FACULDADE DE CIÊNCIAS E TECNOLOGIA DA UNIVERSIDADE DE COIMBRA

BlueWorks

BUSINESS DEVELOPMENT

THESIS REPORT

MASTERS IN BIOMEDICAL ENGINEERING

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"Agora,
o remédio é partir discretamente,
sem palavras,
sem lágrimas,
sem gestos.
De que servem lamentos e protestos,
contra o destino?"

Miguel Torga

Resumo

Num mundo empresarial em constante mudança e cada vez mais competitivo e exigente, as empresas necessitam de profissionais que saibam não só adaptar-se a essa mudança, mas também identificar e aproveitar uma oportunidade de negócio quando ela surge.

Um Business Developer faz isso mesmo – explora oportunidades de negócio. Idealmente numa empresa, um profissional de "BizDev" deve juntar competências nas áreas de Vendas, Marketing e Parcerias, acompanhando o desenvolvimento do produto que deve conhecer melhor do que ninguém.

Este documento é assim uma síntese do estágio realizado na BlueWorks para a cadeira de Projecto do Mestrado Integrado em Engenharia Biomédica, na Universidade de Coimbra.

Este trabalho compreendeu uma primeira abordagem ao cargo de Business Developer, onde foram desenvolvidas competências nesta área que tem como derradeira finalidade a comercialização dos produtos de uma empresa. Assim, análises de mercado, contacto com clientes, desenvolvimento de parcerias e publicitação da empresa foram algumas das tarefas desenvolvidas, sempre com especial atenção ao mercado em que a BlueWorks se insere.

Fica este relatório como um ponto de situação desta actividade – que certamente ainda terá um longo caminho pela frente - passível de ser lido por um eventual sucessor que certamente ficará mais elucidado sobre a dinâmica de negócios da empresa.

Abstract

In a constantly changing and increasingly competitive business world, companies need professionals who can, not only adapt to this change, but also identify and seize a business opportunity when it arises.

A Business Developer professional does just that – explores business opportunities. Ideally, in a company, a person in this field of action should gather competences in the areas of Sales, Marketing and Partnerships, following closely the development of the products that he should know better than anyone.

This document synthesizes the work performed in BlueWorks for the course Project for the Master Degree in Biomedical Engineering at the University of Coimbra.

The work developed was a first approach to the position of Business Developer, an area where skills were obtained with the ultimate purpose of selling the company's products. Thus, market analysis, contact with clients, partnership development and advertising to the company were some of the tasks performed, always with special attention to the market where BlueWorks operates.

This report remains as a current status of this activity – that will certainly require a lot of work in the future – that can be read by an eventual successor, who will be a lot more elucidated about the dynamics of the business.

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Definitions and Acronyms

ARS – Administração Regional de Saúde

CHT – Consulta a Tempo e Horas

OPSS – Observatório Português dos Sistemas de Saúde

TMR – Tempo Médio de Resposta

PIO – Programa de Intervenção em Oftalmologia

SNS – Serviço Nacional de Saúde

BES – Banco Espírito Santo

1. INTRODUCTION

1.1 Scope

This document is the report of the project carried out by the Student Alexandre Sousa for the Master's Degree in Biomedical Engineering. The supervision of the work developed was in charge of Engineer Paulo Barbeiro, and Professor Miguel Morgado was the project's coordinator.

The referred project started in September, 2010, and took place in the development facilities of BlueWorks – Medical Expert Diagnosis (in ISA's installations, Coimbra).

Business Development was the generic title given to the project – and consequently to this document – because of the wide range of functions that can be attributed to the workers on this field.

1.2 Motivation

"Business development relies on exploiting the opportunities that are presented to you and your company." (1)

One year before this project, in the academic year of 2009/2010, BlueWorks launched for the first time the project for Business Development. Since it was a start up with a few years of existence, this was the first time that the need was felt to have someone to support this field of action.

This year, there was unfinished work to be continued and several tasks to be performed, and as the company enters the market, a lot more will be required.

1.3 Objectives

It wasn't scheduled a rigid map of objectives to this year, but the biggest challenge was to put OphthalSuite in the market. Promoting OphthalSuite and establishing contacts and strategies to potentiate its selling was the priority.

Beyond this, it was necessary to give particular attention to the final phase of development of the Screening Tool for Magalhães – that is now ready to launch – and to potential business opportunities that could affect any of BlueWorks' products.

This will all be contemplated in this document.

1.4 Schedule

Month	Tasks
September	Contextualization with the Company and Business Development Alignment of strategies to promote BlueWorks
October	Familiarization with CRM and its potential Gathering of information about potential clients
November	Contacting with potential clients EyeDropper – Documentation review and considerations about the product itself OphthalSuite – Documentation review
December	Company's analysis - competition and others - contacted some of them Information Gathering about the general state of vision health in Portugal.
January	Preparing the analysis of HUC's workflow (Case Study) BlueWorks at Cordis' platform
February	OphthalSuite – HUC - Workflow analysis, Interview with doctors and technicians from the service. OphthalSuite - Case Study BlueWorks' Screening Tool: Government actual expenses and the possible savings. Possibility of expansion.
March	Contact with potential clients (phone and Email) Mapping and contacts of Portuguese hospitals (public and private) and clinics. APEG – Falar Saúde Congress – stand and BlueWorks'

	representation CRM and Xmind to keep Clients' information
April	Application for : Inovação BES contest Data gathering about the use of Information Technologies in Portuguese Hospitals.
May	Application for : ISCTE–IUL MIT Portugal – innovation and entrepreneurship initiative Opportunity : Advertising in Clinical Software
June	Jornadas Portuguesas da Oftalmologia – Stand and BlueWork's representation OphthalSuite – Expansion to other countries

Table 1 – Schedule of some the tasks performed in BlueWorks

2. BUSINESS DEVELOPMENT – THE PROJECT

2.1 Context

On an ever changing market, everyday means new challenges to the companies.

In order to accompany these changes, the enterprises need professionals that combine a set of specific competences in the areas of sales, partnerships and the constant monitoring of products evolution, taking advantage of opportunities that may be presented to the company.

This definition may seem a bit ambiguous, as Tim Berry (president and founder of Palo Alto Software and bplans.com, author of Business Plan Pro) wrote, “Business development (bizdev) seemed to me like an internet catch-all job with little definition, little standardization and–all too frequently–little meaning.” (2)

On the other hand, Tim Berry also states “However, as I look at it today, bizdev, done well, is an essential part of our business at Palo Alto Software. It really helped us grow.” (2)

Performing a quick search about the theme, many different definitions appear and it is hard to say which one is more accurate, and that’s because in different companies and different situations, a business developer’s job can have multiple approaches.

The thing that seems to be common to all the definitions of a business developer’s job is the importance of finding business opportunities – whether that means closing deals, making new partnerships, strategic planning, even participating on a product’s (or service’s) development – and knowing how to deal with them in the best interests of the company.

In this specific project, the work developed was like a first approach to Business Development. By following Eng Paulo Barbeiro’s work, and working side-by-side with him, some competences were acquired and the knowledge about the market reality was widely improved.

During this last year, some important phases to the maturation of a Business Developer were contemplated;

2.2 Contact with Clients/Partners

As Charles Huston (co-founder of Bionic Panda Games, former vice president of Business Development at serious business) said:

"If you want to go into business development, I think you have to be good at dealing with and understanding people. If you're not comfortable with interpersonal communications and relationship management, it probably isn't the right job for you" (3)

In a meeting, personal approach or cold-calling (contact, usually by telephone, with the client who were not expecting that call), social skills are considered to be indispensable qualities to become a Business Developer. (3) (4)

The lack of social skills has been identified as one of the greatest barriers for an engineer to take a management position in a company - "Most engineers become managers in their careers, and typically they are unprepared for the transition," according to a paper that appeared in Engineering Management Journal in 2002 (5). This is one of the reasons that make it important to have a previous contact with the field, before joining the labor market.

For several times these "social skills" were developed in real life situations, when dealing with costumers or people representing other companies, by phone or in person.

2.3 Sales

To become a successful company and to survive on the market world it is vital to sell, and to do so, a sales strategy is the first thing that should be created.

After indentifying the target market, it is important to decide the method to use in selling the products. (6)

There are some ways to contact clients, and the approach depends on the situation and on the person or company to be approached. The nature of the product and factors like the geographical area help to find the best solution.

In BlueWorks – especially for OphthalSuite – the target market is well defined, and different approaches were performed, when trying to get to potential clients (phone, sending letters, going to Ophthalmic Services, etc).

2.4 Cold Calling

Cold calling is often considered to be dead but, in spite of being annoying as some state, it may be the only form to get in touch with some people.

In some professional circles Emails aren't read, and even if they are, no one responds to them. When contacted by phone, it is easier to talk directly to the person (or, in the worst case scenario to talk with a secretary, or a co-worker). Big companies still rely on cold calling to promote its products, making a big share of their sales based on this method. (7) (8)

Taking this context into account cold calling, well done, might be a powerful tool to a company, sometimes even necessary. In BlueWorks, is not feasible to be constantly travelling around the country, going to hospitals and clinics trying to speak directly with the service responsible. This method besides being really expensive is also very uncertain, since frequently the responsible isn't available at his work place. In this case a cold calling is the only way to contact them (even if the plan is to meet them in person).

2.5 Email

Emailing is a practical way to contact someone. It doesn't feel as intrusive as a cold call – can be seen as spam though – and doesn't interrupt the workflow or the life of the target person. (8)

Unfortunately, many ophthalmologists are not computer savvy; lots of people don't read emails, making this form of contact less effective. Sometimes, when a previous contact occurs, a "follow up" email is a good way to maintain the conversation, because the person is already expecting the Email.

2.6 LinkedIn and social networks

Another form to initiate a business contact is using the social and business tools that internet give us.

LinkedIn is a network that allows a person to initiate a business conversation, contacting someone without the annoyance of a cold call. This approach is softer, because it doesn't interrupt the workflow, and usually the person that is contacting knows someone that knows the one being contacted. (8)

Another way to contact people is via social networks like Facebook, Twitter or blogs. These options aren't as professional as LinkedIn, but sometimes may work to reach some people that are inaccessible by other means. (8)

Contact with the client is just a part of a Business Developer's competences – the contact is obviously made with an objective, whether it is for a client or a partner;

2.7 Partnerships

Within the range of a Business Developer's job there's the responsibility to make partnerships. It must be a constant preoccupation to a company not only to initiate but to maintain relations with partners, being this job in charge of the Business Developers. Some companies were contacted, and meetings arranged with some companies that BlueWorks thought qualified as potential partners.

2.8 Competition

A Business Developer needs to identify which companies and products are direct competition. This definition of what may be considered a threat to the company is important to define which competitor must be studied in what concerns to strategies and plans. These inputs are vital to refine ones business plan. Besides the company profiling, is also important to benchmark products, and identify strengths and weaknesses, and act accordingly to this information, market needs, times to market and other vital variable. (2)

Contact with several potential clients was made; it was even created a database of clinics and hospitals (both private and public) to follow all the advances made in the relation with the customers.

One important tool to follow the relationship with customers is, as the name suggests, CRM – Customer Relationship Management. This online platform is made to assure that the relations with customers and partners are never neglected.

3. BlueWorks

3.1 The Company

BlueWorks is a biomedical SME, and it's a joint-venture from companies with different fields of expertise – engineering, healthcare providers, and electrophysiology – which has been focusing its work on the ophthalmic field.

Since its foundation, BlueWorks has developed several innovative systems for diagnosis and therapy support, and aims to be a world reference in eye care and Hospital Integration Systems.

BlueWorks was created in 2007 by the companies Coimbra Surgical Center, ISA – Intelligent Sensing Anywhere, and NeuroEye, along with full professors from Physics and Medicine from the University of Coimbra and three of the first graduates in Biomedical Engineering from that University. (9)

Figure 1 – Logotypes from Neuroeye, ISA and Centro Cirúrgico de Coimbra (from the left to the right)

3.2 Products - Summary

3.2.1 EyeDropper

The treatment for some ophthalmic diseases (like Glaucoma) often consists on liquid drops to be applied in the eye. One important factor in therapy success is the patient's ability to correctly comply with the regimen prescribed by the physician. (9)

However, not always this regimen is accomplished by the patient, resulting in serious health complications. It is estimated that almost 10% of the visual loss from Glaucoma is the result of non compliance with medication (Health Benchmarks - Blue Cross Shield of Illinois).

BlueWorks is developing a solution to overcome this problem – it's called EyeDropper.

This device will allow not only helping patients to remember and correctly align the flask to increase the success of the instillation, but also to document instillation attempt success. By recording the instillation with a high definition camera, not only the doctor but also the patient can assure the compliance of the therapy.

The assessment of the compliance is helpful not only for medical care but also to research. In clinical trials with volunteers (generally people paid to participate in experiments) this gadget will prove to be very useful to group control and to provide all the information regarding the instillation without the need for being under a professional's watch.

On the long term this device may be equipped with features like:

- User identification by a system of iris recognition
- Assessment of compliance by weighing the flask (in addition to recording the instillation)
- Registry of date and time of the device's usage
- Audible alarms to remember the user to comply the prescription

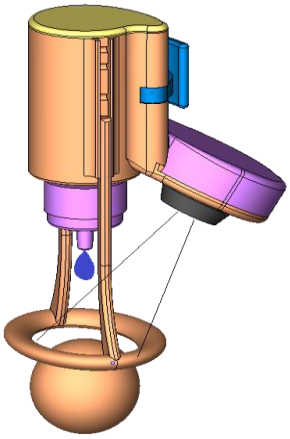


Figure 2 - Current prototype for EyeDropper

The main target markets to this technology are initially pharmaceutical laboratories that will use this technology in research programs, and then everyone who wants to acquire the EyeDropper for personal usage.

3.2.2 Magalhães as a Vision Screening Tool

BlueWorks developed a free software to be installed on "Magalhães computer", consisting on an interactive computer game that evaluates the visual function preferentially on children in scholar age. Requiring only cheap and reusable components, this tool allows all children to be diagnosed on time, preventing future vision problems.

3.2.3 OphthalSuite

In order to make accurate diagnosis on Ophthalmology services, information from several machines is required, sometimes from different models and manufacturers. These machines aren't interoperable, information doesn't exist on a centralized repository, and most of the times the format of the exams is paper, losing data and data quality. This affects Physician's workflow and results in important time and quality losses for these professionals.

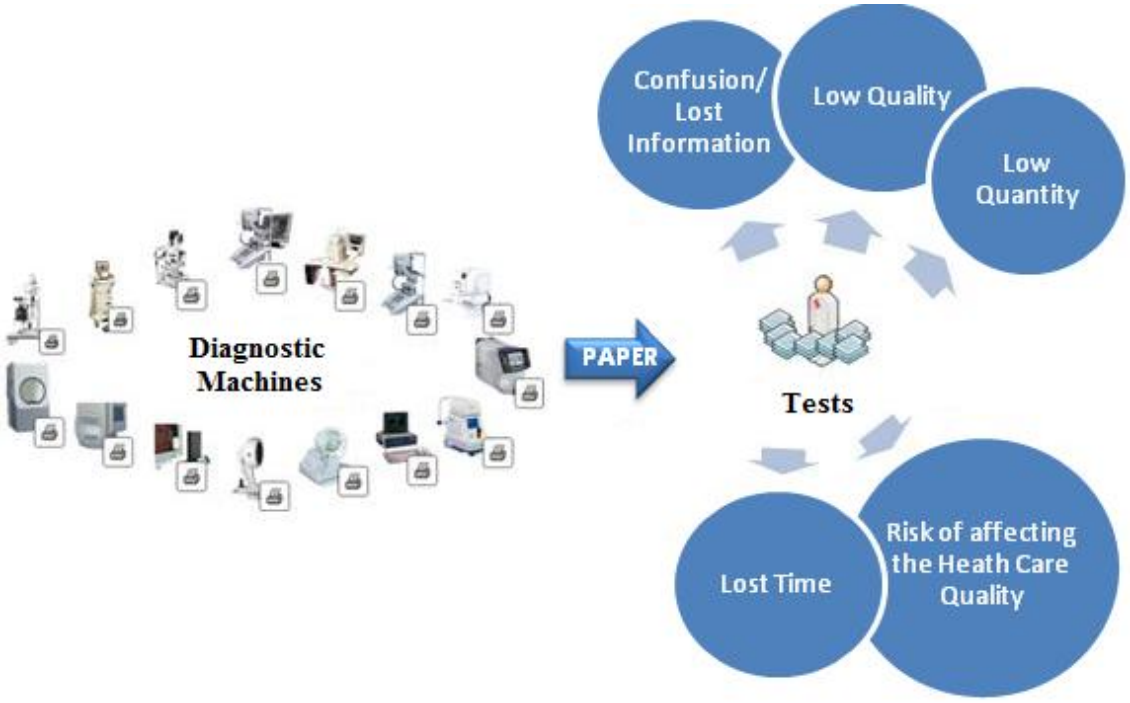


Figure 3 – Integration with OphthalSuite (original figure from the Case Study)

OphthalSuite is a software application which allows ophthalmologists to access all the data gathered by the several complementary exams, regardless of their manufacturer or specific model with a number of advantages;

- Fast and easy access to tests
- Increase of the quality and quantity of stored information
- Safety, reliability and data integrity
- Business Intelligence for clinical and administrative decision-making support
- Easy integration with existing systems
- Compatibility with all Windows' versions

This product is now on the market, and is running in Centro Cirurgico de Coimbra (www.ccci.pt), and one of the biggest Portuguese Hospitals (Hospitais da Universidade de Coimbra - www.huc.min-saude.pt). One case Study for each one of these services was made, and the results were very satisfactory, resulting in great *feedback* from the staff of the service. This product will be referred later on this report.

3.2.4 Atlas 3D

As an Ophthalmologist, it is very important to recognize diseases, being this one important phase of a doctor's education. Unfortunately there are plenty of limitations in high definition pictures, presently being paper its only format, limiting not only the quality but the size and the resolution. Also, they can't be manipulated – options like zoom or comparing images side by side are completely impossible nowadays.

Atlas 3D is a software of ophthalmic diseases, that allows both doctor and patient to have a new tool to ease the understanding of the different ophthalmic problems.

3.3 Synergies

BlueWorks, aiming to be a reference in technology for eye care, has product that complement each other.

It is based on these synergies and on a robust logic of product that BlueWorks intends to give its contribution to medicine in general.

BlueWorks' products contribute to the gathering of clinical data in the ophthalmic area, easing the execution of statistical studies and data mining and also educating about Ophthalmology. Thus, these products include several phases of Ophthalmology in people's life, from the prevention and screening (with the Screening tool for Magalhães), medical treatment (with EyeDropper and OphthalSuite) and education (with Atlas 3D). This circle completes with all the data to be analyzed to improve this area.

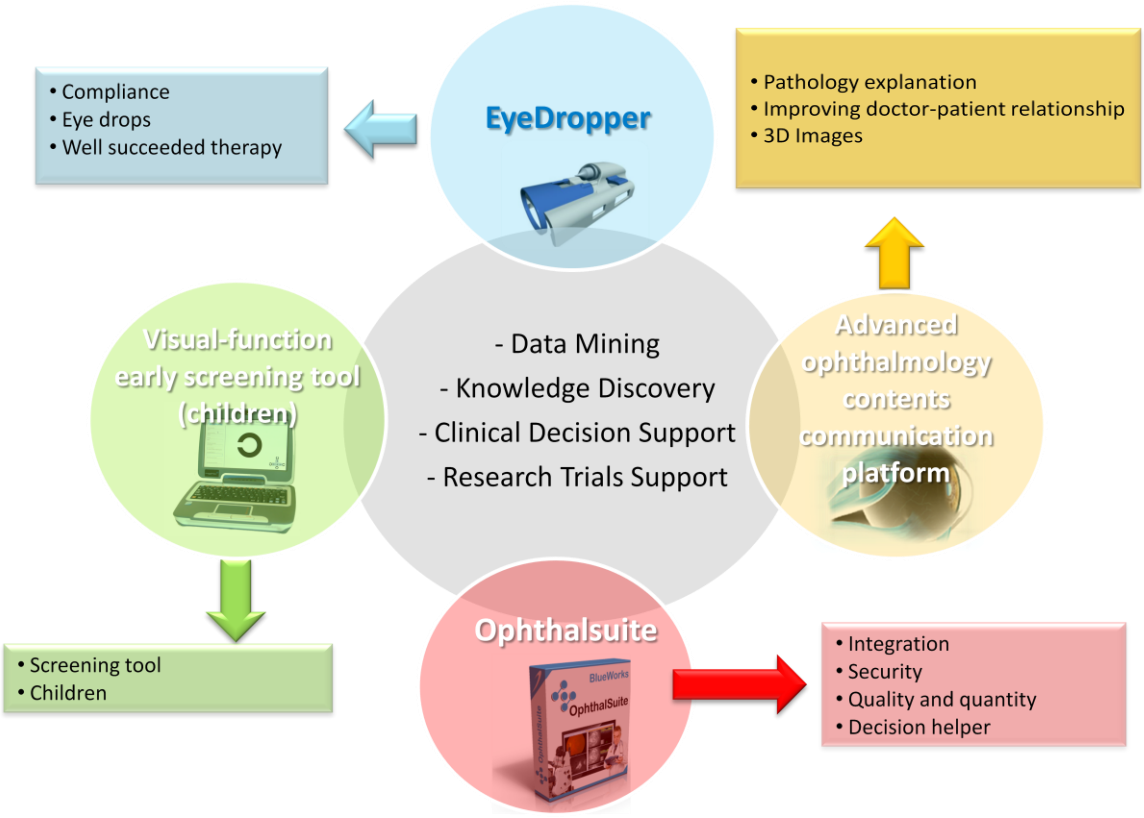


Figure 4 – BlueWorks' products synergies

4. Ophthalmology in Portugal

4.1 Recent Past

Ophthalmology is known to be one of the specialties where people have to wait the most to get a consultation.

In the process of selling OpthhalSuite, is important to know the reality in ophthalmic services. Factors like waiting lines, or money spent by the Government to fight the wrongs of this specialty can be very enlightening, and very helpful to make a business plan.

	Utentes em espera		
Especialidades	31.03.2006	31.12.2008	Δ (%)
Cardiologia	18.009	15.126	-16,0%
Cirurgia geral	24.296	28.883	19,0%
Cirurgia vascular	11.940	13.636	14,2%
Dermatologia	34.629	46.584	34,5%
Endocrinologia	9.257	11.475	24,0 %
Estomatologia	4.531	15.097	233,0%
Gastrenterologia	8.958	13.869	55,0%
Ginecologia	13.110	22.759	73,6%
Medicina física	9.057	7.980	-11,9%
Medicina interna	5.486	9.649	76,0 %
Neurocirurgia	5.306	7.605	43,3 %
Neurologia	9.515	11.958	25,7%
Oftalmologia	97.847	114.606	17,0%
Ortopedia	32.109	43.990	37,0%
ORL	45.125	51.416	14,0%
Pediatria	4.858	8.939	84,0%
Pneumologia	4.673	10.916	133,0%
Psiquiatria	6.571	11.686	78,0%
Reumatologia	2.951	4.319	46,4%
Urologia	24.501	25.408	3,7%
Totais	372.729	475.901	27,7%

Table 2 - Evolution of the number of patients waiting for a hospital consultation (10)

As we can see in the table above, by the Portuguese Observatory of Health Systems (spring report from 2010), between March of 2006 and December of 2008, Ophthalmology is the specialty that have more Patients on hold for a consultation and growing (17% on those years).

By the end of 2008, Ophthalmology had more than 114 thousand people waiting for a consultation, being this number almost a quarter of the people waiting in all the specialties together. (10)

Médias CHT	%	Médias Oftalmologia	%
Consultas realizadas	61.4%	Consultas realizadas	36,1%
Pedidos recusados	3.8%	Pedidos recusados	6.7%
Pedidos cancelados	2.2%	Pedidos cancelados	1.2%
Pedidos transitados	32.6%	Pedidos transitados	56%

Table 3 - Indicator of requests for consultation management process

CHT stands for "Consulta a Tempo e Horas" and is an electronic based system that records the information related to requests for consultation from the moment of its registration in the computer system until they are completed. This has the objective of making possible a better management of access to a first consultation with a specialist. (11)

In this period 128.157 specialty consultation requests were registered by family doctors, 46.332 were performed (36,1%), 71.768 of them were still on hold (56%), 6,7% were refused and 1,2% cancelled (table 2).

Comparing with the medium CHT for other specialties there is a difference of more than 25% of effectiveness disfavoring ophthalmology. (10)

	Consultas realizadas	Pedidos recusados	Pedidos cancelados	Pedidos transitados	Total
ARS Norte	38%	7%	1%	54%	69.058
ARS Centro	40%	3%	2%	55%	14.061
ARS LVT	22%	8%	2%	68%	29.538
ARS Alentejo	58%	6%	1%	35%	8.405
ARS Algarve	47%	6%	1%	46%	7.095
Média	36%	7%	1%	56%	128.157

Table 4 – Management of consultation requests

As we can see in table 3 only in two ARS, the balance between the performed consultations and the ones on hold is positive (58% to 35% in Alentejo and 47% to 46% in Algarve).

The one with the lowest ratio is the Lisboa and Vale do Tejo ARS, with a difference in percentage of 46% between the consultations that were performed, and the ones on hold.

Unfortunately the overall difference is negative with 36% consultations made against 56% that weren't. (10)

Especialidade	Muito prioritário	Prioritário	Normal
Todas	60 dias	73.9 dias	117.6 dias
Oftalmologia	123,5 dias	115.1 dias	176.1 dias

Table 5 - Comparison of waiting time in ophthalmology and all other specialties (10)

The table speaks for itself, and in the three priority levels Ophthalmology is far from the other specialties times, being this more than the double on the High Priority (123,5 days against 60 for other specialties).

These are scary numbers, because this increase of the waiting time for a patient to be seen by a doctor (especially in the Priority and High Priority status) will aggravate not only his clinical file but also the need for treatment and the patient's recovery time.

4.2 Intervention Program in Ophthalmology

In the end of June of 2008, the prime minister announced a new government program to fight the waiting times in ophthalmology. The idea was to implement in Portugal good practices adopted by other countries to reduce the waiting time for cataract surgery to 4 months, as internationally recommended. (12)

This program was called "PIO" (Programa de Intervenção em Oftalmologia) and the ministry of Health was willing to spend up to 28 million Euros in public hospitals to regularize the situation in the waiting lines until the end of June of the following year. (12)

The Objective of PIO, was to make more 30 thousand surgeries to cataract (in public hospitals) and 75 thousand consultations during that year, between 1 of June of 2008 and 30 of June of 2009.

To join the program and get financial contributions, hospitals would have to increase their production in 10% (if their activity was higher than national average), 20% (if it was the same as national average), and 30% (if less than national average). (13)

Unfortunately, according to a report by the "Tribunal de Contas", not only the Program spent more 3,9 million Euros than was supposed, but also the requirements weren't fulfilled. The majority of the Hospital Units didn't meet the required objectives and didn't increase the surgeries and consultations as planned – only 21 thousand surgeries and 48 thousand consultations were made. (13)

In the end, this Program was considered to have "low rate of execution" by the "Tribunal de Contas".

4.3 Present

In the spring report of 2011, Ophthalmology remained a concern to OPSS, and one year later, the scenario remains concerning.

		Tempos médios de resposta (dias)				
Especialidades cirúrgicas	**Prioridades**	**ARS Norte**	**ARS Centro**	**ARSLVT**	**ARS Alentejo**	**ARS Algarve**
Oftalmologia	Muito prioritário	140,3	402,9	197,8	173,9	127,8
	Prioritário	103,3	219,5	119,3	67,8	135,1
	Normal	190,7	230,1	201,4	**112,7**	199,1
ORL	Muito prioritário	56,6	310,1	71	162,3	-
	Prioritário	94,8	299,9	71,2	200,1	80,7
	Normal	205	**126,5**	**110,8**	**142,2**	**90,6**
Urologia	Muito prioritário	42,3	34,5	79,8	39,8	162
	Prioritário	61,9	**58,6**	99,5	64,3	406,9
	Normal	**127,3**	153,3	151,1	**94,6**	368,2
Cirurgia vascular	Muito prioritário	32	**4,5**	**30,5**	-	-
	Prioritário	86,9	**39,1**	**35,9**	**56,2**	-
	Normal	301,5	41,5	82,7	155	-

Table 6 – Medium times of response per specialty and region (14)

The Medium Times of Response are very discrepant, with Ophthalmology "leading" the time a person has to wait to get a consultation in surgical specialties. For instance, in the Center a patient can wait more than a year to get a high priority consultation. (14)

Especialidade cirurgica	**Muito prioritária (≤ 30 dias)**		**Prioritária (≤ 60 dias)**		**Normal (≤ 150 dias)**	
	TMR (dias)	**Δ**	TMR (dias)	**Δ**	TMR (dias)	**Δ**
Oftalmologia	203,1	+173,1	129,8	+69,8	193,7	+43,7
ORL	96,5	+66,5	130,7	+70,7	169,6	+19,6
Urologia	77,1	+47,1	85,8	+25.8	139,3	-10,7
Cirurgia vascular	30,7	+0,7	62,9	+2,9	220,5	+70,5

Table 7 - Medium deviation, in days, comparing to the Medium Times of response (14)

Ophthalmology presents the greatest deviation for the high priority consultations, with more than 173,1 days over the 30 predicted to this level of priority.

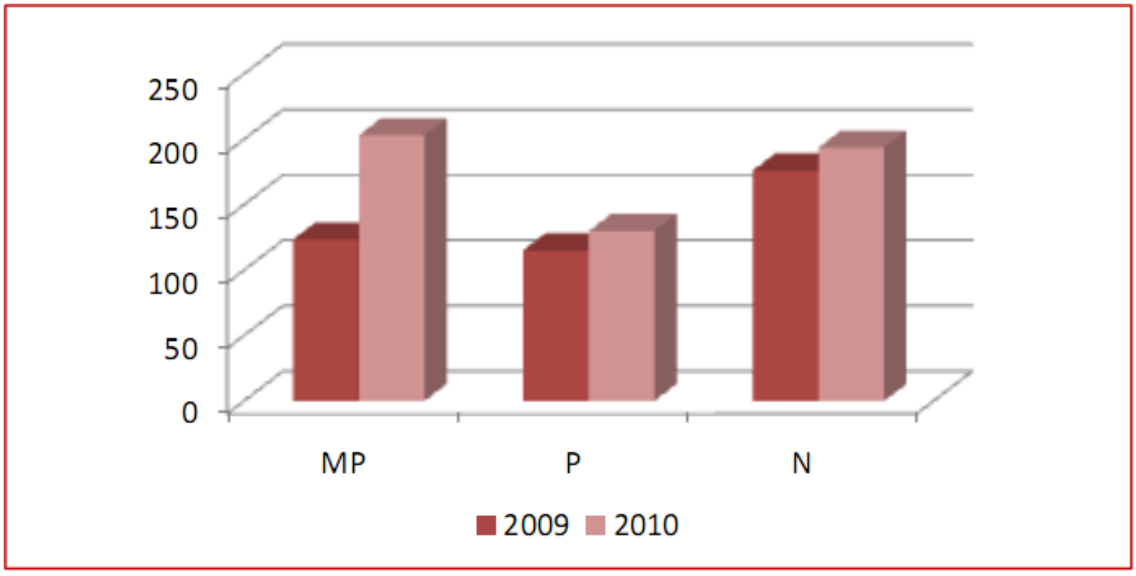


Figure 5 – Evolution in the Medium Times of Response in the 3 consultations priorities in Ophthalmology (14)

Legend: MP – High priority consultations; P – Consultations with priority; N – Normal consultations

Comparing to 2009, the maximum times of response for ophthalmology evolved negatively, in spite of the policies to increase the productivity in this sector.

Analyzing the data in this chapter is secure to say that ophthalmology is a problem to Portuguese public hospitals.

In a year where the state budget has contemplated the Health sector with a cut of 18,5%, it is hard to find large scale solutions to this problem. Meanwhile it's hard to see any improvements in the waiting lines as they continue to grow.

The better looking solution may pass by an internal logic of service, improving the workflow in every hospital. OphthalSuite, in its pilot installations has proven to optimize the time spent in the ophthalmic service, and can be a valid solution to reduce the time per consultation, allowing more consultations every day thus reducing the waiting time for this specialty.

5. Information Technology in Portuguese Hospitals

5.1 Scope

When selling OphthalSuite it's vital to know to the reality and the background of the informatics infrastructures that hospitals consider vital to their functioning.

2010 Unidade: %

Tipo de entidade	Acesso à Internet	Banda Larga	Presença na Internet
Total	**98,7**	**94,9**	**88,1**
Oficial	**97,7**	**96,9**	**89,1**
Particular	**100,0**	**92,5**	**86,9**

Table 8 - Information and communication Technologies in Hospitals by entity type (15)

In 2010, 98,7% of the Hospitals had access to the internet, 94,9% had Broadband connection and 88,1% had presence on the internet.

2010 Unidade: %

Tipo de tecnologia	Hospitais
Local Area Network (LAN)	**90,6**
Wide Area Network (WAN)	59,1
Wireless LAN	62,1
Videoconferência	21,7
Correio electrónico	**96,6**
Software médico	**77,9**
Intranet	73,6
Extranet	39,6
Rede Virtual Privada (VPN)	52,3

Table 9 - Hospitals that use Information and communication Technologies, by type of technology (15)

Regarding the Information and communication technologies, Email seems to be the most widely used technology. In spite of this high percentage, self experience given by a year contacting hospitals and clinics, tells that a great part of these Emails aren't used at their full potential. Some Emails aren't read (or if they are, they are ignored), they are read too late or the box is full, etc.

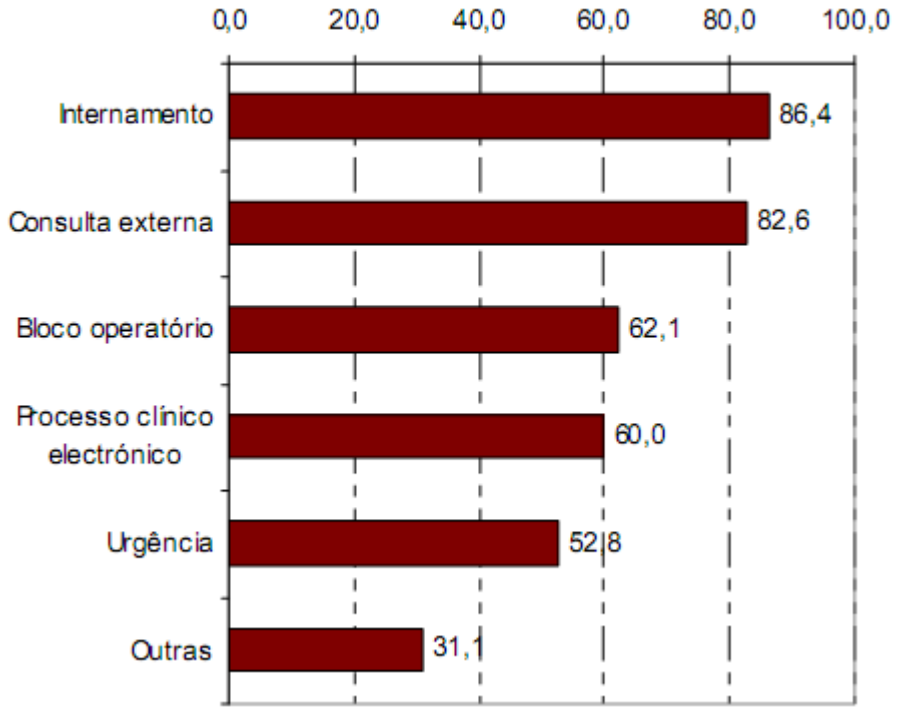


Figure 6 – Hospitals that use information technologies, by activity in 2010 (%) (15)

In Portuguese Hospitals, the processes associated with hospitalization are the most computerized (86,4%), but several other sectors are not as equipped with Information Technologies. [14]

Considering OphthalSuite, these last statistics can be deceiving, because the Ophthalmology service of a Hospital can be computerized, but the information provided by all the diagnosis machines (some of them with specific software, and therefore considered computerized) may not be connected to a central repository, hindering the work of the medical staff.

2010	Unidade: %
Finalidade de utilização	
Procura e recolha de informação	**99,6**
Acesso a bases de dados	83,6
Consulta de catálogos de aprovisionamento	**87,9**
Formação de recursos humanos	44,4
Comunicação interna entre os diversos serviços hospitalares	64,2
Comunicação externa com outras unidades de saúde	**81,9**
Troca de ficheiros com outras unidades de saúde	**86,2**
Investigação biomédica	27,2
Comunicação através de Pager	7,8
Outras	4,3

Table 10 - Hospitals that use Internet, and the use they give to it (15)

Among the Hospitals that have access to the Internet, the greatest part of them (99,6%) use it to search and gather information. Most of them (83,6%) use Internet to access Databases, 64,2% to internal communication between hospital services, and 86,2% for files trading with other health units. (15)

These Data, tells us that the majority of the Hospitals in Portugal are ready to support OphthalSuite, as they are already aware of the importance of Information Technologies and interoperability for a Hospital's workflow and to provide the best possible medical care.

2010 Unidade: %

Tipo de presença	Presença na Internet
Portugal	**88,1**
Website	**76,3**
Website integrado no site do Ministério/Portal temático de saúde	**31,9**
Outra situação	10,1

Table 11 - Hospitals that have presence on Internet (15)

Not every Hospital has presence on the Internet (88,1%), and only 76,3% of them have their own Website. [14]

2010 Unidade:%

Tipo de funcionalidades	Presença na Internet
Informação institucional acerca do hospital	**97,1**
Disponibilização de informação sobre os serviços prestados	**82,1**
Disponibilização de informação sobre prevenção e cuidados de saúde	61,4
Localização, meios de acesso e facilidades de estacionamento do hospital	77,3
Indicações de procedimento em caso de emergência médica	30,9
Endereço electrónico para recepção de contactos externos	**91,3**
Marcação de consultas médicas online	8,2
Informações sobre o corpo clínico	56,5
Disponibilização de formulários para download	25,1
Disponibilização de formulários para preenchimento e submissão online	12,6
Acessibilidade para cidadãos com necessidades especiais	19,8
Outras	5,8

Table 12 – Hospitals that have presence on Internet, and the available features (15)

The features available on the Websites were usually related to institutional information about the hospital (97,1%), Email to external contacts (91,3%), and information about the provided services (82,1%). (15)

Sometimes the Websites are poorly structured and aren't updated, making it difficult to access required information, or even contact the hospitals by Internet.

5.2 Financing

The recent cuts in the health sector brought other problems related with the informatization of Hospitals. Portuguese Hospitals are starting to question if some software tools are worth the price they have been paying for the last years (and consequently, resisting new forms of software), and studying alternatives to the systems already implemented.

One good example is the ALERT system. This was first installed in the year of 2003, and was made to improve the workflow and to end the use of paper in the emergency service. At the time, the European Union helped with funding for the adoption of Information Technologies by the Hospitals, facilitating the process. But now, the cost of maintaining these services became unbearable in the eyes of the Hospital management teams. (16)

This reaction is a warning to medical software companies, as they often overprice not only their products but also their maintenance. When trying to sell to a hospital (or private clinic), a company must prove how its product is irreplaceable, and how will it promote the workflow in the specific service. Also, it is very important to decide the price to charge for the product. The Hospital's committee will have a price in mind that fits on their budget, and may not be willing to consider large deviations from the estimated price. (16)

6. Publicity in Clinical Software

6.1 Introduction

Increasingly, computers are being used in daily clinical practice, and the clinical software is now familiar to doctors. These doctors are normally used to find advertising in magazines and to be approached by representatives of the pharmaceutical industry (advertising on television and radio is intended mainly to patients in an attempt to shape their choice).

This approach allows not only to alert physicians to the existence of new drugs, but also to increase the sales.

It is known that pharmaceutical companies spend a large portion of their budget on advertising – ironically these expenses tend to be higher than the ones associated to research (and thus taking first place in the schedule of expenditures of these big companies). (17)

This situation, coupled with the fact that the Hospitals increasingly feel the need to cut spending, makes it difficult to afford the costs associated with a software platform and opens the door to a new kind of advertising of medical products – advertising in Clinical Software as a way to finance such software. (18)

6.2 Advertising effect on prescription

In fact, there is no documentation proving that this type of advertising has some effectiveness in the prescribing act.

Studies which analyzed the prescriptions made by doctors who used a particular Clinical Software for electronic prescribing – advertising to certain drugs – showed little or no difference in the prescribing of products advertised in such Software. (19)

However, studies have focused on a single type of advertising when it is known that drug makers use a series of synergistic strategies with the aim to influence the prescriptions. This publicity may work, for example, to facilitate the approach of pharmaceutical representatives to doctors, upon presentation of the product. (20)

6.3 Problems associated with advertising in Clinical Software

For some, the advertising software is seen as "spam", like the unwanted advertisements from the Internet. This makes some companies that create Clinical Software to point the absence of advertising as an advantage on the product. (21)

Another problem relates to the fact that some doctors may be reluctant to use a program that has advertising content, and how it might influence clinical practice. Thus, this type of advertising should be distinguished from the environment of the program and must be separated from the area of the screen where the physician is working (in the case of OphthalSuite, visibly separated from the exams visualization and from the doctor's workspace).

There was also controversy in other countries related to the fact that pharmaceutical companies have offered proposals to Software companies for clinical information on patients' prescription. In 2004, a pharmaceutical company was sued by a law firm (Privacy Rights Clearinghouse) for selling confidential information regarding patients. Knowing the clinical status of the patients, that pharmaceutical company came into contact with them by phone and mail informing of new drugs for the treatment of their medical history, advising them to request more information from their doctor (for example, someone with a history of depression was informed of a new anti-depressant). Also in 2002 a pharmaceutical company paid 1 million dollars for using information about their patients for marketing campaigns, sending samples of medications to people by mail (22).

6.4 Cases

Some companies already allow advertising on its software, thus overcoming the problem related to the limited number of potential buyers (hospitals or clinics only) and having a source of extra income every month. (19)

However, their Website does not indicate that there is this option, and the price lists for the purpose aren't contemplated.

For example, the program Medical Director – the most commonly used prescription Software in Australia – in spite of accepting advertising in their program does not have any details about it on their website. (23)

6.5 Patient

Also the patient may be exposed to advertising, if the monitor is in its visual field. This can result in embarrassment for both patient and physician if the advertising is made to drugs that touch a nerve to the doctor or the patient.

Embarrassment can also be created when the doctor prescribes any medicines that are advertised on software. In this case the patient may fear the doctor is being influenced, ignoring what's best for his treatment.

6.6 Hospital

Hospitals generally prefer to buy the product with advertising if it means they will spend less money on the purchase. Thus, since it does not interfere in practice, hospitals prefer the versions with advertising. (17)

6.7 Pharmaceuticals

The healthcare market, specifically linked to the pharmaceutical industry, is known as one of the most influential markets in the world, according to IMS (2006) worth over 500 billion dollars, contributing to this value more than 10 000 companies (however the eighth largest pharmaceutical companies are holding about 40% of total turnover). (24)

As already mentioned, the big pharmaceutical use most of its budget for advertising and marketing. In 2004, the United States of America spent 24.4% of the money gained from sales in marketing, against 13.4% in research and development. In promotion, this year it is estimated that expenditures were 57.5 billion dollars by the pharmaceutical industry only in the United States of America.

Also the number of meetings for promotional purposes has increased dramatically, from 120,000 in 1998 to 371,000 in 2004. Note that the drug trade in the United States of America represents 43% of the world. (17)

Due to the time and paperwork associated to the entry of a drug to the market, drug companies are often willing to make huge investments, so the medicine in question outweighs all the wait and investment. (25)

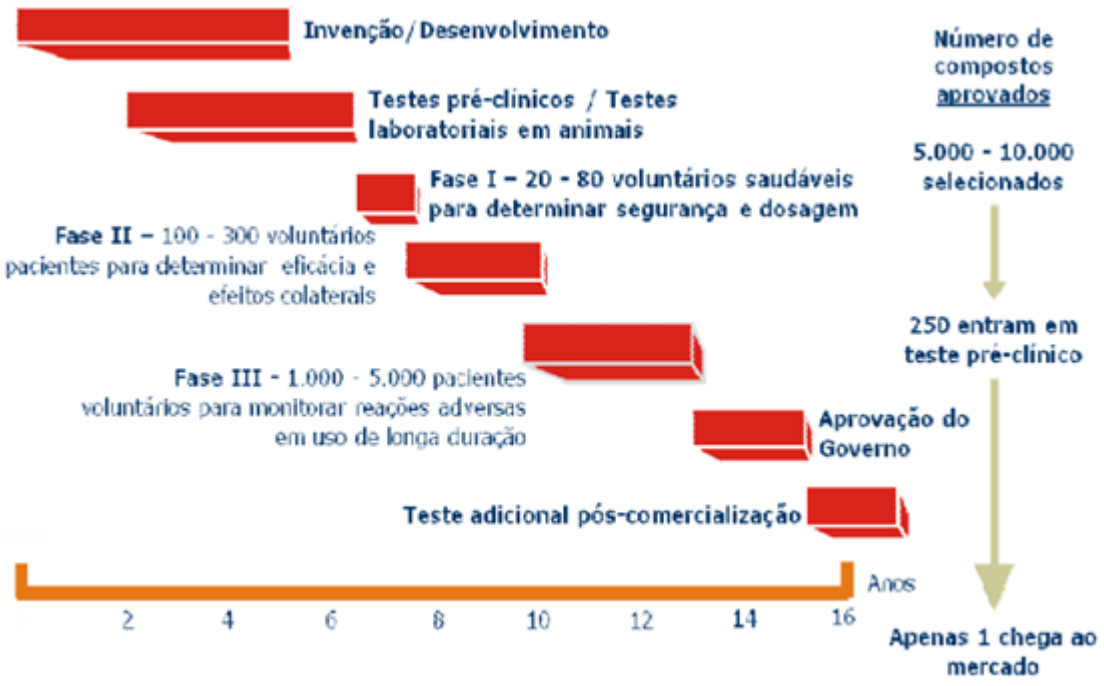


Figure 7 – Process for new Drugs approval

1º	Vioxx (Merck)	US$ 171 milhões
2º	Celebrex (Pharmacia)	US$ 133 milhões
3º	Clarinex (Schering-Plough)	US$ 132 milhões
4º	Bextra (Pharmacia)	US$ 120 milhões
5º	Prevacid (TAP)	US$ 101 milhões
6º	Zocor (Merck)	US$ 86 milhões
7º	Nexium (Astra Zeneca)	US$ 85 milhões
8º	Lipitor (Pfizer)	US$ 84 milhões
9º	Allegra (Aventis)	US$ 82 milhões
10º	Zoloft (Pfizer)	US$ 81 milhões

Figure 8 – The biggest spender in advertising for drugs. (EUA, 2002)

In Europe, it is estimated that advertisement spending is about 13% lower compared to the United States.

Despite publicity in Software may not be relevant in that budget, these data is in itself an indicator of the availability of large pharmaceuticals to spend on marketing. Also, big pharmaceutical bet on spending money on several fronts, using synergistic strategies, which in its together influence sales.

There is, however, a great climate of secrecy regarding publication of Pharmaceutical accounting reports. These companies are often criticized of having lack of scruples, and paying more attention to sales than to the real need of the consumers, and so they try to let the minimum information out as possible.

Consumers International (organization that brings together 230 consumer organizations and the governments of 113 countries) conducted a study using questionnaires, interviews with 20 major pharmaceutical and further fieldwork in seven European countries (Portugal, Finland, Czech Republic, Greece, Hungary, Denmark and Slovenia) where they accuse the pharmaceutical industry of lack of transparency, not specifying about their social responsibility policies due to differences in the direction of the budget, with a clear preference for marketing. This study revealed results very close to another study done eight years earlier by Health Action International. (26)

6.8 Regulation

OphthalSuite is a Software platform made to be used only by Health professionals. Thus, it was studied its applicability for use as a tool of advertising for pharmaceuticals.

The following study is a legal framework which qualifies OphthalSuite as suitable publicity.

Analyzing the current legislation in Portugal, by the decree-law number 176/2006, of August 30, the appearance of drugs information on OphthalSuite fits into the category of advertising (and therefore under the legislation presented in this paper - Article 150. º Attached).

6.8.1 Advertising to Health professionals

OphthalSuite is intended to be used only by physicians or technicians of the ophthalmology service, and is therefore uniquely targeted for health professionals.

In the Article number 154 (Attached) on advertising to health professionals, none of the points indicates a setback on advertisement in OphthalSuite.

6.8.2 Prohibitions

Advertising on clinical software isn't also contemplated on the prohibition Article for drugs advertising (Article 152. º - Attached).

6.8.3Medical Devices

The same goes for advertising of medical devices, duly legalized and which meet the legal requirements for advertising of devices. Decree-Law No. 145/2009 of 17 June (attached).

6.9 Conclusion

Although there is very little information about advertising in clinical software (what has been done through regulation, pricing, pharmaceuticals that requested such services, and even what's the share of the budget they spend on this type of advertising) the tendency to this industry is to continue to spend a large part of their budget on advertising, often without a very enlightening "feedback" about the influence and impact on sales that each strategy has accomplished.

Drug makers like to maintain proximity to the doctors, and to influence their decisions; Clinical Software is a tool that doctors use in their daily clinical practice - more time than they use, for example, a medical journal where the pharmaceutical industry makes large investments (that is the purpose of, for example, a block of paper sheets, where the doctor is constantly seeing the product in question being advertised).

Also note that the cases presented in this chapter were all about Clinical Software used to Prescribe, ie there are more problems related to ethics than in OphthalSuite, as they may influence the physician's decision when they're prescribing.

Thus, following certain rules, so that advertising does not influence clinical practice, and not exceed some ethical limits already discussed, the advertising in Clinical Software can be a good way to get some extra income (and at the same time to facilitate the purchase at a lower price for Hospitals) for software companies.

7. OphthalSuite

7.1 Introduction

As said earlier, the process of selling OpththalSuite was considered one of the priorities in this project. A lot of time of the project was invested on this Software, and only a part of that work (which may be described in this thesis) is going to be discussed on this document.

7.2 Sales Strategy

To be successful it was necessary to design a sales strategy and put it into action to decide how and who to sell to;

7.3 Define Target Market

In this field of action, the target market may seem obvious, but it's not. Obviously this kind of products can be sold only to healthcare institutions, but there are a lot of factors that have to be taken in consideration.

- What institutions have an ophthalmology service?
- Between these institutions, which ones have the number of machines that justify the acquisition of OphthalSuite?
- Is it more likely for public or private institutions (or both) to buy the Software?
- How big should the area of action be? Just Portugal or also abroad?
- If the decision is to sell OphthalSuite abroad, which countries will be the better options?

Finding an answer to these questions required not only a lot of research, but a lot experience (even from people working on the ophthalmic field).

To ease taking these decisions, it was made an extensive work, tracking the most significant Portuguese private clinics and hospitals with an ophthalmic service. In all of these, factors like the available equipment, the staff, and the number of hours (and the patient flow – how many patients an institution is prepared to receive) (attached).

This helped to realize what clients BlueWorks should bet on, and what institutions really needed OpthalSuite.

7.4 Look at Competition

Another important task to decide which strategies to adopt is to look at the competition.

- What are others in the market doing?
- For what price are they doing it?
- What are their strengths and weaknesses (in terms of company and their product)?
- What methods do they use to sell?
- How do they approach the customer?
- Where do they act?
- What can be learned from their practices?

To answer these questions, some companies were studied. Some of them qualify as competition, others are just studied because of their success nationally and internationally. The SWOT analysis that were made, are only referring to the commercialization of the product which competes with OphthalSuite, and not to the company as a whole (except for Alert, that isn't a direct competitor);

7.4.1 Company: IFA Systems

IFA stands for “intelligent future applications”, and it’s a company that creates software for eye care.

About IFA Systems (27):

- Headquarters located in Germany, Austria and United States of America.
- About 700 ophthalmologists, technicians and clerks in eye use IFA’s software.
- Over 450 digital interfaces to all kinds of ophthalmic instruments, image systems and software applications.
- Data of more than 50 million patients stored in their databases.
- Stability: Leaders in Germany since 1989 – 45% of German ophthalmic EMR market nowadays.
- Started Internationalizing in 1992.
- Exclusive supplier for EUREQUO (European Registry of Quality Outcomes for Cataract and Refractive Surgery) co participated by the European Union.
- Listed on Frankfurt Stock Exchange
- 76% owned by employees

7.4.1.1 Product: Interface Suites

Interface Suites is a software that, like OphthalSuite was design to connect the ophthalmic devices.

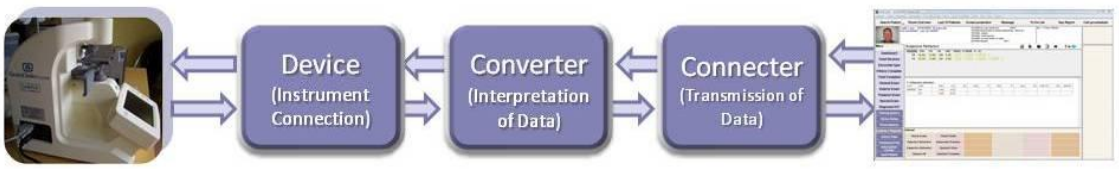


Figure 9 – Interface Suites’ logic of operation

7.4.1.2 Special Features

- More than 250 interfaces.
- Interface Suite is available in English, Germany, Portuguese, Spanish, Flamenco and Finnish.
- Guarantee of connectivity on their software if new devices ate introduced
- Good relations with the software specialists of all major vendors of ophthalmic technology.
- Planning a growth of 20 to 30% in the international market.

7.4.1.3 SWOT analysis

Strengths	Opportunities
Market leaders in Germany (good market share in Europe) **Good relations with ophthalmic technology vendors** **Available in six different languages** **Experience**	**Good predictions – Opportunity to expand the business**
Weaknesses	**Threats**
Great expectations (perhaps unreal) towards the market **Doesn't take metadata**	**Market competition (BlueWorks, topcon, etc)**

Table 13 – SWOT analysis performed to IFA Systems

7.4.2 Company: Topcon

Topcon is a Japanese company that produces high tech instruments to:

- Positioning Business (Surveying instruments, GPS, Machine control system, 3D measurement, Precision agriculture, Mobile control).
- Eye Care (Ophthalmic instruments, Optometric instruments).
- Finetech Business (Semiconductor equipment, FPD equipment, Optical devices) (28)

7.4.2.1 Advantages

- Scattered throughout the world, being one of the world leaders in their area.
- Big market share, and associated with companies like Toshiba (plus, they acquired some other companies too).
- Ease to sell their product, thanks to the proximity to the client, when selling ophthalmic devices. (28)

7.4.2.2 Product: EyeRoute

This software integrates more than 100 manufacturers' systems into a single and digital environment in a paperless system (29)

- Sold over 3000 licenses of EyeRoute in the United States of America. They don't sell EyeRoute on other countries, (following the information available on their Website).
- Multiple Locations – Allows access to patient information from anywhere, including workstations, remote computers and iPhone.
- Privileged position to expand, since they sell machinery all over the world.

- According to their politics, it is likely – when they consider BlueWorks to be a threat to them and to have a good market share – that they consider acquiring BlueWorks, like they did with other companies that were already established in the market (29)

7.4.2.3 SWOT Analysis

Strengths	Opportunities
Proximity with the customer **Easy to Expand**	**Good chance to expand the company even more.**
Weaknesses	**Threats**
They only sell EyeRoute in USA **EyeRoute isn't as robust as OphthalSuite in Business Intelligence** **Doesn't connect to legacy machines (only to machines that already support DICOM).** **Doesn't take metadata**	**Competition for the market (BlueWorks, IFA systems, etc)**

Table 14 – SWOT Analysis performed to TOPCON and its product EyeRoute

7.4.3 Company: OIS

7.4.3.1 Product: Symphony Image Management System

OIS (Symphony Image Management System) is made to improve the ophthalmic practice efficiency by importing all of the images and diagnostic reports in the clinic into a single system and enabling users to review them from anywhere. (30)

- According to OIS Web Site has already been adopted by 60% of the major Ophthalmic Institutions in the United States of America.
- Symphony Web – Allows to access patient information from anywhere (like the feature "multiple locations" by Topcon).
- Representation all over Europe, America Asia and Australia. If they decide to bet on Portugal they can become the biggest competitors to BlueWorks.

7.4.3.2 SWOT Analysis

Strengths	Opportunities
Big market share in the USA Representation all over the world	Expand in the international market (by their agents abroad).
Weaknesses	**Threats**
They only sell in the USA Their product isn't as robust as OphthalSuite in Business Intelligence Doesn't take metadata	Market competition (BlueWorks, IFA systems, etc)

Table 15 – SWOT Analysis performed to OIS

7.4.4 Company: ALERT

Despite being a Hospital Software producer, this company doesn't qualify as competition to BlueWorks, since none of their products have the same purpose as OphthalSuite. This company was chosen due to its recognized success in Portugal (and in other countries in Europe, Asia and America) and being in the field of medical Software, it may be useful to learn and take benefit from their experience. (31)

7.4.4.1 Brief Facts

- Alert made 10 700 implementations of their Software
- Over 10 300 000 urgency episodes
- 60 000 certified users
- 11 countries adopted Alert

7.4.4.2 SWOT analysis

Strengths	Opportunities
Present in 11 countries Big market share in Portugal (and expanding in other countries).	**Having achieved a big market share, and expanding, it is a good opportunity to launch new products, and expand to other countries. Opportunity to start developing specific solutions like BlueWorks' for medical specialties**
Weaknesses	**Threats**
Expensive product, other companies make similar products cheaper (the clients are starting to realize that). Frequent rumors about internal problems (structure, costs, etc) Doesn't take metadata	**Stiff competition – Some hospitals want to give up Alert's Software, because there are cheaper alternatives. Aveiro has already completed the withdrawal.**

Table 16 – SWOT analysis performed to ALERT

7.4.5 Good Practices

In addition to the good practices mentioned above, some of them stood out (comparing to other companies), and are pointed in this separator. These are practices that BlueWorks could benefit from, since they add value both for the company and the product that is being sold. OphthalSuite has its own unique features that separates it from the competition and can be seen as an advantage when selling it on the market.

Multiple Locations (TOPCON)

After an analysis made to 100 clinics (chosen randomly), one realizes that these "unfold" in 152, because 21 of them are associated with a group, belonging to the same owner, or the same board of directors of other clinics.

Obviously, if one group has more than one clinic, it would be of its interest to be able to access the data from all the clinics (and the data regarding a specific patient could be accessed by the doctor in all the clinics).

Among the analyzed companies the one that has the best service in this matter is TOPCON (allowing the access even in the iPhone)

Articles and Publications (TOPCON)

Credibility – Articles wrote by physicians describing the product and its advantages. BlueWorks did a similar thing with OphthalSuite, when the Case Study in "Hospitais da Universidade de Coimbra" was made. The opinion about OphthalSuite was asked to some doctors, proving the effectiveness of the Software.

Client Support (IFA Systems)

Support line 24 hours a day.

“10 questions you should ask” – In their Web Site, questions about their product and some answers that influence the choosing of IFA system’s software.

Case Study (ALERT)

In ALERT’s case study, the improvements are put in numbers (in money), so the client can have an idea of how much they can win in medium/long term if they acquire the Software.

Schedule demonstrations (ALERT)

Another thing ALERT allows is for the client to experience the Software, which may help him to make a decision regarding the purchase of the Software.

BlueWorks

Of all the companies studied, BlueWorks is the most recent and the smallest (in gains and workers). However, BlueWorks’ product is the best product in terms of business intelligence. OphthalSuite gets metadata that can be used for studies about an ophthalmology service.

7.5 OphthalSuite – Contact / Follow up with clients

When selling these kinds of products, is not easy to reach the customers. Since OphthalSuite is not meant to be sold to particulars, but to institutions such as hospitals and clinics, closing a deal with the client requires more work than if it was to a single person. This means that it is necessary to make some preparations and also to consider different approaches.

7.5.1 Hospital Mapping

In Portugal, there are not only a lot of public and private Hospitals, but also a lot of private Clinics. Among these some have ophthalmology services and others don't, so it was necessary to have a registry of which hospitals and clinics had an ophthalmology service and which ones would be of interest to BlueWorks – a small service, or one that runs in partial time may not be interested in OphthalSuite (may find that it is not worth the investment).

After finding the hospitals that had a significant ophthalmic service, they were mapped – originally with the objective of making a national presentation and choosing the best path to take.

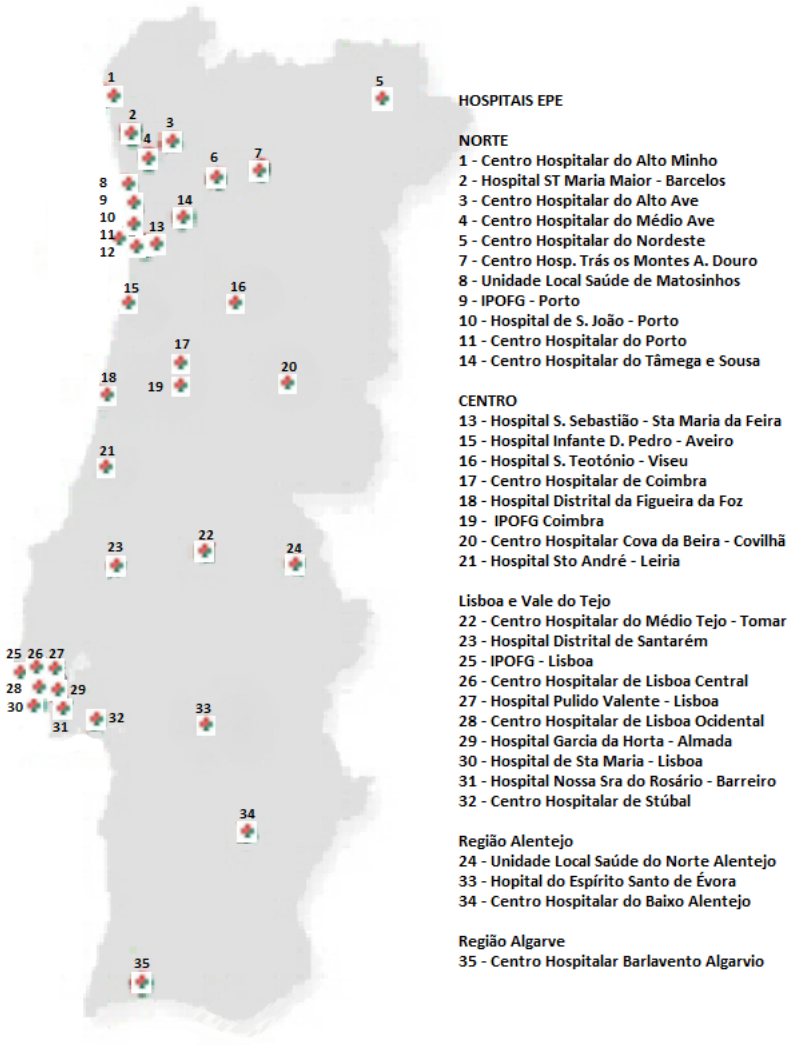


Figure 10 – Mapping of Hospital with an Ophthalmic Service

Some hospitals and clinics were contacted through phone or Email, with a presentation of OphthalSuite – with the purpose of making OphthalSuite familiar to doctors and to call out the attention for the necessity of its usage (attached).

It was used a Software called XMind to archive the information of the service. Data like the Director of the Ophthalmology Service and his contacts, the address of the Hospital/Clinic, the contact of the Informatics department and other relevant contacts was stored in this user friendly Software.

This Software allows saving the information of which institutions were already contacted and how is their relationship status with BlueWorks (useful for anyone that is not familiar with the situation of the business).

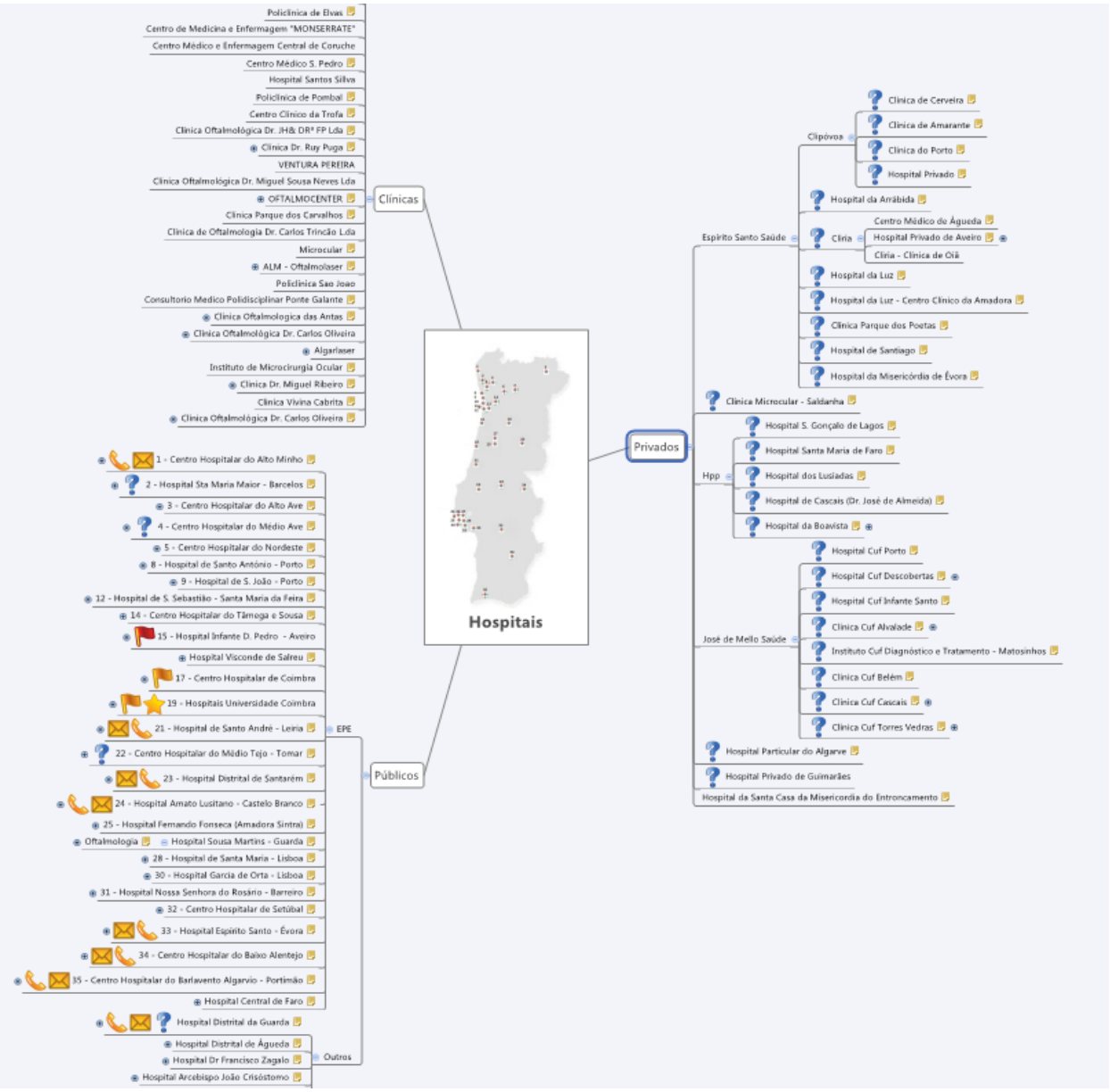


Figure 11 – Information about potential clients (XMind).

As seen in the Picture above, this Software is really intuitive. With branch based architecture, eases the search of a facility to contact by anyone, and the pictures available are clear about their purpose.

7.6 Case Study

As previously done in Centro Cirúrgico de Coimbra, another Case Study was performed during the current year, this time in Hospitais da Universidade de Coimbra.

In this case, a pilot installation was made in the ophthalmic service – unlike in Centro Cirúrgico de Coimbra where the Software was fully functional. This installation represented a bigger challenge to BlueWorks, as it was running in a bigger service and getting used by more doctors.

Another concern to BlueWorks was having an idea of the direct impact of this Software platform in the service's workflow. Being hard to measure the exact time saved with OphthalSuite, the solution found was asking the professionals of the service for their opinion about this pilot installation. Plus, this approach may mirror how these professionals – both doctors and technicians – feel about the change on their service. This may have an outmost importance when it comes to buy the product.

Some of the quotes gathered in these surveys were registered for further usage (attached);

"Não tenho nada a dizer que não seja bom!"

"Notei uma grande diferença quando comecei a usar o OphthalSuite"

Since the Software is sold to doctors, these quotes may become useful as a marketing resource to promote the product (the doctors may identify with fellow professionals).

In conclusion, the case study in Hospitais da Universidade de Coimbra was considered a success. Doctors and technicians found OphthalSuite to be a tool that improves the Workflow of the service.

The biggest complements were addressed to the exams quality and the amount of images per exam, easing the diagnostic to the doctors of the service.

8. Magalhães

8.1 Social Context

"Around the world, 325 million people have vision problems or are blind, 80 percent of blindness and 85 percent of the moderate or severe vision problems could be avoided through prevention, treatment or cure, and almost 90 percent of blind people live in countries with low economic resources."

Leonor Beleza (President of Champalimaud's Foundation) (32)

As said before, in a year where the Portuguese state budget cuts the funding of the health sector in 12,8%, with the increasing of life expectancy resulting in an increasingly aging population, new challenges to the financial management of the SNS arise.

Thus, to ensure the sustainability of the SNS a new approach is imperative, and betting in means of increasingly early diagnosis, may prove to be advantageous, resulting in large savings in the medium term.

In the specific case of the ophthalmic field, the ineffectiveness of screening methods results in unnecessary expenses that can easily be avoided if there is the care to start using means of previous detection of vision errors.

Data from the last National Health Plan (Strategic Guidelines for 2004-2010) indicate that in Portugal four million people suffer from eye diseases. Among these, 700,000 have low vision that can't be corrected with lenses and 40 thousand of these people are blind – half of them younger than 65 years old. The same document tells us that one third of new blindness could be prevented if the Portuguese population had access to existing ophthalmic technology in our country and the vision errors were detected on time. However, about 65% of the parents have never taken their children to the Ophthalmologist.

In addition to the social there is also the financial component. The public expenditure with a working-age blind citizen is on average 150 000€, resulting in expenditures of hundreds of millions of Euros. (33)

As mentioned above, this problem is discussed in the last National Health Plan which points out how crucial is “the primary prevention and risk reduction, screening and early detection, before the onset of first symptoms”.

Thus, it is clear that the investment in new ways of child vision screening – as exists in other specialties, which require more investment – is compelling, and that the sooner these methods start to work properly, the sooner their impact will be noticed. It is important that the ministry of Health start to look into this issue as soon as possible, since the technology exists and can bring great advantages.

8.2 Current State

“Ideally, all the children should make a visual exam, performed by a physiatrist at the age of 3 to 4 and 5 to 6 years old”

Serviço de Pediatria do Hospital de Braga (34)

Presently, the Screening of vision errors is made by mobile unities (vans) that drive around the country, from school to school. This system is not only is expensive for the government (because of the professionals and the machines involved) but it also fails to reach all children in scholar age, making this procedure far from perfect.

8.3 BlueWorks’ Solution

“(…) the government wants to give primary school students 500 thousand Magalhães, an ambitious objective which should accomplish, by the year of 2010 a computer for every two students“

BlueWorks' solution is the software to be installed on "Magalhães computer" that is mentioned in the second chapter, which is meant to be distributed for free.

This way, every child will possess the means of being properly diagnosed, even if they attend schools that are more inaccessible to the screening Vans.

It is important to note that this screening, in spite of not being performed by a doctor, uses reliable technology. It consists of an adaptive staircase, whose progression in each iteration depends on the user's feedback, containing security mechanisms to validate user's cooperation.

The tests used are "Landolt's C" and "Tumbling E" that are widely performed by ophthalmologists to evaluate visual acuity, with scientific validity and effectiveness demonstrated by numerous studies.

In addition to facilitating the screening process and making it more efficient, there is the advantage of using the data for statistical purposes. The results would be in a database, which could be studied, giving an overview of the children vision state in the country.

8.4 Influencing Opinions

One important step to achieve product sales is related to reputation amongst certain communities, and this is used to educate them to value needs that a product or service was made to fulfill.

In the nature of the business where BlueWorks acts, more specifically in the task of selling the Screening Tool, and being the primary client the Government, this matter reaches its peak. The decision makers are only a few, and it is necessary to reach them effectively, and to make sure that they understand the need to implement the system.

Other important factor is to fight the natural resistance to the implementation of new technologies. It is necessary to prove the practicability of this method as well as to assure the reliability of the Software (is important to note that it doesn't replace the doctor's work, it just identifies vision errors).

Within the scope of this project, some of these tasks were performed, like a contribution to a government managed health forum containing elements related to blindness and low vision and alerting to the need for Child Vision Screening actions, to prevent future complications and costs**.** The participation in contests like BES – innovation contest and presenting the product in the congresses BlueWorks attends to are also good ways of promoting the Software.

The same this is being done in other countries – BlueWorks is starting to establish contact with other countries' Governments, to make the screening tool known abroad.

8.5 Savings

The current outlook of the market at a national level is as follows: 100 000 new students every year, resulting into a total size of about 400 000 students currently attending primary school. Based on these numbers, we may predict astronomical savings for the state.

Since the estimate cost for a single screening – using the current method – is about 10€, BlueWorks after implementing the service could reach the goal of only 10% of those expenditures.

In the long run, there is also the advantage of saving in reimbursement for the visually impaired and people with vision problems (as explained in the beginning of this chapter). These costs become much higher than those associated with an early treatment that this technology could facilitate.

8.6 Expansion

If countries in the process of adopting programs similar to e-school are considered, the numbers speak for themselves:

France - 65 447 374 inhabitants (35)

Germany – 81 757 600 inhabitants (36)

United Kingdom – 60 975 000 inhabitants (37)

Venezuela – 28 892 735 inhabitants (38)

Only in these countries the market size is more than 20 times larger than the Portuguese (and the savings for their Governments in the same proportion).

Of course that, as in Portugal, there are few people who can make the decision of adopting this product, so it would help to have a market in Portugal first, to help convince the decision makers in other countries (based on Portuguese success).

In Venezuela's case, may be easier to implement BlueWorks' software, since the computer is the same, only with slight differences on the software (Canaima's software developed by Venezuela's Government).

8.7 Future potential

Another great advantage of this technology is that it can be applied to other fields, making the screening more automated and practical:

- Audiology – Hearing screening with pre-calibrated headphones
- Dentistry – Oral photography with an optical adapter attachable to the Magalhães' Webcam.

9. Other Work

9.1 EyeDropper – Case Study

Like with OphthalSuite, BlueWorks decided to make a Case Study with EyeDropper.

To make it, the EyeDroper was used by a number of individuals who recorded the fall of the drop instillation and – after watching the video – inserted it into one of three categories:

Success – Drop well applied (falls in the eye)

Failure – Drop misapplied (falls out of the eye)

Inconclusive – Nothing can be concluded

After obtaining the data, they were treated and given a value to each one of the categories. These values were used later in statistical tests.

1 – Success

-1 – Failure

0 – Inconclusive

Statistical Analysis

There was calculated the mean, standard deviation, median, mode and quartiles, first with all the data then without the inconclusive category (attached).

There was calculated the correlation between the various observations, also with and without the inconclusive category.

It was also performed the Spearman Correlation between all the Data.

Number of persons: 10

Number of tests (per person): 93

These studies are made to prove Eyedropper's effectiveness. As it is made to improve patients' compliance, these tests made by different people is helpful to realize how Eyedropper's videos will be interpreted in different hands, and the correlation between users with different perception.

9.2 Atlas 3D

Atlas 3D was BlueWorks' product that was least connected to this project. In its final phase of development required mostly professionals with specific knowledge about eye's anatomy and Software developers.

However, BlueWorks has already started to promote Atlas 3D – Especially in presentations, in instances where ophthalmologists could be present. This way, when the Software is fully developed, many professionals will already know its potential.

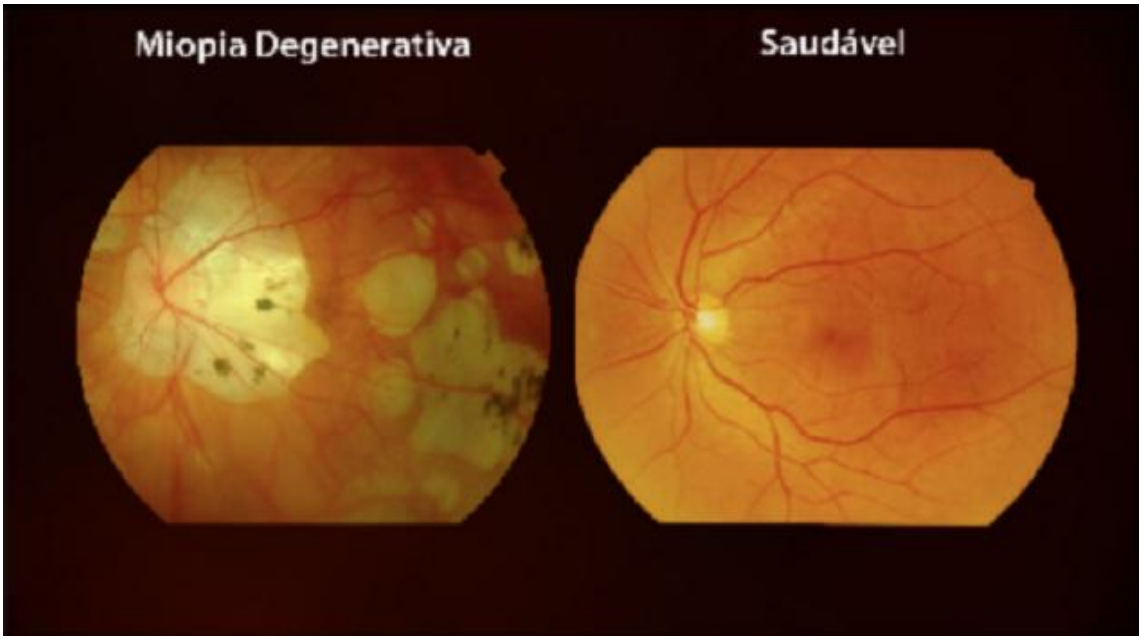


Figure 12 – Example of an eye disease that can be found in Atlas 3D

9.3 Innovation contests

The participation in innovation contests helps not only to promote the Company but also to attract potential investors (not to mention the prizes that are usually associated with these events).

Another upside of these contests comes from the dynamic of the competitors' teams, forced to deal with decision makers in their development field, upgrading their experience and marketing skills.

9.3.1 ISCTE-IUL MIT PORTUGAL

This initiative was created with the objective of fostering the creating of new technology-based ventures or strengthening recently incorporated companies. Supported by Caixa Geral de Depósitos, it provides financial awards to the winning teams in each track of the competition. (39)

The competition mission is to facilitate and encourage a model of entrepreneurial value creation and to create means to transfer it to the global market.

Inspired in the famous MIT $100k Business Plan Competition (going for its 21st year) this initiative can be seen as a hybrid between Venture Capital and Business Plan Competition. (39)

BlueWorks competed in the category of Lifesciences (LS) dedicated to projects or companies related to biotechnology, therapeutics, medical devices, biomaterials, healthcare IT, diagnostics and instrumentation.

The contest is still running, and BlueWorks qualified to the semi-finals.

Figure 13 – ISCTE-IUL MIT Portugal initiative logotype (39)

9.3.2 BES – Concurso Nacional de Inovação

BES - National Innovation Contest (since June 2005) is an initiative that promotes and rewards applied research projects in sectors that are critical to the future of the Portuguese economy, such as Renewable Energy, Health, Industrial Processes, among others. (40)

This initiative expressed the will of Banco Espírito Santo to contribute to the spread of a culture of innovation in Portugal.

The projects are selected according to their innovative nature and its degree of scientific excellence, and the awards for each area of activity reach a total of 60 000 Euros. (40)

BlueWorks participated in the seventh edition of the National Innovation Contest BES that has begun on 15 April. Presently is running the evaluation period the projects.

Figure 14 – Logotype for BES – Concurso Nacional de Inovação (40)

9.4 Meetings/ Congress

Other effective way of promoting products in this field is to attend meetings and medical congress. In such occasions, it is likely to have the opportunity to talk to decision makers, presenting them the Software without the hassle of a call or a surprise visit.

This year, BlueWorks attended "falar saúde", a congress by *Sistema de Saúde Português* in *Hospital de São João do Porto,* and *XXI jornadas internacionais de Oftalmologia dos Hospitais da Universidade de Coimbra.*

On both of these events, BlueWorks made presentations of their products to ophthalmologists, as well as to curious about the company's solutions. Like other companies, BlueWorks created promotional material, like Roll up banners and pamphlets (with the case study about OphthalSuite) to make the stand more appealing.

Figure 15 – Logotype for Falar Saúde – Congresso do Sistema de Saúde Português (41)

10. Conclusion

10.1 Current Status / Potential

This thesis was written with the goal of making an assessment of a year working in BlueWorks. Thus, whoever wants to follow the work developed during this year will have access to a document that will prove to be especially useful, particularly at the beginning of the functions. The same scenario happened in the beginning of this work that can be seen as continuation of work done during the academic year of 2009/2010.

The biggest difference between this year and the last, relates to the fact that BlueWorks already has a product on the market (OphthalSuite, in this case), so it was more important than ever to create opportunities to sell it. Lots of contacts were made, not only with hospitals and doctors, but also with other companies that can become valuable partners helping BlueWorks in finding clients.

Now that OphthalSuite is being used by doctors in a public hospital, it is important to take advantage of the good things that the Software is bringing to that ophthalmic service and try to expand to other hospitals. Not only is this a good argument to use when trying to sell OphthlSuite but also may draw the attention of other services in the country.

Other strategy that may prove really fruitful is expanding to other countries. Portugal may become a good market, but why settle for Portugal if an opportunity arises abroad? Comparing to competitors, OphthalSuite has some advantages that can be used in foreign markets that aren't already explored. This expansion means an increased commitment by BlueWorks and particularly to the field of Business Development, not only in tracking Hospitals and Clinics but also in getting in contact with them and closing deals.

Regardless of these factors, the future lies in information technology and optimization of hospital services, and even in a financially troubled phase, there is the notion that the savings and the advantages that it brings to the health professionals in their jobs can overcome the initial effort to purchase a product like OphthalSuite.

Focusing on the Vision Screening Tool for Magalhães, the key to be successful will be the ability to reach people with power to buy the software, especially in the Government and other Institutions. Advertising the product, and getting help from BlueWorks' associates that have the means to speak directly with those decision

makers, will be of utmost importance to the expansion of this Software that can become a great help in the detection of vision problems. Advertising will also be required if BlueWorks decides that is wiser to sell to the general public.

For Atlas 3D and EyeDropper, it is harder to make a forecast for market entry since both products are in an embryonic stage (comparing with OphthalSuite and the Vision Screening Tool that are fully developed). However, it is really important to ensure that there is a place in the market for these products, since their development require funding and manpower (resulting in a financial effort for the company). During this development phase it is necessary to continue to mention them in company presentations so that more and more people – preferably health professionals – can become familiar with them.

Thus, BlueWorks presently has the necessary means to grow and assert itself in the market for health care technologies, becoming a reference in eye care or even using its experience to expand to other areas.

10.2 Personal Considerations

It almost goes without saying that much has been learned during this year, which radically changed my view of the business world.

It helped me understand the dynamics with a client or another firm, and discard many false ideas, realizing the importance of experience when working in a company with the natural necessity to market a product or a service.

I considered BlueWorks a great starting place to my journey, since it is a company composed of young working and competent people with thirst for success. Hence, I wish the best of luck for BlueWorks which I believe is destined for great things in this competitive business world.

One year later, I consider myself much more competent and confident to enter the labor market, with full awareness that a lot is yet to be learned.

References

1. http://www.thinkingmanagers.com/business-management/business-development.php.

2. http://upandrunning.bplans.com/2009/09/22/seth-godin-adds-meaning-to-bizdev/#ixzz1Mt4YiGhJ.

3. http://mashable.com/2010/11/13/biz-dev-tips/.

4. http://en.wikipedia.org/wiki/Cold_calling.

5. http://news.thomasnet.com/IMT/archives/2008/02/a_case_for_good_engineers_making_good_managers_profession.html.

6. http://www.mybusiness.co.uk/Yapytm5otKRAKg.html.

7. http://sbinfocanada.about.com/cs/marketing/a/coldcall.htm.

8. http://www.readwriteweb.com/archives/business_development_20.php.

9. www.blueworks.pt.

10. *Observatório Português dos Sistemas de Saúde - Desafios em tempo de crise.* 2010.

11. http://www.acss.min-saude.pt/%C3%81reaseUnidades/ConsultaaTempoeHoras/tabid/501/language/pt-PT/Default.aspx. [Online]

12. **Pimenta, Paulo.** Sócrates quer listas de espera de Oftalmologia ao nível das boas práticas internacionais. *Público.*

13. Imprudência com listas de espera de oftalmologia custou mais 3,9 milhões. *Jornal de Notícias.* 2011.

14. **Saúde, Observatório Portugues dos Sistemas de.** *Da depressão da crise para a governação prospectiva da saúde.* 2011.

15. Inquérito à Utilização de Tecnologias da Informação e da Comunicação nos Hospitais. *Instituto Nacional de Estatística.* 2010.

16. **Arreigoso, Vera Lúcia.** Hospitais querem poupar na Informática. *Expresso.* 2011.

17. Big Pharma Spends More On Advertising Than Research And Development. *ScienceDaily.* 2008.

18. **Nolan, A.** Pharmaceutical advertising in clinical software. *General Practitioner and Research Fellow for Therapeutic Guidelines Ltd.* 2008.

19. *The effect of advertising in clinical software on general practitioners' prescribing behaviour.* **Henderson J, Miller G, Pan Y, Britt H.**

20. *The effect of advertising in clinical software on general practitioners' prescribing behavior.* **Reeve, James F., Mackson, Judith M., Sweidan, Michelle. and Williamson, Margaret.**

21. http://www.bpsoftware.com.au/. [Online]

22. **Ballenden, Nicola.** New Frontiers Old Cowboys: A Consumer Perspective on eHealth Initiatives. *Health Issues.* 42.

23. http://www.hcn.com.au/. [Online]

24. **Carminhato, Joana Paula.** *Ética como Ferramenta para o Marketing Farmacêutico.* 2008.

25. http://www.slideshare.net/ivan_luizio/conscincia-limitada. [Online]

26. http://www.drvisao.com.br/noticias/846-Empresas-farmaceuticas-gastam-duas-vezes-mais-em-promocao-do-que-em-pesquisa. [Online]

27. http://www.ifasystems.com/. [Online]

28. http://global.topcon.com. [Online]

29. http://www.medcompare.com/OphthalmologyWeb/itemdetails.asp?itemid=53227. [Online]

30. **http://www.oisi.com/index.php?option=com_content&view=article&id=51&Itemid=2.** [Online]

31. http://www.alert.pt/pt. [Online]

32. http://www.publico.pt/Ci%C3%AAncias/leonor-beleza-quer-alargar-influencia-do-premio-antonio-champalimaud-em-2011_1469415. [Online]

33. http://www.publico.clix.pt/Sociedade/oftalmologistas-pedem-rastreio-para-prevenir-cegueira-provocada-pela-diabetes_1409324. [Online]

34. http://www.educare.pt/educare/Opiniao.Artigo.aspx?contentid=434D9FD76E520C4DE04400144F16FAAE&opsel=2&channelid=0. [Online]

35. Bilan démographique. *INSEE.* 2009.

36. First demographic estimates for 2009. *Eurostat.*

37. National Statistics - United Kingdom.

38. Población total, por sexo. *Instituto Nacional de Estadística de Venezuela.*

39. http://mitportugal-iei.org/. [Online]

40. http://www.bes.pt/sitebes/cms.aspx?labelid=cnibes. [Online]

41. http://www.falarsaude.net/. [Online]

42. **PORTUGAL, MS, ACSS. Base de dados da CTH, (não publicado), 2010.**

43. Inquérito à Utilização de Tecnologias da Informação e da Comunicação nos Hospitais. *Instituto Nacional de Estatística.* 2010.

Attachments

A. Case Study - OphthalSuite

CASE STUDY

OphthalSuite

Interoperabilidade entre equipamentos de diagnóstico em Oftalmologia

Problema

- Os resultados dos exames ficavam dispersos por diversas bases de dados em diferentes formatos;
- Os dados eram acedidos apenas em papel
- Por vezes tinham de ser os médicos a deslocar-se para recolher os resultados dos exames que pediram.

Demo da Solução

Foi disponibilizada uma Demo do OphthalSuite:

- Conectado a:
  - Retinógrafo/Angiógrafo Visucam - Zeiss;
  - OCT Spectralis - HRA;
  - Seg. Anterior - Topcon;
- Instalado em 28 PCs de consultório.

Resultados

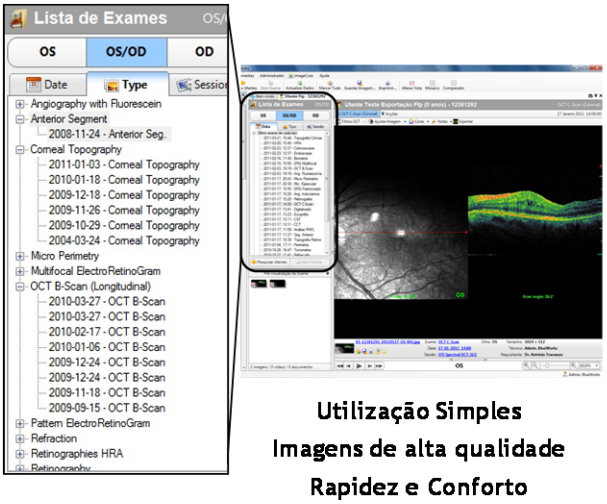
- O piloto decorre há já 4 meses.
- No seu pico de utilização, foram guardados 40 exames/dia
- No total, o OphthalSuite arquivou mais de 54.000 imagens
- Aumentou-se não só a quantidade de imagens por exame como a qualidade destas.

Reacções

- A dificuldade de adaptação a esta ferramenta foi descrita como "não existente" ou mínima
- A maioria dos Médicos recomendaria o Software a outros colegas Oftalmologistas

Extrapolações

- A versão completa do Software permitiria:
  - Guardar mais de 300.000 imagens por ano;
  - Fornecer dados já organizados para produção de investigação científica;



Utilização Simples
Imagens de alta qualidade
Rapidez e Conforto

BlueWorks é uma empresa tecnológica focada no desenvolvimento de soluções para a área da Oftalmologia

BlueWorks - Medical Expert Diagnosis, Lda.
www.blueworks.pt
blueworks@blueworks.pt
+351 239 791 090

Query

Inquérito de Avaliação do OphthalSuite

1 – Que tipo de impacto está a ter na sua prática clínica

_____

_____

2 – Qual a dificuldade de adaptação a esta ferramenta?

_____

_____

3 – Antes de usar o OphthalSuite, quais os métodos que utilizava para aceder à informação de um exame previamente realizado?

- ☐ Ida ao equipamento onde o exame foi realizado
- ☐ Exame impresso trazido pela assistente depois de este ser realizado
- ☐ Pesquisa do exame noutro software. Qual? _____
- ☐ Outro. Qual?_____

2.1 Aproximadamente quanto tempo demorava? _____

3- Por hora/dia, quanto tempo acha que poupa na visualização de exames?

_____

_____

4- Quais considera serem as principais vantagens do OphthalSuite

_____

_____

5- E desvantagens/pontos a melhorar?

_____

_____

6- Classifique as funcionalidades do OphthalSuite por grau de importância.

	Muito Importante	Importante	Pouco Importante	Não é vantajoso
Acesso rápido aos exames de um utente	☐	☐	☐	☐
Os exames ficam disponíveis para visualização logo que são realizados pelos utentes	☐	☐	☐	☐
As imagens podem ser vistas com o tamanho real com que são adquiridas	☐	☐	☐	☐
Posso ver todas as imagens de um exame rapidamente	☐	☐	☐	☐
Navegação entre as imagens	☐	☐	☐	☐
Filtragem de imagens por olho	☐	☐	☐	☐
Criação de relatórios personalizados	☐	☐	☐	☐
Visualização de imagens em mosaico	☐	☐	☐	☐
Zoom sincronizado nas imagens em mosaico	☐	☐	☐	☐
Outra. Qual? _____	☐	☐	☐	☐

7-Recomendaria a utilização do OphthalSuite a um outro colega oftalmologista?

☐ Sim
☐ Não

Porquê?

_____

_____

Podemos citá-lo no nosso site?

Se sim, indique o seu nome e função

_____

_____

Muito Obrigado

Testimonials

Como era a visualização dos exames antes do OphthalSuite ?

“Era em papel.”

E qual era o procedimento para ir buscar os exames (neste caso no próprio dia)?

“Ou íamos nós logo buscar os exames, ou as assistentes por vezes demoravam muito tempo.”

A respeito do OphthalSuite:

“Para mim, tem grandes vantagens:

Primeiro, não há o risco de o exame não aparecer, não desaparece o processo.

Segundo, Informação. A página impressa tinha 2 ou 3 imagens, aqui temos toda a informação do exame. Estas imagens para além disso eram escolhidas pelo técnico, por vezes não eram as que mais nos interessavam.”

Frases Soltas

“Não tenho nada a dizer que não seja bom!”

“Não tenho tido problemas”

“Poupa tempo”

“É difícil quantizar, mas ganha-se o tempo que os funcionários demoravam a trazer os exames que eram feitos no próprio dia”

Dr. Ricardo Araújo

Oftalmologista

Assistente Hospitalar de Oftalmologia

Usa o OphthalSuite?

Uso o OphthalSuite para Angiografia e OCT.

Em que formato eram visualizados os exames?

“No caso do OCT o exame era visualizado em papel, no caso da Angiografia o exame era visualizado no próprio Angiógrafo.”

E como faziam para ter acesso aos exames realizados no próprio dia?

“Tradicionalmente, quando precisava de um exame feito no dia tinha que ir buscar o processo, ou ficava à espera que o trouxessem.”

“A maior parte das vezes íamos nós, preferia ir lá que estar a chamar a assistente e esperar que ela o fosse buscar, demorava muito tempo”

Frases Soltas

“Poupa tempo”

“No caso da Angiografia, a imagem tem muito melhor qualidade no OphthalSuite do que no Angiógrafo”

“Notei uma grande diferença quando comecei a usar o OphthalSuite”

“Rápido, não tenho problemas”

Maria da Luz Cachulo

Oftalmologista

Assistente Hospitalar de Oftalmologia

B. ISCTE-IUL MIT-Portugal Venture Competition

Executive Summary

Introduction

Located in Coimbra, BlueWorks is a spin-off founded in 2007 by the companies Coimbra Surgical Center, ISA – Intelligent Sensing Anywhere, and NeuroEye, along with full professors from Physics and Medicine from the University of Coimbra and three of the first graduates in Biomedical Engineering from that University.

The clinical support is given by Dr. Antonio Travassos, former president of Portuguese Society of Ophthalmology (2008-2010) and member of the General Council of Champalimaud's foundation. Prof. Dr. Rui Proença, teacher in the Medicine Faculty of Coimbra's University, and by NeuroEye's staff, especially Prof. Dr. Miguel Castelo-Branco, researcher in psycho-physiology and the actual IBILI's director – *Instituto Biomédico de Investigação da Luz e da Imagem* – and the winner of the Bial prize (2009).

All of the presented products are BlueWorks' property.

OphthalSuite

Problem: In order to make accurate diagnosis on Ophthalmology services, information from several machines is required, sometimes from different models and manufacturers. These machines aren't interoperable, information doesn't exist on a centralized repository, and most of the times the format of the exams is paper, losing quality and the number of pictures per exam, affecting a doctor's work and losing important time for these professionals.

Product: OphthalSuite is a software application which allows ophthalmologists to access all the data gathered by the several complementary exams machines in a fast and comfortable way, regardless of their manufacturer or specific model.

This product is now on the market, and is running in Centro Cirurgico de Coimbra, and in Hospitais da Universidade de Coimbra. One case Study for each one of these services was made, and the results were very satisfactory, resulting in great *feedback* from the staff of the service.

Target Market: The market for this product are all the Hospital Ophthalmology services, as well as Ophthalmic Clinics worldwide.

Magalhaes as a Vision Screening Tool

Problem: In Portugal, 20% of the children suffer from refractive errors, and 5% of newborns have factors for amblyopia. According to the Portuguese Society of Ophthalmology, nearly 5000 of children may become amblyopic every year due to the lack of screening. If one analysis a more populated country, as for instance the United States of America, it is documented that eye problems affect more than 12 million children. This and other diseases can lead to blindness if not treated on time.

Presently, the Screening of vision errors is made by mobile unities (vans) that drive around the country, from school to school. This system, not only is very expensive for the government (because of the professionals and the machines involved) but it also fails to reach all children in scholar age, making this procedure far from perfect.

Product: BlueWorks developed a Tool, on the form of free software to be installed on "Magalhães computer", consisting on an interactive computer game that evaluates the visual function preferentially on children in scholar age. Requiring only cheap and reusable components, this tool allows all children to be diagnosed on time, preventing future vision problems.

Target Market: The Target Market for this product is the Portuguese ministry of health, and of all the countries with a project similar to *e-escolas* (countries like France, Germany and Venezuela that represent even bigger market opportunities).

EyeDropper

Problem: The therapy for some diseases consists in liquid drops to be applied in the eyes, like the treatment for Glaucoma. The biggest problem associated with this therapy has to do with the compliance. It is estimated that almost 10% of the visual loss from Glaucoma is the result of non compliance with medication (Health Benchmarks - Blue Cross Shield of Illinois).

Product: This Gadget will allow not only helping patients to remember and correctly align the flask to increase the success of the instillation, but also to document instillation attempt success. By recording the instillation with a high definition camera, not only the doctor but also the patient can assure the compliance of the therapy. The assessment of the compliance is helpful not only for medical care but also to research.

This product is still under development by BlueWorks.

Target Market: The target market is, initially laboratories and pharmaceuticals to research programs, and then everyone who wants to acquire the EyeDropper for personal usage.

Atlas 3D

Problem: As an Ophthalmologist, it is very important to recognize diseases, being this one important phase of a doctor's education. Unfortunately there are plenty of limitations in high definition pictures, presently being paper its only format, limiting not only the quality but the size and the resolution. Also, they can't be manipulated – options like zoom or comparing images side by side are completely impossible nowadays.

Product: Atlas 3D is a software of ophthalmic diseases, that allows both doctor and patient to have a new tool to ease the understanding of the different ophthalmic problems.

Target Market: All the Ophthalmologists and students, Medical Schools, Hospitals and Clinics related to Ophthalmology.

Presentation

OphthalSuite
Context & Description

Context

- In order to perform diagnosis in ophthalmology, data from several equipments is required.

History

- These equipments were not inter-operable so information did not exist in a centralized repository;
- Some machines have specific remote visualization tools (1 tool for 1 machine)
- Existing solutions that allow such interoperability have the following disadvantages:
  - Great impact on workflow (time consuming manual export procedures);
  - Data quality degradation (resolution, metadata) by using print screens or pdf prints;

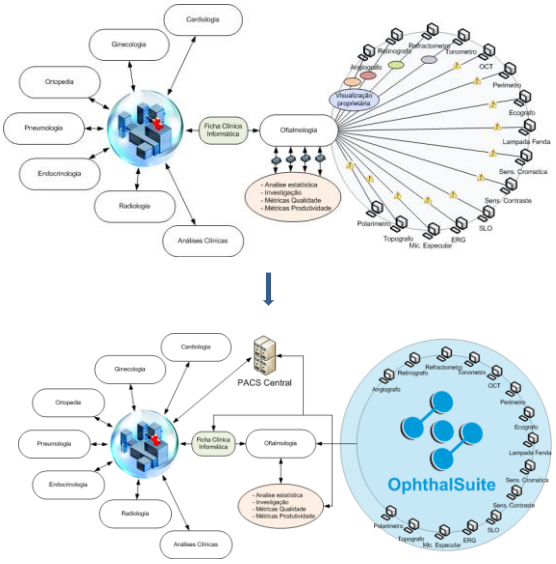
Needs:

1. Fast and simple access to exams, through a single application
2. Fast and simple storage procedures
3. Integration with remaining clinical records
4. Structured access to organized raw-data (research).

Solution Preview

- Departmental image management solution
- Data forward to PACS,

  (Allowing results to be available outside of Ophthalmology Department)



EyeDropper

Current solutions for compliance assessment

- Weight of drops flasks between visits.
- Asking patients to keep a compliance diary.
- In clinical trials:
  - Daily dislocation of volunteers to study center;
  - Rental of an hotel or private clinic to accommodate volunteers and staff.
- Use of electronic devices to get data regarding compliance.
  - Indirect measures
    - Date
    - Time
    - Flask squeeze / Drop leaving flask

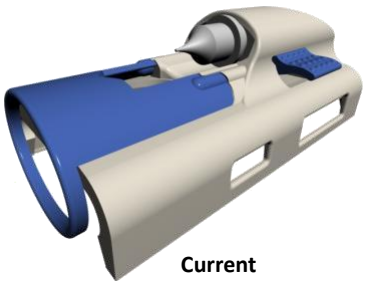
Two questions remain:

1 – Did the drop successfully hit the eye ?

2 – Was it the correct Eye ?

Proposed Solution

- Small-sized autonomous device
- Portable Device able to contain a drop dispenser
- Schedule alarms
- Light and sound alarms
- Remotely programmable therapeutical schedule*



Current Prototype

This device has a Patent Pending

- Under development *

Actual Situation

Screening through mobile units:

Advantages

- Screening extended to other specialties (audition, for example)

Disadvantages

- Cost per individual Screening
- Scope (this method may fail to go to all schools)
- Timming (this method may fail to go on time to all schools)

Solution

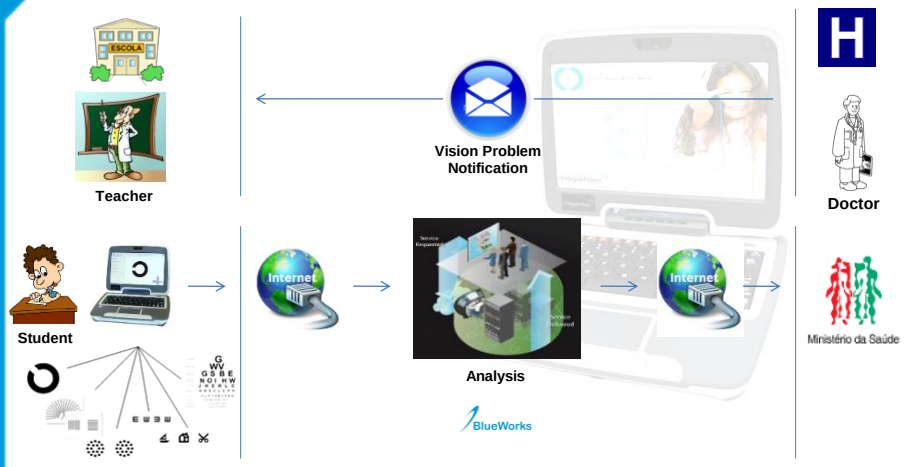
• Free Software to be installed on "Magalhaes Computer"

• Interactive computer game that evaluates the visual function

• Preferentially to be used on schools (under adult supervision)

• Requires cheap and reusable components (eye patch and remote numpad)

Modelo de Funcionamento



Oportunity

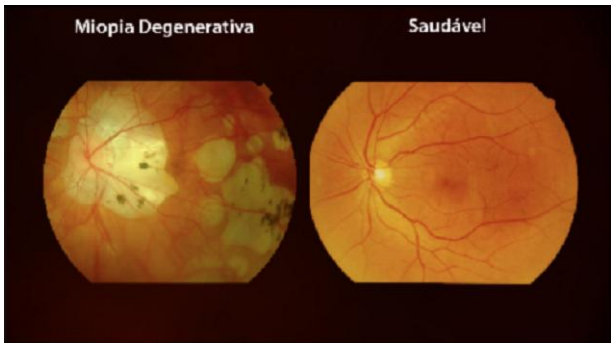
- Images of Ophtalmic Diseases - Paper
  - Limitations in size and resolution of high-quality images
  - Images can't be manipulated (options like zoom or comparing two images side by side)
  - Increasing the number of images directly increases the physical dimension and overall cost

Solution : Atlas 3D

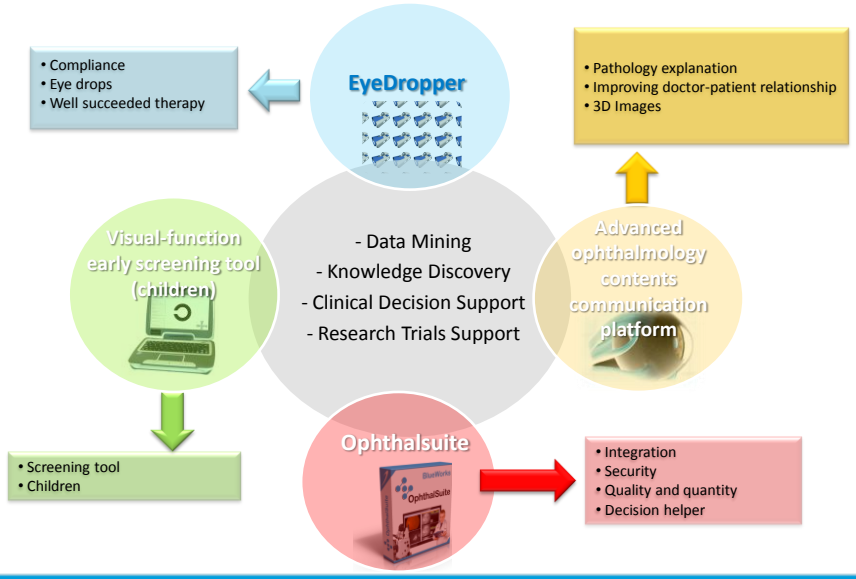
- Software of Ophthalmic Diseases

- New tool to ease the understanding of the different ophthalmic problems.

- Promotes the education of both doctor and patient.



Product Portfolio Sinergies



C. Concurso Nacional de Inovação BES - Application

ÁREA da CANDIDATURA (assinalar a área em que se candidata):
- **Energias**
- **Agro-Industrial**
- **Processos Industriais**
- **Saúde**
- **Comércio & Serviços**

TECNOLOGIA: Sistema para Rastreio de problemas de Visão em crianças, recorrendo ao computador Magalhães

Promotor da Candidatura
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Fax: 239 802 709

DESCRIÇÃO DA TECNOLOGIA E SEU POTENCIAL DE INOVAÇÃO (2)
(máximo 1000 palavras):
- o que é?; de que base científica de suporta?; para que serve?; porque traz inovação/melhoria?; porque se diferencia das tecnologias alternativas? em que contexto(s) de aplicação concreta?

(2) Considera-se INOVAÇÃO: a introdução de uma mudança (tecnológica e/ou organizacional) com o objectivo de criar uma oferta distintiva em produtos e/ou serviços que permita às organizações diferenciar-se da concorrência indo de encontro, ou mesmo antecipando-se, às necessidades dos clientes através da apresentação de propostas de valor sempre renovadas

O que é e para que serve:

A Tecnologia apresentada é um Software, capaz de avaliar e detectar potenciais erros na visão dos utilizadores, calibrado para os computadores "Magalhães".Este programa é semelhante a um jogo de computador interactivo, que será "jogado" pelas crianças (com a supervisão do professor) e enviará os resultados através da Internet para um servidor central, onde através de algoritmos automáticos será avaliado o estado global da função visual da criança. Caso os resultados não estejam dentro de parâmetros normais, o sistema avisará o encarregado de educação da criança, e este é aconselhado a levá-la ao Oftalmologista.

Contexto

No que diz respeito a crianças com problemas oculares em Portugal, 20% das crianças sofrem de erros de refracção, e 5% dos recém-nascidos em cada ano têm

factores de risco para a ambliopia. Segundo a Sociedade Portuguesa de Oftalmologia, em cada ano, cerca de 5.000 crianças podem ficar amblíopes devido à falta de rastreio.

Com o contributo desta tecnologia, o rastreio infantil de doenças oftalmológicas tornar-se-ia mais eficiente, visto que se estima que 65% dos pais Portugueses nunca tenham levado os seus filhos ao Oftalmologista. Isto acontece porque muitos dos problemas de visão são assintomáticos, a criança não tem noção do que é "ver bem" e consequentemente não se queixa.

Actualmente, o rastreio oftalmológico nas escolas é feito ocasionalmente por unidades móveis (carrinhas de rastreio) que não só implicam um alto custo – associado aos profissionais e às máquinas envolvidas - como impossibilitam a chegada dos cuidados de saúde a todas as crianças em tempo útil.

Alguns dos erros de visão a que nos referimos, devem ser detectados e tratados o quanto antes, podendo resultar em graves problemas de visão ou mesmo em cegueira com o evoluir da doença. Este método permitiria um rastreio periódico e igual para todas as crianças.

Base Tecnológica:

O algoritmo desenvolvido assenta em trabalhos anteriores feitos no domínio da avaliação de limiares psicofísicos, tanto de audição como de visão. Consiste numa *staircase* adaptativa, cuja progressão em cada iteração depende do *feedback* do utilizador, e contém mecanismos de segurança para validar a cooperação do utilizador.

Os testes específicos consistem no “Landolt’s C” e “Tumbling E”, estímulos largamente utilizados por oftalmologistas para avaliação de acuidade visual, e com eficácia e validade científica demonstrada através de inúmeros estudos.

Inovação, melhoria, diferenciação:

Pretende-se que o software seja distribuído gratuitamente, através de um instalador simples que poderá ser utilizado por qualquer pessoa com competências básicas de utilização de computador.

Deste modo, será possível viabilizar um cenário no qual na primeira semana de aulas, em todas as escolas nacionais, fosse efectuada a avaliação da função visual e com isso prevenidos eventuais casos de cegueira decorrentes de patologias como a ambliopia.

As alternativas habitualmente utilizadas consistem nas carrinhas com equipas móveis, que têm como principais lacunas a sua dificuldade em chegar a todas as

crianças atempadamente, visto terem que se deslocar a um grande número de escolas.

Existem testes para a visão na Internet, mas têm como principais desvantagens a falta de calibração do hardware específico onde estes serão executados (dimensão do monitor, resolução, dimensão de cada pixel, etc.), traduzindo-se fundamentalmente numa falta de fiabilidade dos resultados.

As vantagens da solução da BlueWorks são:

Fiabilidade: Está calibrado especificamente para o hardware do computador "Magalhães", e os testes serão sempre supervisionados por um professor;

Baixo custo: Apesar do preço por exame assentar numa economia de escala, prevemos que possa ser tão pequeno como 10% dos custos actuais (que estimamos que actualmente esteja em 10€ por criança rastreada);

Abrangência: Colaborando com o ministério da educação, poderão ser analisadas TODAS as crianças do ensino primário nacional (100.000 alunos); Sendo no início do ano lectivo, será possível garantir que todos os alunos têm acesso a rastreio.

Rapidez: é um teste rápido e simples de fazer.

Eficiência: Sendo realizado a crianças do ensino primário nacional, é garantido que as crianças sejam rastreadas desde os 5/ 6 anos, tendo assim acesso a um rastreio atempado.

Flexibilidade: Possibilidade do teste poder ser realizado na data mais conveniente a alunos e professores, podendo ser particionado por várias datas em caso de necessidade, sem custos adicionais.

Periodicidade: Possibilidade de ser feito regularmente (todos os anos). Todas as crianças do ensino primário nacional serão avaliadas, sem um grande custo adicional.

Em termos de negócio, para além do retorno com baixos custos de estrutura (manutenção servidor), o potencial de internacionalização é extremamente elevado, assim como a expansão deste conceito para outras áreas médicas (por exemplo, pré-avaliação de audição com *headphones* calibrados; fotografia bucal através de adaptador óptico acoplável à webcam do Magalhães, etc.)

PARTE A

A1. Excelência científica e valor estratégico da tecnologia

Posicione a tecnologia na matriz seguinte, justificando a sua solidez científica e o seu grau de inovação, em termos nacionais e mundiais.

Apropriação da Tecnologia (3)	Ciclo de Vida da Área Tecnológica (4)			
	Emergente	Crescimento	Madura	Declínio
Única-patenteada ou patenteável				
Detida por uma ou poucas empresas/instituições no			x	

mundo				
Dominada no estrangeiro / Dominada no país				
Do domínio público				

Justificação (máximo 300 palavras):

(3) Avaliar o grau de exclusividade da tecnologia e a dificuldade da sua cópia ou imitação
(4) Posicionar a tecnologia no seu ciclo de vida, desde a tecnologia totalmente nova até ao declínio e à obsolescência

Grau de Inovação, Solidez

Apesar dos testes utilizados já serem realizados há muito, esta aplicação dos testes ao Magalhães é inovadora, primeiramente porque está calibrado especificamente para um computador e, sendo feito o teste no mesmo, os resultados são fiáveis.

Outra vantagem prende-se com a massificação destes computadores portáteis. Ao instalar este Software em todos os Magalhães, todas as crianças poderão ter acesso ao teste, e realizá-lo de uma forma interactiva. Isto pode acontecer não só em Portugal, mas em todos os países com um sistema de distribuição de computadores portáteis como Portugal.

Por exemplo, no caso da Venezuela, a aplicação seria bastante simples, visto que o computador é o mesmo (apesar de ter um sistema operativo diferente).

Por possuir um algoritmo criado especificamente para esta aplicação, é possível de uma forma automática ter acesso a um valor para a acuidade visual, no final do teste. O processo torna-se assim automático, com um grande grau de fiabilidade.

Cópia, Imitação, Ciclo de Vida

É possível copiar esta ferramenta, visto não estarem previstas patentes de Software na Europa, no entanto, só pode ser copiada por elementos especializados no domínio da psicofisiologia da visão, devido as características das funções de limiar de sensibilidade. Para além disso, a BlueWorks é a primeira empresa a produzir uma solução deste género, e este nicho pode considerar-se ainda pouco explorado.

A2. Carácter inovador dos produtos, processos ou serviços

Posicione o potencial da aplicação da tecnologia, de acordo com o grau de inovação que pode introduzir em processos (de fabrico, de negócio ou outros) existentes e em produtos e serviços oferecidos ao mercado.

Melhoria de Processo (5)	Melhoria de Produto / Serviço (5)			
	Radical	Nova família prods./serviços	Novo prod./serviço	Incremental
Alteração radical				x
Nova geração de processos				
Novo processo				
Mudança incremental				

Justificação (máximo 300 palavras):

(5) Avalie e justifique o grau de mudança / melhoria potencial em processos, produtos e serviços (e famílias de produtos) existentes ou novos decorrente da aplicação da tecnologia

Grau de Inovação em Processos existentes

Até ao presente, a única forma de rastreio infantil público (que não implique os pais da criança levarem-no ao Oftalmologista após terem percebido que o filho vê mal) é feita por carrinhas de rastreio. Este método é presencial, o que implica levar as máquinas à escola, bem como Oftalmologistas e Enfermeiros, levando a custos elevadíssimos, suportados pelo estado. Para além disso, este método não chega a todas as crianças ou, por vezes, chega tardiamente.

Esta tecnologia é inovativa no sentido em que revoluciona todo o sistema de rastreio oftalmológico nas crianças. Não só poderia chegar atempadamente a todas as crianças em idade escolar como permitiria um corte nos custos (podendo chegar a apenas 10% dos custos actuais).

A longo prazo, há ainda a vantagem de o estado poupar ainda mais nas comparticipações a invisuais e pessoas com baixa visão, comparticipações que implicam custos que se tornam bem mais elevados do que os associados ao tratamento precoce, tratamento esse que a tecnologia visada poderia facilitar.

Para além de facilitar o processo de rastreio e torná-lo mais eficiente, existe ainda a vantagem da utilização dos dados para fins estatísticos. Os resultados ficariam presentes numa base de dados, passíveis de ser estudados, dando um panorama geral da visão nas crianças.

Para além disso, estes dados permitiriam fazer o planeamento das necessidades de cuidados da franja populacional rastreada dando uma noção da mobilização dos recursos materiais, financeiros e humanos que seria necessário mover a longo prazo, permitindo uma previsão muito mais fiável que a actual.

A3 . Benchmarking com tecnologias alternativas

Sublinhe o carácter distintivo da tecnologia e as vantagens comparativas que apresenta – em termos de melhoria de custos, tempos, qualidade, adequação ambiental, capacitação de novas funcionalidades, etc. – relativamente às tecnologias alternativas ou concorrentes, actuais ou emergentes, no contexto específico da sua aplicação em produtos, processos e serviços endereçando mercados existentes ou novos mercados.

Justificação (máximo 300 palavras):

Carácter Distintivo e Vantagens da Tecnologia

No que toca à identificação de erros da visão o único método de rastreio em massa para todas as crianças em idade escolar, é o das unidades móveis (carrinhas de rastreio).

Este método, para além de moroso tem custos altos associados. As carrinhas têm que chegar a todas as escolas com todos os custos que esse método acarreta; o pagamento de profissionais para integrarem a equipa de rastreio, as máquinas para o rastreio, a manutenção da carrinha, etc.

Este método, apesar de ser eficaz quando é realizado – por ser presencialmente e com profissionais treinados para esse fim – nem sempre chega a todas as crianças, e muitas vezes chega tardiamente.

No caso do sistema de rastreio apresentado pela BlueWorks, as crianças poderão fazer pelo menos um rastreio anual, pois já estarão munidos do computador Magalhães com o Software devidamente instalado. A única condição é que sejam supervisionados por um adulto, como a professora que os acompanha durante o ano lectivo.

Como é fácil imaginar, este método – para além de tornar o rastreio mais eficiente – possibilita uma redução dos custos.

Finalmente, no que toca à fiabilidade dos resultados, a criança não é prejudicada, visto que se for detectado algum erro, esta é aconselhada a ir ao oftalmologista, onde é devidamente diagnosticada e tratada (se for necessário).

A4. Fase do desenvolvimento tecnológico

Posicione a tecnologia no quadro abaixo, de acordo com a fase de desenvolvimento em que se encontra, e identifique os passos necessários para a sua completa valorização económica, estimando o tempo necessário para a entrada no mercado dos novos produtos, processos ou serviços que ela suporta.

Fase de desenvolvimento actual	Protótipo Laboratorial	Protótipo Industrial	Pré-série de Produção	Protótipo ou Pré-série com Plano de Negócio
Posicionamento da Tecnologia				x

Justificação (máximo 300 palavras):

Neste momento, o Software está completamente desenvolvido e pronto a entrar no mercado, estando a ser trabalhada a vertente comercial do mesmo, mais especificamente na forma de um estudo piloto que tem como objectivo validar a ferramenta em condições reais junto de pelo menos 100 crianças

PARTE B

B1. Impacto potencial da tecnologia na competitividade empresarial

Avalie o impacto da tecnologia na competitividade da(s) empresa(s) receptoras ou utilizadoras da tecnologia, referindo:

- o potencial de aplicação em produtos, processos e serviços inovadores, transaccionáveis no mercado global em regime de livre concorrência;
- a dimensão dos segmentos de mercado endereçáveis por esses produtos, processos e serviços.

Justificação (máximo 300 palavras):

Impacto da Tecnologia (aplicação em processos e serviços inovadores)

O impacto de uma tecnologia do género seria bastante significativo.

Este sistema tem condições para revolucionar todo o sistema de rastreio oftalmológico, logo em idade escolar, antevendo muitos problemas que quando descobertos tardiamente podem levar a graves complicações. Tem ainda o potencial de poder ser aplicado a outras especialidades clínicas, numa filosofia de saúde 2.0

Facilitaria o processo, tornando-o mais prático, livrando profissionais e máquinas para os hospitais e poupando nos custos.

Seria possível criar um banco de dados, com os resultados do rastreio, com vista a ter uma noção exacta dos problemas do foro oftalmológico no país e poder tomar as medidas que se achassem mais indicadas.

Segmentos de mercado endereçáveis pelo produto

Outra grande vantagem seria, depois de comprovar o sucesso deste método aplicá-lo a outras áreas da medicina – como a pré-avaliação de audição com headphones calibrados ou uma fotografia bucal através de adaptador óptico acoplável à webcam do Magalhães – tornando o rastreio em várias áreas muito mais automatizado e prático.

- potencial aumento de competitividade da empresa receptora ou utilizadora, estimado em termos de indicadores como: aumento do valor acrescentado; volume de vendas; redução de custos; melhoria de quota de mercado; ou abertura de novos segmentos de mercado (no caso de novos mercados, justifique a sua existência ou emergência e pronuncie-se sobre a sua dimensão e facilidade de penetração da potencial empresa "entrante");
Justificação (máximo 300 palavras):

Redução dos Custos e novos segmentos de mercado

Calcula-se que os custos associados ao rastreio em unidades móveis nos dias de hoje estejam entre os 10 e os 30€, dependendo do detalhe da avaliação. Esta tecnologia tem o potencial para reduzir em cerca de 90% estes valores.

Em termos nacionais, ocorrem cerca de 115.000 nascimentos por ano, resultando num universo de aproximadamente meio milhão de alunos a frequentar o ensino primário. Com base nestes números podem prever-se poupanças astronómicas para o estado.

Para países em processo de adopção de programas semelhantes ao e-escolas a dimensão do mercado é muito superior, sendo a poupança ainda maior. Paises como Alemanha (população cerca de 8 vezes maior), França (6 vezes), Reino Unido (6 vezes) e Venezuela (3 vezes) são bons exemplos da projecção que uma solução deste género poderia ter a nível mundial.

O problema associado a estes clientes está relacionado com o baixo número de *"decision makers"*, ligados ao ministério da Educação do País.

- relevância da contribuição para plataformas tecnológicas internas, enquadradas na estratégia tecnológica da empresa.
Justificação (máximo 300 palavras):

Enquadramento na estratégia da Empresa

A BlueWorks tem como actividade a criação de ferramentas de suporte ao diagnóstico e investigação em oftalmologia, apoiando o desenvolvimento destas ferramentas em novas tecnologias de informação e comunicação, e na utilização de inteligência artificial para análise de dados clínicos.

Esta tecnologia poderia ainda ter uma importante componente de Business Intelligence, visto que associada a um servidor e uma base de dados centrais, permitiria tirar importantes conclusões acerca do estado da Oftalmologia em Portugal.

Inserido neste contexto, este Software adequa-se perfeitamente à estratégia com a qual a BlueWorks se compromete.

B2. Credibilidade da empresa, instituição de I&D ou inventor
Curriculum vitae resumido (ou extracto da informação relevante no contexto da presente candidatura) do responsável técnico e científico pela tecnologia.
(máximo 2 páginas A4):

A identificação do problema, da necessidade de mercado subjacente a este, e sugestão da linha de desenvolvimento tecnológico a seguir para a resolução do mesmo, foi efectuada pelo Dr. António Travassos, pelo que este é o Inventor da ideia.

O Dr. António Travassos foi presidente da Sociedade Portuguesa de Oftalmologia entre 2008 e 2010, e é actualmente presidente do Centro Cirúrgico de Coimbra. É também membro do conselho Geral da Fundação Champalimaud.
Licenciou-se em medicina pela Universidade de Coimbra, e tem uma especialização em Oftalmologia pelas Universidades de Coimbra, e de Chicago – EUA. Foi professor assistente na Faculdades de Medicina da Universidade de Coimbra, e director da Unidade de Cirurgia Vítreo-Retiniana nos Hospitais da Universidade de Coimbra.

É Presidente do Conselho de Administração do Centro Cirúrgico de Coimbra, desde a sua criação em 1999. Publicou igualmente diversos artigos na sua área de especialização, tendo pertencido ao Editorial Advisory Board da revista “Vitreo-retinal surgery & Technology”.

Sendo membro da Sociedade Portuguesa de Oftalmologia, da Sociedade Americana de Oftalmologia, pertence igualmente ao Conselho Geral da Fundação Champalimaud.
No âmbito clínico, destaca-se como cirurgião vítreo-retiniano com mais de 18 anos de experiência, durante os quais efectuou mais de 20000 cirurgias.

O desenvolvimento do conceito está a ser efectuado pelos colaboradores da ISA e da BlueWorks, cujos currículos serão descritos na próxima secção.

Currículo resumido (ou extracto da informação relevante no contexto da presente candidatura) da equipa de desenvolvimento da tecnologia..
(máximo 2 páginas A4):

A BlueWorks - Medical Expert Diagnosis, Lda é um spin-off conjunto entre quatro empresas:

Três prestadores de cuidados de saúde, nomeadamente o Centro Cirúrgico de Coimbra (CCC), a VisionCare, e a Neuroeye, e uma empresa de engenharia, a ISA – Inteligent Sensing Anywhere

De modo a completar as breves referências às empresas associadas e seus currículos, estas são de seguida descritas de um modo mais detalhado:

ISA - Intelligent Sensing Anywhere
A ISA é uma empresa de base tecnológica que desenvolve produtos e soluções completas para o mercado global nas áreas da Gestão Remota, das Comunicações M2M e da Automação e Controlo, assentes em tecnologia e know-how específicos nos campos da electrónica, desenvolvimento de software, sensores, telemetria e controlo. Reconhecida nacional e internacionalmente pelos seus produtos de gestão remota de gás, ambiente e telecontagem, foi distinguida pela Agência de Inovação, European Utility Awards, ANETIE, COTEC Portugal - Associação Empresarial para a Inovação (que distinguiu a ISA com o título de PME Inovadora em 2005 e 2006), Univ. Coimbra, ICEP, laboratórios internacionais de certificação, entre outras.
Aproveitando as suas competências e tendências de mercado, associou-se ao XHMS - Centro de Excelência em Healthcare & Medical Solutions e de modo a iniciar actividades na área da saúde, pretendendo desde já desenvolver projectos destacadamente inovadores para a triagem de doentes com o Síndrome de Apneia Obstrutiva, para a medição da velocidade de onda de pulso, e para um medidor de ruído para unidades neo-natais.

CCC - Intercir - Centro Cirúrgico de Coimbra
Inaugurado em 1999, o CCC é uma unidade privada de saúde situada em Coimbra que se assume como um complemento das instituições de saúde existentes na Região Centro. Esta unidade pretende criar condições de excelência quer para os utentes, quer para os profissionais de saúde que nele trabalham, e é já reconhecido pela diferenciação e elevada qualidade dos seus serviços médicos, equipamentos e instalações.
Entre a equipa médica permanente e não permanente do CCC, encontram-se Médicos e Professores universitários de renome das áreas de Oftalmologia, Cardiologia, Endocrinologia, Otorrinolaringologia, Urologia, Neurocirurgia, Ginecologia, Ortopedia, e Cirurgias geral, vascular e plástica.

NeuroEye

Fundada por dois professores universitários na área da saúde neuro-visual, o Neurofisiologista Prof. Dr. Miguel Castelo Branco – Vencedor do prémio Bial em 2009, pelo seu trabalho em áreas relacionadas com este projecto (psicofisiologia da Visão) - e a Ortoptista Prof. Drª Aldina Reis.
A NeuroEye é um spin-off da Faculdade de Medicina da Universidade de Coimbra, e tem como core-business a prestação de serviços inovadores e o desenvolvimento de novas ferramentas especializadas em Oftalmologia, Neurologia, e outras áreas ligadas às Ciências da Visão.

O desenvolvimento desta tecnologia está a ser participado por todos os sócios (tanto pessoais como empresariais) da BlueWorks.

Assim, à equipa de desenvolvimento principal composta por 4 engenheiros biomédicos, com formação nas áreas de informática e electrónica, soma-se o apoio na área de engenharia providenciado por 2 professores do Departamento de Física da Faculdade de Ciências e Tecnologias da Universidade de Coimbra, nomeadamente o Prof. Dr. Carlos Correia, docente catedrático, e o Prof. Dr. Luís Requicha Ferreira, e pelos departamentos de hardware, firmware e software da ISA.
Relativamente ao suporte na área clínica, este é providenciado pelo Dr. António Travassos, pelo Prof. Dr. Rui Proença, docente de Oftalmologia na Faculdade de Medicina da Universidade de Coimbra, e pelos elementos da NeuroEye, dos quais destacamos o Prof. Dr. Miguel Castelo-Branco, investigador na área da psico-fisiologia e director do IBILI - Instituto Biomédico de Investigação da Luz e da Imagem.

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D. Pharmaceutical Advertising – Legislation

Artigo 150.º

Definição

1 - Considera-se publicidade de medicamentos, para efeitos do presente decreto-lei, qualquer forma de informação, de prospecção ou de incentivo que tenha por objecto ou por efeito a promoção da sua prescrição, dispensa, venda, aquisição ou consumo em qualquer das seguintes circunstâncias:

a) Junto do público em geral;

b) Junto de distribuidores por grosso e dos profissionais de saúde;

c) Através da visita de delegados de informação médica às pessoas referidas na alínea anterior;

d) Através do fornecimento de amostras ou de bonificações comerciais a qualquer das pessoas abrangidas pelo disposto na alínea b);

e) Através da concessão, oferta ou promessa de benefícios pecuniários ou em espécie, excepto quando o seu valor intrínseco seja insignificante;

f) Pela via do patrocínio de reuniões de promoção a que assistam pessoas abrangidas pelo disposto na alínea b);

g) Pela via do patrocínio a congressos ou reuniões de carácter científico em que participem pessoas referidas na alínea b), nomeadamente pelo pagamento, directo ou indirecto, dos custos de acolhimento;

h) Através da referência ao nome comercial de um medicamento.

2 - A publicidade de medicamentos pode ser realizada directamente pelo titular de autorização ou registo de um medicamento ou, em nome deste, por terceiro, sem prejuízo do disposto no presente decreto-lei.

3 - A publicidade de medicamentos:

a) Deve conter elementos que estejam de acordo com as informações constantes do resumo das características do medicamento, tal como foi autorizado;

b) Deve promover o uso racional dos medicamentos, fazendo-o de forma objectiva e sem exagerar as suas propriedades;

c) Não pode ser enganosa.

Artigo 152.º

Proibição

1 - É proibida a publicidade de medicamentos que não sejam objecto de uma autorização ou registo válidos para o mercado nacional ou que tenham sido autorizados ao abrigo do artigo 92.º e 93.º

2 - É proibida a publicidade junto do público em geral dos medicamentos:

a) Sujeitos a receita médica;

b) Contendo substâncias definidas como estupefacientes ou psicotrópicos, ao abrigo de convenções internacionais que vinculem o Estado português;

c) Comparticipados pelo Serviço Nacional de Saúde.

3 - O disposto no número anterior não prejudica:

a) A realização de campanhas de vacinação efectuadas pela indústria, desde que aprovadas pelo INFARMED;

b) A realização de campanhas de promoção de medicamentos genéricos efectuadas pela indústria desde que aprovadas pelo INFARMED.

4 - É proibida a distribuição directa de medicamentos ao público pela indústria.

5 - É proibida a menção ao nome de um medicamento, no patrocínio de todas as iniciativas dirigidas ao público, salvo se a menção for realizada nos termos previstos no presente decreto-lei.

Artigo 154.º

Publicidade junto de profissionais de saúde

1 - Os medicamentos sujeitos a receita médica só podem ser anunciados ou publicitados em publicações técnicas ou suportes de informação destinados e acessíveis exclusivamente por médicos e outros profissionais de saúde.

2 - A publicidade de medicamentos junto dos profissionais de saúde inclui:

a) O nome do medicamento;

b) As informações essenciais compatíveis com o resumo das características do medicamento;

c) A classificação do medicamento para efeitos de dispensa, nomeadamente indicação de que o medicamento é um medicamento sujeito a receita médica, quando for caso disso;

d) O regime de comparticipação.

3 - Quando a publicidade se destinar exclusivamente a uma chamada de atenção para o nome do medicamento, são dispensadas as demais indicações previstas nos números anteriores.

4 - O INFARMED pode identificar e regulamentar as situações em que, tendo em conta o tipo de suporte publicitário utilizado ou os destinatários da publicidade, se justifica:

a) A apresentação de uma versão reduzida do resumo das características do medicamento ou das informações essenciais compatíveis com o resumo das características do medicamento;

b) A dispensa da inclusão na documentação publicitária de algum ou alguns dos elementos considerados obrigatórios, ao abrigo do presente artigo.

Artigo 152.º

Proibição

1 - É proibida a publicidade de medicamentos que não sejam objecto de uma autorização ou registo válidos para o mercado nacional ou que tenham sido autorizados ao abrigo do artigo 92.º e 93.º

2 - É proibida a publicidade junto do público em geral dos medicamentos:

a) Sujeitos a receita médica;

b) Contendo substâncias definidas como estupefacientes ou psicotrópicos, ao abrigo de convenções internacionais que vinculem o Estado português;

c) Comparticipados pelo Serviço Nacional de Saúde.

3 - O disposto no número anterior não prejudica:

a) A realização de campanhas de vacinação efectuadas pela indústria, desde que aprovadas pelo INFARMED;

b) A realização de campanhas de promoção de medicamentos genéricos efectuadas pela indústria desde que aprovadas pelo INFARMED.

4 - É proibida a distribuição directa de medicamentos ao público pela indústria.

5 - É proibida a menção ao nome de um medicamento, no patrocínio de todas as iniciativas dirigidas ao público, salvo se a menção for realizada nos termos previstos no presente decreto-lei.

Artigo 156.º

Obrigações das empresas

1 - O titular da autorização de introdução no mercado fica obrigado a criar e manter um serviço científico responsável pela informação relativa aos medicamentos de que é titular.

2 - O titular da autorização de introdução no mercado fica ainda obrigado, nomeadamente através do serviço científico referido no número anterior, a:

a) Manter registos completos e pormenorizados de toda a publicidade realizada pela empresa, em fichas que mencionem os destinatários, modo e data da primeira difusão;

b) Manter os registos previstos na alínea anterior à disposição das autoridades com competência fiscalizadora durante um período mínimo de cinco anos, contados da data prevista na alínea anterior;

c) Garantir que a publicidade efectuada pela sua empresa ou por conta ou em nome dela respeita as obrigações impostas por lei;

d) Assegurar que os delegados de informação médica que promovem medicamentos por sua conta ou em seu nome dispõem das habilitações adequadas e da formação profissional necessária ao cabal desempenho das suas funções, exercendo a sua profissão no respeito pleno das respectivas obrigações;

e) Criar os mecanismos necessários para assegurar a recepção e o tratamento das informações referidas no n.º 3 do artigo seguinte;

f) Colaborar com as autoridades públicas com competência no âmbito do presente capítulo, nomeadamente fornecendo as informações e a assistência necessárias ao exercício das suas competências;

g) Respeitar as decisões adoptadas no âmbito do presente capítulo, sem prejuízo do direito de impugnação resultante da lei.

3 - As empresas responsáveis pela informação ou promoção de um medicamento transmitem ao titular da autorização de introdução no mercado, imediatamente, no caso de reacções adversas, ou em prazo nunca superior a quinze dias, nos restantes casos, todas as informações ou elementos necessários ao cumprimento, por este, das obrigações previstas no número anterior.

4 - O titular da autorização de introdução no mercado e as empresas responsáveis pela informação ou promoção dos medicamentos são solidariamente responsáveis pelo recrutamento, formação profissional e actos praticados pelos delegados de informação médica, com vínculo contratual, no exercício das suas funções.

5 - A responsabilidade prevista no número anterior não depende de culpa.

E. Case Study (Eyedropper) – Data analysis

All the Samples

			Validadores													TOTAIS		
MOVIE_ID	MOVIE_NAME		SC_1	SC_2	SC_3	SC_4	SC_5	SC_6	SC_7	SC_8	SC_9	SC_10	SC_11	SC_12	SC_13	mau (-1)	? (0)	bom (1)
15	BW20090525_10h09m44s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
16	BW20090525_10h11m02s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
24	BW20090525_12h01m47s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
30	BW20090526_09h24m48s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
32	BW20090526_10h01m13s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
34	BW20090526_10h39m18s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
35	BW20090526_10h55m00s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
37	BW20090526_11h03m19s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
38	BW20090526_11h38m08s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
46	BW20090602_09h18m51s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
51	BW20090602_13h57m28s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
54	BW20090602_14h33m13s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
56	BW20090602_14h53m41s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
57	BW20090602_14h53m55s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
63	BW20090603_14h19m38s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
72	BW20090603_16h11m46s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
73	BW20090603_16h12m15s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
87	BW20090604_10h31m28s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
91	BW20090604_10h35m58s.avi		1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	13
7	BW20090522_10h57m12s.avi		1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	12
8	BW20090522_10h59m14s.avi		1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	12
11	BW20090525_09h36m44s.avi		1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	12
19	BW20090525_11h12m30s.avi		1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	12
23	BW20090525_11h27m53s.avi		1	1	1	1	0	1	1	1	1	1	1	1	1	0	1	12
26	BW20090525_12h05m20s.avi		1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	12

33	BW20090526_10h03m15s.avi		1	1	0	1	1	1	1	1	1	1	1	1	1		0	1	12
36	BW20090526_10h59m57s.avi		1	1	1	1	1	1	1	0	1	1	1	1	1		0	1	12
48	BW20090602_10h40m54s.avi		0	1	1	1	1	1	1	1	1	1	1	1	1		0	1	12
58	BW20090603_10h10m43s.avi		1	1	1	1	1	1	0	1	1	1	1	1	1		0	1	12
81	BW20090603_16h39m32s.avi		1	1	1	1	1	1	0	1	1	1	1	1	1		0	1	12
92	BW20090604_12h09m16s.avi		0	1	1	1	1	1	1	1	1	1	1	1	1		0	1	12
106	BW20090616_11h22m43s.avi		1	1	1	1	1	1	1	1	1	1	0	1	1		0	1	12
111	BW20090616_12h06m52s.avi		1	1	1	1	1	1	0	1	1	1	1	1	1		0	1	12
4	BW20090522_10h54m43s.avi		1	1	1	1	-1	1	1	1	1	1	1	1	1		1	0	12
10	BW20090522_11h05m23s.avi		1	1	1	-1	1	1	1	1	1	1	1	1	1		1	0	12
40	BW20090526_12h51m55s.avi		1	1	-1	1	1	1	1	1	1	1	1	1	1		1	0	12
62	BW20090603_14h18m56s.avi		1	1	-1	1	1	1	1	1	1	1	1	1	1		1	0	12
100	BW20090615_10h00m12s.avi		-1	1	1	1	1	1	1	1	1	1	1	1	1		1	0	12
21	BW20090525_11h27m03s.avi		1	1	1	1	0	1	1	0	1	1	1	1	1		0	2	11
117	BW20090618_11h36m39s.avi		0	1	1	1	1	1	0	1	1	1	1	1	1		0	2	11
41	BW20090526_14h33m25s.avi		1	1	-1	1	1	1	1	0	1	1	1	1	1		1	1	11
55	BW20090602_14h33m31s.avi		1	1	1	1	1	-1	0	1	1	1	1	1	1		1	1	11
60	BW20090603_11h21m17s.avi		1	1	-1	1	1	1	1	1	0	1	1	1	1		1	1	11
116	BW20090618_11h36m17s.avi		1	1	1	1	1	1	0	1	1	1	-1	1	1		1	1	11
86	BW20090604_10h31m05s.avi		1	1	1	1	1	1	1	1	-1	1	1	-1	1		2	0	11
20	BW20090525_11h15m51s.avi		1	1	0	1	1	1	0	1	0	1	1	1	1		0	3	10
18	BW20090525_10h44m51s.avi		1	1	1	1	0	1	0	1	1	1	1	-1	1		1	2	10
39	BW20090526_12h12m51s.avi		-1	1	0	1	1	1	0	1	1	1	1	1	1		1	2	10
68	BW20090603_14h41m12s.avi		-1	1	0	1	1	1	0	1	1	1	1	1	1		1	2	10
70	BW20090603_14h54m09s.avi		-1	1	1	1	1	1	0	1	0	1	1	1	1		1	2	10
114	BW20090618_10h16m36s.avi		-1	1	-1	1	1	1	0	1	1	1	1	1	1		2	1	10
2	BW20090522_10h49m15s.avi		1	1	0	1	0	1	1	1	0	1	1	0	1		0	4	9
110	BW20090616_12h06m32s.avi		0	1	1	1	1	1	0	1	0	1	0	1	0		0	5	8
112	BW20090618_09h58m15s.avi		1	0	0	1	1	1	0	0	1	1	1	1	1		0	4	9
25	BW20090525_12h03m18s.avi		0	1	-1	1	0	1	0	1	1	1	1	1	1		1	3	9
66	BW20090603_14h24m46s.avi		0	1	-1	1	1	1	1	0	0	1	1	1	1		1	3	9
113	BW20090618_09h58m28s.avi		-1	1	0	1	1	1	0	1	0	1	1	1	1		1	3	9
115	BW20090618_10h16m52s.avi		-1	1	1	1	1	0	0	1	0	1	1	1	1		1	3	9
61	BW20090603_11h29m55s.avi		-1	1	0	1	1	1	1	1	0	-1	1	1	1		2	2	9
93	BW20090604_12h10m36s.avi		0	1	0	1	1	1	0	1	0	1	1	0	1		0	5	8
9	BW20090522_11h01m22s.avi		1	1	-1	1	1	0	0	0	1	0	1	1	1		1	4	8
59	BW20090603_10h11m52s.avi		0	1	-1	1	0	1	0	1	0	1	1	1	1		1	4	8

80	BW20090603_16h39m14s.avi		0	1	0	1	1	1	0	1	1	1	-1	0	1		1	4	8
119	BW20090618_11h38m28s.avi		1	1	0	1	1	1	0	1	0	0	-1	1	1		1	4	8
108	BW20090616_11h25m11s.avi		0	1	0	0	1	1	0	1	0	1	0	1	0		0	7	6
118	BW20090618_11h38m12s.avi		1	1	1	1	0	0	0	1	1	0	0	0	1		0	6	7
1	BW20090522_10h46m19s.avi		1	1	0	1	0	0	0	1	1	-1	-1	1	1		2	4	7
79	BW20090603_16h37m50s.avi		-1	1	1	1	0	1	0	0	0	-1	-1	1	-1		4	4	5
99	BW20090615_09h59m58s.avi		1	0	1	-1	1	1	0	0	-1	-1	1	-1	-1		5	3	5
17	BW20090525_10h16m45s.avi		1	0	-1	1	-1	1	-1	-1	0	-1	1	1	-1		6	2	5
64	BW20090603_14h21m26s.avi		-1	1	-1	0	1	1	-1	0	-1	-1	1	1	1		5	2	6
28	BW20090526_09h24m05s.avi		-1	-1	-1	1	-1	1	-1	1	1	0	-1	1	-1		7	1	5
103	BW20090616_09h29m58s.avi		0	0	0	1	0	0	0	1	1	1	0	0	1		0	8	5
78	BW20090603_16h37m16s.avi		-1	1	1	1	-1	1	0	0	0	-1	-1	0	-1		5	4	4
82	BW20090604_10h27m13s.avi		-1	0	-1	1	1	1	0	0	0	1	-1	-1	1		4	4	5
31	BW20090526_10h00m44s.avi		0	1	0	-1	-1	1	1	-1	0	0	-1	-1	-1		6	4	3
95	BW20090604_12h13m01s.avi		-1	-1	-1	1	-1	1	-1	1	-1	-1	-1	-1	-1		10	0	3
47	BW20090602_09h23m29s.avi		0	0	0	1	0	0	0	0	0	-1	-1	1	1		2	8	3
29	BW20090526_09h24m28s.avi		-1	0	-1	-1	-1	-1	-1	1	-1	-1	-1	1	-1		10	1	2
102	BW20090616_09h20m39s.avi		-1	-1	-1	1	-1	1	-1	0	-1	-1	-1	-1	-1		10	1	2
74	BW20090603_16h15m05s.avi		-1	0	-1	0	0	1	-1	0	0	-1	-1	-1	-1		7	5	1
22	BW20090525_11h27m28s.avi		-1	1	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1		11	1	1
76	BW20090603_16h31m55s.avi		-1	-1	-1	-1	-1	0	-1	-1	0	-1	-1	0	0		9	4	0
105	BW20090616_10h53m54s.avi		0	0	-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1		10	3	0
109	BW20090616_12h06m17s.avi		-1	0	-1	0	-1	-1	-1	0	-1	-1	-1	-1	-1		10	3	0
42	BW20090526_15h39m57s.avi		-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	0	0		10	3	0
97	BW20090604_12h14m52s.avi		-1	0	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1		11	2	0
43	BW20090526_15h42m01s.avi		-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	-1	-1		12	1	0
65	BW20090603_14h23m03s.avi		-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		12	1	0
98	BW20090604_12h15m09s.avi		-1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		12	1	0
67	BW20090603_14h25m38s.avi		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		13	0	0
75	BW20090603_16h15m54s.avi		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		13	0	0
104	BW20090616_09h30m10s.avi		-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		13	0	0

Statistical tests performed

Resultados obtidos, com e sem dados inconclusivos.

	Resultados obtidos					
	Total	Total_2	Total r	Total_r_2	Total (%)	Total (%) _2
mau (-1)	171	171	0,18387	0,20602	18,38710	20,60241
? (0)	100	0	0,10753	0,00000	10,75269	0,00000
bom (1)	659	659	0,70860	0,79398	70,86022	79,39759
	930	830	1	1	100	100

Resultados obtidos para Desvio padrão com e sem dados inconclusivos

	xCorr_1	xCorr_2
dev. Pad	0,07089	0,09668
Média	0,66642	0,74634
Máximo	0,82123	0,92720
Mínimo	0,52325	0,51067

Correlação entre amostras com todos os dados

xCorr	2	4	5	6	8	9	10	11	12	13		
2		0,61779	0,71705	0,52325	0,65143	0,63486	0,69444	0,67271	0,63409	0,71485		
4	0,61779		0,60315	0,64500	0,72773	0,68090	0,65474	0,56595	0,62312	0,69484		
5	0,71705	0,60315		0,61134	0,69702	0,63234	0,76183	0,72607	0,65491	0,80847		
6	0,52325	0,64500	0,61134		0,60820	0,56980	0,61202	0,57397	0,53251	0,55376		
8	0,65143	0,72773	0,69702	0,60820		0,68018	0,74142	0,61251	0,66163	0,73027		
9	0,63486	0,68090	0,63234	0,56980	0,68018		0,76950	0,62298	0,72612	0,75298		
10	0,69444	0,65474	0,76183	0,61202	0,74142	0,76950		0,75286	0,61679	0,82123	0,07089	dev P
11	0,67271	0,56595	0,72607	0,57397	0,61251	0,62298	0,75286		0,64997	0,74600	0,66642	média
12	0,63409	0,62312	0,65491	0,53251	0,66163	0,72612	0,61679	0,64997		0,70618	0,82123	máximo
13	0,71485	0,69484	0,80847	0,55376	0,73027	0,75298	0,82123	0,74600	0,70618		0,52325	mínimo

Correlação entre amostras sem dados inclusivos

xCorr	2	4	5	6	8	9	10	11	12	13		
2		0,67100	0,80431	0,51067	0,71825	0,74755	0,72129	0,68279	0,68211	0,77426		
4	0,67100		0,67753	0,75475	0,84711	0,80202	0,67216	0,56738	0,67512	0,71039		
5	0,80431	0,67753		0,67483	0,84266	0,79658	0,86190	0,80546	0,72867	0,92720		
6	0,51067	0,75475	0,67483		0,76667	0,72664	0,63012	0,58675	0,59015	0,63104		
8	0,71825	0,84711	0,84266	0,76667		0,85187	0,83762	0,70312	0,80376	0,86504		
9	0,74755	0,80202	0,79658	0,72664	0,85187		0,92195	0,73265	0,87546	0,87698		
10	0,72129	0,67216	0,86190	0,63012	0,83762	0,92195		0,79360	0,66362	0,87670	0,09668	dev P
11	0,68279	0,56738	0,80546	0,58675	0,70312	0,73265	0,79360		0,67632	0,76205	0,74634	média
12	0,68211	0,67512	0,72867	0,59015	0,80376	0,87546	0,66362	0,67632		0,75706	0,92720	máximo
13	0,77426	0,71039	0,92720	0,63104	0,86504	0,87698	0,87670	0,76205	0,75706		0,51067	mínimo

Correlação de Spearman entre amostras

	T_2	T_4	T_5	T_6	T_8	T_9	T_10	T_11	T_12	T_13
T_2		0,9997538	0,9997314	0,9997091	0,9997613	0,9996867	0,9996867	0,9996419	0,9997091	0,9997538
T_4	0,9997538		0,9996345	0,9997613	0,9997986	0,9997091	0,9996494	0,9995450	0,9996867	0,9997315
T_5	0,9997314	0,9996344		0,9996494	0,9997314	0,9996717	0,9997613	0,9997165	0,9996792	0,9998135
T_6	0,9997091	0,9997613	0,9996494		0,9997240	0,9996344	0,9996195	0,9995598	0,9996270	0,9996270
T_8	0,9997613	0,9997986	0,9997314	0,9997240		0,9997314	0,9997464	0,9996121	0,9997240	0,9997687
T_9	0,9996867	0,9997091	0,9996717	0,9996344	0,9997314		0,9997762	0,9996270	0,9997538	0,9997687
T_10	0,9996867	0,9996494	0,9997613	0,9996195	0,9997464	0,9997762		0,9997314	0,9996195	0,9998135
T_11	0,9996419	0,9995449	0,9997165	0,9995598	0,9996121	0,9996270	0,9997314		0,9996344	0,9997240
T_12	0,9997091	0,9996867	0,9996792	0,9996270	0,9997240	0,9997538	0,9996195	0,9996344		0,9997314
T_13	0,9997538	0,9997314	0,9998135	0,9996270	0,9997687	0,9997687	0,9998135	0,9997240	0,9997314	

Máximo	0,9998135
Mínimo	0,9995449
Média	0,9997006
Desvio Padrão	0,0000644

FÓRMULA APLICADA:

$$1 - \frac{6 * \sum D^2}{N(N^2 - 1)}$$

F. Particular Clinics

These are just an example of some of the clinics of the Database. Not all of them are present in this document because the clinics and hospitals were registered directly in the software. Information about contacts isn't also available for privacy issues.

NOME	CÓD-POST	LOCALIDADE	MORADA	TELEFONE
ALM - Oftalmolaser	1050 - 078	Lisboa	Rua Dr Nicolau Bettencourt, 39	213 838 560
CliniAlba - Clinica Oftalmológica Dr Aldir Alba	1000 - 298	Lisboa	Av. João XXI, 15, R/C Dto	218 436 000 218 407 387
Medimar Clínica	4450 - 257	Matosinhos	Rua Roberto Ives, 1355	229392066
Clínica Oftalmológica das Antas Lda	4350 - 171	Porto	Avenida Fernão Magalhães 1989, Porto	225 089 470
Instituto de Microcirurgia Ocular	1600 - 209	Lisboa	Rua Tomás de Fonseca	217 221 630
Centro de Oftalmologia do Algarve	8000	Faro	Avenida 5 de Outubro, 14	289 895 560
Centro Oftalmológico da Lus	1600 - 082	Lisboa	Av das Forças Armadas, nº4 - 7º - J	217 995 450
Leite & Leite VI-Microcirurgia Ocular Lda	3000 - 351	Coimbra	Avenida Sá Bandeira Edifício Avenida-2ª Fase-piso 6-,	239 853 450
Clínica Capitólio	4050 - 276	Porto	Av de França, 352	228 349 350
Clinica Oftalmológica de Aveiro	3800	Aveiro	Av. Lorenço Peixinho 177-179	234 382 847
Clínica Oftalmológica de Faro	8000 -198	Faro	Rua Aboim Ascensão	289 894 400
Clínica Oftalmológica Doutor Artur Carvalho	1050 - 058	Lisboa	Av 5 de Outubro, 56 - 8º	213 570 002
Clínica Oftalmológica Dr Campos Lopes	4050 - 115	Porto	Av. Da Boavista, 117 - 6º	226 006 556
Clínica Oftalmológica Dr Carlos Oliveira	7000 - 647	Évora	Largo da Porta de Moura, 23	266 704 875
Clínica Oftalmológica Dr José Henriques & Dra Filomena Pinto, Lda		Torres Vedras		261 325 925

Clínica Oftalmológica Dr Miguel Sousa Neves	4490 - 004	Póvoa de Varzim	Edf Portas do Parque I Av 25 de Abril, 62/70	252 688 937 252 688 938
Clinica Oftalmológica Joaquim Mira, Lda	3000 - 377	Coimbra	Quinta do Voimarães	239 488 020
Clínica Oftalmológica Prof Dr J. Salgado Borges	4000 - 422	Porto	Av Rodrigues de Freitas 407 - 409	222 026 669
Clinica Opseon	2750 - 279	Cascais	Av. Eng. Adelino Amaro da Costa	214 862 480
Clínica Todos os Santos	1169 - 084	Lisboa	Rua Gonçalves Crespo, 39	213 565 700
Futuremed - Clínica de Medicina Integrada	2785 - 035	São Domingos de Rana	Estrada nacional 249	214 459 820
I-Qmed - Centro médico de Oftalmologia	8400 - 431	Lagoa	Parque Empresarial do Algarve, n12	282 353 486
Oculista do Feijó Lda	2810 - 167	Almada	Rua Dr. António Elvas, 49 -A	212 509 720
OftalmoCenter - Clínica médica, Lda	4800 - 045	Guimarães	Rua Francisco de Castro, n205	253 439 500
Rufino Silva - Clinica Oftalmológica, Lda	3030 - 163	Coimbra	Rua Camara Pestana nº37	239 484 348
Casa de Saúde de Guimarães	4810 - 508	Guimarães	Rua Paulo VI, 402	253 420 400
Clínica Sampaio Pina	1250 - 145	Lisboa	Av da Liberdade, 92 A, 4º	213 808 270
Centro Médico Santa Maria	2670 - 441	Loures	Rua da República, 116 R/C Esq	219 839 780
Centro Clínico Indumed, Lda	3720 - 245	Oliveira de Azeméis	Rua Fernando Paul, 37	256 687 035 256 668 341