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COMPETITIVE INTELLIGENCE AND BUSINESS VALUATION IN THE HEALTHCARE IT INDUSTRY

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Competitive intelligence and business valuation in the healthcare IT industry

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Resumo

Esta dissertação tem como objectivo principal implementar um processo formal de monitorização dos principais concorrentes da unidade de negócios "healthcare IT" da empresa Siemens healthcare. Para tal, foi criada uma ferramenta em excel que suporta as actividades relacionadas com monitorização e análise dos concorrentes: angariação, segmentação e armazenamento de informação e apresentação resumida da informação armazenada.

Para a realização deste trabalho foi necessária a revisão de literatura sobre o tema "competitive intelligence", na qual foi abordada a teoria desenvolvida em torno deste tema, as melhores práticas utilizadas pelos profissionais de "competitive intelligence" e a forma como as empresas em vários países estão a conduzir as actividades relacionadas com monitorização da concorrência.

A plataforma, constituída pelas ferramentas e documentos de apoio a todo processo de monitorização da concorrência, foi implementada no departamento onde projecto decorreu. No entanto, também teve como objectivo servir de projecto piloto para uma futura instalação em toda a unidade de negócio de "healthcare IT" de uma plataforma com características semelhantes. Portanto, para além do desenvolvimento da plataforma para o departamento de "business development", também foi conceptualizado o desenvolvimento e a implementação de uma plataforma com maior abrangência para toda a unidade de negócio "healthcare IT".

Esta dissertação é também composta por um segundo projecto, de menor dimensão, que consiste na avaliação de um negócio. Devido a factores relacionados com a confidencialidade, este projecto foi abordado de uma forma mais teórica não revelando muitos aspectos da parte prática do projecto. Para a realização desta parte da dissertação, foi conduzida uma revisão bibliográfica aos métodos de avaliação mais comuns, assim como um análise aos métodos de avaliação utilizados na indústria de "healthcare IT".

Abstract

This work has the purpose to develop to Business Develop (BD) department of Siemens Healthcare IT, a framework to support a formal process of monitoring the competitors. An extensive literature review about competitive intelligence was conducted in order to understand what are the best practices are as well as understand how companies are currently conducting CI activities.

The framework was specially developed for the BD department, but it has also served as a mock-up project to the development of a competitive intelligence platform for the entire healthcare IT business unit. So besides the platform for the BD department, a suggestion of implementation and adaptation of such a tool for the entire healthcare IT business unit was also developed in this project.

The second and smaller project consists in the valuation of a business. As this topic was considered critical for Siemens AG the developments core must be confidential and cannot be disclosed any details from this project. A literature review with focus on valuation methods was also conducted as well as a review on the way business are being valued in the IT market. Although it isn't possible to describe the project in detail, the methods and different practices adopted were described whenever possible, discussing the differences exist between the theory and the practices followed by the company.

Acknowledgement

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1. Introduction

This thesis describes the work developed in a business environment for the Dissertation course of the Master in Industrial Engineering and Management from Faculdade de Engenharia da Universidade do Porto. The project took place at the Healthcare sector from Siemens AG in the international Business Development department. This chapter starts by describing the context in which the dissertation was developed and then presents the objective of the work developed for the project.

1.1. Siemens Healthcare IT Business unit

Siemens A.G. is a global company with a diversified product portfolio. Its business spans between 4 four distinct sectors: Energy, Healthcare, Industry and Infrastructure & Cities (Siemens, 2014). Along with its three core divisions of the Healthcare sector - Imaging and Therapy Systems, Clinical Products, Diagnostics - Siemens Healthcare AG has a division devoted to the Healthcare IT: the Health Services (HS) Business Unit (BU). The HS BU, with focus on hospital information systems (HIS), offers a broad range of clinical and financial IT applications, as well as outsourcing and professional services to support health providers across the continuum of care. The health services product portfolio consists of Hospital Information systems, Health information exchange systems (HIE systems) Archiving and documentation solutions, Business Intelligence solutions and Managed services.

1.2. Introduction to Healthcare Information Technology

Decisions of healthcare professionals are based on a great amount of information. Physicians and nurses need different types of information about the patient during the whole care process such as patient history, lab results or radiology exams. Healthcare professionals in hospital administration and management, as well as other non care-providers entities such as insurance companies must also be provided with a vast amount of information (Winter et al., 2011). Thus, information processing is an important quality factor in health care, particularly in hospitals.

HIT is the application of information processing, involving both hardware and software that deals with the storage, retrieval, sharing and use of health care information data, creating knowledge for communication and decision making (Goldschmidt, 2005). In other words HIT, which comprises the use of the hardware and software in an effort to manage and manipulate information, consists of the application of information technology (IT) to healthcare. Since it encompasses a lot of different technologies, several potential levels of applications and stakeholders (e.g. vendors, governments, payers, patients, pharmacies, hospitals, among others), HIT spans a wide range of dimensions and type of systems (Ciampa & Revels, 2012).

IT has been embraced later and adopted with a slower pace in healthcare than in other industries - such as banking - due to several reasons. First, there is a high fragmentation among doctors groups, which typically use different kinds of systems, what makes automation and information connection difficult. Second there is a shortage of trained healthcare technology professionals, who must be specifically trained for this industry and be aware of all the Governments regulations that play a great role in the HIT systems deployment (Ciampa & Revels, 2012). There was a first wave of IT in healthcare in 1950s, when organizations began to use IT to process vast amounts of data and to automate and standardize repetitive tasks. A second wave of adoption came 20 years later and it was characterized by the effort of

promoting the use of HIT by several entities and also by the stakeholders' focus on the integration of the information available. Now, many institutions are already entering in the third wave of IT adoption, which consists in the digitalization of their entire enterprise – digital products, channels and processes - and starting to use advanced analytics to make better decisions. Additionally to this focus towards a fully integrated digital healthcare system, players in healthcare industry are moving from an IT adoption focused on processes to a more patient focused approach, which comes along with privacy and regulatory concerns (Biesdorf & Niedermann, 2014).

1.2.1. Healthcare IT market

The market size of the global HIT was estimated to be approximately \$170 billion in 2012 and expected to grow 4% annually through 2016 (Calton, 2013). Because of the complexity of the US healthcare system, its government stimulus and earlier investments in IT, the US IT market represents the largest HIT global market share with approximately 60%, followed by Japan with just 7% (Calton, 2013).

In Europe the market is difficult to define and to enter, because each country has its own healthcare climate due to differing approaches to healthcare administration. This gets even more complicated when the healthcare governance system of the country, such as the one of Italy creates different regional markets where each administrative zones has authority to set unique rules and guidelines (Lynn, 2011). Nevertheless, Europe is frequently the choice for market expansion for the vendors of HIT systems.

Thanks to the "National Program for IT", United Kingdom (U.K.) is the country in Europe which spends more on HIT (4% of the global market) followed by Germany and France, each of them representing approximately 2% of the global market (R. Anderson, 2005; Calton, 2013). Emerging markets such as China and India are in an early stage of implementing IT in the healthcare, but are the countries experiencing the highest growth rate of the HIT market (Calton, 2013).

It is difficult to make comparisons among countries, because healthcare infrastructure varies widely in developed countries, as does the organization and funding of health services and the patients' behavior. Moreover, there are countries such as Sweden and U.S that have been spending heavily for a while on IT, whereas others are just starting to spend seriously in IT related to Healthcare. This leads to different needs of Healthcare IT among the countries and consequently different industry's characteristic (Marketsandmarkets, 2013). For instance, in US a great proportion of the IT market is dedicated to the complex billing systems, made necessary by the way health system is organized and how providers and payers interact between them.

Another example of the differences between countries is the fact that U.K. is a strong adopter of the electronic booking, while in countries like France and Germany, this type of systems don't have any adoption, since patients go directly to specialists, rather than through GP referrals (as it happens in U.K). Countries also have different priorities: cost control and efficiency drive IT strategies in Sweden and U.S.A, while Germany has a major focus on solving the problem of fragmented information that exists between different providers (R. Anderson, 2005).

So, although the HIT will be addressed as a global market, it is important to retain that the HIT market has different characteristics and it is in different stages of adoption among the different countries in the world, which produces varying HIT requirements.

1.2.2. How IT is influencing Healthcare

Currently there are some trends emerging that are crucial to the vitality of the Healthcare IT market. One of them is E-health, defined by (Eysenbach, 2001) as:

“an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the internet and related technologies, that characterizes not only a technical development but also a state-of-mind, a way of thinking, an attitude and a commitment for networked, global thinking to improve healthcare locally, regionally and worldwide by using information and communication technology.”

E-health is bringing some benefits to healthcare, such as an increased access to information, better match of users' needs and better education of individuals with poor health education. Furthermore, it also gives the patients the chance to reach out in search of effective strategies for managing their own health (Oenema, Brug, & Lechner, 2001). The e-health paradigm gets even more powerful with its recent upgrade m-health, which encompasses mobile communications and network technologies for healthcare systems and represents the evolution of the traditional e-health systems from desktops platforms and wired connections to the use of more compact devices and wireless connections in e-health systems (Beaver, 1998; Istepanian, Laxminarayan, & Pattichis, 2007).

There are several factors that are driving the growth of IT adoption in the healthcare industry. The most consensual and important reason is the cost pressure that healthcare providers are experiencing. Healthcare costs are rising in most countries – for example the U.S shows five years of consecutive annual double-digit increases (Beaver, 1998). At the same time, because of the aging population, there is an increase in the demand for healthcare and patients are becoming more challenging by requiring higher quality. This need to cut healthcare costs, along with the requirement of an improvement in quality and efficiency, has lead providers to use HIT investment as a strategy to reduce operating costs and improve efficiency of healthcare delivery. If the data and knowledge is accessed and interpreted in the right way, HIT enables not only to enhance administrative and clinical workflows and optimize the health information management, but also to enhance decision-making in the clinical scope. Examples of these enhancements are reduction of costs by eliminating double treatments and exams, process optimization by reducing the need to physically retrieve patient's charts and files and minimizing human error. Moreover, an efficient HIT framework provides the practitioners the time and freedom to focus on their core competencies and therefore increase the outcomes of the healthcare system (Beaver, 1998).

In a study presented by Gartner¹, where the potential benefits of an increased usage of e-health in 5 EU member states (Czech Republic, France, the Netherlands, Sweden, Spain and U.K.) were analyzed, was concluded that five million yearly outpatient prescription errors could be avoided, 100 000 yearly inpatient adverse drug events could be avoided through Computerized Physician order entry (CPOE) and clinical decision support. This would make 7000 beds free yearly. Furthermore, the increased usage of the e-health would also avoid 49 000 cases of inpatient Hospital Acquired Infections every year through the use of business intelligence and data mining for real time detection, as well as 11,000 deaths caused by complications could be reduced through EMR with chronic disease management capabilities.

¹ <http://www.sweden.gov.se/content/1/c6/12/98/15/5b63bacb.pdf>

At last, telemedicine and home health monitoring would avoid 5.6 million admissions to hospitals for chronically ill patients (Winter et al., 2011).

Also in order to cut costs and to have more flexibility, by purchasing what they need when they need and to obtain a tailored solution, hospitals are beginning to reduce their IT departments and starting to use software as a service (SaaS) (Bowman, 2014). In SaaS models, organizations secure applications from other companies, what allows them to bypass the risk associated with maintaining and upgrading networks, computers and software applications. Consequently, organizations don't need to spend time with activities that support the IT platform and don't have to invest in an infrastructure to support this platform comprised of computers, servers to store the data and the maintenance that is required. These cloud-based services also provide the chance to the end-user to work in a pay-per-use capacity according to the business needs and give the chance to the user to update fast to modern systems (Bowman, 2014).

Encouragements and initiatives from the governments play a crucial role on the development and growth of the HIT market. In some cases, such as in the U.S, the government implements programs – Health Information Technology for Economic and Clinical Health (HITECH) Act – under which the providers are obliged to adopt IT best practices and infrastructures. Along with the governments' encouragements, which have the intention of moving the healthcare systems towards a more integrated one, is coming another shift: the evolution from clinic centric model to a patient centric model. Following this shift, providers are moving from Electronic medical records (EMRs), which are a digital record of patient's information found in clinicians' office, to electronic health records (EHRs), which have the goal of covering the total health of the patient in order to provide the users of EHRs a comprehensive and holistic perspective of the patient's health (Winter et al., 2011). This way of storing information about the patient is crucial to the new patient centric model and contributes to the achievement of its ultimate goal of letting all the healthcare providers – such as physicians, specialists, nursing facilities and hospitals - act as a team (known as care coordination team) by sharing their perspectives on the patients' health (Beaver, 1998; Rodrigues, 2009).

1.2.3. Integrating healthcare information and systems

In order to move towards care coordination goals and also due to the ever more highly specialized and distributed patient care, it is crucial to have integration between all the entities. Therefore, a recent concept is gaining importance and adherence in the HIT industry: Unified information management (UIM). UIM is a concept that encompasses the connection and exchanging of data between two or more entities and is supported by Health Information exchange (HIE) systems – archiving and networking solutions that enable the share of health-related information among organizations. The components of Unified Information Management that are used depend on specific customer requirements. A UIM project can range from a small project to a system responsible to connect and store the data of a whole country in a central unity (Health Information Exchange Steering Comitee, 2009; Siemens Healthcare, 2014). This ability to exchange information electronically through the HIEs systems is a basic and critical capability to improve healthcare, since it enhances the communication with patients, between practitioners and among the community stakeholders, leading to better health management of the patients and decision making by the health practitioners (Winter et al., 2011). Moreover, it provides the means to reduce duplication of services with a resultant reduction of healthcare costs and provides a connecting point for an organized, standardized process for data exchange across local, regional and country wide

HIT initiatives. HIEs will ultimately provide a single health record view for each patient that is one of the healthcare organizations goals today (Health Information Exchange Steering Comitee, 2009). An example of an UIM project is the NHS National Programme for IT (NPfIT)² in the U.K, whose goal is to move the National Health Service towards a single, centrally-mandated electronic care record for patients and to connect 30 000 practitioners to 300 hospitals.

1.2.4. Big data in Healthcare IT

More and more data becomes available free of charge and some specialists argue that the future of Healthcare will be in the ability to analyze these data with intelligent algorithms, which may enhance decisions, identify opportunities, make better diagnosis and preventions. It is believe that it will also contribute to a better management of the health of populations. Governments and other stakeholders are beginning to move towards transparency in the healthcare by making healthcare related data usable and searchable³ (Population Health Management Solutions and Strategies, 2014). Consequently, healthcare is experiencing an increase in the healthcare data liquidity, diversity and complexity (Groves & Knott, 2013). At the same time, technology advances in the industry are gaining the ability of taking advantage of analytics applications from HIS applied to Big Data, which is expected to transform the healthcare industry in many ways. An example of that are the decision support systems, which comprise clinical analytics solutions and business intelligence solutions. These systems extract multiple types of data – clinical, financial, operating, supply-chain, human resources, among others – that are used to support and enhance decision-making from different functions.

On the clinical dimension of healthcare, this type of technology associated with big data is already playing a significant role. Clinical decisions support systems that compare patient information against research literature and medical guidelines are already available, alerting to potential errors or dangers such as adverse drug reactions. Furthermore, it is expected that they will be essential to the clinical process by enhancing the evidence-base care and efficiently prevent complications, new disease developments of patients and helping physicians make the final decisions about diagnosis and treatments. They will be important to enhance the drug prescriptions or even the track the high-cost patients, who are responsible for about half of all health care spending in US. On a more operational dimension, there is the example of decisions support systems supporting research organizations in optimizing operations and strategic planning as well as helping Pharmaceutical companies to predict disease trends (Health Information Management Systems Society, 2014).

Now that a great part of healthcare organizations has a robust and integrated IT structure installed, relevant data is easily accessible. HIT is entering in a new phase, where integration of information is a requirement and where taking advantage of these big data by enhancing the decisions and getting insights from them will be essential to achieve success (Piai & Claps, 2013).

² www.connectingforhealth.nhs.uk

³ www.healthdata.gov is an US government website dedicated to make health data accessible

1.2.5.HIT systems

Healthcare information systems (HIS) provide the informatics platform that enables all the benefits and efficiencies stated before. HIS collects data that can be used across a number of systems of many different purposes (Winter et al., 2011). One major category of the HISs are the hospital information systems.

A hospital information system has many different aspects incorporated within itself and therefore different types of systems. The type of systems that are comprised by a hospital information's systems can be defined as Clinical information systems (CIS) and non-clinical information system (NCIS) (Calton, 2013).

NCISs include applications that address the financial and operational aspects of a healthcare organization, such as cost accounting, staffing levels, budgeting and facility management. CIS includes applications that address aspects of the health practice such as care delivery, drug efficacy and population health management (Beaver, 1998; Rodrigues, 2009).

HISs are generally composed by a great number of different applications that support the needs of many type of organizations interacting with each other in the healthcare industry (EMRconsultant 2014).

HIS's applications typically used in a CIS are the Electronic Health Record (EHR) system, order entry system also known as Clinical Physician Order Entry (CPOE), Laboratory information system (LIS), decision support systems, pharmacy information system and nursing system (www.emrconsultant.com, 2013). While on the non-clinical dimension of the HIS, the most used application are patients administration systems, financial information systems and HR-related systems.

As mentioned before, the HIT market varies widely from country to country and applications that are usually used in one country can have no adoption in others. Since they constitute a great part of the revenue for the HIT vendors, the services related to the HISs, provided by these vendors are usually considered as part of the HIT business. The services related to Healthcare IT are usually IT consulting, development integration and maintenance of the system acquired, Business Process optimization (BPO) and as hosting and IT outsourcing.

1.3. Objective of the work described in this thesis

The work described in this thesis is related to two projects developed in the field of competitive intelligence (CI) and business valuation in the Healthcare Information Technologies (HIT) business unit of Siemens AG. Both projects were supported by an extensive literature review that is presented in the thesis. The CI project consists in the development of a framework to support the process of gathering, storing and disseminating information about the competitors. The part devoted to the business valuation project is approached with focus on the theory, since the project details are confidential and can't therefore be disclosed.

The first and main project consists in the development of a competitive intelligence framework (CIF) to the business development (BD) department, as well as a proposal for its adaptation to the whole HIT Business Unit of the company. Before developing the framework, a review of competitive intelligence literature was executed, where it was reviewed what the authors understand by the term CI, as well as the importance of the CI

activities and how they should be performed. During the literature review was also addressed the way companies are performing CI related activities.

The goal of the framework to be developed in this project is to create a platform that enables the BD department to store information about the competitors in a way that it is easier to access and enables the user to obtain a completed and updated “big picture” of the main competitors. In order to achieve these goals, to automate some of the CI analyst activities and according to the specifications required by Siemens BD HIT managers, the framework is composed by the following components:

- An excel file with 3 databases containing information about competitors and a dashboard that presents the information contained in the databases in a comprehensive and aggregated way, i.e. through charts and tables.
- A design of tasks to regular be undertaken by the CI analyst, who is responsible for administrating the database by updating its records and redesigning the framework as required.
- A set of support documents, which are intended to support the activities related with the CI framework - such as data gathering - as well as to contribute to a continuous improvement of the whole process related to the CIF.

Since such a tool would be more powerful and useful if used by all employees, a roadmap has been suggested for adopting the CIF in the whole Healthcare IT division. This was presented to the team responsible for the competitive intelligence of the Business Unit and is described in detail in the chapter dedicated to the Project of Competitive Intelligence Framework.

The second and smaller project also described in this dissertation consists in the valuation of a business. As this topic was considered critical for Siemens AG the developments core must be confidential and cannot be disclosed any details from this project. However, since it was a project to which a lot of time was devoted, it was decided to include it in the master thesis. A literature review with focus on valuation methods was also conducted as well as a review on the way business are being valued in the IT market. Although it isn't possible to describe the project in detail, the methods and different practices adopted were described whenever possible, discussing the differences exist between the theory and the practices followed by the company.

Besides the development of the previous described projects, a lot of time was devoted to tasks that won't be mentioned in this dissertation. These task include the management of the whole recruitment process of the next intern, development and enhancement of presentations, researches documents about specific topics to support managers in meetings, analysis and translation of contracts, among others administrative tasks.

2. Literature Review – Competitive Intelligence

2.1. Introduction

On the present era the amount of information created in the entire world is doubling every 40 months and the world is getting highly connected. Due to this, there is a rapidly changing of business environments. Therefore, mastering the process of information creation and transforming it into intelligence - what supports a wide range of decisions-types - is getting crucial for every company (B. Anderson, 2014; McAfee & Brynjolfsson, 2012).

Although competitive intelligence (CI) activities can be useful for different functions of a company, in this master thesis the focus will be on the importance of CI at a strategy level since the majority of tasks done during the internship were related the strategy of the company.

In studies conducted about companies from different industries was found that for most of them the goal of the CI activities was to support strategy decisions (Muller, 2007). This happens because CI is produced essential to understand better an industry as well as the company itself and the competitors. Therefore it is crucial to the formulation of the strategy (Bose, 2008).

Wright (2010) states that typical provisions and advantages of CI activities to the strategic decision making process are: an objective view of the market place; a reduction in decision making time; minimizing risk and avoiding surprises; identification of opportunities before the competition does; identification of early warning signals of competitor moves; verification of assumptions; support for prioritization of decisions as well as reduction in uncertainty.

The literature review of CI reported in the remainder of this chapter is composed by a first part where several definitions attributed to CI are discussed. The second part is devoted to the state-of-art of the CI, describing the way companies are executing CI activities and what their goals are. The results from studies that compared CI activities among different countries are also presented.

The third part is devoted to a review of the literature from different CI processes conceptualized by different authors, with focus on a recent study that created an universal CI process model by analyzing several different models from the literature. It is important to mention that this particular section will serve as the theoretical guideline to the development of the CI project presented in this thesis.

The last part describes typical CI activities and their relevance to strategy formulation. This chapter also addresses the important role that the CI analyst represents in the intelligence producing process.

2.2. Defining Competitive intelligence

Among researchers and practitioners, there is no consensus over the definition of Competitive intelligence (CI) since the concept is extremely broad and sometimes it refers to different subjects. In the literature, several definitions of CI covering different scopes and functions might be found.

Murphy (2005) explains that "CI is now so catholic in its range of concerns it becomes difficult to know where to fix its boundaries, since it is intertwined with functions such as market research, business information and knowledge management." Attaining an accurate

and consensual definition becomes even harder when intelligence practitioners use different terms. For example, terms like competitive intelligence, business intelligence, market Intelligence and corporate Intelligence are often used interchangeably or as synonyms (Ettorre, 1995).

Murphy (2005) defines CI as being the "transmutation of intelligence into shared learning within an organization that provides an informed basis for its corporate actions". Anica-Popa and Cucui (2009) state that CI is the acquisition and use of information about new and existing competitors, customers, suppliers and competing industries, in order to support decision making process for enhancing competitiveness of organization. In a more general and broad approach, Global Intelligence Alliance (2004) defines CI as knowledge and foreknowledge about the external operating environment, whose key goal should be facilitating a more effective strategic planning, providing decision-maker with early warnings of future events, which may have an impact on company's performance and produce insights about the competitors' capabilities and intentions. Also Bergeron and Hiller (2002) have a broad definition for CI. They claim that CI covers various areas of intelligence including competitors, technology, product/service, environment (ecology), economy, legislation, regulation, mergers and acquisitions, customers, suppliers, market, partners, social environment, and the internal environment of the organization, with the objective of creating actionable intelligence, i.e. information that has been synthesized, analyzed, evaluated, and contextualized.

Rouach and Santi (2001) defined it as the "art of collecting, processing and storing information to be made available to people at all levels of the firm to help shape its future and protect it against current competitive threat: it should be legal and respect codes of ethics; it involves a transfer of knowledge from the environment to the organization within established rules". They also attempted to summarize the various aspects of the Competitive Intelligence concept as shown in Figure 1.

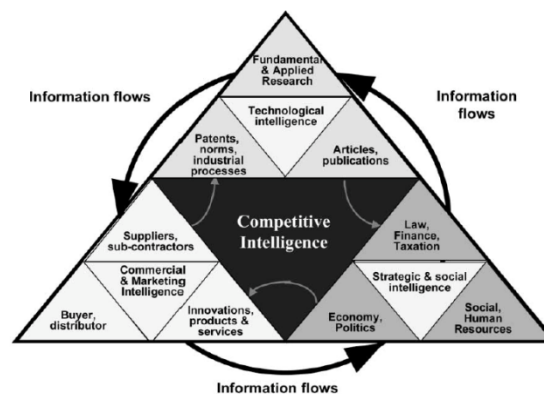


Figure 1 - Aspects of Competitive intelligence (source: Rouach and Santi, 2001)

Their approach categorizes different types of competitive intelligence. First the market Intelligence, which is needed to provide a road map of current and future trends in customers' needs and preferences. The second category is Competitors' Intelligence, which is needed to evaluate the evolution of competitive strategy over time through changes in competitors' structure, new product substitutes and new industry entrants. The last category is Technological Intelligence, which is responsible to assess the cost and benefit of current and new technologies and to forecast future technological discontinuities.

The biggest ambiguity lies between the terms BI and CI. There are some authors such as (Lönnqvist & Pirttimäki, 2006) and (Tyson, 2002), who have addressed this issue by defining BI as an umbrella concept referring to the analysis of internal and external information sources and CI as being one of the several dimensions from the BI. For Gartner Group (2014), BI includes all the applications, infrastructure and tools, and best practices that enable access to and analysis of information in order to improve and optimize decisions and performance. Also for them CI is a part of BI, which is considered to be the "analysis of the enterprise's marketplace to understand what is happening, what will happen and what it means to the enterprise".

Also addressing this issue, the Institute of Management & Accountants (1996) considers that there are 3 levels of intelligence, partially represented by the inverted pyramid on Figure 2.

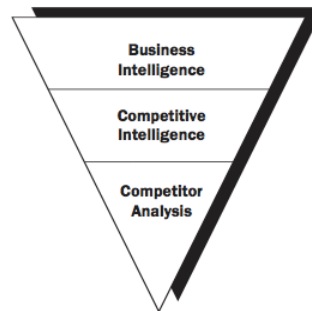


Figure 2 - Relationship between three types of intelligence gathering

For them, the broadest level of intelligence is BI, which includes CI but also environmental scanning, market research and analysis. The CI level comprises all the information about the competitors and the competitor analysis is a narrow focus on an individual competitor profile, which is understood to be "a package of information about a specific competitor at a specific time, that typically includes an overview of a competitor, its key executives, important markets and product lines, underlying operations and technology and financial performance." (Institute of Management & Accountants, 1996)

As it can be perceived from the above review of the different definitions of CI, all of them refer to a process or framework that comprises gathering, dealing and working with information transforming it into intelligence that can support and be useful to decision-taking processes. The main difference between the concepts is the scope of the term CI, i.e. to which company's functions should CI be related. Therefore, the terminology and scope of Competitive Intelligence efforts in organizations "should be determined on a case-by-case basis both in terms of contents as well as the decision-making levels it is primarily intended to serve" (Global Intelligence Alliance, 2004) .

2.3. State-of-art

2.3.1. How competitive intelligence is being performed

According to statistics, in the top 500 enterprises of the world, over 90% of the enterprises have established CI systems. However, many of these undertaking CI do so at a very low level of commitment and intensity and even when a more developed CI project is running, it receives few resources (Murphy, 2005). In general, companies established in more competitive industries tend to have more CI personnel (Viviers & Muller, 2004).

Many ways of approaching the task of undertaking and delivering CI are being adopted. In some cases, it is given to an employee as one of several duties or as his sole duty. Less frequently, a distinct CI unit is formed. It is also common that companies assign the activities related with CI to external consultants, while in others cases, where CI plays an important role, and is assigned high priority such as in Procter and Gamble, a director takes charge of a CI unit and reports direct to the chief executive officer (Murphy, 2005).

The survey conducted by Competitive Intelligence Foundation (CIF) answered by 520 CI professionals and by GIA indicates that CI is often a small function conducted by people who work part-time on CI (Figure 3).

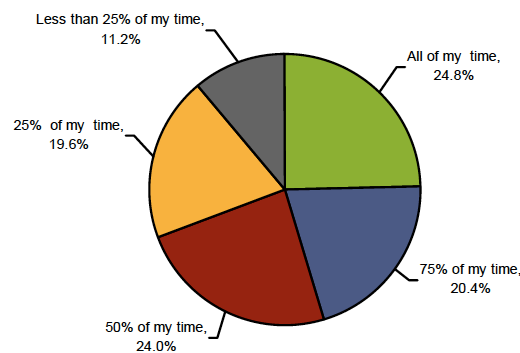


Figure 3 - Percentage of employees' work time dedicated to CI

Both studies found that in general CI is conducted by a specific division in a company and that it makes use of additional support from other company divisions.

In terms of its structure, CI is most often either a stand-alone unit or a part of marketing or market research. Other divisions where CI is often located or to which it reports include strategic planning, information services or business and product development (Muller, 2009).

In large companies CI is more usually performed in-house, although some areas of it are outsourced (Global Intelligence Alliance, 2004). As the SCIP report revealed, more than 50% of all CI professionals outsource some part of their CI activities. One of the reasons that leads companies to outsource CI activities is reducing costs by contracting out services and activities traditionally provided in-house and to gain a competitive advantage by seeking differentiation and efficiencies (Juha & Pirttimäki, 2005). Furthermore it allows companies to focus on their core-business and it ensures that ethical and legal guidelines are followed (SCIP, 2014). However, outsourcing intelligence activities comes along with risks that companies should be aware of, such as revealing strategies to competitors or confidentiality, and provide information to outsiders that can use this information in a way that can be prejudicial to the company (Juha & Pirttimäki, 2005).

2.3.2. CI objectives and techniques

Intelligence activities have a wide range of possible goals. Powell and Allgaier (1998) conducted a survey with more than 200 members of SCIP from different industries, that found that the objectives of the companies' CI activities tend to be more strategic than tactical, and more oriented towards market and competition than sales, as shown in Figure 4.

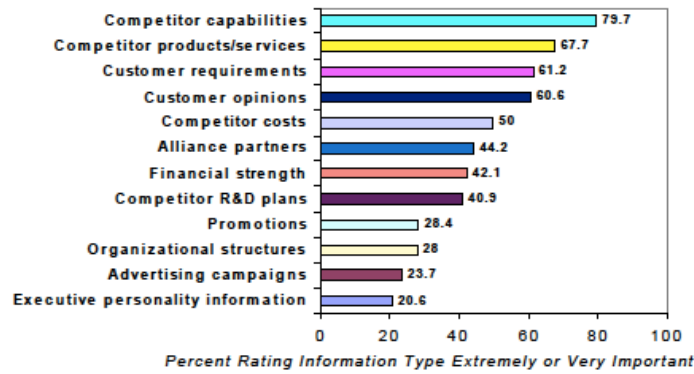


Figure 4 - Intelligence Objectives (source: Powell and Allgaier ,1998)

They also discovered that the techniques currently used to analyze the information vary widely. The top three techniques relate to the development of competitors’ profiles, financial analyses and SWOT analysis.

The companies inquired considered SWOT analysis to be the most effective technique (see Figure 5). The more complex techniques such as conjoint analysis and simulation models were considered less effective, because they are less understood than other more simple and intuitive techniques.

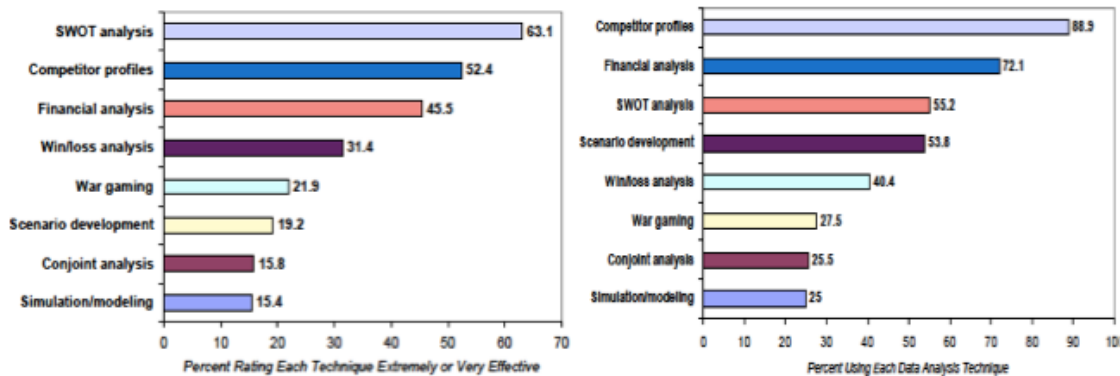


Figure 5 - Usage and rated effectiveness of information analysis techniques (source: Powell and Allgaier ,1998)

Similar results were obtained in the (Competitive Intelligence Foundation, 2006) survey, where Competitor analysis and SWOT analysis were the techniques most used by the 500 CI practitioners that participated in the study.

2.3.3. Global CI Overview

Although there are some studies within countries and others comparing countries with others with respect to their CI activities, there is a relative lack of empirical research in field of global CI (Blenkhorn & Fleisher, 2007).

Rouach and Santi (2001) did a study to assess the CI activities in French and American companies and in which they have identified five types of analysts’ attitudes towards CI. as reported in Table 1.

Table 1 - Five type of CI attitudes

Type	Description	Corporate examples	Methods
Sleepers	Have no deliberate CI activity and are led by passive managements who believe that they already know all they need.	N/A	Blind and passive
Reactive	Have no regular CI operation, but will be provoked into undertaking some ad hoc CI exercises when faced with an overt competitive challenge.	Most of the French small and medium enterprises (SMEs)	Reacts to attack, very limited budget
Active	Companies with an <i>active</i> approach have a permanent CI function and try to anticipate opportunities and threats rather than respond to them when they become prominent.	Many large French firms and some French SMEs. Most of the American SMEs.	Limited resources, beginning of operational CTI network
Assault	Have a very pro-active management of CI and continuously on the look-out for opportunities	Ericsson, L'Oreal, France telecom, Airbus and IBM	Significant resources, professionalism and ethics
Warrior	Also pro-active and the intelligence analyst are frequently ex-military intelligence specialists.	Thomson CSF, Nestlé, Cegetel and Ford	Sophisticated tools and significant resources

They found that most of the French Small and Medium Enterprises (SMEs) are on the reactive category and most of the American SMEs and many French large companies are on the active category.

On another study, Wright et al. (2002) analyzed a set of UK companies regarding their CI activities and found that the majority perceived CI as "simply knowing about their competitors". And while most companies rely upon general and specialist publications to provide their research material only a few others do some primary research. These authors have also developed a typology of attitudes and practices based on the results from the study, presented on Table 2.

Table 2- Typology attitudes and practices of CI

Type	Description
Immune	These companies were not interested in their competitors, believing themselves too big or too little or too special for it be worth engaging in.
Task driven	Ad hoc CI activity, more usually carried out by individual departments than by the company as a whole. Such companies are similar to the reactive category.
Operational	These companies were trying to understand their market environments, although their CI efforts (which are usually under the auspices of senior management) were focused more on the current situation than on taking long-term factors into account. They resemble the active group.

Strategic	Sponsored both at top management level and by departments, the CI program is broad in scope and its timeframe extends beyond immediate conditions and concerns.
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Blenkhorn and Fleisher (2007) analyzed and compared Brazilian and North American companies and found that North America is executing CI activities better than the Brazilian companies (ANEXX D)

2.4. CI Process

Kahaner (1997) believes that CI works better as a process instead of a function, arguing that the structure of the CI cycle is clearly a process and that having CI working as a function can lead to the perception of CI being as an “executive spy agency”. This may lead the other employees being less participative and contributing less to the CI activities. Global Intelligence Alliance (2004) also has the opinion that to have an effective transformation of information into actionable intelligence, it is required a process perspective "given that a continuous chain of action is required". The core objective of this process is to “turn raw information or data into intelligence" which is illustrated by the intelligence pyramid (see Figure 6) (Kahaner, 1997).

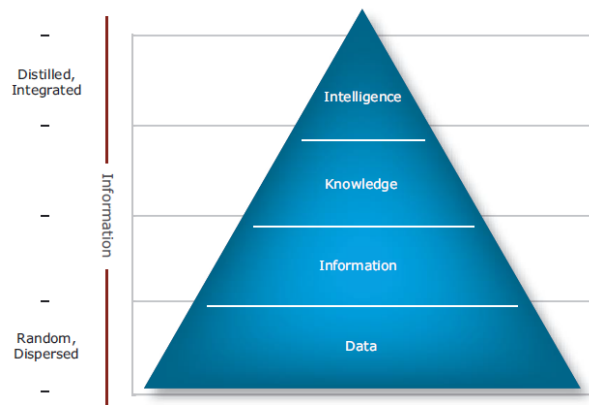


Figure 6 - The intelligence pyramid (source: Kahaner, 1997)

In order to accomplish this, the literature has several proposals for CI processes, which typically differ in the number and type of stages and characteristics. Most of the models adopted by the authors have five stages in common: Planning, collection, analysis, dissemination and feedback.

Recently, Pellissier, R. and Nenzhelele (2013) developed a proposal of an universal process model for CI. After reviewing the current literature about CI processes they identified the common and unique phases and characteristics used by different authors, which are stated and described on Table 2, based on various authors definitions.

Table 3 - Common Phases and Characteristics in the literature

Phases and Characteristics	Description
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Establishment of CI needs	<p>Identified with different names among the scholars such as “intelligence requirements and determination of key intelligence topics”, “understanding the need” and “defining CI demand”, this phase involves identification of the intelligence needs of decision-makers (Pellissier, R. & Nenzhelele, 2013) and it is in this phase that is determined what CI unit should research and to whom (Strauss & Toit, 2010). Upon the understanding of the user’s need depends the success of the whole process (Rouach & Santi, 2001). (Global Intelligence Alliance, 2004) considers that effective intelligence processes set the intelligence users as the starting point for the entire function.</p>
Planning and direction	<p>For some authors this is the first phase, where they integrate the previous phase of identifying the intelligence needs in here. (Murphy, 2005) described the planning phase as “the management process through which intelligence users table requests for intelligence and where strategies for satisfying these needs are decided and resources for the activity are allocated.” He further states, that it is challenging prioritizing the so many areas potential interest that usually emerge. To deal with that, CI operations must be guided based on accurately defined key intelligence needs (KITs), which are those topics identified as being of greatest significance to the primary users of the CI (Bose, 2008). And these must most of the time been determined by the CI analyst, since managers do not always know what they really need (Viviers & Muller, 2004).</p>
Information collection	<p>Being the second or the third phase of the CI process for some scholars, it can be referred to in different ways: “data collection”, “collecting raw data”, “collection” or “gathering”. This phase involves actual gathering of raw information and all available ways and methods to collect the information from all possible and available sources are identified (Kahaner, 1997). The emphasis is on collection of publicly available information, where the information to be collected must be relevant to the KITs (Pellissier, R. & Nenzhelele, 2013). Sources are usually categorized into primary sources or secondary sources (Bergeron & Hiller, 2005), where the first consists of direct observations, reverse engineering or human intelligence networks (such as employees, clients, competitors, consultants, etc.). Examples of secondary sources are internet sources and media. Most of CI analysts consider that the most forms of primary and secondary sources are important to their CI practice, although results showed that secondary sources continue to be a main source of information (Muller, 2007). Furthermore, a previous survey showed that about 90% of competitive intelligence could be acquired from the Internet (Teo & Choo, 2001).</p>
Information Processing	<p>Some experts consider this phase as being a part of information collection phase. This phase involves processing the information so that it can be sorted and communicated (Kahaner, 1997). This means that it is responsible to organize, systemize, implement and maintain a mechanism of capturing and storing information (Pellissier, R. & Nenzhelele, 2013). Depending on the level of decision making involved, the requirements for this phase may change. The higher the decision-making level, the more</p>

	sophisticated the processing required (Global Intelligence Alliance, 2004).
Information analysis	(Viviers & Muller, 2004) consider this as the core phase of CI process, whereas (Kahaner, 1997) considers it the most challenging and difficult part of the process, because it “requires the analyst to weigh information, look for patterns and come up with different scenarios based on what he has learned. Out of the complexity, confusion and uncertainty the analyst has to produce a output that should be the options and recommendations emerging from the analysis that facilitate senior managers’ strategic decision-making”. As (Rouach & Santi, 2001) explain, it is in this core element of the process, that seemingly unconnected information is turned into intelligence. A survey conducted by SCIP and another one by (Competitive Intelligence Foundation, 2006) showed that the most used techniques by CI professionals to analyze information are competitor analysis or profiling and SWOT analysis.
Intelligence dissemination	The specialists refer to this phase in several manners, such as “communication”, “intelligence dissemination”, “disseminating information” or “communicating the finished intelligence” (Pellissier, R. & Nenzhelele, 2013). For (Kahaner, 1997) this is the most important part of the CI process, because it is here where the most of projects fails. The analyst is supposed to present and defend his conclusions and analysis based on the raw data he collected. The main goal of the intelligence dissemination phase is to summarize the information in a way is readable and comprehensible and communicate it to the end-user. It can be preceded in many different ways depending on the particular needs of the target audience. This can range from a short conversation to a formal presentation with slides and supporting documentation (Murphy, 2005). In a survey conducted by CI Foundation was found that the communications methods used to communicate the product of CI activities included e-mail, printed reports and presentations briefings, where e-mail was by far the most popular communication method of communicating intelligence (Muller, 2007).
Taking action	In this phase is where the end-users of the intelligence make use of the intelligence produced to influence their decisions and give feedback about new intelligence needs (Botha & Boon, 2008). (Global Intelligence Alliance, 2004) identifies the main targets for the intelligence’s utilization as being: identifying new business opportunities, sharing ideas, improving the organization’s ability to anticipate surprises, improving managers’ analytical skills and integrating diverse ideas.
Process and structure	In the literature is often mentioned that in order to have effective and productive CI activities it is required appropriate policies, procedures and infrastructures (sometimes informal) (Kahaner, 1997; Murphy, 2005; Pellissier, R. & Nenzhelele, 2013).

<p>Skills development</p>	<p>Embedding competitive intelligence and employees that know the rationale for the CI program is a condition for successful CI activities. And for that it is necessary considerable training throughout the organization, for which the skills development phase is intended. Employees need education about possible sources of information that exist and about how to communicate in order to make the CI process work. (Pellissier, R. & Nenzhelele, 2013).</p>
<p>Organizational awareness and culture</p>	<p>A company should have awareness of its CI programs and the importance of it. It's crucial to have that and a culture that contributes to a "firm-wide CI". This can be achieved by encouraging and facilitating the contribution of all organization's members that are valuable intelligence agents. (Murphy, 2005) says that 70 to 80 percent of the intelligence needed by a company resides with employees, who collect it in dealings with suppliers, customers and other industry people. So there is a need to motivate these employees contribute to the intelligence effort and pass along important information. To motivate their employees companies usually have incentives such as feeding back information (through newsletters, e-mail or competitor information bulletin boards), awards to employees who have contributed vital market and competitor information to managers (Institute of Management & Accountants, 1996).</p>
<p>Feedback</p>	<p>This is the phase where the users of the intelligence provide their feedback about the CI process (Pellissier, R. & Nenzhelele, 2013). (Rouach & Santi, 2001) suggest that in this stage of the process a deep evaluation of the system must be made. (Institute of Management & Accountants, 1996) states that it is also important to evaluate the extent to which CI is being used in critical management decisions.</p>

In order to understand the importance and adherence of each of these phases, the frequencies of adoption and characteristics were also calculated (ANEXX G). And based on the literature and the analysis of the frequencies Pellissier, R. and Nenzhelele (2013) formulated a universal CI process model illustrated in Figure 7. This is viewed as a continuous cycle of interrelated phases, where the output of one phase is the input of the next phase.

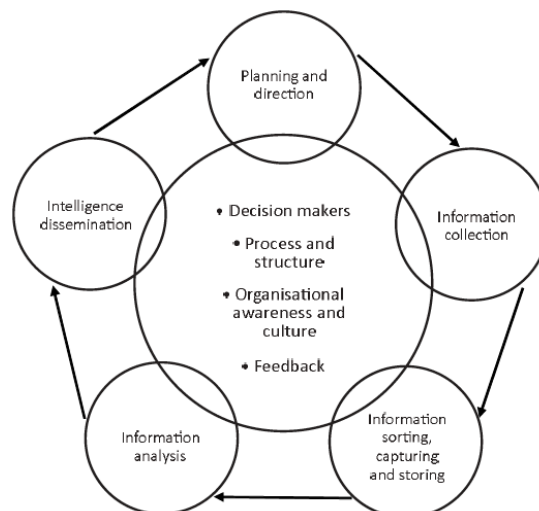


Figure 7 - Propose of universal CI process model

This model starts with the phase "planning and direction", that incorporates one crucial activity of the CI cycle: establishment of CI needs. The second phase is called "information collection", in which information relevant to the KITs is collected. Because the authors consider the "information sorting capturing and sorting", also known as information processing, as being crucial for the CI activities, this part of the process was considered to be a different phase of information analysis, although some scholars considered it as being part of the same phase of the cycle. It is important to note that the name "information sorting capturing and sorting" was given to this phase in order to eliminate confusion between the information processing and the information analysis phases. Since most scholars had an "intelligence dissemination" phase in their model, the authors have also incorporated this phase in their model as the last one, in which the information is supposed to be disseminated to the end-users of intelligence. Fewer specialists adopted the skills development, process and structure, organizational awareness and culture and feedback as phases, but in this model they were integrated as being influential factors affecting the cycle.

2.5. Performing CI

2.5.1. CI analyst

One key piece of the process of intelligence production is the CI analyst. His/her role ranges from looking what is happening in the industry and being able to alert for potentially important events to gather information about a specific topic (Rouach & Santi, 2001). CI activities are conducted under a complex, confuse and uncertain environment as every business environment. So, it is important that the analyst is passionate and persistent about what he/she is researching and is able to remember and fit what he/she reads into the context of an overall big picture, but also to attend carefully to fine details (Murphy, 2005).

Decisions-makers, like chief executive officers and senior managers, need intelligence to make decisions, but usually they don't have time to execute CI activities. So they have to delegate this task to CI analysts. Therefore one of the factors that leads to a satisfactory CI output is a properly briefed analyst, that is aware of the strategic thinking of the decisions-makers so that he can judge what kind of intelligence should be passed or not to them (Murphy, 2005). This is crucial because one common mistake of a CI analyst is to produce irrelevant material or intelligence, usually caused by the wrong understanding of the requirements of end-users. "It is also very important to separate the "nice-to-know" from the "need-to-knows" information. During the research and collecting phase, the analyst will pass through a great amount of information and one thing that characterizes a good analyst is the availability of ignoring that information that seems to be important, but has not a purpose for the needs it is been searched" (Carr, 2003, p. 177).

Most of the times, CI activities involve trade-offs between time and quality. Analysts often believe that a detailed and extensive report is the best way of showing their value, whereas most decision-makers seem to prefer a timely answer to a totally accurate answer (Murphy, 2005). The Competitive Intelligence Foundation (2006) argues that only 70% of the delivered intelligence needs to be totally accurate if it is delivered on time (Competitive Intelligence Foundation, 2006). Thus, an analyst has to know when to stop the research and therefore have the right feeling of knowing if it will be possible or not to get the information it is looking for (Murphy, 2005).

Furthermore, as Breeding (2002) argues, the main activities that a CI analysts perform are answering ad-hoc requests, in which are typically included the following items: “demographics and statistics, company financial comparisons, journal and news article searches, markets overview, investment analysts’ reports, studies and research reports, competitive information international business research, among others”. Examples of these ad-hoc requests from managers that can range from request of the type: “We are competing against this firm. Can you tell me all the information you have about this specific business segment of them?” to “We are in Egypt and we’re considering partnering with a small local company and we need information that company and that market”. Breeding (2002) called these ad-hoc requests as reactive requests, where the analyst has to do research to answer them. On the other side of the spectrum are the proactive requests, for which the analyst already has the answers before the request is made. And one of the goals of the CI analysts should be to automate the most common requests for information, and minimize the reactive research by transforming them into proactive requests and therefore freeing up time for the CI analyst to perform high value-added activities (Breeding, 2002).

At last, there is another dimension of CI that must be addressed: the ethics dimension. Although most of the information the analyst will need is in the public domain (80% according to Rouach and Santi (2001)) and will not infringe upon any laws or personal ethics, it is important that before starting to gather and store information, the practitioners of CI are aware of the legal boundaries, in order to access the information in a scrupulously legal and ethical manner (Murphy, 2005)

2.5.2.CI activities

Industry analysis

Industry analysis helps to understand forces that are economically impacting players in an industry, as well as the markets in which the company competes (Lewis, 2014). The literature suggests the organization shouldn’t just focus on its products and internal processes, as these two components alone do not enable any long-term competitive advantage (Jenster & Søylen, 2009). In order to gain this competitive advantage, a company needs to have a strategy that creates a unique and valuable position (Porter, 1985). To be able to achieve this strategic positioning, it is essential for an organization to understand the industry’s underlying structure, react quickly to opportunities and threats, as well as be aware of its external environment, such as its competitors and costumers (Global Intelligence Alliance, 2004). Moreover, the development of a robust and sustainable strategy that will enable a superior performance through gaining competitive advantage is what ultimately drives all intelligence activities. To achieve this competitive advantage an accurate industry analysis is essential, because it will provide an awareness of the external environment that will enable to better understand the competitive landscape and will enable the organization to better interpret other type of information gathered, such as the behavior of a competitor, that can only be fully understood if the context in which it operates is perceived first (Jenster & Søylen, 2009).

Focus on competitors

Analysing the competitive environment and anticipating competitors’ actions and reactions is crucial to formulate competitive strategies (Day & Reibstein, 2004). Figure 8 illustrates the scope of competitor intelligence, which is intended to be an important part of CI.

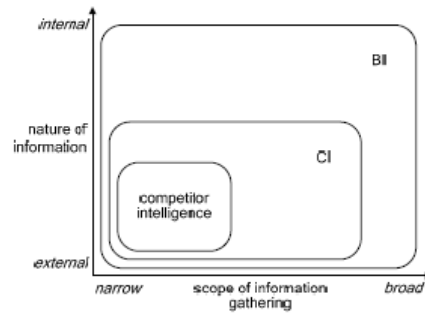


Figure 8 – Competitors intelligence scope (Pirttim, 2007)

Strategic success depends heavily on the strategies of competitors and there are often strategies interdependencies between rivals in the same industry. Therefore, the ability to anticipate the competitors' strategic moves is crucial to a company's success (Courtney, Horn, & Kar, 2009). By analyzing capabilities, vulnerabilities and intentions of the competitors, the intelligence produced during CI activities allows a company to remain competitive and improve performance against its competitors by enhancing the strategic decisions (Bose, 2008). Furthermore, it enables the companies to develop effective defensive positions over its competitors (Porter, 1985).

Company profiles

Company profiles are usually developed about competitors, but as West (2001) argues, this technique is also valid for other purposes. Company profiles are also conducted to monitor competitors, potential competitors, indirect competitors and companies that are active in related business and might enter in our business (West, 2001). Maintaining the contact with these three different types of competitors or potential competitors is important, since it enables to address current and future competition. Indirect competitors are important because of the effect they can have on the market and also because at any time they may turn into direct competitors by broadening their product portfolio (West, 2001).

Another type of companies that must also be monitored are the companies that are neither direct nor indirect competitors, but have the skills and resources to diversify and enter in our market (West, 2001). An example of these companies in the Healthcare IT industry are companies that offer IT solutions to other industries, but that can at any time use their skills to build solutions to the healthcare industry.

Murphy (2005) explains that a company profile must give a good understanding of how a company operates and should offer clues as to its future behavior and performance. To achieve this while analyzing a company, the analyst should focus on the present situation as well as changes over time, like trends in firm's financial situation and performance or shifts in the markets it serves in terms of region and product portfolio. He/she should also enumerate some items that might be addressed in a company profile: background, activities, markets, financial condition, financial performance, premises, inventory, technology, R&D and equipment, management and ownership, human resources, intangible assets and litigation, alliances, company's external environment (STEEP analysis), SWOT analysis, role and status of individuals within a company and their interrelationships (Murphy, 2005).

3. Competitive Intelligence Framework Project

3.1. Competitive Intelligence in the BD International department

The BD international department is responsible for the inorganic growth of the HS division, and therefore it is responsible for all investments and divestures decisions, as well as for strategic decisions in all the countries where Siemens HS is present, excluding the U.S. Decisions have usually to be made in a very short period of time. So, a quick intelligence producing process about specific markets, industries, competitors or costumers is essential for the decision-taking process of the department. During the project, the author was in charge for most of this intelligence producing process, which usually is triggered by a request from a manager about specific information he/she needs to access. A great part of the work performed during the internship can be considered as a CI related work, since it perfectly matches the definitions of CI activities presented before.

Almost all the tasks executed in the BD department were in the domain of industry analysis. As the healthcare IT industry is evolving rapidly – with a changing environment in terms of competition, products and regulations – it is fundamental to the managers and to the CI analysts to have a good understanding of the industry and to be aware towards which direction the industry is moving. Consequently, during the project researches related to industry analysis have ranged from macro researches to very specific studies about small entities of the industry. Examples of macro industry studies conducted during the project are: research about life-sciences trends, healthcare-related business models, trends of private-equity firms' investments in the life-sciences industry and analysis of the healthcare systems of different countries. Regarding the industry analysis with a narrower scope, the major intelligence activities conducted were company profiles and competitors analysis. Since the BD department is responsible for all M&As, it is understandable that a great part of these company profiles developed had the final goal to analyse companies that might be candidates for future acquisition, investment prospects, potential partners in a specific project or a threat to the business development of the HS.

The information contained in the company profiles developed were usually divided in 4 parts:

- Company overview (headquarters, type of company, number of employees, affiliates companies, operating regions and segments);
- Financial information (revenues, profits and margins evolution, financial ratios, sales by regions and segments among others);
- M&A and strategic partnerships activity (information related with acquisitions, mergers, divestures and joint ventures);
- Product portfolio;

Of course that these criteria have varied from company to company. The decision of what to include was evaluated for each case, taking into account the manager needs, the type of company and the deadline for the project. Frequently, time was the most important factor and therefore a quick profile was developed. In other occasions, when a more detailed research about the company was needed, an extensive report about the company was produced.

Although all type of intelligence was produced during the internship – market, costumer, industry, competitor and corporate related intelligence - a major focus was given to

competitors' intelligence and related activities, since the department, because of its functions and mission, has a major focus on this type of intelligence.

The main project developed for the company, presented in this chapter, is totally focused on competitors and consists on a framework with the goal of creating a platform to store and disseminate information gathered about the competitors. It provides the end-user a comprehensive overview of the competitor regarding the markets where it is entering and operating as well as the type of costumers it is acquiring or losing. To accomplish this a database containing information about wins and losses (WL) of the competitors was created. Typically a WL analysis identifies customers' perceptions of specific products from the company and from competitors, providing insights about why the customers are buying or not our products or services. These insights can then be actively used to focus sales staff more effectively in the marketplace and also to guide the research and development department (Fleisher & Wright, 2009). However, because in the specific case of the project, the manager's needs were more focused on obtaining information about the market, the WL related information gathered focused more on the regions and type of costumers from the competitors, than on the costumer feedback's about the products.

Also, information about the M&A activity and strategic partnerships from the competitors was gathered in the platform. This type of information is important to track the competitors' M&As paths, in order to assess the emerging build-up of market positions and competencies (Jenster & Søylen, 2009).

With the same purpose of assessing the competencies and market positions as well as being aware of recent important moves of the competitors a third type of information was provided to the user: relevant latest news about the competitor.

At last, by developing the CIF, it was also intended to follow the theory best practices and transform the reactive requests about competitors into proactive requests by automating the analysis of competitors' data in a way that every time a manager requests information about a competitor, the analyst already has the answers in the framework and doesn't have to start the CI activity from scratch.

3.2. Introduction to the project

The Project consists in the development of a new CIF specifically for the BD international department. It is meant to ensure a structured and formal way of organizing specific information and knowledge regarding the competitors (Figure 9). This framework is comprised by an Excel file containing three databases with relevant information about the competitors, and presents the information contained in the databases through a dashboard in a way that is possible to the user to have an overview over the competitor that is analyzed.

The key part of the framework is the CI analyst, who is in charge of updating, managing and monitoring the framework. In order to keep the databases updated and to promote the efficiency of the process of gathering data and updating the databases, as well as to enable the responsible for the CIF to know how to work and modify the structure of the Excel file, a set of support documents was also created.

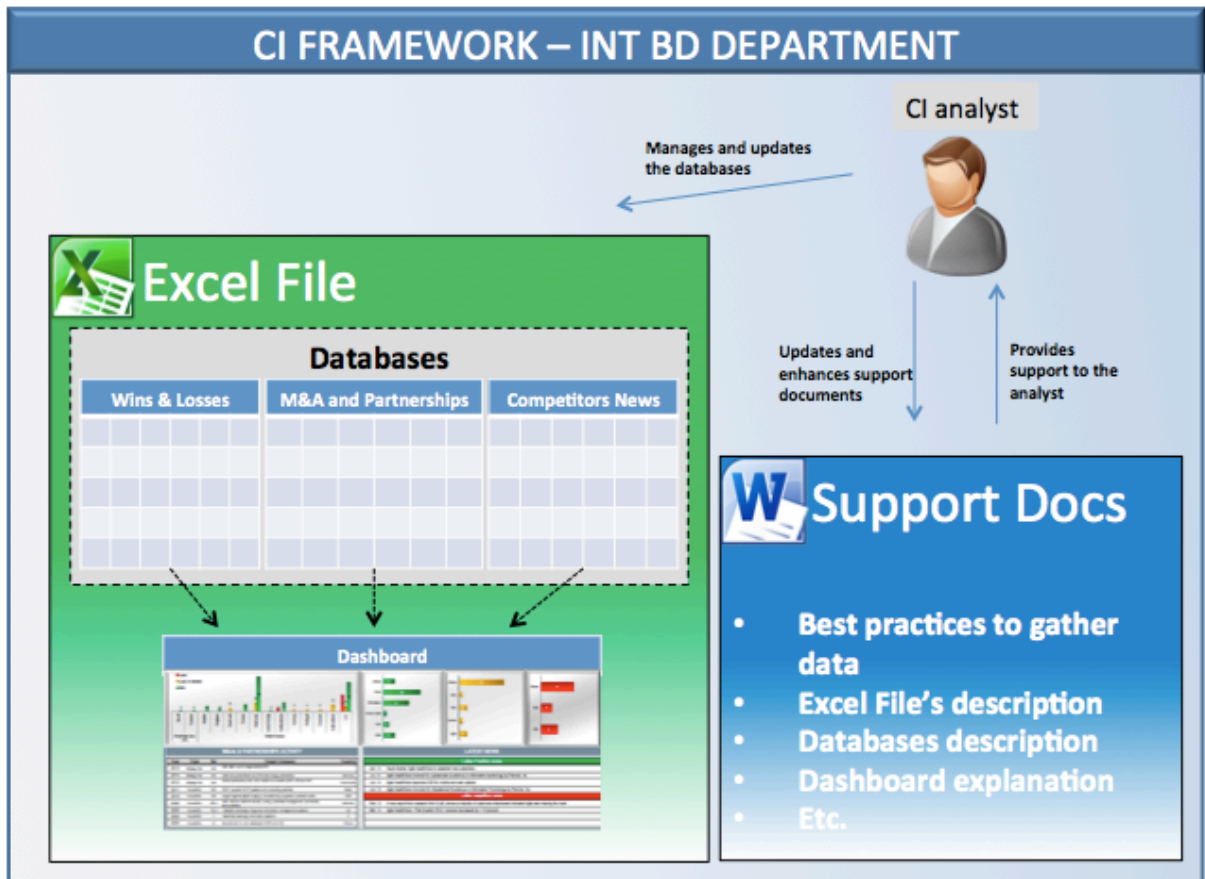


Figure 9 - CIF's architecture

3.3. Goals of the CI framework project

The need of developing a competitor-monitoring tool was triggered during a competitive worldwide analysis. This analysis was supposed to analyse the competitive landscape, i.e. where, in the entire world excluding U.S., were the main competitors winning and losing new contracts and in which context. The stage of data gathering has revealed great difficulties because of several reasons. The first has to do with the language - in some countries the results of the tenders are published in the country's language. Second it is hard to access non-recent information - it tends to disappear or to get more difficult to access as time passes by. Third, it is very difficult to have access to the right amount of information in a short period of time, as the present situation demanded.

So, in order to overcome these problems and to automate CI activities that are usually required to answer the managers' need, an implementation of a CI framework that would support an on-going process for gathering this type of information was needed. Furthermore, another management requirement was that the platform should provide a big picture of the main competitors, i.e. relevant and complete information about the competitors.

So at this point it was clear that the goals of the project were to create an on-going process of collection and storage in a coherent way, relevant information about competitors. The framework to support such process, should help to quickly disseminate the information to the users, whenever information about competitors required.

The information storage and dissemination was made in Excel because it is an application widely used. Moreover, the use of Excel would enable the managers to interact and use the

information easily, and it would also be easier for the future managers of the platform – intern of the department – to administrate it. In addition, the managers preferred to use Excel for this project, because the department is small (composed only by 4 employees) and the share of information is usually done by email or by storing files in a share folder.

3.3.1. Methodology

The deployment process of the CIF was based in the universal model presented in the literature review. So every time it was possible, the phases and the ordering previous presented were adopted, as well as the best practices suggested by different authors in the literature for the implementation of each phase (Table 3).

Planning and direction Phase

At this stage, it was already known that one goal of the project was the implementation of a continuum process in order to gather the information that tends to disappear over time, and also to have available updated information about competitors. A crucial factor of the process was to determine the KITs. Together with the department experts, it was concluded that the framework should provide an overview of the business development of the competitors. In order to achieve this it should be tracked and analysed three type competitors' movements: industries in which they operate; regions where they are entering or leaving; acquisitions or loss of new costumers.

In addition, the framework should be developed in a way that would be easy for anyone to use it and to administrate it, which includes updating the databases and also to revise its structure in case it is desirable. In order to reach this, several support documents (how to best gather the data, description of the excel file components and how to use it and change them) were created. Furthermore a tutorial about how the platform works was included in the "intern guide" (the document that supports the transaction from one intern to the next one). This was made, because it was intended that the platform would be managed, updated and configured by the intern of the department - which is supposed to change every 6 months.

Information collection

Before starting to gather the raw information, it was necessary to outline exactly which information would be relevant to the KITs and from which sources it should be collected. After consulting the opinion of some experts and potential users of the platform, it was concluded that to keep track of the rivals' movements and the dynamic in the HIS market, the information needed would be about the WL from the competitors, their M&A and strategic partnerships activity and relevant news about them.

A great part of the information was obtained through the Internet and most of the relevant sources were uncovered only after spending an extensive amount of time searching on the Internet. Having identified the importance of these hidden sources of information and the best methods to get the desired information, a document whose aim would be to support the management and update of the CI platform was produced. This way, it was safeguarded that the next person that updates the databases can easily and in a more efficient way have access to the information. One of the goals of the support documents is to promote the enhancement of the information gathering that can only be achieved if every CI analyst who uses the platform shares his knowledge with the next ones, about how to best and faster gather the information.

The phase of collecting information was the most time consuming phase, since the information needed wasn't available in a way that was immediately recognized and therefore it was required to dig deep into the sources - documents, news and articles - to extract only the relevant information. Besides that, it was only noticed in a later stage that some more specific information was needed, which required an additional iteration of gathering information. For the WL database a total of 360 records regarding 9 competitors and from 46 different countries were collected. For the M&A and strategic partnerships database a total of 750 records from the same competitors were collected, processed and stored.

Information sorting, capturing and storing and information analysis

Both phases, information analysis and information sorting, capturing and storing, were addressed together in this particular project. This happened, because the aim of the project was not to produce insights or recommendation about the information gathered - what is supposed to do in the information analysis phase - but to provide a framework that presents the complex and vast amount of information in a simple and fast way. Besides that, it is difficult to clearly separate the activities that belong to one or another, since efficient storing and segmentation of information is needed to produce a good analysis and analysis trials are also needed to achieve and understand the best storing structure of the information. Therefore, this phase was comprised by an iterative cycle starting with storing and sorting the information, trying to come up with relevant analysis, realizing what segmentations or data were missing and going back to the information gathering phase in order to obtain the missing information and segmenting the data in a way it would enable to do proper analysis.

The information was stored in three different databases (i.e. in three different sheets in tables): one for the WL, another one for the M&A and strategic partnerships activity and a third one to store the information related to news and reviews from the competitors. This way it is easier to create a user-friendly excel file, where the user clearly understands where it is possible to have access to the different types of data.

Wins and Losses database

The WL database was stored with the following attributes (Figure 10):

- Vendor: competitors' name
- Country: country where the record happened
- Date: date of the record
- Type: indicates if the record is a win a loss or a loss in tender
- Costumer: costumer name
- Costumer type: single-hospital, multi-hospital, non-hospital or ambulatory hospital
- Nr. of Beds: applicable only to single-hospitals and multi-hospitals when the type of system is HIS-related.
- Description: detailed description of the record
- Value: value associated to the record
- Incumbent: vendor of the previous system, i.e. the system that has been replaced
- Incumbent system: indicates the incumbent's system installed

- Scope: What type of systems and services does the contract involve (HIE, HIS, services or any combination of them)
- Region: East Europe (E.E), West Europe(W.E), Middle East (M.E), Asia, Pacific and Africa Collections (APAC) and Americas (excluding U.S)

Figure 10 shows an example of 3 records of the WL Database and how the interface explore the framework looks like.

SIEMENS Wins & Losses Database SIEMENS												
Competitor Summary			Win & Loss Database			M&A Database		Competitor News			Analysis tool	
Vendor	Country	Date	Customer	Win/ Loss	Description	Value (\$million)	Incumbent	Scope	Nr Beds	Type of customer	Region	Incumbent system
CSC	U.K.	Sep 13	Tameside Hospital NHS Foundation Trust	Win	Tameside Hospital NHS Foundation Trust will be the first to go-live with Lorenzo under an interim deal between CSC and the Department of Health.	4.0	McKesson	HIE Services	524	Single Hospital	West Europe	Medway
Epic	U.K.	Mai 14	Royal Devon and Exeter NHS Foundation Trust	Win	Royal Devon and Exeter NHS Foundation Trust has selected Epic as preferred supplier to provide a new electronic patient record system.	40.0	Cerner	HIS	1.500	Multi-hospital	West Europe	Millenium
Compugroup	U.K.	Mai 13	Oxford University Hospitals NHS Trust	LOSS	Oxford University Hospitals NHS trust goes to tender to replace Cerner Millenium system, because of a crisis that took five months and £4.6m to resolve.	N/A	Cerner	HIS	1730	Multi-hospital	West Europe	Millenium

Figure 10 - Sample records from the WL database

Each record has an attribute that specifies the country where it happened. Because in some occasions it was difficult to analyse segmented by countries, it was decided to create another attribute that aggregates information about the countries into regions: Americas (excluding U.S.), Middle East (ME), Asia Pacific and Africa Countries (APAC), West Europe (W.E) and East Europe (E.E). This made possible to have a clearer view of patterns in the WL from the competitors around the different regions.

The value of the contract of the records is usually not disclosed. So there was the need of having an attribute that would enable to quantify the WL. A traditional way used by industry’s experts to segment the costumers (most of them hospitals and hospitals networks) in the HIS market is through the number of beds, because it is correlated to the value of the contract. HISs are usually sold through licences. Each hospital's employee must have a license to work with the HIS. And because the number of employees usually depends on the number of beds in acute hospitals, the number of beds provides an accurate estimation of the costumers' value. Therefore, in order to have an attribute in the database that gives an idea of the record’s value, it was decided to add to each WL registration the costumer’s number of beds.

This approach led to another problem: there are cases where the costumer doesn’t have beds - like for example ambulatory hospitals - or isn’t a single-hospital – it can be a hospital network - as well as there are cases where the costumer isn’t a hospital at all –for example insurance companies. Because of the differences that exist among them, there was also the need to characterize the type of costumer for each WL record. This was made by categorizing the different type of costumers as single hospital, multi-hospital, ambulatory hospital or non – hospital.

Furthermore, it was noticed that the differences of the contract scope - what type of system and services were acquired - related to the WL record should be also registered. This distinction is important to be made because the contract scopes can vary from small systems installations to big projects with a lot of services attached. To address this issue it was decided to add the information about the scope of the contract – HIS, HIE and managed services - related to the WL record.

Besides these sorting of the data, it was also detected that there were two very different types of losses: loss of a contract and a loss in a tender (the vendor went to tender against others

competitors, but didn't win the customer). Obviously, these two types of losses are completely different and a distinction had to be made between them. So a third type of record - loss in tender - was considered.

The last possible enhancement to the storage of data identified was related to the incumbent. The field incumbent indicates who is the vendor of the system that was installed in the customer before the WL, i.e. the system that has been replaced. The problem is that one single vendor has more than one system and it's different to lose a customer with an old and legacy system than to lose a customer from the latest "go-forward" system. So, in order to enhance the analysis of the WL a field regarding the incumbent system was also added to the database.

Competitors' News database

To store competitors' related news, a separate database was created. The goal of the database was to contribute to the competitor overview by providing the latest relevant news at a glance. Furthermore, it provides the user with a quick summary about the latest relevant news in the industry. By consulting this database, the user can analyse and filter the industry's and competitors' news, but also analyse specific countries' news. For each record the following attributes were registered:

- Vendor: indicates to which competitor is the news related
- Date: date of the news
- Title: title or brief description of the news
- Type: positive or negative news.
- Link: link to the source of the news
- Country: country related to the news

Figure 11 shows a set of records from the database. The idea of only having the title or a brief description of the news is to provide the user of the platform with an accurate but short idea of the news about each competitor. Separating the news in positive and negative makes it easier for the user to extract information from the database that can be useful, for example, to conduct a SWOT analysis about the competitor. This distinction is also useful for the competitors' summary dashboard that will be introduced later on the information dissemination phase. If the user wants to know more about particular news, for each record there is a link button that will redirect the user to the original news source. At last, it was considered important to group the news by country, because it's often needed to conduct an analysis about a specific country or competitor's activities in specific countries.

SIEMENS		Competitors News Database			SIEMENS	
Competitor Summary		Win & Loss Database	M&A Database	Competitor News	Analysis tool	
Vendor	Date	Title			Type	link
Cerner	Jul. 14	London trusts in chaos as NHS IT system 'loses' waiting lists			-	LINK
CSC	Aug. 13	iSOFT is the first of the six vendors participating in the NEHTA GP Desktop Panel project to achieve thirdparty conformance			+	LINK
Alert	Nov. 12	Alert's Kansas Hospital's Failed EMR Project Shows Peril of Vendor Relations Gone Bad			-	LINK
Intersystems	Feb. 13	InterSystems and eHealth Technologies (imaging solutions for ERP and HIEs) announce partnership			+	LINK
McKesson	Feb. 13	McKesson 2012 bookings at \$3.14B			+	LINK

Figure 11 – Competitors news database

M&A activity database

Based on previous M&A reports produced by the department every quarter, and after questioning the managers for their intelligence needs about competitors' activity in this field, it was identified the kind of information considered relevant about M&A deals and Strategic Partnerships. The sorting of the information for the database was the following:

- Vendor: competitor name
- Date: date of the deal
- Type of deal: merger, acquisition, sell or strategic partnership
- Target Company: name of the secondary/target company and a small description
- Portfolio: description of product portfolio involved in the deal
- Description: description of the deal
- Value: value related to the deal
- Country/Region: In which country or region operates the target company

Figure 12 shows a part of the M&A database stored as a table in an excel sheet, which enables the user to filter and get to know which competitors are acquiring or developing strategic partnerships in a specific country or region.

Competitor Summary		Win & Loss Database		M&A Database		Competitor News		Analysis tool	
Company	Year	Type of Deal	Value (\$m)	Target company	Country	Description	Portfolio		
AGFA	2014	Strateg Part.	N/A	Dell: technology solutions	World-wide	Agfa HealthCare and Dell team up to "Image-Enable" the EHR. The companies announce last Monday that they will invest joint venture to research in imaging.	Imaging		
CompuGroup	2009	Merger	N/A	CompuDENT, ChreMaSoft and Z1Software: Ambulatory IT solutions	Germany	CompuDENT IT Prozesscomputer GmbH & Co KG and the ChreMaSoft Diagnosticsysteme GmbH & Co KG have been merged into Z1 Software GmbH. The company v as subsequently renamed CompuDENT Medical Diagnosticsysteme Deutschland.	Ambulatory IT		
Allscripts	2013	Acquisition	N/A	Jardogs: Patient engagement and Health mangt. solutions	USA	Jardogs is a leading provider of patient engagement and health management solutions. Jardogs offers cloud-based patient and consumer engagement technology that enables	HIS		
Cerner	2013	Acquisition	93	PureWellness: Solutions for Pop. Mangmt, Pati. engagement	USA	A leading health and wellness company which develops solutions to enable population health, individual engagement and measurable lifestyle improvements.	HIS		
McKesson	2013	Acquisition	8300	Celesio: One of largest European drug wholesalers	Germany	Celesio is one of the largest European drug wholesalers and has been acquired by McKesson for a price of 8300m.	Pharmacy		

Figure 12 - Example of M&A database records

The information stored in this database is intended to give the user of the platform the information about what type of companies are the competitors acquiring, selling and developing partnerships with, and that way get an insight about their product portfolio, competencies and type of markets in which they are operating.

Intelligence dissemination

All the information was stored in an excel file comprised by five sections (five different sheets): WL database, M&A database, news database, competitor overview and analysis tool. In order to have a user-friendly and easy to use tool, an interface was created to navigate through each one of these sections (see Figure 12).

Databases

Besides the function of storing the data, the databases allow the user to filter the data in order obtain the information they needed. Furthermore, a user that is familiar with pivot tables can conduct more sophisticated analysis with the pivot tables feature, and also to develop charts based on the data from these databases.

Competitor overview section

The competitor overview section is intended to disseminate the intelligence about each of the competitors. At this section the information from the databases is presented through charts and tables, in a way that is easy to the user to have a sense of what are the competitor WL, M&A activity and latest relevant news (ANEXX D). In order to accomplish that, a dashboard composed by three parts was created: one that provides the user with general overview of the information from the three databases, another one with focus on the wins, and a third one focused on the losses.

In the competitor overview dashboard the user selects the competitor and the years he/she wants to analyse, and the information about that competitor is presented. The first part of the dashboard - “Overview” - is comprised by a summary of the WL and losses in tenders by region and country, a graph containing the other competitor from which the competitor under analysis has won costumers, another one containing the competitors for which it has lost tenders to, and a last one with the competitors to which the company has lost costumers (see Figure 13).

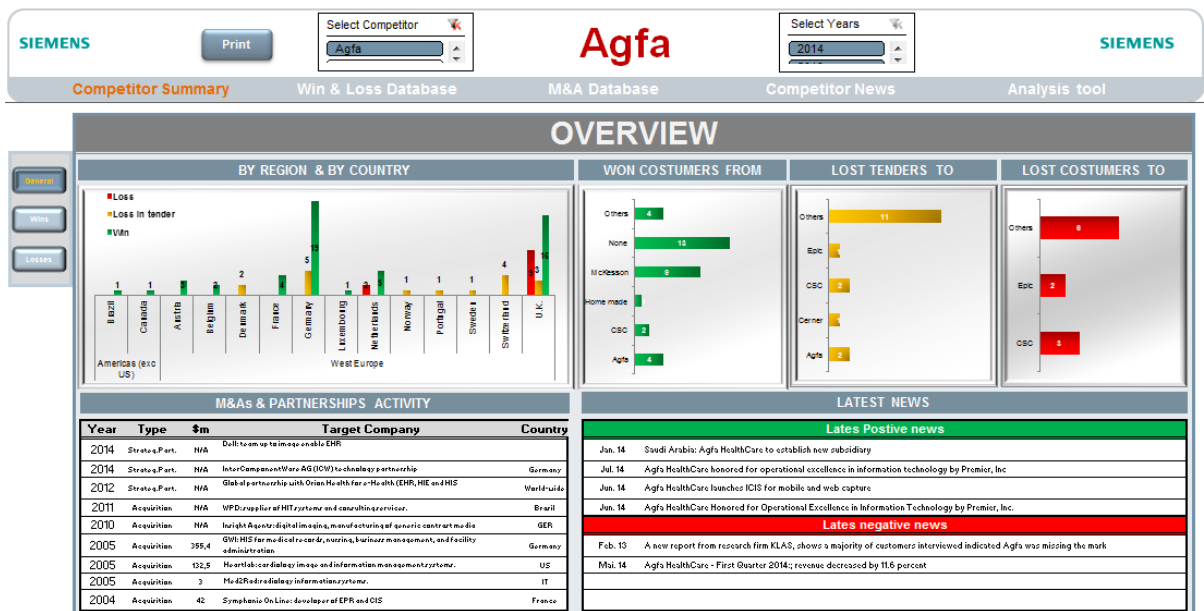


Figure 13 – Dashboard overview

This tool is supposed to be more focused on the wins and losses from the competitors. Because of this, it was chosen to give just a short summary of the information on the dashboard: the latest 10 records of the M&A and strategic partnerships, and the five latest positive and negative news.

The second part is devoted to the wins of the competitor under analysis. Here the charts present information by year, region and country where the wins took place, and is segmented by type and size of the costumers.

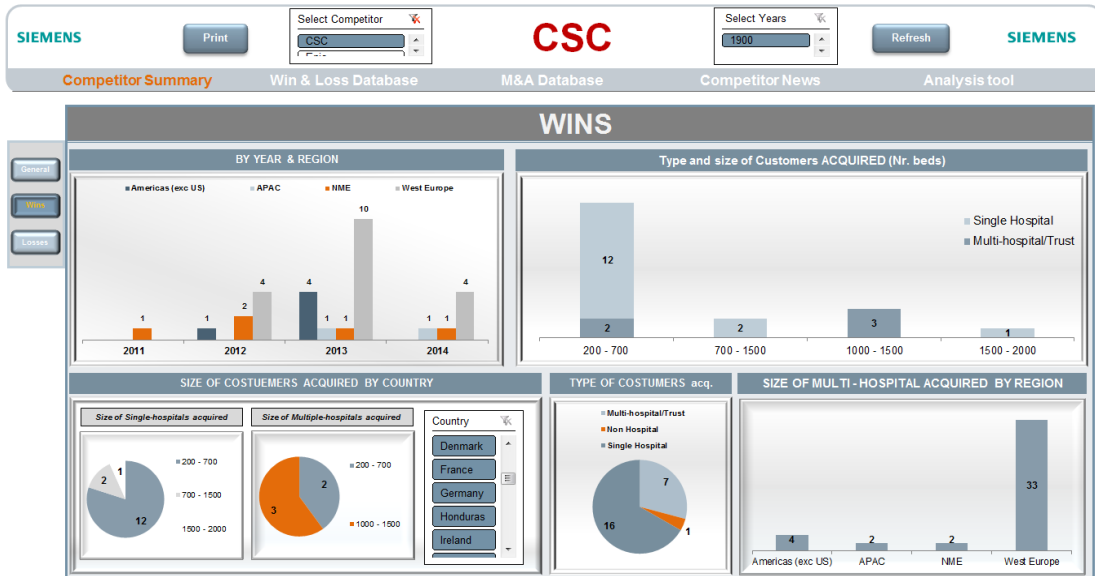


Figure 14 - Wins dashboard

The last fragment of the dashboard is similar to the wins part, but focusing on the (see Figure 15).

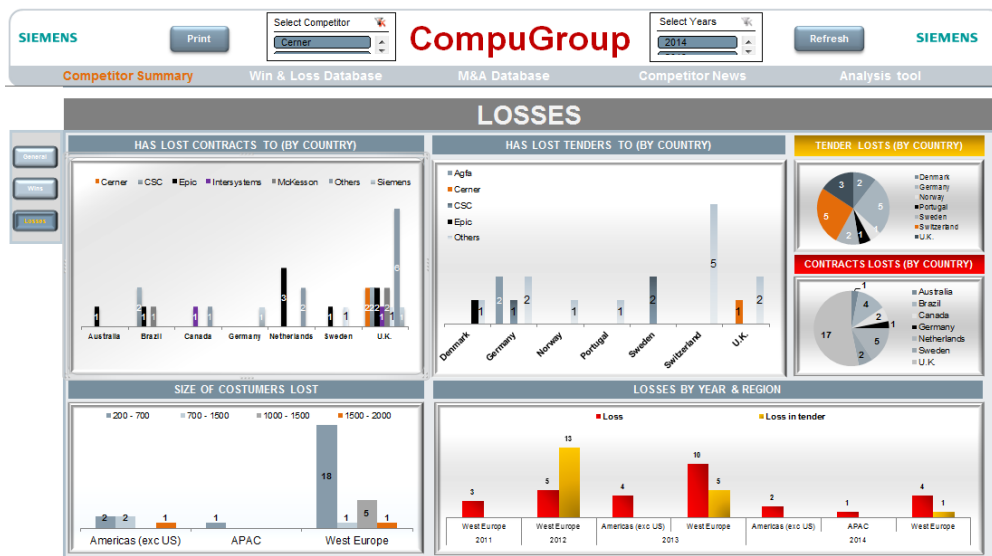


Figure 15 - Losses dashboard

Analysis tool

In order to have a dynamic and updated dashboard, all the charts are attached to pivot tables connected to the databases. If the user knows how to work with pivot-tables, than it can adjust the chart to the information he wants to analyse. But one of the reasons to develop the tool in Excel was to enable any kind of user to work with it. So, in order to overcome these issues, the section “analysis tool” was created. The analysis tool gives some flexibility to choose parameters that drive the charts and has also charts where comparisons among all the competitors are made (Figure 16).

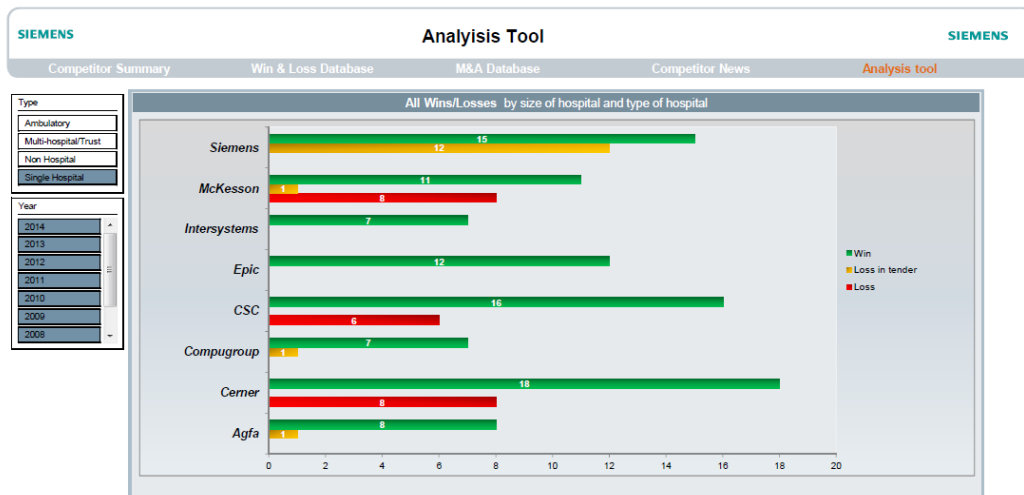


Figure 16 - Example of one type of dynamic charts available in the analysis tool

This section was developed for that users that don't want to spend too much time on the doing the analysis or that don't know how to use pivot tables.

3.4. Conclusion and recommendations

3.4.1. Conclusions from the Framework to the BD international department

Although a great part of the time available was dedicated to gathering the information to the databases, which involved a great effort, it is impossible to have all the data related to this topic. Regarding the WL it must be noted that the sample collected is not a good representation of the population. There are countries and regions where this type of information is easier to access and therefore they are better represented in the databases. There are also some competitors whose information is easier to gather, and therefore they will have a greater number of records in the databases. So, the user of the framework has to be aware of this limitation when conducting analysis about the WL data. To overcome this problem, it is recommended to conduct analysis and make conclusions that aren't affected by the fact that the information is incomplete. For instance, to avoid conducting analysis that require all the information - or samples that are a realistic representation of the population – such as determination of market shares. Second, it is essential that the manager of the framework keeps the support documents and the structure updated. One of the main goals of the support documents is to implement a philosophy of continuous improvement of the data gathering. However, every CI analyst who has contact with the framework should contribute to achieve this goal. Along with this, the requirements and the structure of the framework should be continuously adapted, since it might happen that the needs, as well as the users, change over time. Every time a potential useful new type of information is identified, the CI team should verify with the users if it is relevant to be added to the framework – as a new attribute of the existing databases or as a new database. If the department, or the size of information contained in the databases grows it should be considered to deploy the CIF in the intranet. But to do this is important that the structure and the logic of the CIF is proven to be the right one for the long term, since such a deployment would need a big investment.

At last, there are two gaps in the framework that must be indicated. The first is related to the fact that the framework doesn't address properly the product-related information about competitors. The second gap has to do with the valuable internal information that isn't

captured, since the framework only gathers information from external sources. These two issues weren't addressed properly, because the requirements specified for this project and because of the barriers that exist in information sharing between departments. Nevertheless, they were included in the suggestions for improvements reported to the CI team described in the next chapter.

3.4.2. Suggestion of implementation the CI framework to the HS division

Because it is believed that the platform developed in this project is more powerful if all employees have access to it and can contribute to its improvement a recommendation to adapt the CIF to the whole Health Services of Siemens Company was made. Since the CIF was developed with the intention to be used only on the BD department, an adaptation of its structure to the needs of the group should be done to address the whole HS division properly. In the HS division, only recently a CI team has been established to address the CI needs. This team is in charge of starting to address CI issues, just by the time the current project was ending in the company. This was a disadvantage, because during the project there wasn't a established CI function to support the project.

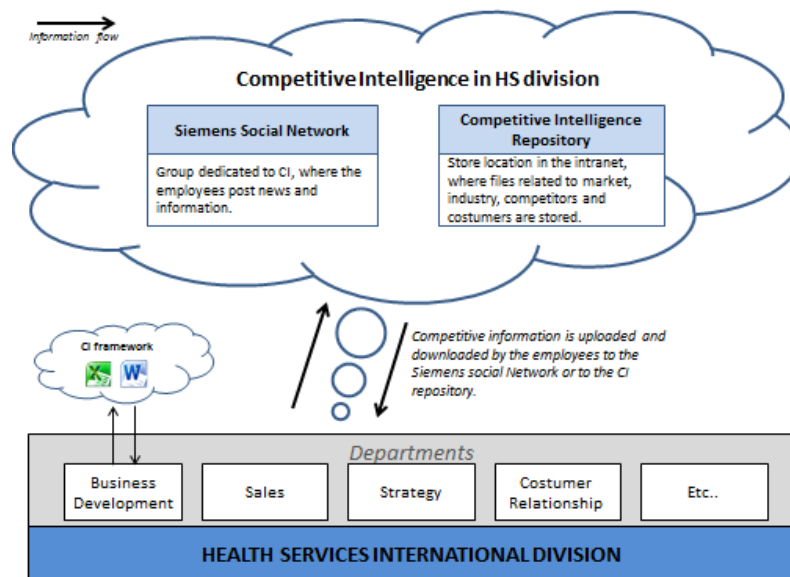


Figure 17 - Current CI model in HS division

The way CI is currently conducted in the HS division is represented in the Figure 17. Information is being shared in two ways: through the Siemens Social Network (SSN) or through a Competitive Intelligence Repository (CIR) – a file storage location in the internet just launched and therefore in an initial stage. In the SSN a group dedicated to CI was created, where employees share news and information about the market, competitors and healthcare IT industry. The CIR is accessed through the intranet and it is where the employees can upload and download files related to competitive relevant information. So it is a storage location that is intended to be a structure to promote the share of information. To adapt the CIF to the whole Health services Division, 2 options were first considered.

Option A, illustrated in ANEXX G consists in adapting the CIF excel file to the needs of the total HS division CI and store it in the CIR so that any employee can download it and use it. The file must before be adapted, because the needs of the whole HS division are different than the ones from the international BD department. Besides storing the excel on the CIR, a person

to manage this file should be nominated, since the databases should be updated on a regular basis and should also be updated with the relevant information that is flowing into SSN and CIR.

Option B, the second option suggested to the HS CI team, was to create a competitive intelligence platform in the intranet, where the logic adopted in the CIF developed to the BD department should be adopted. So it should have a database containing the relevant information about competitors and a section where a summary of this information for each competitor is presented in a comprehensive way, providing a profile about a specific competitor. If it is possible a tool that would enable the user to conduct analysis (Figure 18).

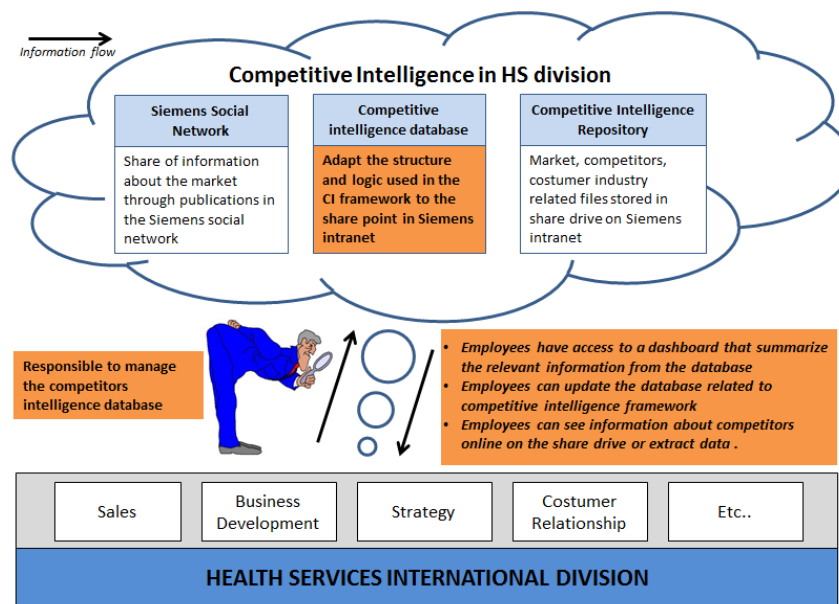


Figure 18 - Option B to adapt the CI framework to the HS division

Also in option B, it was suggested to nominate a person responsible to manage the competitors’ intelligence platform, who should be in charge of scanning all the information that is uploaded to the CIR and SSN and that should be added to the competitive intelligence database. It was also suggested that the employees should be able to update by themselves the competitor’s intelligence database, but in a way that the quality and consistence of the data inserted in the databases is ensured. For example by creating an user-interface for the users to insert the information in the databases, where it is clear how and what information should be introduced. Furthermore, the responsible of the database should be aware of all the modifications, for example by being alerted every time a record is added, so that he can keeps track of what information is being introduced in the database and who has inserted a specific record in the database. This is important because the responsible for the database must be the key person who, besides being a resident expert on competitors, must also coordinate the competitive information by helping help all the users on consulting and updating the database.

But more important, since this database will be connected to more functions, departments and employees, it should cover a broader scope than the one covered by CIF developed for the BD department. Actually, there are two gaps in the CIF that haven’t been addressed properly. The first one is the fact that the product-related information – from competitors and from Siemens -, such as costumers’ feedbacks and industry experts reviews haven’t been addressed. To overcome this, besides the already included in the CIF information, this new platform should

cover information that before wasn't a need or wasn't possible to access, like product-related information.

The second gap, which somehow is related with the previous one, is that the CIF was almost based on external information, i.e. no internal information was gathered. There is a lot of information flowing internally. And regarding this, there are experts who argue, that although it is not easy as an online search, tapping into the human network from the company can be the best source of competitive and market intelligence (Lewis, 2014). (Malhotra, 1996) states that despite the increasing sophistication of CI tools and techniques most important role in a CI program remains of the organizational or its internal information.

Everyday employees exchange important information by e-mail, on a conversation or even on works they developed to their department. For example, sales teams receive feedback about the costumers about their product or the competitor's products. Managers attend to tradeshowes where they have contact with industry insiders and sales people and get important insights from them. Or even human resources that interview job candidates who work or may have worked for rival firms. There are a lot of examples where important information about competitors flows and is not been captured and stored in a way it is useful to all the people that need to have access to it.

This new CI platform to the HS division should address this internal information issue by first designing a comprehensive structure to store all that relevant information and that is capable of producing intelligence from the information contained in it. And second by putting a great effort in encouraging all the employees to gather competitive information and to participate in the competitive intelligence activities by sharing the information they have. Each one of this independent information can help building larger pictures about the competitors.

The first can be achieved if the information is stored in a way that can be consulted in a comprehensive way and fulfils the managers' needs. And for that it is essential to involve the managers and the people that have knowledge about the information that is being stored and that will use the platform. The second can also be achieved if there is an effort from the CI team to engage all the employees in participating in the CI process and also to gather relevant information from where it is possible. Examples of programs to enhance the engagement of the employees that have been given to the CI team are:

- Rewards to the most actives users, who have contributed with vital market and competitor information to managers (Institute of Management & Accountants, 1996)
- Incentives such as feeding back information through newsletters, e-mail or competitor information bulletin boards (Institute of Management & Accountants, 1996)
- Address personally the employees to inform them what type of information from the database could be useful to them and discuss how this employee could contribute to the database (Helm, 2011).
- Conduct workshops on how to use and update the database as well as how is the best way to collect competitive information (Breeding, 2002).
- Involve the high level managers and ask for their public recognition of support to the CI activities (Breeding, 2002)
- Support from the managers in order to overcome barriers between the departments and to uncover hidden information.

- Build relationships with those who can better contribute to the CI activities and storage (Lewis, 2014)
- Working with the corporate communications group to get CI group and platform featured in company literature and newsletters (Breeding, 2002)
- Use Siemens social Network to make all the employees aware of the existence of the CI platform and the information in it
- Develop key performance indicators (KPIs) about the sharing performance in order to create a healthy competitive environment between the employees or departments.

After analysing the feedbacks from the CI team to both suggestions, a final proposal with a roadmap containing four stages of implementation was given to the CI team and HS managers. (Figure 19)

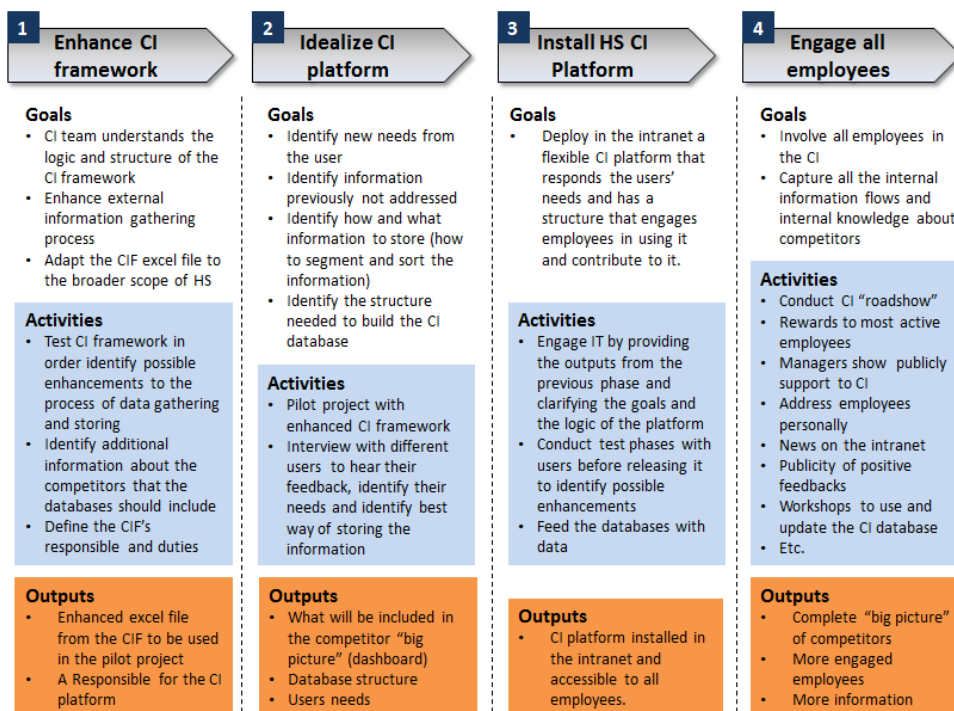


Figure 19 - Roadmap to implement a CI platform to HS

It was suggested that in a first stage the CI team gets to know well the CIF and the way the data is stored in it. In this phase the CI team is also supposed to identify possible enhancements to it so that the excel file that will be used in the pilot project is adequate to it. In a second stage it was suggested to adopt option A – store the enhanced excel file in the CIR - to identify the different users' needs, the potential information it could be stored and to conceptualize the structure it should be used for the CI database that will be installed in the intranet. Analysing users' feedbacks and needs after the project pilot with the option A should enable to achieve this.

As soon as a clear concept and architecture to the CI database to install in the intranet is accomplished, the third stage – install the CI platform in the intranet - should be putted in place. So, getting from stage 2 to 3 is the same as using option A to identify the best way of implementing option B.

The last stage would be devoted to address the not previously attended internal information and to engage all the employees into the CI activities.

4. Business Valuation

4.1. Introduction to valuation

Knowing the value of an asset and what drives it is crucial to take intelligent decisions. Valuating an asset is needed in a wide range of situations, such as to choose investments in portfolios, to define the appropriate price to pay or receive in an acquisition, and to decide investment choices when running a business (Damodaran, 2011).

Executing a valuation is not a precise science since the value is driven by a vast amount of factors and it depends on the purpose of the valuation as well as by who is preceded (Sjöqvist, 2008). As Damodaran (2011) explains, "all valuations are biased, the only question is how much and in which direction". Besides the fact that the analyst has always influence on the valuation, there is also the problem that a lot of information provided to the analyst is already biased. This must be taken into account during a valuation process, where adjustments and corrections should be done whenever it is needed.

The valuation methods that are most frequently user are: (i) Discounted Cash flow (DCF) valuation, an income-based valuation that estimates the value of a business based expected future cash flows (CF); (ii) Relative Valuation, a market-based valuation which estimates the value of an asset by analyzing the price of comparable assets; (iii) Adjust Book Value method, an asset-based valuation that considers the value of a company to be the difference between the book value of the assets and liabilities; and at last, Contingent Claim Valuation, that recognizes the value of assets whose cash flows are contingent on a future event occurring (Damodaran, 2011; Venema, 2007).

This master thesis will focus in the DCF and relative valuation methods, since a combination of the two was used in the project. Besides, it was also considered that the others weren't appropriate for the type of business to be valuated.

Adjust book value method has advantages such as the fact that it is simple to use and does not require a large extent of assumptions. However, it has the problem of requiring the full access to all of company's internal information and disregarding some qualitative factors, such as management talent and non-activated intellectual property rights, as well as it is focused on the history rather on the future of the business (Sjöqvist, 2008; Venema, 2007). Furthermore it also has the problem that some important value creators, such as intangible assets, are valued in the balance sheet in a way that doesn't reflect their real value (Moeller & Brady, 2014). This method is best applied to businesses that are in a great part composed by tangible assets, which is not the case for a services and IT business, as most value created is through its people, services and software, or to valuate companies that will be liquidated or are insolvent (Damodaran, 2011). At last, it must be pointed out that this valuation method is legally required in some jurisdictions such as China.

Contingent claim valuation isn't often used to value the type of business considered in the project, since normally this method is used to value projects with huge risk and uncertainty, and where it is difficult to link the value of the assets to future CF. Typical examples for this would be the development of a pharmaceutical drug or a search for a new oil field (Moeller & Brady, 2014).

4.2. Discounted Cash flows Methods

DCF valuation methods estimate the value of the asset by accessing its capacity to generate CFs in the future and the risk associated with these CFs. The logic under it, is that the company's value is determined by the value of the CFs that will be available to its investors in the future. So to access the company's value, the present value (PV) of the expected future CFs to investors is calculated. This is made by discounting the sum of expected CF at rates that reflect the riskiness and time value of these CFs⁴ (Damodaran, 2011; Moeller & Brady, 2014). Since it is not possible to estimate CFs forever, in practice it is common to divide the value of the asset in two elements⁵: the present value (PV) of expected CF for the explicit forecast period and after the explicit period, usually named as terminal value (TV) or continuing value (Koller, Goedhart, & Wessels, 2010).

The DCF based methods have the advantage of being less exposed to market moods and perceptions, and also to force the analyst to think about the underlying characteristics of the business, what ultimately can lead to capture unique characteristics of the business and lead to a better valuation (Damodaran, 2011). Furthermore, it takes into account business related value drivers, and allows conducting sensitivity analysis, i.e. to simulate and analyze different scenarios. However they require more explicit inputs and information than other valuation approach. These inputs are difficult to estimate and can be easily manipulated (Damodaran, 2011). DCF methods have also the problem that they might not consider important market valuations' insights (Koller et al., 2010).

4.2.1. Valuation process

Soffer and Soffer (2009) describe a valuation process model where before the valuation method is applied the analyst must go through a set of analysis that will provide him information to accurately estimate the required inputs.

The first phase, related to business analysis, is intended to give the analyst a perspective of the internal and external factors that drive the performance of the company (Soffer & Soffer, 2009). The second phase, named accounting analysis phase, is where the business financial reports such as balance sheets and income statements are analyzed and where possible adjustments or correction should be identified. The last phase before valuation, relating to financial statement analysis, is where the financial data should be compiled and an historical and financial profile about the company should be built. In this phase, ratios are calculated and analyzed, also including their evolution over the years, in order to give different perspectives about the company to the analyst (Sjöqvist, 2008). The insights and outcomes from these phases should help the analyst to make an accurate forecast of the company's future economic performance and clarify the inputs and the assumptions that must be made (Groves & Knott, 2013; Sjöqvist, 2008).

Groves and Knott (2013) also points out the need to access the historical performance of the value drivers of the company performance, which they consider to be the return on invested capital (ROIC) and its ability to growth, in order to place the forecast in a proper context. In line with them, Damodaran (2011) suggests to conduct the estimations of CF based on the historical performance of the company. He also suggests to do the estimations based in what

⁴ Value of asset = $\frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} + \dots + \frac{E(CF_n)}{(1+r)^n}$, where r reflects the risk of the expected CFs

⁵ Value of asset = $PV CF_{\text{explicit forecast period}} + PV CF_{\text{after explicit forecast period}} = \sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{TV}{(1+r)^N}$

others are estimating to similar firms, as well as to look at the fundamentals of the company, i.e. how much the firm is investing in new projects - reinvestment rate - and the ROICs that the firm is making for them⁶.

4.2.2.DCF models

Groves and Knott (2013) consider four possible DCF methods to conduct a valuation (see Table 4):

Table 4 - DCF models

Model	Measure	Discount factor
Enterprise DCF	FCF	WACC
Economic Profit	Economic Profit	WACC
Adjusted Present Value	FCF	Unlevered Cost of equity
Equity CF	CF to equity	Levered Cost of equity

The Equity CF model calculates directly the equity value by estimating the future CFs available to equity holders and discounting them at cost of equity. Enterprise DCF, Economic Profit (EP) and adjusted present value (APV) value the entire business, by discounting future free cash flows (FCF) to the whole firm (equity and debt holders) at the cost of capital.

Groves and Knott (2013) use the last three models to calculate the value of the operations (not including the value from non-operating assets⁷ in the future CFs). After having the value of the operations, the value of non-operating assets must be added in order to get the enterprise value (EV) (see Figure 20).

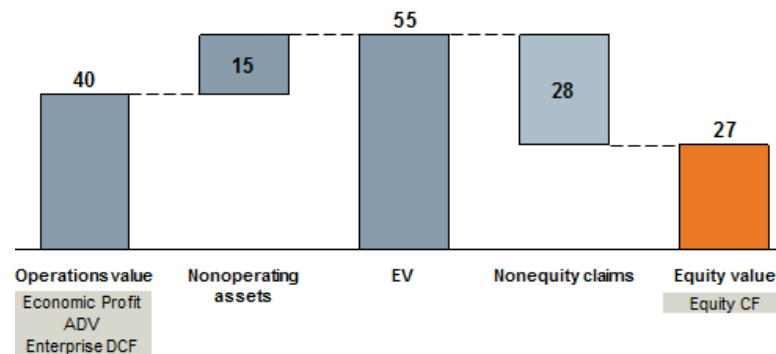


Figure 20 - Equity value calculation

EV is the value of the entire company and therefore it includes the equity and non-equity claims. So, the value of non-equity claims⁸ should be subtracted from the EV to obtain the equity value of the company (Damodaran, 2011; Koller et al., 2010).

⁶ By having a good estimation of ROIC and the reinvestment rate, the analyst can make an accurate estimation of growth rate that is given by the growth from new investments plus the growth of efficiency of this investments (ROIC).

⁷ Non-operating asset is an asset that is unrelated to the core operations such as excess cash and marketable securities.

⁸ Non-equity claims among others it includes debt, employees' options and also contingent claims that should be considered (for example a law suit in which the company is involved and that might represent a non-equity claim in the futures).

Groves and Knott (2013) argue that splitting the value of the firm in value of operations and non-operating assets is useful not only to access the real performance of the operations, but also to compare different business units and companies. Besides, they also argue that “having a clean measure of operating performance over time leads to better forecasts”.

4.2.3. Enterprise DCF and Economic Profit models

Enterprise DCF is also known in the literature as classic DCF valuation. It remains the favorite of the experts, “because it relies solely on the CF of the company, rather than on accounting based earnings (which can be misleading)”. However EP model - also known as economic value added (EVA) - is gaining popularity because of its “link to economic theory and competitive strategy” (Groves & Knott, 2013).

Enterprise DCF calculates the present value of operations by discounting the value of future Free CF (FCF), which are the CF available to all the company’s investors. To calculate the FCF, the following calculations must be performed (ANEXX E):

1. Calculate the net operating profits (EBITA) less adjusted taxes that represent all the CF generated from the operations and known as NOPLAT.
2. Add back the value of depreciations to NOPLAT
3. Subtract the invested capital⁹ to obtain the FCF

In order to estimate the NOPLAT and invested capital, (Groves & Knott, 2013) suggest on the short run to forecast all the financial statements items. On the long run (usually after five years) these items become harder to estimate. So, they suggest estimating FCFs on the key value drivers like operating margins and ROIC.

In the EP model the value created during a period is calculated as follows:

$$\text{Economic profit}_t = \text{Invested Capital}_t \times (\text{ROIC}_t - \text{WACC}_t)$$

To calculate the PV of the operations, the initial investment is summed to all economic profits of future periods discounted at the WACC rate (ANEXX F):

$$\text{Value of operations}_0 = \text{Invested Capital}_0 + \sum_{t=1}^{\infty} \frac{\text{Invested Capital}_{t-1}(\text{ROIC}_t - \text{WACC})}{(1 + \text{WACC})^t}$$

The difference between the two models relies in the fact that in the enterprise DCF model the analyst has to forecast the all financial statement items to calculate the future FCF, while in the EP model the value created each period is accessed only through the reinvestment, ROIC and WACC. Groves and Knott (2013) states that an advantage of the EP model is that by calculating the value this way it is possible to analyze the effect that ROIC and WACC have on the value and how and when is value created.

Weighted Average Cost of Capital (WACC)

Both methods discount the value created to the investors at the WACC rate. The rate at which the CFs are discounted is supposed to represent the risk that the investors attribute to the asset that will generate these CFs, and consequently reflects what is the reward they require to invest in that asset (Damodaran, 2011; Koller et al., 2010). Since EP and classic DCF

⁹ Invested capital is the capital required to the operations such as investments in operating working capital, property and equipment.

methods calculate the CFs that are generated to both investors in equity and in debt, the discount rate should reflect in a proportional way the expected return of these two types of investors. So to obtain the WACC a weighted average - based on the capital structure (debt-equity ratio) - of the cost of debt (k_d) and cost of equity (k_e) is calculated as follows¹⁰:

$$WACC = \frac{D}{D+E}k_d(1 - T_m) + \frac{E}{D+E}k_e$$

The cost of equity represents the expected return rate for equity whereas the cost of debt represents the expected return rate for the debt holders (Damodaran, 2011; Koller et al., 2010).

To estimate the cost of equity of public companies the experts use different models such as Gordon's model, arbitrage pricing theory (APT) and capital asset pricing model (CAPM). The standard approach is CAPM, since it is the simplest model to use. For private companies the cost of equity can be calculated by looking at similar public companies (Damodaran 2011; Koller et al. 2010).

In order to estimate the cost of debt, for public companies (Damodaran, 2011; Koller et al., 2010) suggest using the yield to maturity (YTM) of the company's bonds or look up the rating of the firm in order to estimate a default spread. If none of these two is available, then a synthetic rating should be calculated in order to estimate the cost of debt¹¹.

Adjusted present value (APV) model

In the first two models, all future CFs are discounted at a constant WACC. By using a constant WACC the analyst is assuming that the capital structure is constant (or managed to a target), which actually is applicable to most of the situations, since usually debt grows proportionally to the company value. But in some cases, the company plans to change the capital structure in the future. And although the WACC can be adjusted yearly according to the change in the debt-equity ratio, it is a complex process (Groves & Knott 2013). Therefore, in these cases the APV model should be adopted. The APV values the firm as if it was all funded by equity and then adding the financial effects of debt to this value (tax shields such as the value created by deductible interests):

$$APV = EV \text{ as if company was all equity financed} + \text{Present value of Tax shields}$$

To obtain the EV as if the company was all equity financed, the FCF without tax shields are discounted at rate of unlevered cost of equity¹². The value of tax shields should be discounted at the rate that appropriately reflects the risk of these tax shields (for interest related tax shields it should be the cost of debt) (Damodaran, 2011; Koller et al., 2010; Lopes, 2012).

So, the difference between APV and Enterprise models is in how they deal with tax shields. Whereas in the first these benefits are explicitly measured, in the latter the value created by tax shields is incorporated through the WACC.

¹⁰ The term $(1 - T_m)$ represents additional value generated by the deductible interests (a tax shield). So in EP and classic DCF models, the value obtained from the deductible interests is incorporated through the WACC.

¹¹ To know how to compute a synthetic rate for private companies please consult: (Damodaran, 2011)

¹² The rate of unlevered cost of equity is the cost of equity as if the company had no debt.

Finally, it must be pointed out that in certain periods a company may not be able to use the tax shields (or part of them) because the profits from that year aren't greater than the value of tax shields. In these cases the jurisdiction where the company operates must be analyzed in order to know how to calculate and treat the tax shields effects. (Koller et al., 2010)

Equity cash flow model

The equity cash flow model values equity directly by accessing the future CFs to equity and discounting them at cost of equity. The main difference to the previous presented methods relies in the calculation of the CFs. To calculate them, the effects of debt financing are built into the CFs rather than into the cost of capital (as it was made on the enterprise models valuation) (Damodaran, 2011). This means adding to the FCF calculated in previous enterprise methods, increases and decreases in debt and the related effect of paid interests. Also the non-operating assets non-consider in the FCF from enterprise models, should now be consider to calculate the CF to equity.

(Koller et al., 2010) consider that is difficult to implement correctly and can easily lead to errors. For example, when a company increases its debt the cost of equity should be adjusted to reflect the additional risk imposed on equity holders and by using this method this is not done (Koller et al., 2010). However they use it for valuating financial institutions, since in those cases it is difficult to separate value of operations and debt. Damodaran (2011) has a similar opinion on this model and states that estimating CFs with this model can became problematic and "as a rule, firm valuation is a more flexible approach than equity valuation". He argues that the equity CF model should only be used if business has a stable leverage.

4.2.4. Terminal value

As mentioned before, in the long term the CFs becomes difficult to forecast. And therefore usually the value of operations is usually divided in explicit forecast period and after explicit forecasted period. To value the second term a TV is used. There are a lot of approaches for it and the appropriate one depends on the characteristics of the business under valuation. (Damodaran, 2011) gives three options to estimate terminal value: multiple approaches - using a multiple of the EBIT or EBITDA - a stable growth model or a liquidation model.

When using a DCF model to value the business it doesn't make sense to use the multiple approach since it would bring elements of relative valuation into the DCF valuation. So in this case, the choice would be between the stable growth or the liquidation model (Damodaran, 2011)). However, he states that the TV in a significant number of discounted CFs valuations is estimated using a multiple.

The liquidation model consists in valuing the firm, as it would shut down in the last year of the explicit forecast period. So it is suggested to use when the "assets are separable and marketable" (Damodaran, 2011)).

The stable-growth model consists in assuming that the revenues will grow at a constant rate and that the WACC will be constant. And in a scenario like this the analyst can use a perpetuity-based formula to calculate the TV, which is calculated as follows:

$$TV_t = \frac{CF_{t+1}}{WACC - growth\ rate}$$

This perpetuity-based formula can also be used to value the present value of entire business, by applying it to the current year's earnings. Although it is a rough estimation (a small

variance in growth or WACC yields a great variance in the value) it is a simple approach to the value of the business and therefore it is often used in discussions about a deal start to determine if discussions can or should continue (Moeller & Brady, 2014).

4.3. Multiples valuation

Multiples valuation, also known as relative valuation, consists in valuating an asset by looking at the price it has been paid during transactions (acquisitions) or is being paid in the market (market capitalization of public companies) to comparable assets. Using a multiple valuation has the advantage of being simple to use - requires less information - and easier to communicate (Damodaran, 2011). Besides, it reflects the relative market valuations, being therefore free from the evaluator manipulations and influences. However it is often difficult to find adequate comparable firms and the fact that they are market-based can also be a disadvantage, since markets can be under or overvalued (Moeller & Brady, 2014).

To standardize the value, common variables are used. These common variables are usually operational-based variable such as EBIT, EBITDA and Revenue (Damodaran, 2011; Koller et al., 2010; Moeller & Brady, 2014; River Cities Capital Funds, 2011). Other variables also used are book values or sector-specific variables such as web site visits per day for internet-based companies (Damodaran, 2011). Although there are a lot of possible multiples to arrive at a market-based valuation for the company, the most common used are the EV-to-EBITA and EV-to-EBITDA ratio, since they are easier accessed. (Koller et al., 2010) states that these two multiples should be used every time it is possible because by using them the analyst “mitigates problems with capital structure and one-time gains or losses”. However to be possible to use them, the company must have positive operating incomes -

Comparable businesses or firms should be similar in some key operating metrics such as EBITDA or EBIT margins (relative to revenues), revenue growth and ROIC (Koller et al., 2010; River Cities Capital Funds, 2011; Scott, 2010). Besides being similar in its financial and operational profile, the company comparable should have similar size and operate in the same or similar space, i.e. same industry and same target market (Scott, 2010).

Multiples can be extracted from public companies (public multiples or trading multiples) or from recent transactions (mergers or acquisitions). Usually multiples from transactions are higher than multiples based on the market (public companies), because in the first case it is included a control premium, i.e. a premium that the acquirer is willing to pay over market price for the ability to have control over the company and extract synergies (Venema, 2007). When valuing a private business based on public multiples, even if the public company is very similar to the business under analysis, the analyst should take into account that public companies normally have higher revenue multiples than private companies, because they have better access to investment capital, which lowers their financial risk (Venema, 2007). Moreover, they usually have better management team, larger revenues bases and user bases as well as markets to their shares, which is valued by the stock owners (Venema, 2007). So in order to compensate this higher value of the revenue multiple for public companies, analysts should apply a discount when calculating the value for a private-held company based on public-held companies multiples (Venema, 2007). When looking at public companies, a peer group of comparable companies should be used. It is also useful to do this approach at different levels such as sector, market and industry level (Koller et al., 2010). To compute the multiples from the different levels the median or harmonic median of the multiple should be used so that the estimation is less influenced by the outliers (Koller et al., 2010). Furthermore,

multiples should be based on forecast earnings rather than on historical, since the first represent the value better than the latter. When forecasts aren't available the valuation should be focused on most recent multiples available (Koller et al., 2010).

After having calculated and gathered different multiples, the analyst has different ways to choose the value estimation based on them. By averaging all the different multiples obtained, what has the disadvantage of mixing the multiples with poor quality with high quality. By computing a weighted average of all multiples estimations, where the weight of the multiple is usually attributed to its precision (what might be difficult). Or following the approach suggested by (Moeller & Brady, 2014) that is to pick the multiples, that makes more sense to use in that valuation being conducted.

4.4. Selection of valuation methods and specification of their implementation

Koller et al. (2010) uses the enterprise DCFs methods to value businesses, since they consider them as being the most accurate and flexible methods. Because of the benefits from each one of them, they use both EP and classic DCF method. However for companies whose operations are related to financing, the CF to equity method is used. They also state as being good practice to calculate the value of operations with the DCF models⁴ for two or even three scenarios (bad, normal and optimistic scenario) and estimate a probability of the occurrence of these scenarios. The final value of operations should be calculated with a weighted average of the value of the three scenarios. Besides the valuation through DCF methods, Koller et al. (2010) use multiples in order to test the estimations made in the DCF valuation and to identify possible mismatches with the comparable companies, what will also yield productive discussions about the valuation.

Supporting the way that Koller et al. (2010) typically perform a valuation, a study conducted by Imam et al. (2008) revealed that approximately 60% of the analysts inquired expressed strong preference for CF based valuation methods, particularly when on buy-side. During the study was also found that most of the analysts often complemented the CF-based analysis with multiples-based analysis. Regarding the models they adopted, the study revealed that the most widely used valuation method was classic DCF (few used EP model) and the most used multiple was the EV-to-Earnings ratio.

Damodaran (2011) states that 50% of all acquisition valuations are based upon multiples and that objective in "many DCF valuations is to back into a number that has been obtained by using multiple-based valuation". Similarly to Koller et al. (2010), he also argues that since a DCF valuation is function of its inputs, what-if analysis should be conducted to address the potential future outcomes. He suggests 3 different approaches to deal with potential future outcomes. The first is to build a probabilistic approach based on the 3 plausible different scenarios. The second is estimating the most pessimist scenario and the most optimistic scenario. And the third is to build a scenario sensible to particular inputs and analyze how the value is affected by changing these particular inputs.

Another possible approach to execute a valuation suggested by Moeller & Brady (2014) consists in using different methods - DCF methods with different scenarios, book value and a set of multiples valuation - and calculate the final valuation by applying a relative weighted average to the value estimated with the different methods. In this approach, the aspects of the business under analysis should determine the weighted average. For example, in a business where the balance sheet is more liquid, more weight should be given to the book valuation

method. On the other hand, if there a great number of recent transactions then more weight should be given to the market multiples.

4.4.1. Valuating software and SaaS companies

Before getting to the valuation methods used for software companies it is important to note that these type of companies have special aspects that other industries don't pursue and therefore should be treated differently. For example, a typical financial and operational analysis addresses metrics on a year basis, whereas in software companies this can be misleading since they have software development and sales cycles that together can last much more than one year. For these reasons a 18-24 month statement about operating and profit metrics represents better the cycle of the business than the typical 12-month bases (Chalfin, 2006). (Corum Group) a specialized company in software, IT and internet related technology companies, also mention that these companies should have different valuation approaches than other kind of business, because of their different characteristics such as being almost in bankruptcy or losing money and still can worth a great amount of money. They assert that the valuation methods usually used for software companies are usually based on comparable transactions, because it is the simplest way to valuate. Furthermore, they consider the EV-to-sales ratio to be the most popular multiple, because it can be applied to companies with losses or minimal income.

Specifically for valuating software companies, (Venema, 2007) states that although the valuation of a software company can involve the three approaches – market, asset and income based – the focus is usually given to the market-based approach.

As he argues, asset-based valuations aren't appropriate for software companies because the most assets of the software companies are intangible assets, which are not subject to objective valuation. Besides, this type of valuation fails to address some important value creators (such as software that is being under development) and value damagers (such as delays in launch of new software that have lost the market momentum). He also argues that DCF approaches aren't appropriate, since the historical performance of software companies often fail to predict the future performance of the company.

So, he concludes that a market-based valuation should be used for software companies, giving specially attention to the individual sector in which the company operates. That's because within software and IT services subsectors the multiples vary by much. Consequently, the comparable company or group should not only be similar in their profitability and size but also must operate in the same sub-sector.

Addressing particularly the valuation of SaaS companies, (River Cities Capital Funds, 2011) states that while all type of companies are ultimately valued on the present value of their DCF, industry analysts tend to rely more on comparable multiples of revenue and EBITDA for valuing SaaS businesses. To define comparable companies, analyst use companies with similar revenue growth, capital efficiency and market size.

4.5. Business valuation project at the company

During the project at the company, a business valuation from a particular business was conducted. It is impossible to reveal specific details about the business aspects, purpose of the valuation or results, because of the confidentiality to which the project is submitted. However the approach followed for the valuation will be described without violating any type of confidentiality issues.

The valuation method adopted in the project was the classic DCF method. The results were then compared to a set of multiples from different types of groups and companies in order to put the valuation in the proper context and to understand if it deviates significantly from the market and transactions valuations.

This approach was adopted because of several reasons. First, the classic DCF approach is the preferred method of the company. Second, the valuation has also relied heavily on the DCF valuation, because the internal factors that drive the future CFs from the business under analysis were easily identified and quantified and therefore a good estimation of the future CFs could be done. The variance of future CFs was more dependent on external factors than on internal factor, which are stable and predictable. This issue has been addressed by conducting an analysis of the external environment and by computing different scenarios on the DCF valuation.

For the external business analysis, a full profile of the healthcare IT market for the business under analysis was made. For that to be achieved, macro-economic analysis, competitors' analysis, market sizing, estimation of the growth of the market as well as analysis of the different stakeholders of the industry were conducted. This business analysis wasn't fully under the thesis author responsibility, although he has contributed to its development, especially on the market sizing, competitive landscape analyses and healthcare industry analysis. Also for the internal factors analysis, the author has contributed by analyzing and extracting information from documents about the business under analysis.

For the DCF valuation, together with the manager expert in the business and market under analysis, three possible scenarios – pessimist, normal and optimistic - were forecasted in order to have valuation estimates for each of them. Before this phase, the financial statements items and their forecasted values were analyzed and discussed together with the management supervision from Siemens in order to identify possible errors and adjustments that should be done.

The WACC at which the CFs are discounted, must be provided by the financial department of the company since the company uses standards WACC - in function of region, industry, purpose of the valuation among other aspect from the business under analysis. So, there was no need to calculate the cost of equity and cost of debt in order to obtain the WACC.

The TV was assumed to be the liquidation value in the worst and normal scenario. This approach has been chosen because for these scenarios it was considered that the liquidation value was a good indicator of the value in the end of the forecast period, and also because it fitted into the assumptions of the scenarios and the purpose of the valuation. The TV for the optimistic scenario was calculated based on the perpetuity formula, assuming a stable growth of the business – based on market analysis executed - and a constant WACC.

In order to compare the valuations estimated with the DCF model, a set of multiples were calculated and gathered. As suggested in the literature, and because it was difficult to find similar business, different peer groups were considered: companies with the same target market or at least operating partially in the same market; transactions; main competitors that are public traded; public companies operating in the same subsectors (HIT, SaaS and HIT services); and multiples from public companies at an industry level (Software, IT and computer companies). Whenever possible, the EBITDA margin and Revenue growth of the company (or the mean of the group) were gathered, in order to know if the operating and financial profile from the comparable group is similar to the business under analysis (see Figure 21).

Comparable companies	Sector /industry	Multiples		Operating figures	
		EV/EBITDA	EV/REVENUE	Ebitda margin	Rev growth LTM
Business under analysis	Bad Scenarion	YYx	ZZx	XX%	XX%
	Normal Scenario	YYx	ZZx		
	Optimistic Scenario	YYx	ZZx		
Same (or similar) target market	Similar company 1	7.20x	1.00x	13.2%	-3.9%
	Similar company 2	8.00x	0.60x	7.4%	18.8%
	Similar company 3	16.50x	0.64x	8.9%	3.2%
	Similar company 4	6.00x	0.80x	10.0%	-5.0%
Transactions	HIT (all transactions)	12.00x	2.07x	-	-
	HIT (<\$30m)	1.67x	8.20x	-	-
	HIT (\$30m-\$100m)	2.42x	12.60x	-	-
	HIT (>\$100m)	2.35x	13.20x	-	-
	IT and Services (last 20 years)	-	2.25x	-	-
	Vertical SAAS (last 24 months)	-	2.50x	-	-
	Horizontal SaaS (last 24 months)	-	3.60x	-	-
Competitors public traded	Software	15.00x	2.50x	-	-
	Allscripts	16.20x	2.60x	16.0%	16.0%
	CGM	10.80x	2.30x	22.0%	8.0%
Public companies (Subsector level)	Cerner	16.60x	5.70x	35.0%	35.0%
	HIS services	17.00x	3.50x	21.0%	11.0%
	HIT systems	16.00x	3.50x	15.0%	8.0%
	Healthcare software	19.80x	2.60x	0.0%	0.0%
	Healthcare Services	9.36x	-	0.0%	0.0%
Public companies (Industry level)	HIT	17.65x	-	0.0%	0.0%
	IT Consulting	9.50x	2.20x	0.0%	0.0%
	Information	13.80x	3.50x	0.0%	0.0%
	Software companies	17.00x	5.00x	0.0%	0.0%
	Computer Services	9.51x	-	0.0%	0.0%
	Computer Software	12.67x	-	0.0%	0.0%

Figure 21 - Multiples peer groups

The comparison was made having in mind that the majority of the public companies have all of their operations in the US, where the HIT companies have higher valuation than companies in the markets where the business under analysis operates. Furthermore, as suggested in the literature, it was also taken into account that public companies tend to have a higher value than non-public companies.

When comparing with recent transactions, the fact that the value from transactions are higher than public companies and consequently than private companies was also taken into account.

Although the literature suggest to give more focus to the market comparison valuation when valuating software companies, in this case the multiples haven't played a significant role on the valuation, because it was impossible to find adequate comparable companies or involved

in recent transactions. This happened because of the specificities of the market where the business analyzed operates, as well as the particular aspects of its operations.

In the end, rather than one single valuation, three valuations for three different scenarios were considered. These valuations for the different scenarios will serve as a framework to support the managers when attributing a price to the business and negotiating that price (to pay or receive from the negotiation¹³).

4.6. Conclusion of business valuation

It is important to note that the business valuation project was not the main project of this master thesis because of two reasons. First less time was devoted to it, and second because the project is confidential and therefore wasn't possible to disclose any details of the project. This would make it to include it in the master thesis and to confront the tasks done during the project with the literature review.

Also because this wasn't the main project, the literature reviews wasn't as deep as it should be if the master thesis was fully devoted to the topic of valuation. For example, a relevant topic in valuation is the estimation of the cost of equity and cost of debt. This topic should be more deeply analyzed and studied. But because in the project the WACC was provided and because the author couldn't address all the important topics, these two weren't addressed in great detail.

The application of the DCF valuation method wasn't a very complex process since most of the information was provided and the future performance was easily forecasted. Furthermore, the aspects of the business were relative simple leading to an easy estimation of the present value of the operations.

Therefore, it is believed that this project was more fruitful in terms of the experience gained. Being involved in the process of valuation enabled the author to understand the dynamics of the people involved in it, and to understand the differences between practice and theory, i.e. understand that a valuation goes well beyond the mathematical calculations to reach a final value.

Damodaran (2011) says that valuation is more an art than a science. During the project this has been confirmed, since it was noticed that the values obtained from the valuation techniques are only useful as a starting point, and managers don't rely completely on them. All the rest that is involved in a valuation and negotiation process - external environment, purpose, and strategy goals, among others - also weight significantly in the final valuation of the business, and are ultimately reflected on the price paid or received from it.

¹³ It was not possible to disclose in which side - buyer or seller - was this business valuation situated.

5. Conclusion

The CIF developed for the BD department satisfies the goals identified before the project: to create a framework that would support an ongoing process of gathering and storing specific data about competitors, and to provide managers with important and updated information about the competitors in a comprehensive way. However, the department's needs may change over time and the person in charge for the CIF should pay attention to this evolution and adapt its structure so that it addresses new needs of the department and managers.

It is believed that the HS division should learn from this pilot project and adapt it with broader scope. The HS CI activities in the HS division are in a very early stage and therefore in an ideal stage for implementing a platform that would address competitors' issues. In this case, as it was suggested, the platform should definitely be developed by an IT team and installed in the intranet with a robust structure. This solution would be ideal, because it would address what is believed to be the most powerful source of information for CI activities: internal information that flows between employees and that is hidden in the departments and inside employees' heads. Furthermore, it would also have the advantage of having all employees contributing to the CI intelligence of HS division, what is also believed to be crucial in CI activities. Only one or two persons can't do a good job in gathering all the information needed, to get good insights from competitors. In case such a platform is not possible to develop, the CIF developed in this project for the int BD department should be adapted and integrated in the shared storage location from the whole HS division, so that all employees can use it and contribute to it.

At last, regarding the second project from this master thesis, related to business valuation, in normal circumstances it should have been addressed in a more extensive way, by conducting deeper analysis of the internal and external factors of the business. This was not done, because first this was a secondary project of the master thesis and therefore the time devoted to it didn't enable to do so. Second, because other members of the team were already in charge of the other parts of the valuation process and therefore it wouldn't make sense for the author to be also working on them. And third, because the access to all the documents related to the business was restricted - and not accessible to the author - due to the confidentiality profile that this project has. However, despite the fact that the project didn't cover the whole valuation process and tasks related to the valuation, it is believed that the author has contributed for a better valuation of the business.

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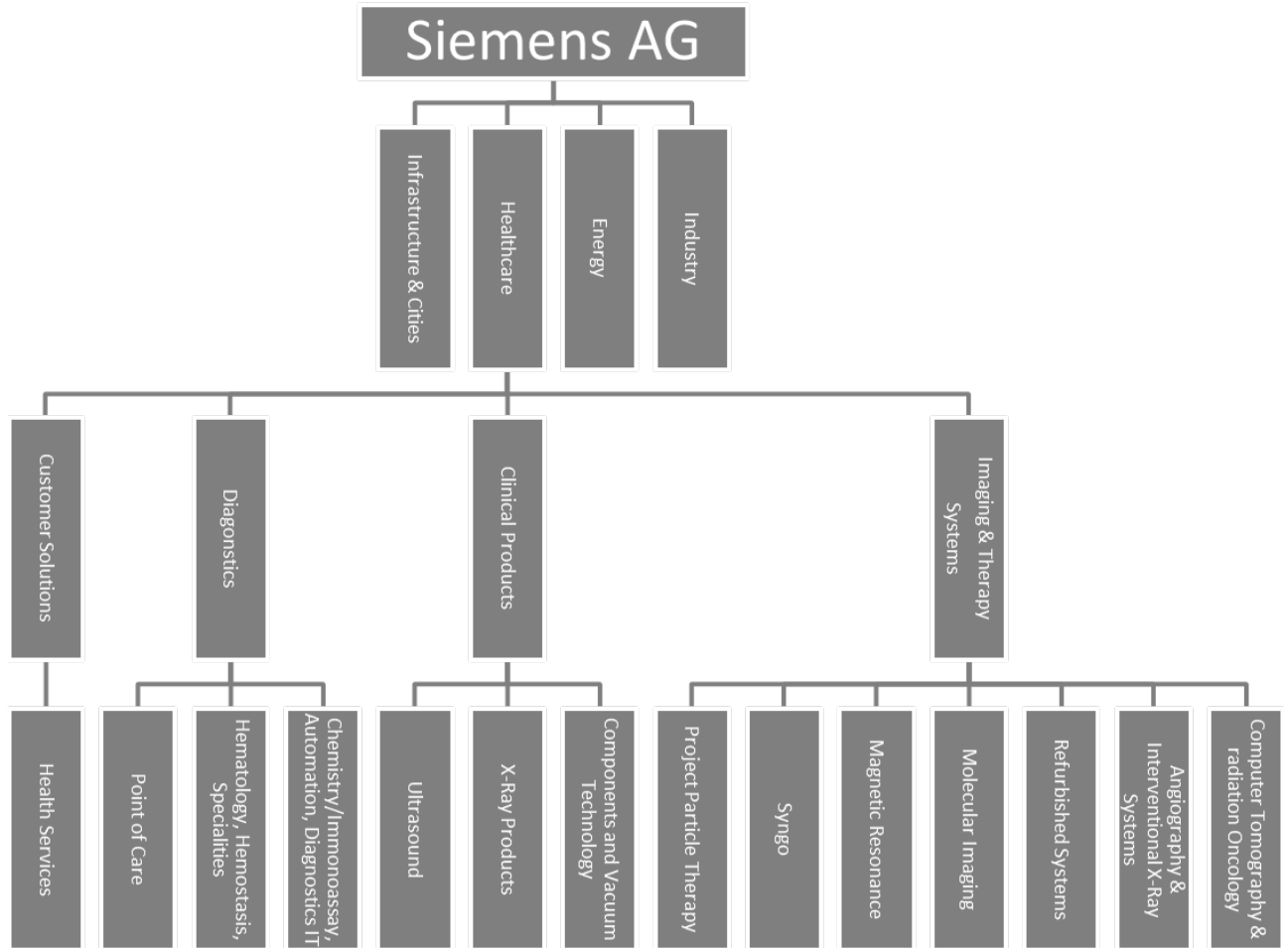
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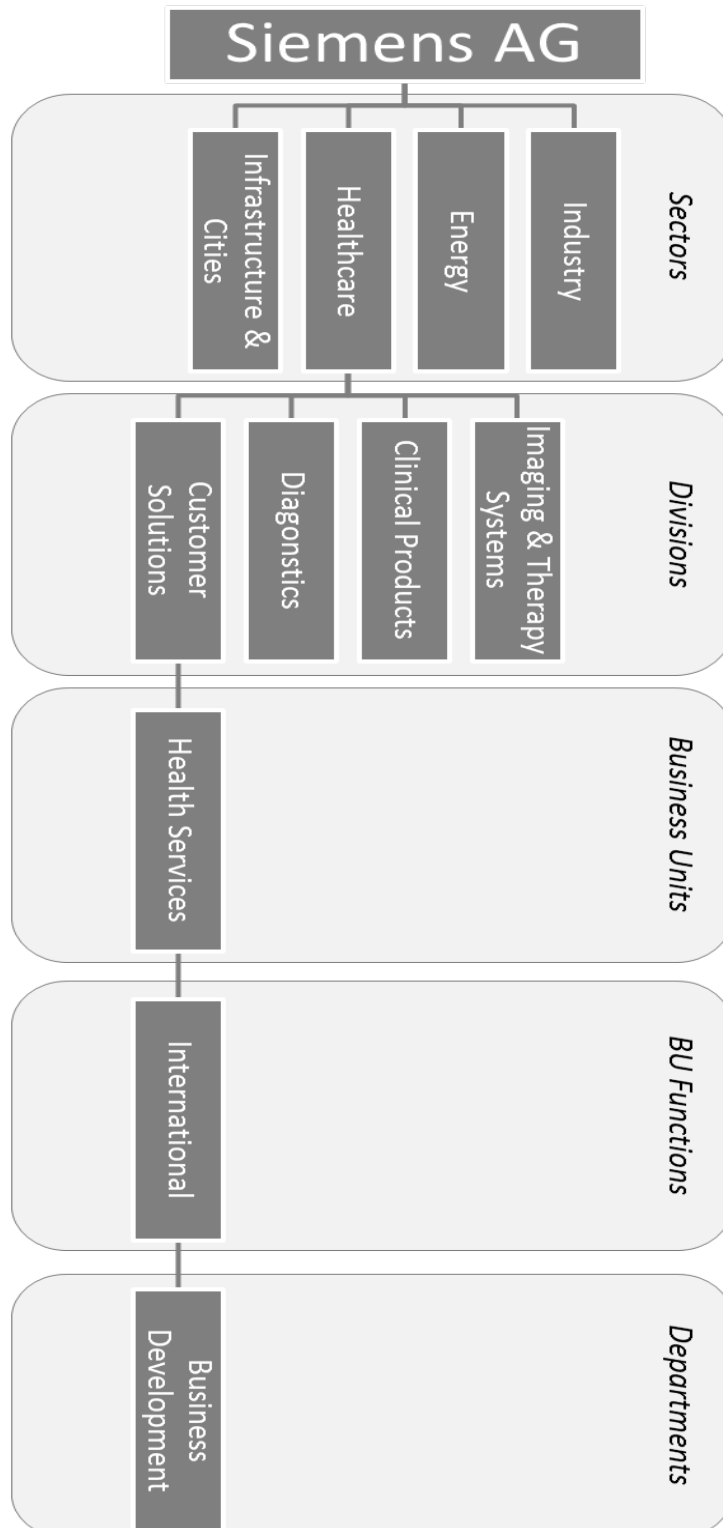
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ANNEX A: Siemens Healthcare organizational chart



ANEXO B: Business Development Department



ANEXX D: CI comparison between Brazil and North America companies

	Brazil	North America
Acceptance of CI	<ul style="list-style-type: none"> Limited, not widely accepted in business Primarily used in international companies 	<ul style="list-style-type: none"> Good. Most business understands that good CI is required, especially on the international stage
Location of CI	<ul style="list-style-type: none"> Primarily tactical (marketing) as decision-makers are not accepting Strategic location in large companies only 	<ul style="list-style-type: none"> A good mixture of tactical and strategic placement
Quality of Secondary Research	<ul style="list-style-type: none"> Limited. Lack of Internet content and online users Government participation does not support secondary sources 	<ul style="list-style-type: none"> Good. North America has the highest number of online users and content High government participation and enforcement
Quality of Primary Research	<ul style="list-style-type: none"> Good, yet credibility and reliability are questionable Often requires third-party introduction 	<ul style="list-style-type: none"> Good. Most North Americans believe in the sharing of ideas as a way to promote economic growth
Capacity for Analysis	<ul style="list-style-type: none"> Limited due to lack of acceptance Companies use easily digested models like SWOT, ratio analysis, etc., to win support 	<ul style="list-style-type: none"> Good. Many analytical frameworks are used to present intelligence due to high acceptance from business and decision-makers
CI Education	<ul style="list-style-type: none"> Limited. Only two academic institutions in Brazil offer CI education 	<ul style="list-style-type: none"> Good. North America has the largest number of CI academic offerings in the world
Ethics and Law	<ul style="list-style-type: none"> Limited. Ethical frameworks are not followed due to lack of support from government and lack of participation in industry associations 	<ul style="list-style-type: none"> Good. Highly structured laws and industry association participation ensures adequate ethical practice

Figure 22 - Comparison between CI activities among Brazil and North America (Blenkhorn & Fleisher, 2007)

ANEXX D: Dashboard from CI Framework



ANEXX E: Calculation of NOPLAT, FCF and equity value through classic DCF method

Calculation of NOPLAT:

\$ million	Home Depot		
	2001	2002	2003
	Net sales	53,553	58,247
Cost of merchandise sold	(37,406)	(40,139)	(44,236)
Selling, general and administrative	(10,451)	(11,375)	(12,658)
Depreciation	(756)	(895)	(1,075)
Operating lease interest	288	260	276
Adjusted EBITA	5,228	6,098	7,123
Adjusted taxes	(2,020)	(2,117)	(2,040)
NOPLAT	3,208	3,981	5,083

Calculation of FCF to use in classic DCF model:

	Historical 2001	2002	2003	Forecast 2004	2005	2006
NOPLAT	3,208	3,981	5,083	5,185	5,741	6,342
Depreciation	756	895	1,075	1,193	1,321	1,459
Gross cash flow	3,964	4,876	6,157	6,378	7,062	7,801
Investment in operating working capital	834	(194)	72	(294)	(318)	(344)
Net capital expenditures	(3,063)	(2,688)	(3,970)	(3,399)	(3,708)	(4,036)
Investment in capitalized operating leases	(775)	(430)	(664)	(721)	(780)	(842)
Investments in intangibles and goodwill	(113)	(164)	(259)	(92)	(99)	(107)
Decrease (increase) in other operating assets	105	31	277	58	62	67
Increase (decrease) in accumulated other comprehensive income	(153)	138	172	0	0	0
Gross investment	(3,165)	(3,307)	(4,372)	(4,448)	(4,843)	(5,261)
Free cash flow	799	1,569	1,785	1,930	2,219	2,539

Calculation of equity through classic DCF model:

Year	Free cash flow (FCF) (\$ million)	Discount factor (@ 9.3%)	Present value of FCF (\$ million)
2004	1,930	0.915	1,766
2005	2,219	0.837	1,857
2006	2,539	0.766	1,944
2007	2,893	0.700	2,026
2008	3,283	0.641	2,104
2009	3,711	0.586	2,175
2010	4,180	0.536	2,241
2011	4,691	0.491	2,301
2012	5,246	0.449	2,355
2013	5,849	0.411	2,402
Continuing value	133,360	0.411	54,757
Present value of cash flow			75,928
Mid-year adjustment factor			1.046
Value of operations			79,384
Value of excess cash			1,609
Value of other nonoperating assets			84
Enterprise value			81,077
Value of debt			(1,365)
Value of capitalized operating leases			(6,554)
Equity value			73,158

ANEXX F: Calculation Economic profit and equity value through Economic Profit method

Calculation of Economic profit:

\$ million						
Method 1	Historical 2001	2002	2003	Forecast 2004	2005	2006
Return on invested capital	15.0%	16.8%	19.4%	17.5%	17.4%	17.4%
Weighted average cost of capital	10.1%	9.0%	9.3%	9.3%	9.3%	9.3%
Economic spread	4.9%	7.9%	10.1%	8.2%	8.1%	8.1%
Invested capital	21,379	23,635	26,185	29,655	32,910	36,432
Economic profit	1,048	1,857	2,645	2,424	2,677	2,950
Method 2						
Invested capital	21,379	23,635	26,185	29,655	32,910	36,432
Weighted average cost of capital	10.1%	9.0%	9.3%	9.3%	9.3%	9.3%
Capital charge	2,159	2,124	2,438	2,761	3,064	3,392
NOPLAT	3,208	3,981	5,083	5,185	5,741	6,342
Capital charge	2,159	2,124	2,438	2,761	3,064	3,392
Economic profit	1,048	1,857	2,645	2,424	2,677	2,950

Calculation of equity through EP model:

Year	Invested capital ¹ (\$ million)	ROIC (percent)	WACC (percent)	Economic profit (\$ million)	Discount factor (@ 9.3%)	Present value of economic profit (\$ million)
2004	29,655	17.5	9.3	2,424	0.915	2,217
2005	32,910	17.4	9.3	2,677	0.837	2,241
2006	36,432	17.4	9.3	2,950	0.766	2,259
2007	40,235	17.4	9.3	3,242	0.700	2,271
2008	44,329	17.3	9.3	3,556	0.641	2,278
2009	48,729	17.3	9.3	3,890	0.586	2,281
2010	53,445	17.3	9.3	4,247	0.536	2,278
2011	58,488	17.2	9.3	4,627	0.491	2,270
2012	63,870	17.2	9.3	5,031	0.449	2,258
2013	69,600	17.2	9.3	5,458	0.411	2,241
Continuing value				57,671	0.411	23,679
Present value of economic profit						46,273
Invested capital ¹ ₂₀₀₄						29,655
Invested capital plus present value of economic profit						75,928
Mid-year adjustment factor						1.046
Value of operations						79,384
Value of excess cash						1,609
Value of other nonoperating assets						84
Enterprise value						81,077
Value of debt						(1,365)
Value of capitalized operating leases						(6,554)
Equity value						73,158

ANEXX G: Option A to adapt the CIF to the HS division

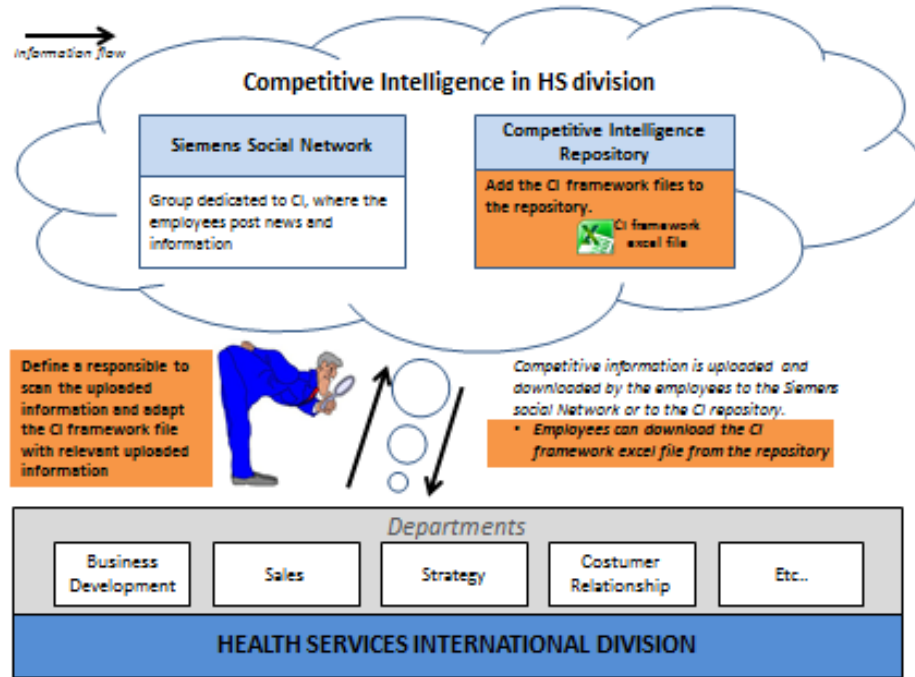


Figure 23 - Option A to adapt the CIF to the HS division

ANEXX H: Frequencies of the phases adopted

Characteristics	<i>f</i>	%
Cycle	18	100
Establishing CI needs	5	28
Planning and direction	14	78
Information collection	18	100
Information processing	3	17
Information analysis	16	89
Intelligence dissemination	18	100
Taking action	2	11
Skills development	1	6
Process and structure	5	28
Organisational awareness and culture	5	28
Feedback	5	28

f, frequency.

Figure 24 - Frequencies of phases adopted