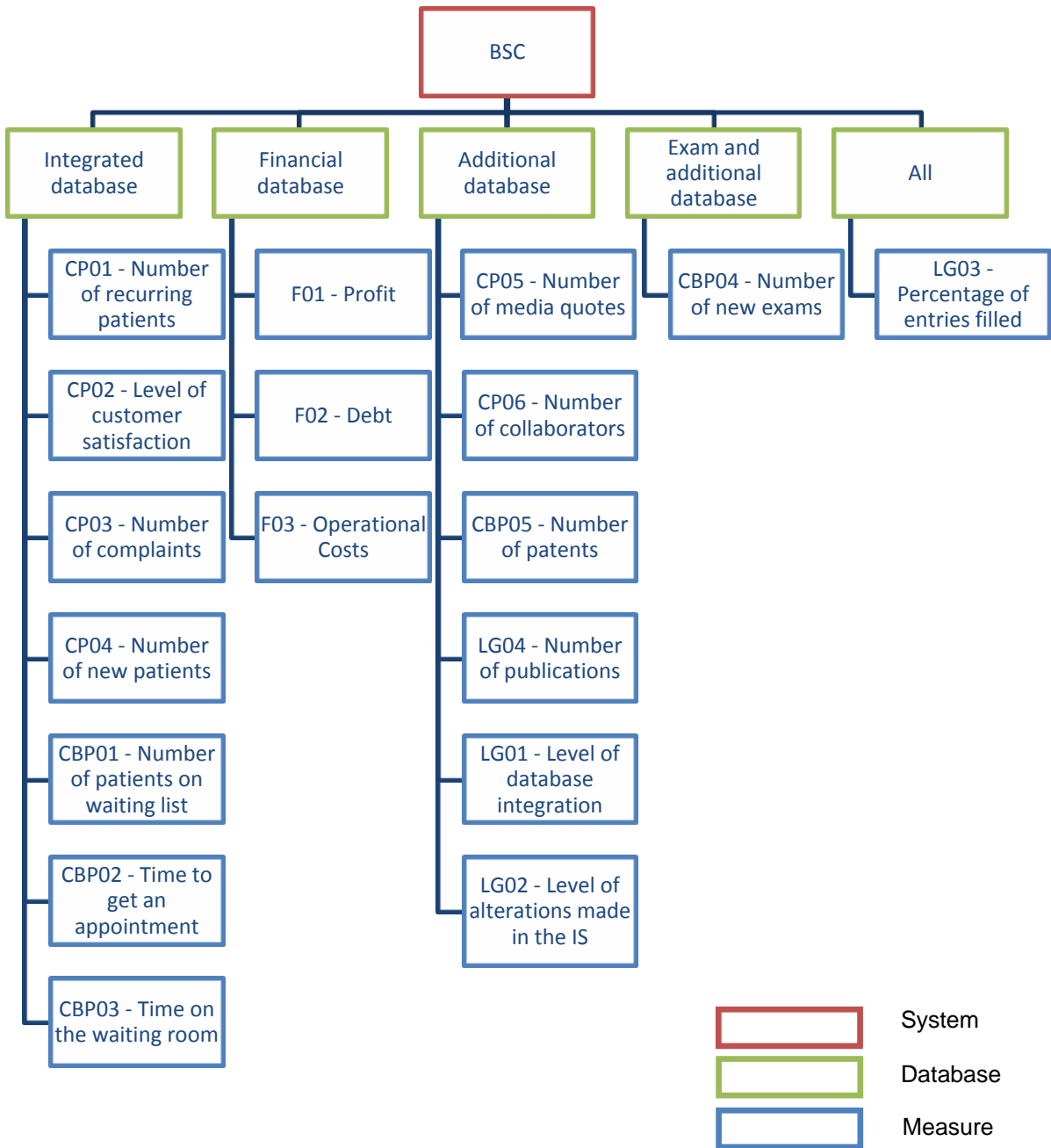
The other database should have the information of the names of the exams that are considered new, the number of patents created by the clinic, the number of monthly quotes in the press, the number of collaborators working with the clinic and number of publications in journals of reference.

After integrating the existing databases, adding new entries to them and creating the new databases, it is time to create an EIS based on the BSC framework, because it is able to concentrate on data relating to key performance indicators and critical success factors (Hong, 2004), and to highlight expressions and variances automatically and to present information in graphical, tubular, textual and colors (McBride, 1997).

As shown in the Figure 14, to offer the clinic an effective BSC system, we must make sure that the BSC system can collect information from all the databases and calculate all the measures. To this end we propose an adoption of a new IS architecture.

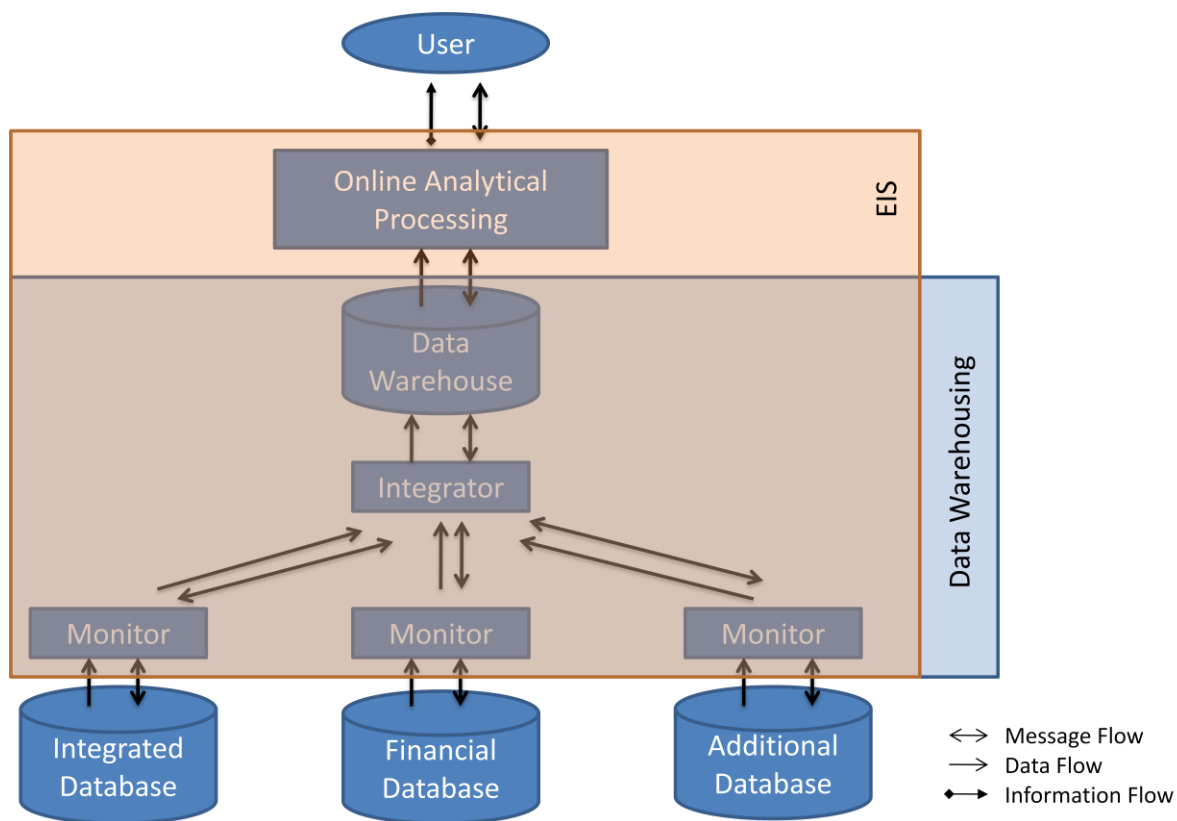
For this purpose we propose the use of a contemporary EIS architecture, shown in Figure 15, based on data warehousing technology and Online Analytical Processing (OLAP) techniques, as described by Cheung et al. (2007).

Although the existence of three different databases in the IS could lead to a more fragmented IS, the adoption of data warehousing technology, which is a subject-oriented, integrated, time-invariant, non-updatable collection of data used to support management decision-making processes and business intelligence (Inmon, 2002), might alleviate some of the data integration problems (Cheung et al., 2007) and organizes information in a much more intuitive and tuned for data access or queries (Gray, 2004).



**Figure 14** – Databases that the BSC needs to access to provide the measures





**Figure 15 – CENC's EIS architecture**

As Cheung et al. (2007) states and as shown in Figure 15, in the contemporary EIS architecture, a small program, which is known as a monitor or wrapper, is built for each of the three databases. The major role of this program is to communicate with the integrator and extract data from the source based on the pre-defined data view. Data from different local data sources are extracted, cleansed, and transformed by an integrator that is based on an integrated data schema, and are subsequently stored in the data warehouse database.

Although Rundensteiner et al. (2000) point out, schematic changes and constraint modifications in the data sources can entail a major rebuild of the existing data warehouse, the adoption of OLAP techniques might help with this problems by giving more flexibility to schematic alterations (Cheung et al., 2007).

When using OLAP in data warehousing the information is stored according to a dimensional model, which is optimized for fast data access, and where queries can run without affecting performance of the clinical applications (Gray, 2004).

In a dimensional model, there are two types of tables, the fact tables that tend to be quite large and grow rapidly as data is added to the warehouse, and the dimensional tables, that are referenced by the fact tables and that are either slow growing or don't grow at all over time.

So as it can be seen the facts represent the factual data being stored, where the dimensions represent the key dimensions of the business as well as the questions one might ask about the business (Gray et al., 2000).

To be able to have a BSC system, first we need to create a monitor program for each database to collect all the information. Then we have to create an integrator program that, with the help of the OLAP system, can integrate and store the relevant information in the data warehouse database.

In the end the BSC system will query the data warehouse database, in order to attain the information necessary to calculate the measures proposed.

Since the profit, the debt, the operational costs, the number of media quotes, the number of publications in journals of reference, the level of database integration and the level of alterations made on the IS measures don't need any kind of formula, the extraction of this data is direct and easy. But there are some measures that need to gather information to calculate their value, and so the BSC system has to be able to do the following:

- To calculate the number of recurring patients, the BSC system has to count the number of patients whose date of their first exam is previous to the date of the exam made during the period of time in analysis;
- To calculate the level of satisfaction the patients the BSC system has to select the level of satisfaction that has the highest percentage of patients;
- To calculate the number of complaints it has to count the number of patients that reported any kind of complaint;
- To calculate the number of new patients it has to count the number of patients for whom the date of the first exam was made during the period of time in analyzes;
- To calculate the number of patients on the waiting list the BSC system has to count the patients that have a exam or appointment scheduled;
- To calculate the time on the waiting list the system has to calculate the average of time a patient that had to wait until he/she did the exam or appointment;
- To calculate the time a patient waits in the waiting room, the system has to calculate the average of the difference between the time the patient started the appointment and the time the patient should have started the appointment;
- To calculate the number of new kind of exams, first the IS must have the information of the type of exams that are considered new, which should be available in the additional database, and then it has to count the number of exams done in a certain period of time that have the kind of exams matching the ones that are considered new;
- With all the new entries added to the exam database, and the creation of the two new databases, the IS is able to calculate the number of fields that weren't filed, thus calculating the percentage of fields filled.

As Niven (2002) point out, the BSC system should have a reporting system able to provide relevant management information and capable of the following:

1. Use gauges similar to those on the dashboard of a plane or automobile, boxes that are reminiscent of organizational charts, or color-coded dials;
2. Associate to every measure its description, so that the user can clearly understand the information on the report;
3. Permit all measure types;
4. Provide the information at the right time, according to each measure frequency of report;
5. Provide past information about the measures;
6. The user has to be able to understand the performance of measures based on an easy to understand status indicator. Many programs take advantage of our familiarity with red (stop), yellow (caution), and green (go) metaphors;

To summarize and as shown in this chapter, the IS currently used in the clinic is fragmented, provide information with poor quantity and quality and is not able to provide all the information needed for the development of an effective BSC system based on the framework proposed.

To improve this aspect of the clinic, we decided to propose an alternative to the existing IS. To this end we propose the integration of the existing databases, the unification of the software used and the creation of two additional databases.

Also we suggested the adoption of a new IS architecture based on data warehousing technology and Online Analytical Processing, so that the BSC system can access all the information in the databases and calculate all the measures needed.

## **7. Discussion**

After conceptualizing the implementation of the BSC framework on CENC, we will discuss how it relates to the ones in the literature, how it benefits the organization, what kind of limitations it has, how it points out the management weakness of the company, and what kind of new information it brings us.

### **7.1. How Does the CENC's Balanced Scorecard Approach Relates to the Ones in the Literature?**

As said before, we propose a 2<sup>nd</sup> generation BSC framework with the four perspectives like the one proposed by Kaplan et al. (1992). Although, like Pink et al. (2001), we changed the names of the perspectives so that the users can better relate each perspective with the health care environment they work in.

Although in the literature there are some authors like Von Bergen et al. (2004), Smith et al. (2007) and Bergin-Seers (2007) that address the implementation of the BSC framework in SME, none of them focus their study in organizations neither with such a small number of employees, nor with such management limitations as the CENC nor give an explicit example of a case study where this kind of work was made or where this kind of solution of adopted.

Fernandes et al. (2006) points out that "there is very limited systematic research done on BSC applications in small and medium scale enterprises", consequently, most of the work done in this thesis results from adaptations of case studies found in the literature about large organizations, so that the outcome might be coherent with the organizational context of the CENC.

To implement the BSC framework in the CENC, we proposed some changes in the current IS architecture, so that it could provide relevant management information and be able to provide an automated BSC report system.

These changes involve integrating the four existing databases, by creating additional databases with relevant management information and implementing an EIS architecture based on data warehousing and OLAP techniques, as described by Cheung et al. (2007).

As Gray (2004) points out, this approach is common in health care organizations because it gives the managers the ability to analyze and to understand the care practices better based on information captured in patient charts.

Nevertheless, the explicit referral of the method used in the adoption of a new IS for the implementation of a BSC framework, is fairly rare in the literature, and when it comes to the literature about health care organizations, this kind of work does not exist.

### **7.2. Positive and Negative Aspects of the CENC's Balanced Scorecard Approach**

The development process of the BSC was not as easy as it could have been expected due to the CENC's small size and due to the lack of management tools and information in the clinic.

Due to the organizational context, common to SMEs as pointed out by Smith et al. (2007) and Bergin-Seers (2007), the CENC had a poorly defined vision, mission, values and strategy, which are the central aspects of the BSC framework, and at the same time, had a severe management constraint caused by the low quality quantity of information provided by the IS.

Although these facts pose a major limitation in the implementation of a management support system, it encouraged us to go forward, because the implementation of the BSC framework helps organizations to formalize the description of their strategic vision and associated strategic objectives and priorities, which helps the organizations to strengthen their identity and helps their staff to know where the manager wants it to go.

As Papakonstantinou et al. (1995) pointed out, the development of the BSC framework also helps the organization to understand what kind of flaws exist in the IS, because as the objectives and measures for the BSC perspectives are developed, we are able to realize what kind of additional information is required to provide an effective framework.

As said before, the adoption of an EIS architecture based on data warehousing and OLAP techniques, gives the managers the ability to analyze and to better understand the care practices based on information captured in patient charts.

Given this context, we think that the adoption of this kind of approach could benefit the clinic's management. Also due to the low complexity of the architecture, we think that its implementation could be quick and could be made by the computer department of the clinic, thus reducing the costs of the application.

This architecture might alleviate some of the data integration problems, because it organizes information in a much more intuitive and tuned for data access or queries and might give more flexibility to the system, this solution has some limitations.

As Cheung et al. (2007) point out, these techniques operate using a predefined database schema, and as such the type of data analysis that can be carried out is restricted, which may lead to a drawback when it comes to future changes in the measure system. Since the BSC framework approach will probably need readjustments in the near future, it is likely that some software changes might also be needed.

After discussing the problems found in the development of the clinic's information system based on the BSC framework, we need to discuss whether this system can or cannot be applied on the CENC's specific profile.

The first aspect that caught our attention was the fact that this approach causes drastic changes to the CENC's working culture and IS. This fact, as always, poses a major obstacle for the approval of any kind of proposal.

Also we think that the lack of information could be a problem that deserves further attention, because the BSC framework, as any kind of management support system relies on information. We think that in the first year or so the BSC system would have to be closely monitored, because during that time lots of new information would appear due to the alterations to the IS, which would lead to adjustments and alterations to the original BSC. This fact may also cause the rejection of the proposal since in the beginning the BSC framework and consequently the information system would need constant maintenance and adjustments.

The low quality of information provided by the current IS makes the CENC's BSC framework approach very limited, without any kind of budget assignment, initiatives related with the measures or clearly defined targets.

These three aspects are one of the virtues of the BSC for a large organization. But since we are dealing with a small/micro organization, the absence of the first two aspects can be minimized, but still might take some effectiveness from the BSC.

On the other hand the lack of defined targets can pose a real threat to the effectiveness of the BSC framework, because without them the manager might lack information on how the organization is doing. But with more time the current manager can, in the future, draw better targets, thus improving the BSC framework.

The BSC framework proved to be a useful and very flexible tool, since it is able to adjust to new realities, whether they resolute from alterations on the clinic's mission or vision, or whether they appear due to alterations in the clinic's internal or external environment, since the BSC system has a double-loop feedback mechanism, which was explained earlier. This way when faced with changes the manager only has to adjust the measures used.

Also, compared with the current system, the system we propose should be able to deliver an automated report system that will bring more relevant information to the manager, giving her the opportunity to take action at the right time and in a correct and informed way, because the BSC system doesn't only rely on financial information, but also on information provided by the clinic's activities and employees, and from customer feedback.

To finalize we think that if the manager is willing to shake the ground, the new IS based on the BSC framework could prove to be a good solution, and above all a strategic edge against the clinic's rivals by providing more information than a normal management system, thus making the manager take better decisions, or at least better informed and supported decisions. If not, we hope that the ideas developed here can give the manager a better understanding of the organization's internal and external environment, and we also hope that this study can help the manager realize that the financial management system can be complemented with additional information, so that the manager can take action in a right way.

Furthermore, if this organization desires a better BSC framework, the owner might make use of professional help to create management tools to help the management of the clinic. This could improve the strategic management of the clinic, thus creating better feedback and ideas for the conceptual framework.

Also we think that for a more effective BSC framework work should be developed in order to create a relative weight analysis of the BSC measures, to distinguish the critical measures from the other ones. In addition a way to categorize the level of achievement of the goals should be created, this way the BSC system may automatically notify the user when a critical measure is not performing within acceptable ranges.

We also think that a more careful analysis of the satisfaction survey associated with a different formula to calculate the customer satisfaction could lead to a more accurate and effective way to analyze the customer satisfaction.

For this method to work and provide valuable information to the BSC system, the customer satisfaction surveys should be promptly copied to the database so that the formula could be applied.

In case the CENC applies this tool and at the same time the organizational structure grows, it is important to point out that a more complete and sophisticated framework should be developed, in order to answer to the new organizational demands.

### **7.3. The Manager's Final Appreciation of the Balanced Scorecard System**

After a careful analyses of the management support tool proposed in this thesis, the CENC's manager point out that without any kind of field test, it would be very hard to express any kind of commentary about the effectiveness of the tool.

Nevertheless and taking in account all the drawbacks the BSC system could pose, she was really interested on the ideas and method presented in the thesis, and was willing to implement them on the CENC, because she recognized the improvement in the management quality of the clinic this tool could bring and due to her poor management experience, she realized that the report system that the BSC has could help her identify critical aspects of the clinic, and help her improve those aspects.

## 8. Conclusion

The main objective of this thesis was to build a decision support tool for CENC that could help its manager to have a better understanding of the situation of the clinic and that could allow for improved decision-making.

After some careful study about the problems of CENC, we proposed the BSC framework, which is a tested framework in many different types of organizations, including health care organizations. As reported earlier in the thesis, the CENC is not like most organizations where the BSC framework has been applied, since it is a small/micro organization and most of the health care organizations that have already implemented the BSC are large hospitals or clinics. The specificities of the CENC anticipated differences in the application of the BSC framework, thus anticipating problems concerning its conceptualization.

The first problem found was the definition of what kind of BSC approach should be applied to the clinic, because as pointed out in previous chapters, there are a great number of frameworks based on the BSC with different structures.

We decided to use a 2<sup>nd</sup> generation BSC, with four perspectives, the financial perspective, the customer perspective, the internal business and processes perspective and the learning and growth perspective, just like the BSC framework initially proposed by Norton & Kaplan.

This choice could be questioned because it is possible to implement a BSC with different perspectives or more perspectives, which could better reflect the health care environment, but since the CENC is a very small organization, we thought that the original four perspectives were enough to help monitor its activities, and the existence of more perspectives would imply a more complex system, which was not what the clinic's manager wanted.

The implementation of a 2<sup>nd</sup> generation BSC framework was based on the fact that this framework uses cause and effect linkage, in the design of the strategy map. This is an advantage because it helps all the organization's employees to understand its strategy.

The perspective used in our proposal were the same used by Pink et al. (2001), which are the same as the ones used in Norton et al. 1992, but with a different name to better describe the health care unique environment. So we think that it is more than adequate to assume that they will not compromise the correct interpretation of each perspective by the BSC system users.

After deciding which BSC framework we would apply to the CENC, we started to apply it, but we found that the clinic had a poorly defined mission, vision, values strategy. This could have posed as a major drawback for the implementation of the BSC framework, since its usefulness relies on these four aspects of the organization.

But it turned out to be just a minor problem, because CENC is a small/micro organization where the owner is at the same time the clinic's manager and the most important physician of the clinic. Due to this fact, the manager had a great deal of information and knowledge in these aspects, and since she had all the decision power in the clinic, she quickly helped us define these four aspects.

Also the fact that the BSC needs a clear definition of the organization's mission, vision and strategy made the clinic manager think about the subject and made her write it down, which is valuable because it helps the organization to strengthen its identity and helps the clinic's staff to know where the manager wants the clinic to go.



After defining the CENC's mission, vision, values and strategy, the next step was to define the main objectives for each perspective. In the beginning this task was not an easy one since there was not a clearly defined strategy. After some interaction with the clinic's manager and after describing the clinic's strategy, this task got easier, and when presented to the manager, the objectives proposed were accepted.

At this point the BSC system conceptualization was going smooth, but the definition of the measures to be used in the BSC framework proved to be a more complex task. This happened mostly because of the lack of relevant management information available in the clinic's current IS.

To compensate the poor quality and quantity of information, to make sure that the information provided to the BSC system could give a holistic view of the clinic's activities and to provide an automated report system associated with the BSC we had to elaborate not only the framework, but also a roadmap for its integration in the clinic's IS.

Since we had to propose changes in the information system, the measure selection process got easier, because we could propose any type of measure, as long as it was consistent with the changes proposed for the IS.

Although the selection process got easier, this did not mean that all the problems disappeared. This happened because when establishing a measure we not only need to have an information source, but also need targets and baselines.

This fact gave us a difficult problem because most of the measures needed for an effective BSC did not have a baseline, and the manager did not have an idea about on their current value nor about the value they should have in the future. This problem cannot be solved unless the information needed is gathered in the future, because in the present there is no available method to attain it.

The measures that did not have information available were not the only ones that created problems – the process of establishing targets for the other measures were also not easy. This happened because the manager did not have time to reflect about the problem at hand.

After solving the problems concerning the measures, we turned our attention towards the integration of the BSC in the IS, and the changes it would provoke. This changes in the IS could pose a real threat for the implementation of a new management support system, but since we decided to use the BSC approach, which makes use of a strategy map, the changes in the IS could be spotted right away, as pointed out by Garcia-Molina et al. (1995).

So to apply the BSC framework we proposed a change in the IS architecture, by proposing the integration of the four existing databases, by creating of two other databases with additional relevant management information that was not present in the current database system and by changing the IS architecture.

Although the existence of these three databases might lead to a more fragmented IS, the adoption of a contemporary EIS architecture, base on data warehousing technology and OLAP techniques, as described by Cheung et al. (2007), might alleviate some of the data integration problems, organizes information in a much more intuitive and tuned for data access or queries and give more flexibility to the system if future changes are required.

This approach, as Gray (2004) points out, is common in health care organizations because it gives the managers the ability to analyze and to better understand their care practices based on information

captured in patient charts. Given this, we think that the adoption of this kind of approach could benefit the clinic's management.

Also due to the low complexity of the architecture, we think that its implementation could be quick and could be made by the computer department of the clinic, thus reducing the costs of the application.

Although this approach supports multidimensional data analysis, as Cheung et al. (2007) point out, these techniques operate using a predefined database schema, which may lead to a drawback when it comes to future changes in the measure system. Since the BSC framework approach will probably need readjustments in the near future, it is likely that some changes in this approach might also be needed.

Now that we have discussed the problems brought by the conceptualization process, we need to discuss whether this system can or cannot be applied on the CENC's specific profile.

In our opinion the adoption of the IS here proposed depends on whether the clinic's manager is willing or not to shake the ground and change the CENC's work culture, because the changes proposed here will definitely change it.

Despite this fact, there are others facts that the manager needs to be aware before she approves or not this application.

First of all, we think that in the first year or so the BSC system would have to be closely monitored, because during that time lots of new information would be available due to the alterations to the IS, which would lead to adjustments and alterations to the original BSC framework. Consequently, the software supporting the new EIS architecture might also have to be altered.

The organizational settings pointed out earlier made this approach very limited, without any kind of budget assignment, initiatives related with the measures or clearly defined targets, the absence of which might remove some effectiveness from the BSC.

On the other hand, the BSC framework can prove to be a useful and flexible tool, since it is able to adjust to new realities, whether they result from alterations in the clinic's mission or vision, or whether they appear due to alterations in the clinic's internal or external environment, since the BSC system has a double-loop feedback mechanism.

Also, compared with the current system, the system we propose will bring more relevant information to the manager, giving her the opportunity to take action at the right time and in a correct and informed way, because the BSC system does not only rely on financial information, but also on information provided by the clinic's activities and employees, and from customer feedback.

To attain a better BSC framework for the CENC, the clinic needed to acquire more management experience, leading to a better strategic management of the organization, thus enhancing the conceptual framework.

Also we think that for a more effective BSC framework work should be developed to create a relative weight analysis of the BSC measures. In addition a way to categorize the level of achievement of the goals should be created.

Furthermore, we think that a more careful analysis of the satisfaction survey associated with a different formula to calculate the customer satisfaction could lead to a more accurate analyses of the customer satisfaction.

In case the CENC grows, it is important to point out that a more sophisticated framework should be elaborated.

In the end, we presented this tool to the CENC's manager. After a careful analyses of the BSC system, she was really interested on the ideas and method presented in the thesis, and was willing to implement them on the CENC, because this tool could improve drastically the management quality of the.

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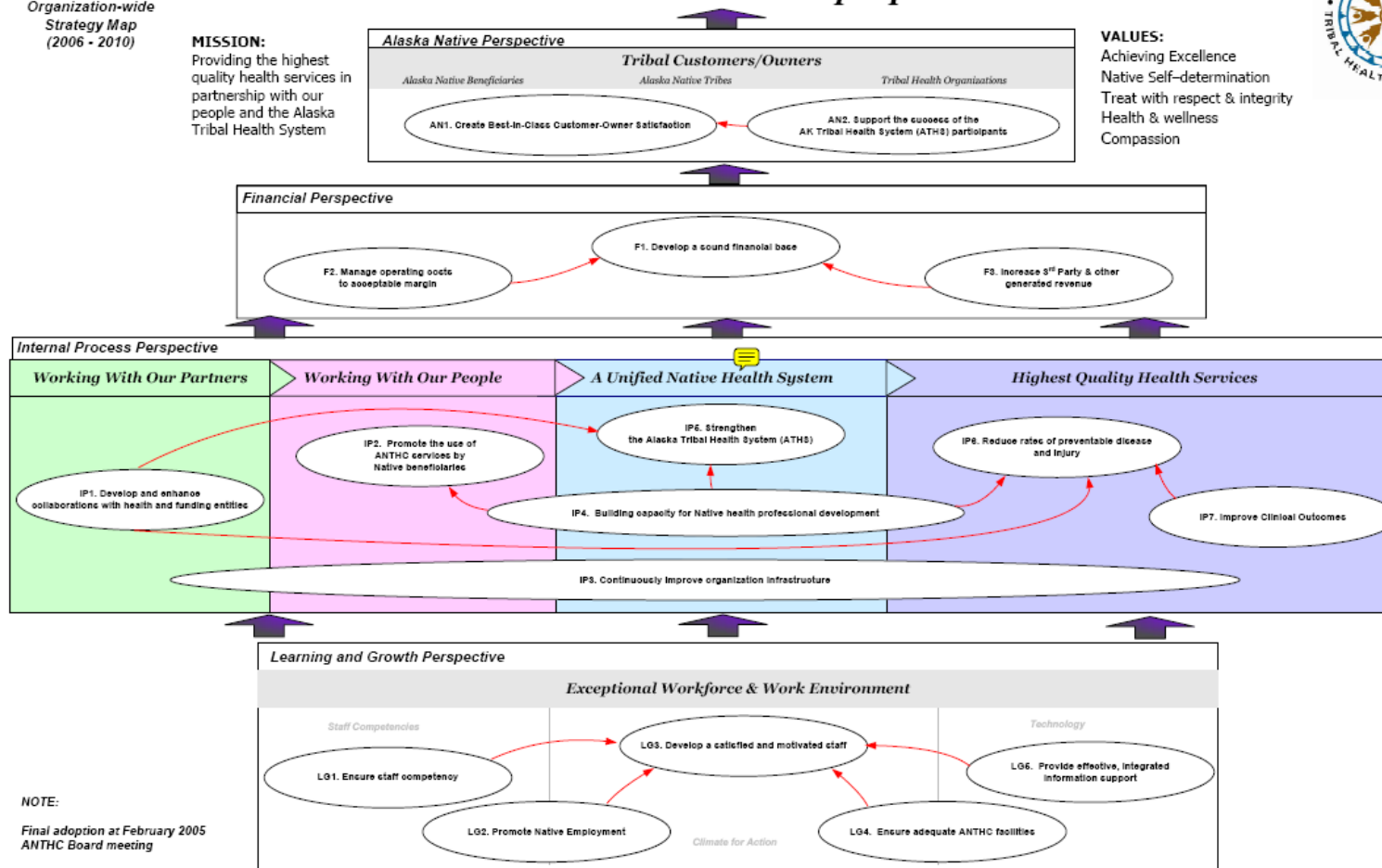
## Appendix I – Examples of Strategy Maps

**ANTHC**  
Organization-wide  
Strategy Map  
(2006 - 2010)

**MISSION:**  
Providing the highest quality health services in partnership with our people and the Alaska Tribal Health System

*Alaska Natives are the healthiest people in the world*

**VALUES:**  
Achieving Excellence  
Native Self-determination  
Treat with respect & integrity  
Health & wellness  
Compassion



**Figure 16 –** Alaska Native Tribal Health Consortium’s strategy map (Alaska Native Tribal Health Consortium, 2005)

# Northern Sydney Central Coast Health Strategy Map

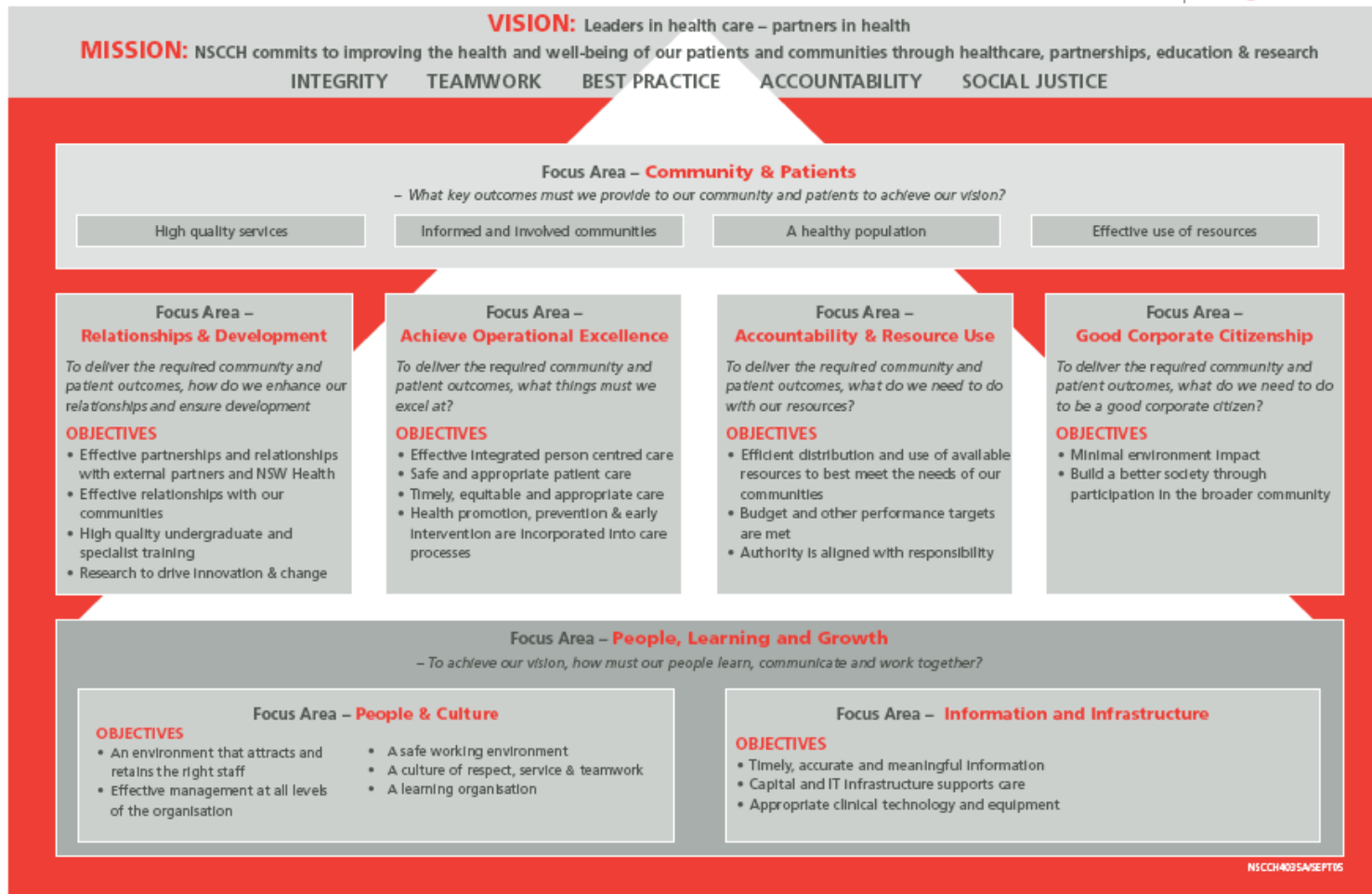


Figure 17 – Northern Sydney Central Coast Health’s strategy map (Northern Sydney Central Coast Health, 2008)

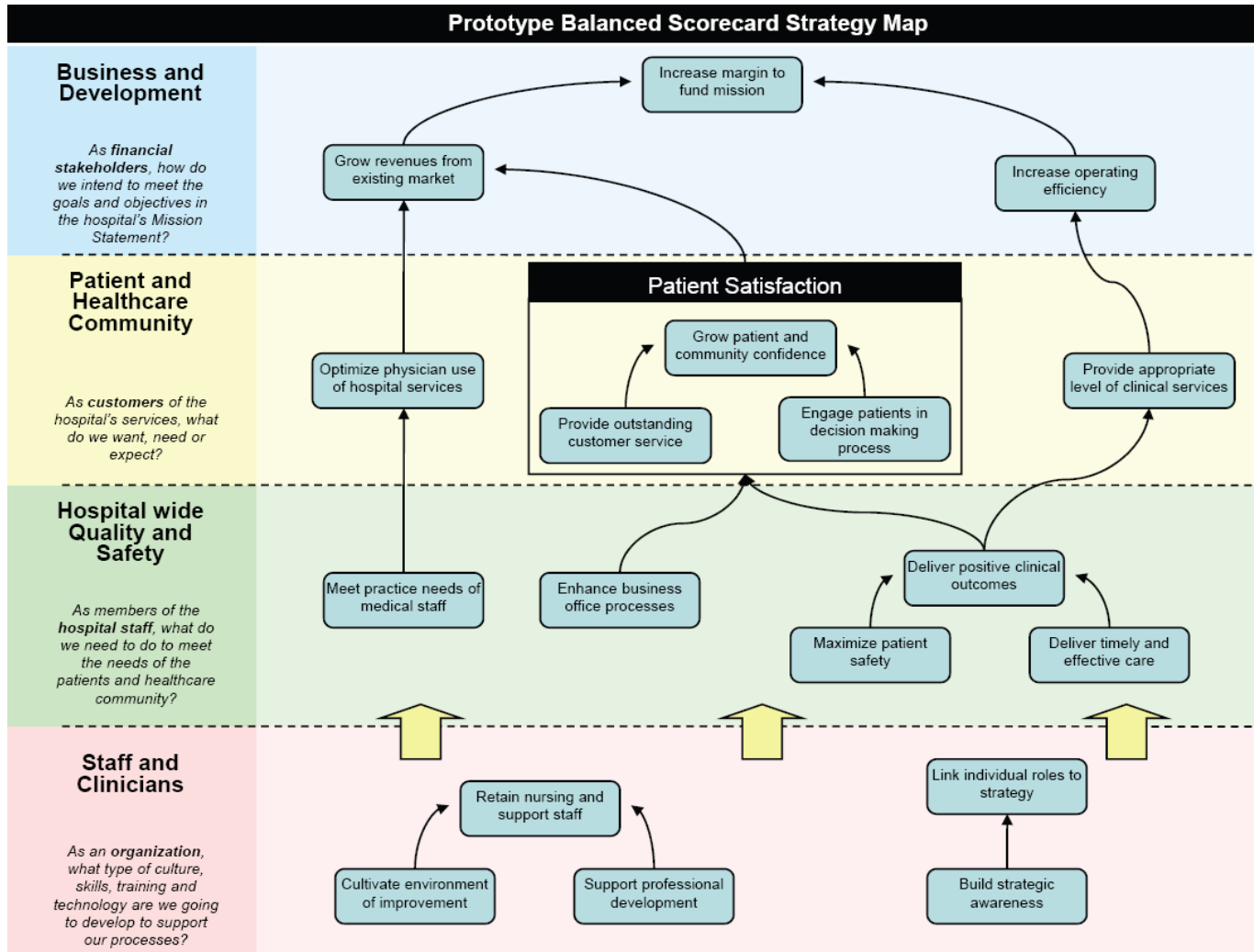


Figure 18 – Rural Health Resource Center's strategy map (Hill & Powell, 2005)

## Appendix II – Information Available on the Databases

**Table 27 – Entries of the databases**

<b>Exames Antigos</b>	<b>Identificação</b>	<b>Sono</b>	<b>Total</b>
<i>ID Exame</i>	<i>ID Doente</i>	<i>ID Exame</i>	<i>Nº interno</i>
<i>ID Doente</i>	<i>Data do 1º Exame</i>	<i>ID Doente</i>	<i>Nome</i>
<i>Nº Exame</i>	<i>Nome</i>	<i>Código</i>	<i>Prontuário</i>
<i>Data Exame</i>	<i>Sexo</i>	<i>Idade</i>	<i>Sexo</i>
<i>Idade</i>	<i>BI</i>	<i>Peso</i>	<i>Estado Civil</i>
<i>Sexo</i>	<i>Tipo de Doc de</i>	<i>Altura</i>	<i>Cor</i>
<i>Médico que enviou</i>	<i>Identificação</i>	<i>Data do Exame</i>	<i>Profissão</i>
<i>Sistema de Saúde</i>	<i>Data de Nascimento</i>	<i>Tipo de Exame</i>	<i>Convénio</i>
<i>Tipo de Exame</i>	<i>Morada</i>	<i>Pedido Por</i>	<i>Matricula</i>
<i>Razão do pedido</i>	<i>Bairro</i>	<i>Motivo do pedido</i>	<i>Data de cadastro</i>
<i>Obs.</i>	<i>Cidade</i>	<i>Sistema de Saúde</i>	<i>Data de nascimento</i>
<i>Pagamento directo</i>	<i>Telefone</i>	<i>Exame de Consciência</i>	<i>Idade</i>
<i>Forma de pagamento</i>	<i>Sistema de Saúde</i>	<i>Obs.</i>	<i>Diagnóstico</i>
<i>Descrição do Exame</i>	<i>Isenção</i>	<i>Medicação</i>	
<i>Conclusão</i>	<i>Nº Sistema de Saúde</i>	<i>Técnico</i>	
<i>Médico</i>	<i>Doente da consulta</i>	<i>Nº de Canais</i>	
	<i>Obs.</i>	<i>EMBLA Canais</i>	
		<i>Tempo de duração</i>	
		<i>Início</i>	
		<i>Fim</i>	
		<i>Características do sono</i>	
		<i>(more than one field)</i>	
		<i>Conclusão</i>	
		<i>Médico</i>	

### Appendix III – Some Satisfaction Survey Results

Frequency Distribution for Profissionais

	Count	Percent
A Moreira	1	,909
Curvelo	3	2,727
manuela	3	2,727
Pimentel	5	4,545
T Paiva	98	89,091
Total	110	100,000

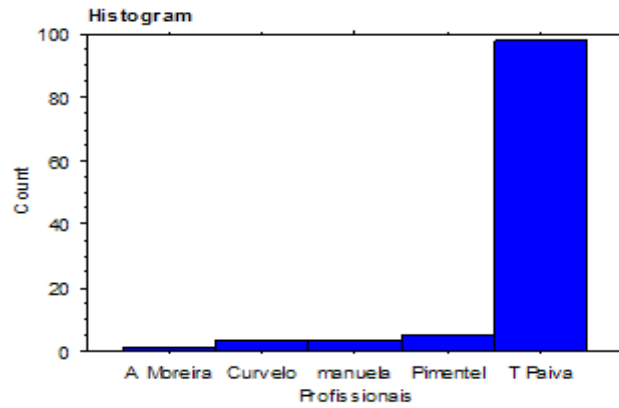


Figure 19 – Frequency distribution for the physicians at CENC

Frequency Distribution for preço qualidade

	Count	Percent
A/Mau	7	6,796
B/Regular	49	47,573
C/Bom	32	31,068
D/Mt Bom	7	6,796
E/Excelente	8	7,767
Total	103	100,000

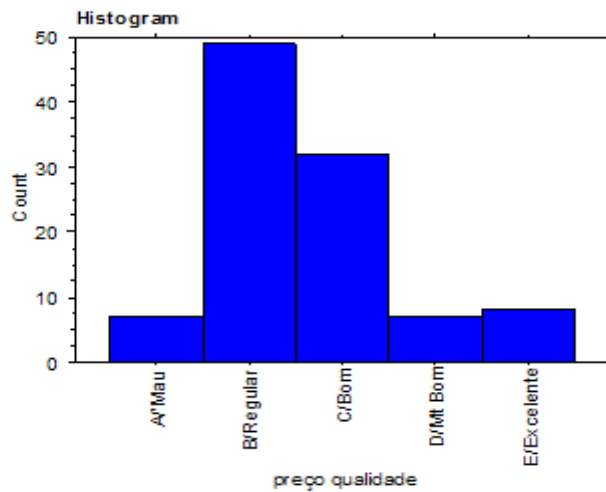
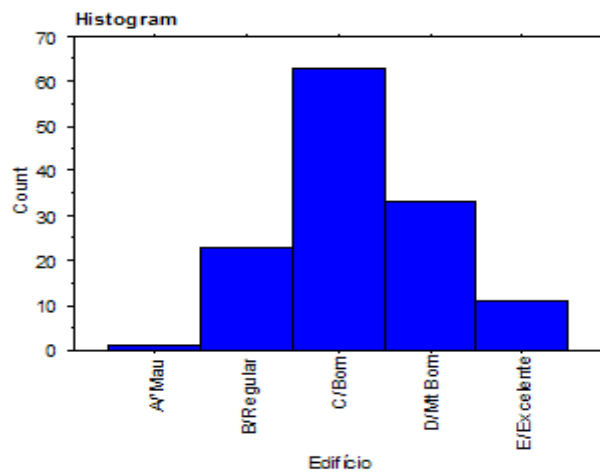


Figure 20 – Frequency distribution for the quality-price at CENC

**Frequency Distribution for Edifício**

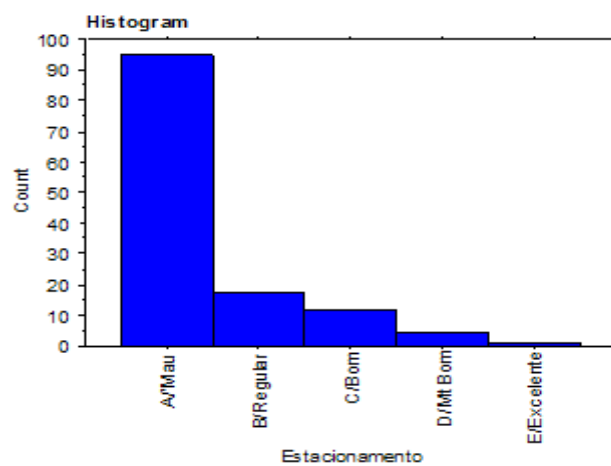
	Count	Percent
A/Mau	1	,783
B/Regular	23	17,557
C/Bom	63	48,092
D/Mt Bom	33	25,191
E/Excelente	11	8,397
Total	131	100,000



**Figure 21 – Frequency distribution for the quality of the CENC’s building**

**Frequency Distribution for Estacionamento**

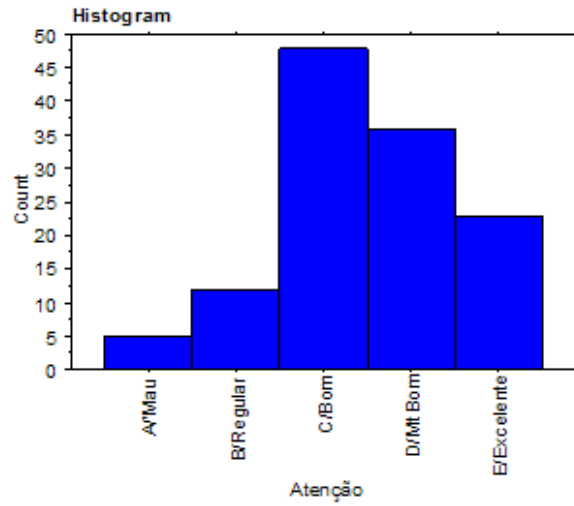
	Count	Percent
A/Mau	95	73,843
B/Regular	17	13,178
C/Bom	12	9,302
D/Mt Bom	4	3,101
E/Excelente	1	,775
Total	129	100,000



**Figure 22 – Frequency distribution for the parking space at CENC**

**Frequency Distribution for Atenção**

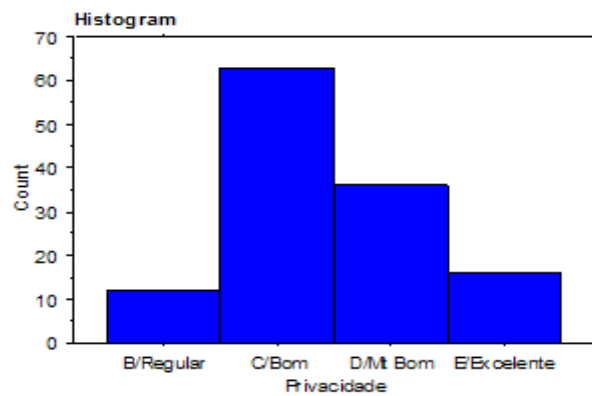
	Count	Percent
A/Mau	5	4,032
B/Regular	12	9,677
C/Bom	48	38,710
D/Mt Bom	36	29,032
E/Excelente	23	18,548
Total	124	100,000



**Figure 23** – Frequency distribution for staff care at CENC

**Frequency Distribution for Privacidade**

	Count	Percent
B/Regular	12	9,449
C/Bom	63	49,606
D/Mt Bom	36	28,346
E/Excelente	16	12,598
Total	127	100,000



**Figure 24** – Frequency distribution for the privacy at CENC

Frequency Distribution for Interesse problemas

	Count	Percent
A/Mau	3	2,459
B/Regular	12	9,838
C/Bom	46	37,705
D/Mt Bom	42	34,428
E/Excelente	19	15,574
Total	122	100,000

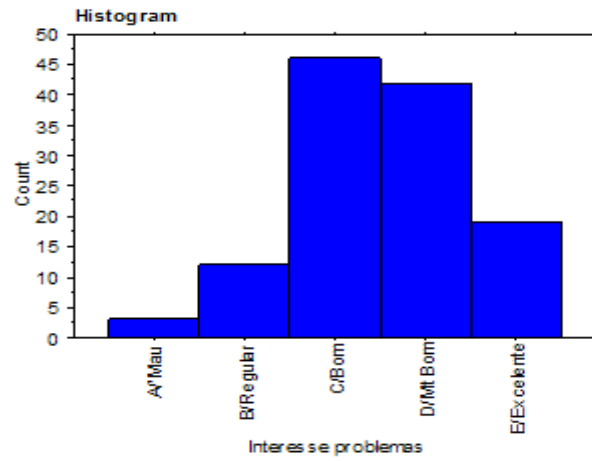


Figure 25 – Frequency distribution for the interest for the patients' problems at CENC