

UNIVERSIDADE TÉCNICA DE LISBOA
INSTITUTO SUPERIOR DE ECONOMIA E GESTÃO

PHD THESIS IN MANAGEMENT

**UNDERSTANDING ORGANIZATIONAL STAKEHOLDER
COMMITMENT TO ENSURE INFORMATION SYSTEMS/
INFORMATION TECHNOLOGY BENEFITS IN PORTUGUESE
HOSPITALS: AN ANALYSIS BASED ON THE THEORY OF
TECHNOLOGICAL FRAMES**

Irene Rebelo Cardoso

SUPERVISORS:

Professor Mário Fernando Maciel Caldeira
Professor Gurpreet Dhillon

THESIS COMMITTEE

PRESIDENT

Reitor da Universidade Técnica de Lisboa

COMMITTEE MEMBERS

Doutor Mário Fernando Maciel Caldeira, Professor Catedrático do Instituto Superior de Economia e Gestão da Universidade Técnica de Lisboa

Doutor Gurpreet Dhillon, Professor Catedrático convidado do Instituto Superior de Economia e Gestão da Universidade Técnica de Lisboa

Doutor Rui Filipe Cerqueira Quaresma, Professor Auxiliar da Universidade de Évora

Doutor Mário José Batista Romão, Professor Auxiliar do ISCTE - Instituto Universitário de Lisboa (ISCTE-IUL)

Doutora Cristiane Debres Pedron, Professora Auxiliar do Instituto Superior de Economia e Gestão da Universidade Técnica de Lisboa

Lisbon, November 2012

UNIVERSIDADE TÉCNICA DE LISBOA
INSTITUTO SUPERIOR DE ECONOMIA E GESTÃO

PHD THESIS IN MANAGEMENT

PhD Program in Management

**UNDERSTANDING ORGANIZATIONAL STAKEHOLDER
COMMITMENT TO ENSURE INFORMATION SYSTEMS/
INFORMATION TECHNOLOGY BENEFITS IN PORTUGUESE
HOSPITALS: AN ANALYSIS BASED ON THE THEORY OF
TECHNOLOGICAL FRAMES**

Irene Rebelo Cardoso

SUPERVISORS:

Professor Mário Fernando Maciel Caldeira

Professor Gurpreet Dhillon

THESIS COMMITTEE

PRESIDENT

Reitor da Universidade Técnica de Lisboa

COMMITTEE MEMBERS

Doutor Mário Fernando Maciel Caldeira, Professor Catedrático do Instituto Superior de Economia e Gestão da Universidade Técnica de Lisboa

Doutor Gurpreet Dhillon, Professor Catedrático convidado do Instituto Superior de Economia e Gestão da Universidade Técnica de Lisboa

Doutor Rui Filipe Cerqueira Quaresma, Professor Auxiliar da Universidade de Évora

Doutor Mário José Batista Romão, Professor Auxiliar do ISCTE - Instituto Universitário de Lisboa (ISCTE-IUL)

Doutora Cristiane Debres Pedron, Professora Auxiliar do Instituto Superior de Economia e Gestão da Universidade Técnica de Lisboa

Lisbon, November 2012

ABSTRACT

The unique context of healthcare organizations provides opportunities to develop or refine theory relating to organizational change and information systems. This research looks at the role stakeholder commitment plays in the realisation of expected benefits for an information system project in a healthcare setting. Case studies, relating to an organization-wide information systems (IS) project, were conducted in two Portuguese hospitals, allowing a study of the perceptions and behaviours of stakeholders, their commitment to the Information System and Information Technology (IS/IT), organizational change and the achievement of business benefits. A qualitative, interpretative, case-based research strategy was implemented based on semi-structured interviews and document analysis. The Three Component Model of Organizational Commitment and Technological Frames of Reference (TFR) provided the theoretical grounding for analysing the collected data. A resulting theoretical framework is proposed to reduce the many issues associated with the implementation of Healthcare Information Systems (HIS) in healthcare organizations, enabling them to quickly achieve the expected benefits. A contribution to TFR theory is made by extending the development of frame structure to include the shaping of perceptions by stakeholders. As part of the conceptual model, a set of frames is identified that healthcare professionals hold regarding Information Technology.

Keywords: HIS (Healthcare Information Systems), Commitment, Technological Frames, Benefits, Hospitals, Case study.

RESUMO

O contexto único das organizações de saúde oferece oportunidades para desenvolver ou aperfeiçoar teoria relacionada com a mudança organizacional e sistemas de informação. Esta pesquisa, propõe uma análise do papel que o compromisso dos stakeholders desempenha na realização dos benefícios esperados com a implementação de um Sistema de Informação no sector da saúde. Nesta pesquisa, foram estudadas as percepções e os comportamentos dos profissionais de saúde, a fim de compreender o seu compromisso com os Sistemas e Tecnologias de Informação (SI/TI), a mudança organizacional e a obtenção de benefícios com os investimentos em SI/TI. Foi adoptada uma estratégia de investigação qualitativa e interpretativa, baseada em estudos de caso. A recolha de dados baseou-se em entrevistas semiestruturadas e análise documental. *The Three-Component Model of Organizational Commitment e Technological Frames of Reference* (TFR) fornecem a base teórica para analisar os dados recolhidos. É proposto um quadro teórico para reduzir as muitas questões associadas à implementação de Sistemas de Informação na Saúde (SIS) nas organizações de saúde, permitindo-lhes uma obtenção mais rápida dos benefícios esperados. Uma contribuição para a teoria dos TFR resulta da extensão da estrutura de *frames tecnológicos* dos *stakeholders*. Como parte do modelo conceptual, é identificado um conjunto de percepções que os profissionais de saúde detêm sobre as TI.

Palavras-chave: SIS (Sistemas de Informação na Saúde), Compromisso, Frames Tecnológicos, Benefícios, Hospitais, Estudo de Caso.

ACKNOWLEDGEMENTS

As a good friend said, “a thesis represents much more than just an academic effort!” When I started the PhD course I was not aware of the effort, commitment and on occasions, the need to abdicate some aspects of life. Today I recognize that this effort was worth it. However I also recognize that this journey would not have been possible without the encouragement, support and assistance that I received from many people.

First of all I would like to thank my supervisors, Professor Mário Caldeira and Gurpreet Dhillon, for their contributions, comments and insights. To my Professor and mentor, Mário Caldeira, I offer special thanks for your availability, care, tolerance, support and encouragement.

I am grateful to all my professors, especially Luís Moutinho, Landeiro Vaz, James Werbel and Robert Dyer, who in one way or another showed me the way, so that I could see my own “road”.

Thank you to all my friends who made me believe that the "goal was already there". I am especially grateful to my colleagues and friends Rita Fuentes and Cristiane Pedron for reading my essays and offering valuable advice.

Thank you Julian Tice for your willingness and subtle, but important contributions that you made throughout the reading and correction of my thesis.

I am deeply grateful to all organizations that have received me and the members of those organizations that allowed me to better understand the issues related to the implementation of information systems in healthcare.

To my mother, brothers and sisters, thank you for your love, tolerance, care and support.

My thanks also go to Educator DeRose for his valuable Method and techniques that enabled me to maintain lucidity, focus, physical ability and strength to continue on.

Finally, to my partner in life Rui, thank you for your love, support and harsh words that have much contributed to my persistence in attaining this important goal.

Lisbon, November, 2012

Irene Cardoso

CONTENTS

LIST OF TABLES	ix
LIST OF FIGURES.....	x
LIST OF ACRONYMS.....	xi
Chapter I Introduction	13
1.1 The Problem under Consideration.....	15
1.2 Research Rationale.....	19
1.3 The Research Questions.....	21
1.4 Thesis Structure	22
Chapter II Organizational Commitment and Benefits Management: A Literature Review	24
2.1 Introduction	24
2.2 Organizational Commitment and IT/IS Benefits.....	24
2.2.1 Organizational Commitment	26
2.2.2 Commitment and Information Systems	33
2.2.3 Commitment, Organizational Context and IT/IS Benefits.....	35
2.2.4 Commitment versus Resistance to IS/IT Adoption.....	37
2.3 Benefits Management	43
2.3.1 IT Benefits Realization.....	47
2.3.2 Organizational Change and Benefits Management.....	48
2.4 Summary	54
Chapter III Healthcare and Hospital Information Systems.....	56
3.1 Introduction	56
3.2. The Organizational Context of Hospitals versus Commitment.....	56
3.3 Healthcare Information Systems/ Healthcare Information Technology.....	61
3.3.1 Benefits of Healthcare Information Systems	64
3.3.2 Issues Related to Clinical Information Systems' Implementation.....	68
3.4 Summary	70
Chapter IV Philosophical Perspective and Research Strategy	71
4.1 Introduction	71
4.2 Research Paradigm	73
4.2.1 Ontology and Epistemology.....	74
4.2.2 The Adopted Research Paradigm	78
4.3 Research Strategy	81
4.3.1 Case Study	86
4.4. Research Design	92
4.4.1 Overall Strategy.....	93
4.4.2 Research Design	94
4.4.3. Data Collection	96
4.4.4 Data Analysis Method.....	104
4.5 Theoretical Framework	107
4.5.1 The Theory of Technological Frames.....	108
4.5.2 Conceptual Model.....	112
4.6 Summary	114
Chapter V Case Studies	115
5.1 Introduction to the Case Study Description	115

5.2 Description of Case 1 (A)	120
5.2.1 Introduction	120
5.2.2 Characteristics of the Site.....	122
5.2.3 Organizational Context	124
5.2.3.1 External Context	124
5.2.3.2 Internal Context	125
5.2.4 Infrastructure and Strategy for the IS/IT	128
5.2.5 Implementation of PFSS: Technological Frames of Users.....	129
5.2.5.1 Implementation	131
5.2.5.2 Technology-in-Use	148
5.2.5.3 Impact of the System.....	155
5.2.6 Usage	160
5.2.7 Commitment	162
5.2.7.1 Commitment dimensions.....	162
5.2.7.2 Commitment antecedents.....	165
5.2.7.3 Project commitment.....	170
5.2.8 Discussion of the Case	175
5.3 Description of Case 2 (B)	178
5.3.1 Introduction	178
5.3.2 Characteristics of the Site.....	180
5.3.3 Organizational Context	182
5.3.3.1 External Context	182
5.3.3.2 Internal Context	184
5.3.4 Infrastructure and Strategy for the IS/IT	187
5.3.5 Implementation of PFSS: Technological Frames of Users.....	188
5.3.5.1 Implementation	190
5.3.5.2 Technology-in-Use	206
5.3.5.3 Impact of the System.....	213
5.3.6 Usage	216
5.3.7 Commitment	220
5.3.7.1 Commitment dimensions.....	220
5.3.7.2 Commitment Antecedents	222
5.3.7.3 Project Commitment	230
5.3.8 Discussion of the Case	234
Chapter VI Case Study Analysis – The Research Contribution	239
6.1 Introduction	239
6.2 General Description	239
6.3 Discussion of Case Studies and Contributions	241
6.3.1 Usage	241
6.3.2 Technology-in-Use.....	243
6.3.3 Implementation	247
6.3.4 Impact of System	251
6.3.5 Commitment	255
6.3.6 Relationship between TFR, Commitment and Benefits.....	262
6.3.7 Other Research Contributions	267
6.4 Summary	270
Chapter VII Conclusions	271
7.1. Background and Summary of Research Undertaken.....	271
7.2 Key Research Findings	273
7.3 Knowledge Contribution	275
7.4 Implications for Practice	277
7.5 Study Limitations and Opportunities for Further Research	279
7.5.1 Limitations.....	279
7.5.2 Further Research.....	281
Appendices	283
Appendix A - Formal request for case studies	284
Appendix B - Interviews guidelines	286

Appendix C – List of Categories of Case A.....	291
Appendix D – List of Relationships between Categories of Case A	295
Appendix E – List of Categories of Case B	298
Appendix F – List of Relationships between Categories of Case B	302
Appendix G - Presentation of data included in NVivo Software.....	305
References	307

LIST OF TABLES

Table 1 A Summary of Principles for Interpretive Field Research	85
Table 2 Examples of Generalizations from IS Case Studies.....	91
Table 3 Advantages and Disadvantages of Record Interviews.	100
Table 4 Sources of Data	117
Table 5 Interviews Realized	118
Table 6 Examples of Verbatim Identification	120
Table 7 Relevant Categories.....	121
Table 8 List of Perceived Benefits.....	157
Table 9 Commitment of Professionals.....	164
Table 10 List of Perceived Benefits.....	214
Table 11 Relative Representation of Work Experiences' antecedents	223

LIST OF FIGURES

Figure 1 A Three-Component Model of Organizational Commitment	28
Figure 2 The benefits dependency network	45
Figure 3 The Combined Framework.....	50
Figure 4 Research Methods/Strategies.....	83
Figure 5 Research Design	96
Figure 6 Conceptual Model.....	113
Figure 7 Distribution of Staff by Professional Groups on 31 December 2010	122
Figure 8 Relationships between Categories	130
Figure 9 Distribution of the Frame Control by Professional Groups	149
Figure 10 Distribution of Frame ‘Protection’ by Professional Groups	151
Figure 11 Relationships between TFR and Commitment Antecedents	177
Figure 12 – Tree of Categories	179
Figure 13 Distribution of Staff by Professional Groups on June 2011.....	181
Figure 14 Technological Frames for Hospital B Professionals.....	189
Figure 15 Distribution of the Frame ‘Control’ by Professional Groups.....	207
Figure 16 Distribution of Frame ‘Complexity’ by Professionals.....	210
Figure 17 Distribution of the Frame ‘Time Consumption’ by Professional Groups.	212
Figure 18 Distribution of Affective Commitment by Profession.....	221
Figure 19 Principal Relationships Between Categories.....	238
Figure 20 Virtuous Cycle of Commitment and Perceived Benefits	255
Figure 21 Conceptual Model of Commitment to a HIS.....	265
Figure 22 Simplified Conceptual Model of Commitment to a HIS	267

LIST OF ACRONYMS

AC	Administration Council
MT	Monitoring Team
BEUs	Basic Emergency Units – (UBUs)
BOD	Board of Directors
CAHS	Central Administration of the Health System
CDSS	Clinical Decision Support Systems
CMDT	Complementary Methods for Diagnostics and Therapy
CMR	Computerized Medical Record
CPOE	Computerized Physician Order Entry
CRM	Customer Relationship Management
CSF	Critical Success Factors
DSS	Decision Support Systems
DW	Data Warehouse
EDI	Electronic Data Interchange
EHR	Electronic Health Record
EMR	Electronic Medical Records
EPR	Electronic Patient Record
ER	Emergency Room
ES	Enterprise Systems
HBM	Health Belief Model
HC	Hospital Centre
HIEM	Higher Institute of Economics and Management
HIS	Healthcare Information System
HIT	Healthcare Information Technology
HR	Human Resources
ICNP	International Classification for Nursing Practice
IS	Information Systems
IS/IT	Information Systems and Information Technology
ISCPN	Information System for Classifying Patients in Nursing
IT	Information Technology

JCAHO	Joint Commission for Accreditation of Healthcare Organizations
MSS	Medical Support System
NCCMERP	The National Coordinating Council for Medication Error and Prevention
NCDP	National Commission for Data Protection
ND	Nurse Director
NHS	National Health Service
OD	Out-patient Department
OR	Observation Room
PC	Personal Computer
PDA	Personal Digital Assistant
PFSER	Paper Free Solution for Emergency Room
PFSS	Paper Free Software Solution
RHA	Regional Health Authority
ROA	Return On assets
ROI	Return On Investment
SSNP	Support System for Nursing Practice
TF	Technological Frames
TFR	Technological Frames of Reference
US	United States
VMER	Vehicle of Medical Emergency and Resuscitation
WG	Working Group

Chapter I Introduction

Information Systems and Information Technology (IS/IT) have been seen as a way to improve organizational performance (Bhattacharjee *et al.*, 2007; Markus, 2004; Ward *et al.*, 1996; Harris and Katz, 1991) due to their ability to enhance the productivity of existing processes, as well as to produce new, more effective and efficient ones. However, the IS/IT impact on productivity within organizations depends to a large extent on the managerial and organizational changes that accompany its implementation (Peppard *et al.*, 2007; Ward and Daniel, 2006; Hillestad *et al.*, 2005) and the level of individual commitment to implement those changes (Shum *et al.*, 2008; Swailes, 2004; Lau and Herbert, 2001).

There is a growing consensus that organizational issues (e.g., structure, business processes, stakeholder interests, power relationships, human and organizational aspects as well as organizational culture) are more critical than technical considerations related to IS/IT (Ward *et al.*, 2005; Doherty and King, 2005; Markus *et al.*, 2000; Davenport, 2000). As a result, although in most cases technical implementation is relatively successful, many of the initiatives have failed to deliver the expected benefits (Peppard *et al.*, 2007; Ward *et al.*, 2005; Markus, 2004).

In order to strategically manage information systems (IS) and information technology (IT), it is important to understand the role of technology-based information systems in organizations, as well as their impact on the social structures of the organization and the forces that act upon it (Ward and Peppard, 2002). Of particular significance is the commitment employees have to organizational change linked to Information Technology (IT) implementation (Shum *et al.*, 2008).

The high failure rate (over 70%) of IS/IT projects is well recognized by both scientific and practitioner communities (see for example, Fowler and Horan, 2007; Highsmith, 2006; Fitzgerald and Russo, 2005; The Standish Group International Report, 1994; Jiang and Klein, 1999).

Much research has been done on IS implementation and its critical factors, both in cases of failure or success (Fowler and Horan, 2007; Fitzgerald and Russo, 2005; Dhillon, 2004; Caldeira and Ward, 2003; Akkermans and Helden, 2002).

Some studies have been concerned with the resistance to change in IS/IT projects (Marakas and Hornik, 1996; Martinko *et al.*, 1996; Joshi, 1991; Marcus, 1983) some specific to hospitals (Lapointe and Rivard, 2006, 2005; Dhillon, 2005; Doolin, 2004), but little research was found in the literature concerning the influence of organizational commitment to IS implementation (Shum *et al.*, 2008; Sabherwal *et al.*, 2003; Stone and Henry, 2003; Newman and Sabherwal, 1996), and more specifically, to IS implementation in hospitals (Marchal *et al.*, 2010; Stone and Henry, 2003; Lau and Herbert, 2001).

Researchers whose work was conducted in the hospital settings have described some relevant issues that prevent successful adoption of IS/IT, such as: lack of communication between managers and system analysts; lack of harmonization between business and clinical objectives and organizational power (Dhillon, 2005), as well as control over clinical activity (Doolin, 2004). Bhattacharjee and Hikmet (2007) present a model of technology acceptance that increases the perception of usefulness as measure of user resistance.

Lapointe and Rivard (2006), in their study of IS implementation in hospital settings, point out other aspects that affect the success of IS implementation, such as: (1) system design features, (2) internal factors relating to people that use such systems (cognitive styles or ways of thinking), (3) the significance of the system, (4) the

organizational distribution of power, and especially (5) the result of interaction between the specific system design features and aspects of organizational context.

Few studies were also found with a focus on organizational commitment in the context of professional organizations, in particular, relating to the adoption and development of IS/IT in Portuguese public hospitals.

Public healthcare organizations, such as hospitals, are very complex organizations, and they present a set of specific characteristics (their non-profit nature, a subordination to government or state, an existence of cultures and subcultures (Quinn, 1996) and, a large and varying number of stakeholders) (Ward and Daniel, 2006), making them excellent fields for investigation (LeRouge *et al.*, 2007). According to Chiasson and Davidson (2004), the unique institutional context of healthcare organizations provides opportunities to develop or refine IS theory.

People individually, and society in general, see health as an important and critical resource that is difficult to put a price on and difficult to access. In 2007 and 2008 many conflicts, debates and protests were observed by the population when some healthcare services were closed under the ongoing restructuring of the network of emergency units integrated into the health reforms conducted by the Portuguese Government.

1.1 The Problem under Consideration

As in other industries and government organizations, the healthcare sector is concerned with efficiency and cost saving and has also seen technology adoption as a way to improve organizational performance, quality of patient care (Reardon and Davidson, 2007; Hillestad *et al.*, 2005; Baus, 2004; Chiasson and Davidson, 2004), patient safety (Bates *et al.*, 2001) and knowledge development (McKee and Healy, 2000). High costs, medical errors, low quality, administrative inefficiencies, and poor

management are often cited as major problems within the US healthcare system (Porter and Teisberg, 2004; Kohn *et al.*, 1999).

Mantzana *et al.* (2007) consider that IT has become a strategic necessity for developing an integrated healthcare IT infrastructure that can improve services and reduce medical errors. IT investments in the health sector have increased dramatically (Carpenter, 2005) and are expected to rise further over the near term (HIMSS Analytics, 2007).

Healthcare Information Systems (HIS) could contribute significantly to improving the health of the population (McKee and Healy, 2000). According to Marietti (1998), the improvement in quality of care, is a primary concern and driving force in the use of HIS, whose use has been recommended by various healthcare bodies as a strategy for improving the quality of patient records (Institute of Medicine, 2001; Ball *et al.*, 1999).

The patient's record is the basis of HIS (Burton *et al.*, 2004; Rashbass, 2001; Kaihara, 1998), and consists in a set of medical data and information collected for a particular patient in its numerous forms (words, numbers and images) (Kaihara, 1998).

Despite high expectations for the value of IT in healthcare, the use of Healthcare Information Technology (HIT) in the US has had a slow uptake, not being universally implemented (Blumenthal *et al.*, 2006; Johnston *et al.*, 2002). Moreover, in many cases, attempts at HIS implementation have failed (Dhillon, 2005; Lapointe and Rivard, 2005; Doolin, 2004; Wilson and Howcroft, 2000; Berg, 1999).

Introducing HIS into a clinical setting involves a certain degree of change in the way the work is done. Therefore overall reasonable expectations for the benefits of HIS must be defined and understood by all users (Wager *et al.*, 2000). Time, training, and/or monetary investments as well as resource allocation are all necessary for providers and staff to effectively learn how to use the new system (Marietti, 1998).

Research made on implementation of Electronic Medical Records (EMR) shows that EMR systems have a profound effect on organizational workflow and practices, and some physicians experience a steep learning curve to achieve effective use (Gans *et al.*, 2005; Miller *et al.*, 2003).

As argued by Slack (2001), providers will use computer based IS and HIS if there is considerable benefit to their practice in the sense of time savings, increased ease in locating patient data, and speedy analysis of specific patient data. So, providers' belief that there is no improvement in quality of healthcare arising from IS/IT, can contribute to development of resistance to change (Burton *et al.*, 2004).

Reardon and Davidson (2007) view EMR systems as a type of complex organizational technology. In turn, Attewell (1992) states that the organizational know-how and technical knowledge required to utilize a complex organizational technology, creates knowledge barriers to adoption.

Hospitals are placed at the top of the health system and carry considerable weight in terms of the public budget in healthcare [about 50% in many Western European countries (OCDE, 2007; Simões, 2004; Mckee and Healy, 2002)]. In Portugal in 2009, the expenditure on healing and rehabilitation accounted 69% of the current health spending (OCDE, 2011).

The increasing age of population associated with new patterns of illness that are difficult to cure are responsible for an increase in expenditure (Mahesh *et al.*, 2005; Mckee and Healy, 2002). On the other hand, the separation between primary and specialist care has also been the cause of an increased demand for hospitals' emergency rooms, which causes an inevitable over-use of these areas and a great loss of efficiency and overall quality in the provision of healthcare to the patients (Carapinheiro, 1998). These issues point to a pressing need to increase efficiency in the execution of the processes and treatments.

The management of patient or customer information is a particularly important part of hospitals' activity as health care providers (Baus, 2004), and this also applies to the Portuguese public hospitals which are increasingly being seen as enterprises (public enterprises).

As it has been said before, the achievement of many of the benefits enabled by IS is dependent on changing the traditional ways of working and standards of organizational practice which can be seen by stakeholders as threatening or disadvantageous results from the changes (Ward and Daniel, 2006). The term stakeholders refers to individuals or groups of people who are directly or indirectly affected by the project or programme of change and are usually identified as 'stakeholders' in relation to a project or change programme (Ward and Daniel, 2006; Jurison, 1996).

According to Coetsee (1999), prerequisites for change management include achieving stakeholder commitment and actively managing resistance to change. He considers commitment as acceptance of change and resistance as the opposite, or in other words, rejection of change.

Although the concept of organizational commitment can be further developed based on the perspective of the three-dimensional model of Meyer and Allen (1991,1997), here this work aligns with the perspective provided by Coetsee (1999), when analysing the concepts of resistance to change and commitment related to the project of implementing IS.

There have been a number of studies that have advocated the need to attain greater commitment from all levels throughout the implementation and some studies have demonstrated that organizational commitment could be an important issue for realizing IT benefits in organizations (Shum *et al.*, 2008; Swailes, 2004; Shoemaker,

2001; Benjamin and Levinson, 1993), with healthcare organizations not being an exception.

1.2 Research Rationale

A review of literature found that organizational commitment has positive effects on large-scale organizational change programmes (Lau and Herbert, 2001), principally change derived from IT Implementation (Shum *et al.*, 2008), and employees with strong affective commitment are willing to do everything to ensure the success of a change initiative (Meyer and Herscovitch, 2001).

Shoemaker (2001) demonstrated the critical role of stakeholder commitment during an IT implementation, while Swailes (2004, p. 187) in the same vein stated that an employee's level of affective commitment is indeed "a determinant in the management of change". Further, Shum *et al.*, (2008) reaffirm this argument with an exploratory research in three banks. They found that employees' commitment to the Customer Relationship Management (CRM) initiative contributed to the positive outcomes of a bank's performance.

Additionally, one study concerning "Experiences from Healthcare Information System Implementation Projects Reported in Canada between 1991 and 1997" by Lau and Herbert (2001) revealed that the two most repeatedly mentioned lessons learned over the years from the implementation projects were: the need to have organizational commitment and training/resource support (Lau and Herbert, 2001). As referred by Lau and Herbert (2001, p. 22), "organizational commitment is needed to provide the leadership, resources and support necessary to implement the systems".

Lau and Herbert (2001) obtained their findings through the analysis of the implementation of fifty IS projects reported at different conferences of the Association

of Health Informatics in Canada in the 1990s and twenty-four interviews with authors of these projects.

Considering the critical role that stakeholders' commitment has for IT implementation, one can say that the success of any change initiative, particularly the one introduced by an IS implementation, is highly dependent on employees having a high level of affective commitment to change (Shum *et al.*, 2008; Swailes, 2004; Shoemaker, 2001; Meyer *et al.*, 1998). Furthermore, if the organization's positive outcomes related to the investment in IS/IT could be seen abroad as potential business benefits from IS/IT (Peppard *et al.*, 2007), one can say that organizational stakeholder commitment is an important factor in obtaining the benefits from IS/IT (Shoemakers, 2001; Benjamin and Levinson, 1993).

According to Baus (2004), there appears to be a gap between the quality of care improvements made possible by HIS and the skills or willingness among healthcare professionals to use these systems. The reasons of this problem are diverse, and reflect many factors. Generally there is no unique cause for difficulties and failures in the implementation of HIS (Wager *et al.*, 2000; Lorenzi *et al.*, 1997).

Clinical activities rely heavily on the gathering and analysis of medical data for decision-making regarding the diagnosis and treatment of patients (Hersh, 2002), where HIS could make an excellent contribution (Institute of Medicine, 2001; Marietti, 1998). However, applications such as Computerized Physician Order Entry (CPOE) systems, Electronic Health Records (EHR) versus Electronic Medical Record (EMR), and electronic prescriptions are frequently strongly resisted by the same community that is expected to benefit from its use (Bhattacharjee *et al.*, 2007).

As the various studies above have demonstrated, it is possible to argue that by ensuring the commitment of healthcare professionals (as stakeholders), either to the

organization or to the implementation of the HIS project, is conducive to realising the expected benefits.

So, to understand how this happens, a research was carried out in the healthcare sector, focusing on a hospital setting and seeking to answer the following research questions.

1.3 The Research Questions

The research questions in this study are as follows:

1. How does the commitment of stakeholders affect the realization of expected benefits for the implementation of clinical information systems?
2. What is the role of technological frames of users in the development of commitment towards a project?
3. How do technological frames of reference and commitment to a project interact to influence the achievement of desired benefits?

These research questions start from an understanding of existing problems with HIS implementations as well as the extensive literature on organizational commitment and on the technological frames (TF) perspective of Orlikowski and Gash (1994) that helped analyse the data.

Understanding how an organization's members make sense of technology is critical to influencing their actions and to achieving planned outcomes. Therefore, in this research, stakeholder perceptions and behaviours were studied in depth in order to understand their commitment to the IS/IT project, organizational change related to it, and the achievement of business benefits.

For the purpose of answering these questions, the TF analysis of Orlikowski and Gash (1991, 1994) was applied. This perspective, which is rooted in social cognitive research, was used as a theoretical lens onto the research to help make sense of the data.

The theoretical framework of Technological Frames of Reference (TFR), investigate interpretive processes related to IT in organizations. Orlikowski and Gash (1994) define TF as the “subset of members’ organizational frames that concern the assumptions, expectations, and knowledge they use to understand technology in organizations. This includes not only the nature and role of the technology itself, but the specific conditions, applications and consequences of that technology in particular contexts” (Orlikowski and Gash, 1994, p.178). In this way, TF are the knowledge and expectations that guide actors' interpretations and actions related to IT.

The TFR framework has been cited in a varied range of published work (Aguilar-Zambrano and Gardoni, 2012; Lin and Silva, 2005; Ovaska, *et al.*, 2005; Davidson, 2002, 2006; Orlikowski and Gash, 1991, 1994), and has formed the basis for a genre of studies on the interpretive aspects of IT and organizational change (Davidson, 2006).

This research adopts the case study as a research strategy in order to provide answers to the research questions. An analysis was made of two different Portuguese hospitals aiming to become paper free that adopted the same software package. The research findings from this work contribute to a theoretical framework and help provide useful insights for practitioners.

1.4 Thesis Structure

The structure of the thesis has seven chapters. The first chapter contains a brief description of the subject under study, the reasons for undertaking this research and the research questions. In the second chapter a literature review of organizational commitment, benefits management and organizational change is presented. Chapter 3 presents the literature review for hospitals and HIS, their features and issues related to them. In the fourth chapter the philosophical perspective and adopted research strategy

are discussed taking into consideration the nature of the research questions. This chapter also discusses the theoretical lens used to analyse the data (the framework of TF) as well as its suitability for the subject under study.

Chapter 5 describes and highlights the relevant issues found in each case while Chapter 6 espouses the interpretation and analysis of the cases that resulted from the cross-case analysis, in which common patterns were searched for and new insights to theory generated. In the seventh chapter, the findings are presented and comparisons are made with previous empirical literature on the subject, following which some research conclusions are drawn. In addition, the contribution to the literature and practitioners' experience is identified. Finally, the study's limitations are acknowledged and possible areas for future research are indicated.

Chapter II Organizational Commitment and Benefits Management: A Literature Review

2.1 Introduction

The literature reviewed presented here centers mainly on theoretical perspectives and the central values that guiding this thesis. To this end, the focus here lies on the study of organizational commitment, benefits, change management and issues related to it. This is due to the fact that the introduction of IS is widely recognized as an inducer of organizational changes, as Davidson and Chismar (2007, p.739) affirm when they state that “Information technologies are viewed widely as enablers of organizational transformation”.

In this research IS is considered to be an organizational concept that must be studied using research methods which analyse its social component effectively (Caldeira and Romão, 2002). This perspective is supported by several authors who have studied the issues associated with the introduction of new IT and IS in organizations, including social interaction, politics and organizational environment (see, for example, Fitzgerald and Russo, 2005; Lapointe and Rivard, 2005; McGrath, 2002).

2.2 Organizational Commitment and IT/IS Benefits

When an IS/IT is introduced in an organization, numerous issues within or outside the project can affect stakeholders perspectives (their perceptions, interests and priorities), which can in turn, change their commitment to the project (Jurison, 1996). For instance, individuals or groups whose roles will be changed considerably can see their jobs threatened and hence develop resistance to change behaviours (Bhattacharjee and Hikmet, 2007; Lapointe and Rivard, 2005; Doolin, 2004; Markus, 1983). Hence, understanding their viewpoints can help prevent resistance and

operational problems (Symons, 1991), increase commitment to organizational change and enable the accomplishment of expected business benefits (Ward and Daniel, 2006).

The involvement of stakeholders in the identification of potential benefits either for individuals or organizations could increase their commitment, reduce their resistance, and facilitate the IS Implementation and IS/IT enabling changes (Ward and Daniel, 2006; Jung, 2006; Dhillon, 2005; Keen, 1981).

According to Jurison (1996), it is important to verify if the balance between "disbenefits" and "advantages" resulting from organizational change is satisfactory to each stakeholder's viewpoint and for the organization overall.

“An important challenge for management is to find a fair balance of benefits between the firm and its stakeholders (...) to implement the system effectively it needs the cooperation of stakeholders... with no apparent benefits to them they are likely to resist the new system” (Jurison, 1996 p.271).

Empirical studies have demonstrated that communication during the initial phase of an IS/IT project, establishing an agreement about the investment objectives and attainable benefits is beneficial to stakeholders when they agree as to how implementation will proceed (Ward *et al.*, 2005; Markus *et al.*, 2000). And, on the other hand contributes to an increase in user engagement (commitment). According to Jensen and Aanestad (2007, p.675), “the introduction of new technology requires conscious work in securing acceptance, as well as, commitment among users”.

Very few studies have addressed the organizational commitment from the stakeholder's perspective as a key element in delivering benefits (Shum *et al.*, 2008), in part because many studies on organizational change have been focused excessively at the macro level, such as enterprise-wide issues, whereas they ignore micro level issues such as individuals' commitment to change (Fedor and Herold, 2004; Wanberg and Banas, 2000).

The literature on organizational commitment has long been associated with the field of Organizational Behaviour (Staw and Ross, 1987; Whyte, 1986), while various

more recent studies exist (Valéau *et al.*, 2012; Bagraim, 2010; Shum *et al.*, 2008; Meyer *et al.*, 2002, 2007; Brockner *et al.*, 2004; Bartlett, 2001; Meyer and Allen, 1991, 1997)

In the area of IS, some empirical studies on organizational commitment have been made, both from the perspective of managers (Sabherwal *et al.*, 2003; Newman and Sabherwal, 1996) and users (Bagraim, 2010; Shum *et al.*, 2008; Lacity *et al.*, 2008; Stone and Henry, 2003).

The literature concerning benefits and benefits management has become more prevalent (e.g., Caldeira *et al.*, 2010; Ward and Daniel, 2006; Peppard *et al.*, 2007; Lin and Pervan, 2003; Ward and Peppard, 2002; Sedera *et al.*, 2001).

2.2.1 Organizational Commitment

Empirical research has been important in demonstrating relationships between the various elements of organizational commitment and the results/work behaviours potentially relevant to the company (Shum *et al.*, 2008; Meyer and Herscovitch, 2001).

Commitment has been defined as a state of mind that holds people and organizations in line with conforming behaviour (Sabherwal *et al.*, 2003; Meyer and Allen, 1991). It involves psychological forces that attach an individual to an action, as well as structural conditions that make a behaviour irreversible or difficult to change. It has been argued that commitment greatly affects the persistence of behaviour (Meyer and Herscovitch, 2001).

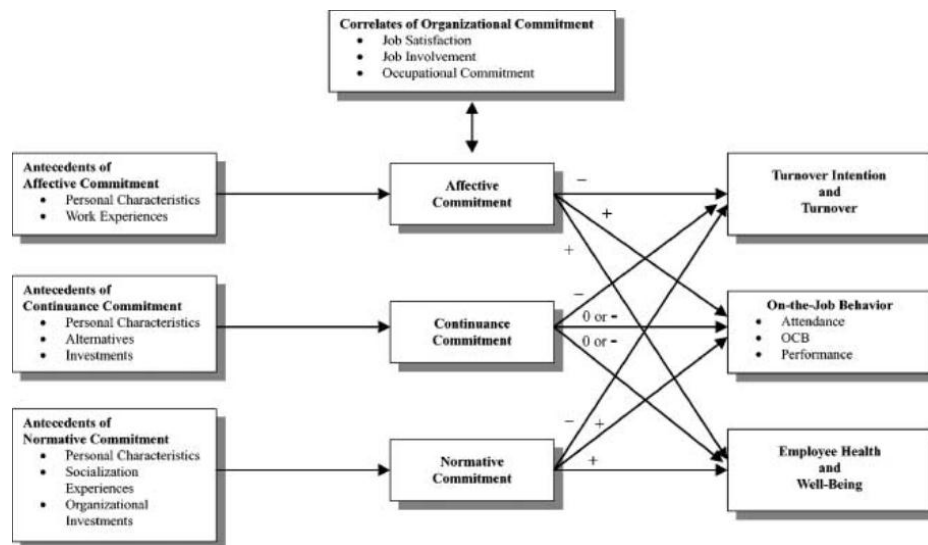
The first typologies of organizational commitment were developed by Etzione (1961) who argued that commitment is based on the degree of conformity that an individual experiences in compliance with organizational guidelines, adopting one of the following that constitute the three different states of an attitude towards continuous commitment: (1) the moral, in which there is a positive and intense orientation to the company, established through the internalization of goals, values and organizational

principles and identification with authority, (2) the calculating, characterized by a less intense connection that emerges from the trade relationship that takes place between the company and its members. In this case, the individual commitment depends on belief that the deal with the firm is both beneficial and fair. As such, there is a correspondence between the value of the contribution that individuals give the company through their work and the amount of reward they receive; and, (3) the alienating, which is characterized by an overall negative view of the organization, developed as a result of situations in which behaviour of individuals is severely conditioned.

The Etzione (1961) concept of commitment has a uni-dimensional nature, contrary to later definitions. The latest empirical studies on the subject, do not take into account the implications of alienating or negative forms of commitment to the organization, and have demonstrated the multidimensional nature of the organizational commitment concept (Meyer *et al.*, 2002; Meyer and Allen 1991, 1997).

The best known model, that is also representative of the multidimensional nature of the organizational commitment concept, is that developed by Meyer and Allen (1991, 1997). This approach of commitment and the developments provided by subsequent research (Meyer and Herscovitch, 2001) was partially adopted in this work. The three-component model of Organizational Commitment of Meyer and Allen (1991, 1997), represented by Meyer *et al.*, (2002) can be seen in Figure 1.

Figure 1 A Three-Component Model of Organizational Commitment



Source: Meyer *et al.*, (2002, p.22)

This model of the three components of commitment of Meyer and Allen (1991, 1997) has been broadly used and has received the most extensive empirical evaluations to date (Bryant *et al.*, 2007; Thatcher *et al.*, 2002-2003; Meyer *et al.*, 2002; Bartlett, 2001; Paré *et al.*, 2000, 2001).

Meyer and Allen (1991, 1997) describe organizational commitment as a psychological state that characterizes the relationship between the employee and the company, and they consider that this state has a strong influence on the worker's decision to remain a member of the organization. According to these authors, the organizational commitment includes, simultaneously, in variable degrees, the three components or dimensions of organizational commitment which reflect the intensity of the psychological connection that binds the employee with the company: 1) the affective commitment, 2) the continuance commitment and 3) the normative commitment (Meyer and Allen, 1991, 1997).

The affective commitment refers to the employee's emotional attachment, identification and involvement with the organization. The continuance commitment

implies the recognition by the employee of the costs associated with leaving the organization. In this type of commitment the individual is conscious that there are costs associated with the abandonment of the company where he or she works. In respect to the normative commitment, there is a sense of moral obligation that the employee feels to continue in the organization.

To date, most of the research on this subject has investigated the association between organizational commitment and turnover intention (Lacity *et al.*, 2008; Thatcher *et al.*, 2002-2003; Lum *et al.*, 1998; Igbaria and Guimarães, 1993), training (Bartlett, 2001), positive outcomes and success of CRM projects (Shum *et al.*, 2008), professional commitment (Bryant *et al.*, 2007; Wallace, 1995) and peer mentoring (Bryant *et al.*, 2007). Other researchers have been concerned with other organizationally valid issues, such as strategic planning success (Basu *et al.*, 2002).

According to Meyer and Allen (1997), the numerous factors that were considered as antecedents of organizational commitment can be grouped into two categories: the 'close' and 'distant' causes. The first are those that seem to have a direct influence on any component of organizational commitment. The second exercise their influence on the commitment through their impact on close causes (Meyer and Allen, 1997).

The close antecedents

The close antecedents comprise:

a) The characteristics of work and work experience that are developed (the scope of work; the level of challenge that involves the degree of autonomy, skills and techniques applied; organizational support perceived by employees in the development of their daily activities);

b) The level of conflict and role ambiguity experienced by employees. Role ambiguity is the difference between what is expected of an individual at work and what he/she feels he/she should do (Igbaria and Siegel, 1992).

c) The type of psychological contract. The psychological contract is an agreement (underlying the non-formal, subjective and dynamic) between the employee and the company, which adjusts the behaviours of both parties and creates a common tie between them. It defines the relationship between the employer and the employee, and reflects the beliefs and expectations of both the employee and the company, respect of duties and reciprocal obligations - a basic point of theory of organizational commitment. Therefore, if employees become conscious that the employer does not fulfil this contract, this will influence their behaviour, attitudes and respect for the organization, leading probably to a decrease in their level of commitment (Meyer and Allen, 1997).

The distant causes of organizational commitment include the organizational characteristics, the employee's personal characteristics, environmental conditions and the strategies and practices of human resources (Meyer and Allen, 1997).

Researches on this topic still lack a strong theoretical and empirical systematization, particularly in relation to the antecedents of continuance commitment and normative commitment. The empirical findings are limited, whereas the approach to the antecedents of affective commitment has been more extensive (Meyer *et al.*, 2002; Meyer and Herscovitch, 2001).

Many studies have examined the specific relationships between affective commitment and some variables considered as its antecedents (precursors) (Bishop *et al.*, 2005; Stone and Henry, 2003; Meyer *et al.*, 2002; Tu *et al.*, 2001; Coleman *et al.*, 1999).

Meyer and Herscovitch (2001) define antecedents of affective commitment as:

“Any personal or situational variable that contributes to the likelihood that an individual will (a) become involved (intrinsically motivated, absorbed) in a course of action, (b) recognize the value-relevance of association with an entity or pursuit of a course of action, and/or (c) derive his or her identity from association with an entity, or from working toward an objective, will contribute to the development of affective commitment” (Meyer and Herscovitch 2001, p. 316).

Theoretically, it will be highlighted only the variables that have the greatest impact on the employee's affective commitment (Meyer and Herscovitch, 2001).

The distant antecedents

The set of distant variables that have traditionally been studied, as having influence on affective commitment are: personal, organizational characteristics, and the human resource strategies.

a) Personal Characteristics

Individuals differ in their predisposition to compromise which, of course, could influence the level of emotional commitment that they feel for the organization (Lee *et al.*, 1992).

Research on personal characteristics that can be considered as a distant cause of affective commitment are focused on sex, age, seniority, marital status, number of children, educational level, etc. However, the most significant positive relationships have been established between affective commitment, age and seniority (Salami, 2008; Meyer *et al.*, 2002)

b) Organizational Characteristics

The organizational characteristics most studied and reported in the literature, as factors which influence commitment are the company size and its degree of formalization and decentralization (Meyer and Allen, 1991, 1997; Wallace, 1995). However, the empirical support for any relationship with affective commitment is neither strong nor consistent (Meyer and Allen, 1991, 1997). This can be explained by the fact that these macro-level variables have a certain influence on affective

commitment through their impact on certain close antecedents, such as work experience or the role definition (the same ones that have a greater impact in shaping attitudes to the organization and are also more closely related to the daily work).

c) Human Resources Strategies Faced by Employees

In light of the literature review, one can say that the human resources strategies and practices are those antecedents with stronger and more consistent relationships with affective commitment, exercising a greater degree of influence on all the close antecedents of organizational commitment, that is, on the experiences of work, job characteristics, the definition of roles and the characterization or modification of psychological contracts (Meyer *et al.*, 2002; Meyer and Allen, 1991, 1997).

At the theoretical level, some human resource practices seem to have more potentially positive effects for affective commitment, such as recruitment policies related to job security and compensation strategies (above average) linked to organizational performance.

Recruitment policies related to job security can increase the belief of the worker in the organization's core values and, on the other hand, high compensation strategies confer to employees feelings of self-esteem that facilitate emotional attachment and identification with the company, because it may be perceived by employees as a sign of the value that the company confers to them.

These policies are likely to develop in the employee a certain level of emotional commitment. They encourage the worker to put in an additional effort for the company and the projects that it develops [including the implementation of IS] (Shum *et al.*, 2008; Meyer *et al.*, 2002; Meyer and Allen, 1991, 1997).

Similarly there is also a positive relationship between the training policy of the company and affective commitment, because the first one may be viewed as a business

philosophy centred on human resources as a valuable investment. This allows the employee to respond to the company's investments with a psychological adherence adjusted to his/her aims and goals (McElroy, 2001).

According to Wallace (1995), organizational commitment is highly dependent on perceived opportunities for career advancement and the criteria used in the distribution of rewards. Being a professional typically involves a life-long career, and if the employing organization does not facilitate the advancement of one's professional career, then professionals can be less loyal to the organization (Wallace, 1995).

This research bases its definition of commitment on that stated by Meyer and Herscovitch (2001) in their work regarding commitment in the workplace. This choice is founded on the fact that these authors, although recognizing the three distinguishable components of commitment of Meyer and Allen (1991), extend the definition of commitment to include the nature of the targets to which employees become committed.

Meyer and Herscovitch (2001), define commitment as "... a force that binds an individual to a course of action of relevance to one or more targets and can be accompanied by different mind-sets [affective, continuance and normative commitment] that play a role in shaping behaviour" (p. 299). This target can be an entity, "an abstract concept or the intended outcome of a course of action- it is that to which the behavioural consequences of the commitment are perceived by the actor to be relevant" (p.310).

According to Meyer and Herscovitch (2001) the employees can commit to both entities (e.g., organizations, occupations and unions) and behaviours (e.g., attainment of a specific goals and implementation of policies).

2.2.2 Commitment and Information Systems

It is widely accepted that commitment to an information system development project affects the eventual success of the system (Sabherwal *et al.*, 2003; Newman and

Sabherwal 1996; Weill and Olson, 1989). Problems arising from low commitment have also been mentioned (Shum *et al.*, 2008). However, there has been little research on the factors that influence the level of commitment within IS projects (Sabherwal *et al.*, 2003; Newman and Sabherwal, 1996).

Much of the research analysed in the IS area has been related with managers' commitment (particularly on escalation of commitment) (Sabherwal *et al.*, 2003; Newman and Sabherwal 1996) but fewer researchers have studied commitment from other stakeholders' perspectives, that is, from the users' perspective (Shum *et al.*, 2008; Fedor and Herold, 2004; Tu *et al.*, 2001; Wanberg and Banas, 2000). The primary interest of this study is to analyse organizational commitment from the user's perspective.

According to Sabherwal *et al.* (2003), the level of commitment could vary over time and during the course of a project, because its determining factors are affected by changes in the organization and its environment.

In line with the definitions of commitment given by Meyer and Herscovitch (2001) and Coetsee (1999) and considering the scope of this work, the concept of commitment to an IS project implementation is seen as an acceptance of it and a higher affinity, identification and engagement in achieving the expected benefits, from it.

Top management commitment is rated as the most important factor in planning and the implementation of IS (Basu *et al.*, 2002) as well as in the influence it has on the commitment of other stakeholders (Sabherwal *et al.*, 2003; Jarvenpaa and Ives, 1991).

Top management support also influences the organization's effectiveness in converting IT investments into useful outputs (Weill and Olson, 1989). Conversely, lack of commitment of top managers could lead to indifference or deliberate resistance (Coetsee, 1999) and may even cause the project to be abandoned (Doolin, 2004; Sabherwal *et al.*, 2003; Wilson and Howcroft, 2000). In this way, "if top management

does not support a project, commitment of other stakeholders may also be diminished” (Sabherwal *et al.*, 2003, p. 785-786).

2.2.3 Commitment, Organizational Context and IT/IS Benefits

Information Systems are complex social objects that are inseparable from the organizational context within which they are introduced and from the infrastructure supporting them, as well as, being products of history and human agency (Symons, 1991). In this way, it “requires an interactionist approach, taking the effects of information technology to be a product of neither the technical nor the social aspects alone, but of their interaction” Symons (1991, p.206).

Dhillon (2005) defends that both the choice of an appropriate methodology and the observation of organizational context in which the information system is being developed is essential to ensure project success.

The lack of attention paid to contextual and historical factors by many researchers is redressed by focusing on the context of interaction, and by integrating the action of humans with the on-going flow of social practices that produce and reproduce social systems over time (Orlikowski and Robey, 1991).

The changes that an organization needs to make when it wants to achieve any benefits made possible by IS/IT will depend on its present status, that is, the current performance level of the organization in relation to its competitors or business goals. This means that the organizational context is unique, and it is not feasible to develop a generic set of benefits and related changes for certain application types, or kinds of organizations and units, even if they pertain to the same enterprise or public institutional system (Ward and Daniel, 2006).

Pettigrew (1985) distinguishes outer from inner context. Outer context is the social, economic, political and competitive environment in which an organization

operates; inner context refers to the structure, corporate culture, and political context within the organization through which ideas for change have to proceed.

The nature or type of organization is a key element in helping to define the context. Thus, when the firm operates in the public (as opposed to the private) sector, the main business drivers (for investing in IS) are different from the private sector. The business drivers for public sector organizations are regularly imposed by government policies, making them sometimes, strangers to the stakeholders. “The drivers are often in the form of a requirement to meet a specific target and by a given deadline, whether or not this is feasible or appropriate for that organization” (Ward and Daniel 2006, p. 280).

Ward and Daniel (2006) highlight several aspects of the organizational context, such as the characterization of the company in terms of size, number of employees and type of employment contracts, physical structure (single entity or multiple entities), geographic location, or nature of its organizational structure (public/private, professional, semi-professional or bureaucratic).

Some of these macro-level variables, such as the size, type of employment contracts, physical structure, degree of formalization and decentralization of organizations may influence organizational commitment, through the impact they have on some antecedents of affective commitment (Meyer and Allen, 1991, 1997), such as work experience or the role definition that employees experience, which can in turn affect the satisfaction of worker personal needs and shape employee attitudes towards the organization (Meyer and Allen, 1997; Wallace, 1995).

Another factor also associated with size is the presence of internal labour market conditions that may allow better work conditions, job rewards and career opportunities (Wallace, 1995). With respect to career opportunities, professional organizations

provide more promotional opportunities for their professional members than, the nonprofessional organizations (Nelson and Trubek, 1992).

2.2.4 Commitment versus Resistance to IS/IT Adoption

According to Markus (1983), explanations of resistance are important since, “informal or implicit, they guide the behaviour and influence the actions taken by managers and systems analysts concerned with implementing computer-based applications” (Markus, 1983, p.430).

Leana and Barry (2000) consider that stability and change are simultaneously present in organizations, and both are a necessary part of an organization’s effective functioning over the long term. At the same time that organizations and individuals are pursuing change, there are several individual, organizational, and societal forces promoting stability in work and employment relations.

To explain the causes of social inertia (or apathy), associated with IS/IT implementation Keen (1981, p.24) pointed out the following: (1) Information is just a small part of the organizational decision making processes; (2) The human method of processing information is usually experimental and simple, organizations are complex and change is incremental and evolutionary; large steps are avoided, even resisted; (3) Data are not only an intellectual product but a political resource, whose repositioning through new IS affects the interests of particular groups.

Research has shown that IT-enabled changes generate particular sets of issues according to the perceptions that are often assumed in relation to the overall effects of IT or the repercussions of a particular change on individual responsibilities or organizational relationships (Ward *et al.*, 2005; Lin and Silva, 2005; Markus, 1983). Some of these perceptions have the ability to produce some resistant behaviours relating to a new system

or technology that is introduced in an organization, reducing therefore, the commitment to the project.

Resistance surfaces because the achievement of many of the benefits depends on changing traditional ways of working and standardization of organizational practices which can be seen as “a significant “disbenefit” [disadvantage] of the changes by those affected” (Ward and Daniel, 2006, p. 204).

However, it is not always the explicit changes that provoke the resistance but, the real or perceived secondary effects of the changes. Examples of these perceived effects are: increases or decreases in job security (Walton, 1989); improved accountability with less discretion and autonomy of decision making; higher visibility of individual performance and loss of autonomy in its responsibility area (Ward and Daniel, 2006; Doolin, 2004); inequity of benefits distribution (Jurison, 1996; Joshi, 1991); and loss of power (Lapointe and Rivard, 2005; Markus, 1983).

Information systems' researchers have for a long time been studying IS implementation and recognized resistance as a critical variable that can undermine success (Lapointe and Rivard, 2005; Maracas and Hornick, 1996; Joshi, 1991; Markus, 1983; Keen, 1981). Thus, IS/IT are frequently seen as menacing, described by Keen (1981, p.25), as “an intrusion into the world of the users who see these unfamiliar and [irrelevant] techniques as a criticism of themselves”.

According to Lauer and Rajagopalan (2003), people express their resistance to change brought by the implementation of IT in various ways. The most common is the expression of opinion in opposition to the new system. In a more extreme reaction, the resister could abandon the organization in protest.

Resistance has been defined as an adverse reaction to a proposed change (Hirschheim and Newman, 1988), as a perception of inequity or loss of equity by users (Joshi, 1991), as passive-aggressive responses to threats that an individual associates

with a new system (Maracas and Hornik, 1996), as behaviours intended to prevent the implementation or use of a system or prevent system designers from achieving their objectives (Markus, 1983), or yet as a signal from a system in equilibrium where the costs of change are perceived as greater than the likely benefits (Keen, 1981, p. 27).

The actions of the resister are apparently visible and relatively simple to detect in active forms of resistance. By contrast, passive forms of resistance are not simple to identify and are more difficult to deal with, as is the case of reluctant acceptance. In this case, the resister apparently shows no signs of frustration or rejection of the system, but is constantly seeking ways to avoid using it and in many cases uses it in ways that are less effective than originally intended. Another kind of passive resistance occurs when an individual feels he can beat the system by simply finding ways of working around it. Finally, there is the crusader against the system who silently conspires and uses every chance to interrupt the system functioning, like sabotage (Lauer and Rajagopalan, 2003).

Some assumptions about resistance to IS/IT are associated with the technical aspects of the system. The main assumption relating to IS/IT's capacity to provoke resistance is the objective/intention of the system designers (intention of the system) (Markus, 1983), many times interpreted (inferred) by the users from the characteristics of the system (usually directly related). This aspect is also presented by Lapointe and Rivard (2005) as system significance.

According to Dent and Goldberg (1999), people do not resist change per se. Resistance occurs when employees believe that change will cause either loss of status, loss of revenue, or loss of power (Lapointe and Rivard, 2005; Dent and Goldberg, 1999; Markus, 1983).

Politics often play a key part in IS development (Symons, 1991) and any new IS introduction can lead to conflict, domination, sabotage or commitment to it (Jasperson

et al., 2002). Therefore, organizational power is one of the important variables that should be properly understood and leveraged in order to ensure the achievement of required benefits and IT implementation success (Lapointe and Rivard, 2005; Dhillon, 2004; Markus, 1983).

Some reasons for resistance described by diverse authors are: (1) incapacity or fear to deal with technology (e.g., Fitzgerald and Russo, 2005); (2) the need to learn new skills or apparent depreciation of their current role; (3) lack of additional resources during the transition; (4) concerns about the ability to introduce changes and simultaneously maintain current levels of performance; (5) fear of reductions in staff (Ward and Daniel, 2006); (6) new systems being too prescriptive (with lose of autonomy); (7) measurements of individual performance (Doolin, 2004); (8) and scepticism that the new system will actually work, based on previous experience (e.g., Fitzgerald and Russo, 2005; McGrath, 2002). For Swanson and Ramiller (1997), resistance often appears as the result of a lack of common understanding of the purpose of change.

Regarding what has been said, it might appear that the resistance is a bad thing, preventing organizations from obtaining the potential benefits of an IT implementation but many of the authors previously mentioned (e.g., Lapointe and Rivard, 2005; Lauer and Rajagopalan, 2003; Markus, 1983) consider that the resistance to change can have both positive and negative effects. Resistance can be destructive because it causes conflict, hostility and consumes time and attention. However, it can also be useful for organizations because it can avoid negative consequences of the system's installation, which could emerge with the on-going use of the system (e.g., stress, turnover, reduced performance) (Markus, 1983).

In the literature, the concepts of user acceptance and resistance have been conceptualized by many authors as being at two ends of a continuum (Riemenschneider

et al., 2002; Venkatesh and Davis, 2000), in which resistance is considered as the reverse of acceptance. User acceptance has been explained in such models with the underlying assumption that non-acceptance has the same connotation as resistance; however, this conceptualization may be inadequate to explain some cases of IS implementation. For instance, apparent acceptance may cover passive forms of resistance (see Maracas and Hornik, 1996).

This research aligns itself with the opinion of Coetsee (1999), where resistance is seen as a rejection of change, and therefore, the contrary of the commitment that he considers as acceptance. He argues that commitment and resistance are related to each other, in the sense that they represent a continuum whose two poles are acceptance and resistance (Coetsee, 1999).

Drawing on Judson's work (1991), Coetsee (1999) developed a commitment – resistance model in which he added more two forms of resistance, one that he considered as a transition level (apathy) and another more intense form of resistance (aggressive resistance).

This transition phase that he has named as apathy or indifference, is a neutral or transition zone of continuum between commitment and resistance. In this way, resistance to change can range from apathy or indifference, which can be characterized by a lack of positive or negative emotions or attitudes (indicated by an absence of demonstrated interest), to aggressive resistance (a destructive opposition). Between apathy and aggressive resistance, he describes intermediate forms of resistance: Passive resistance (mild or weak forms of opposition to change, revealed by the existence of negative perceptions and attitudes expressed by voicing opposing views) and active resistance (strong but not destructive opposing behaviour such as blocking or impeding change). In the same way, acceptance or a commitment to change, vary from a weak

form of acceptance, support (i.e. a positive attitude towards the change) to one stronger form (a limited supportive behaviour).

According to Coetsee (1999), commitment represents the final phase of acceptance of change (the powerful phase of acceptance). His definition of commitment includes five components: knowledge, information, empowerment, rewards and recognition and shared visions (Goals and Values).

Knowledge - indicates the extent to which a learning climate exists in the organization. It concerns employee's knowledge, skills, training, methods and techniques applied to stimulate their growth.

Information refers to communication in an organization (how effectively the information is disseminated, and how well employees understand and accept it).

Empowerment is the degree to which employees can influence and participate in decision making.

Rewards and Recognition relates to the organization's rewards and recognition philosophies, policies and systems and the way in which these are applied, and overlap with financial aspects.

A shared vision describes what the organization is about, and what it must focus on and do to be successful. In other words, this refers to, "what we have to do to achieve goals and the way we do things here" (p.216), a vision that "helps people commit and also serves as a focus (goals) and guides behaviour (values) for achieving the organization's mission" (p. 213).

The approach to commitment proposed by Coetsee (1999) is in line with views of commitment of Meyer and Allen (1990, 1991), where it is seen as "affective commitment".

2.3 Benefits Management

The business benefits can be defined as the effects resulting from the changes, or as the differences between the existing and future ways that work is done (Ward *et al.*, 1996). They could also be seen as an advantage for a particular stakeholder or group of stakeholders who want to obtain value from the investment (Ward and Daniel, 2006).

The benefits arising from IS/IT are often described as either tangible or intangible, depending on the objectivity and capability to be measured. Examples are respectively: financial benefits and improvements in customer or employee satisfaction. Conversely, the “*disbenefits*” are seen as any disadvantage or undesirable consequence for the whole organization, groups or individuals when an IS/IT project is adopted by an organization.

From the literature review, perceived benefits of an Information System refer to: (1) the anticipated advantages that the application can provide to the organization (Chwelos *et al.*, 2001), (2) the positive impact of implementation (Casedesus and Karapetrovic, 2005), and (3) the characteristic that most influences the adoption (Mehrtens *et al.*, 2001). For instance, Chwelos *et al.* (2001) identified and organized the factor of perceived benefits as a determinant of the adoption of Electronic Data Interchange (EDI) and this determinant was found as being a significant predictor of intent to adopt EDI.

There are many different studies exploring the perceived benefits of a technology. Staples *et al.* (2002) conducted one study to examine the effect of new information system on user expectations, an important factor affecting perceived benefits arising from the use of new IS. Shang and Seddon (2002) focused on the benefits that organizations may achieve from their investment in enterprise systems (ES).

Jiménez-Martínez and Polo-Redondo (2004) investigated why EDI was not very widespread, and they hypothesized that this must be due to the fact that the benefits are hard to perceive following technology adoption. Jiménez-Martínez and Polo-Redondo, 2004; Shang and Seddon, 2002; Chwelos *et al.*, 2001; Dearing, 1990), presented three main benefit dimensions: direct benefits, indirect benefits, and strategic benefits.

Direct Benefit - is a result closely related to technologies or applications occurring by cause and effect. It is the easiest to identify, to track, and to measure (Jiménez-Martínez and Polo-Redondo, 2004). Examples of these benefits include operational cost savings and other internal efficiencies such as reduced paperwork and data re-entry, time saved, and error reduction (Chwelos *et al.*, 2001).

Indirect benefits include returns that cannot be directly observed, such as worker productivity or improvement of customer services. These benefits are less tangible than direct benefits (Jiménez-Martínez and Polo-Redondo, 2004). They are enabled by the technology or are the result of changes in the way people do things (Ward and Daniel, 2006; Dearing, 1990).

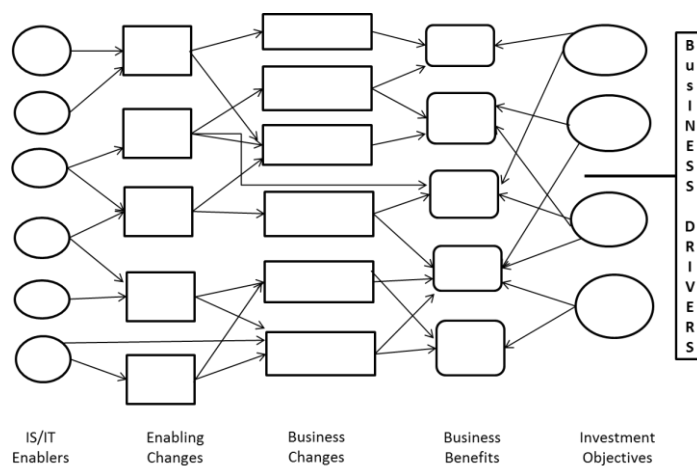
Indirect benefits can also be opportunities that arise from the use of the technology such as improvement in customer services, improvements in operational efficiency, better productivity or employee satisfaction (Chwelos *et al.*, 2001).

The strategic benefits are strictly related to the indirect benefits, and may be the most significant benefit, even though they are hard to measure. These benefits are related to the strategic relationship with suppliers/providers, customers, and others, rather than with the measurable cost savings (Dearing, 1990). The strategic benefits include the large amount of information generated, faster response and access to information (Jimenez-Martinez, Polo-Redondo, 2004), and market share expansion through the strategic use of information and lower costs.

Traditional measures have not been very effective in identifying all available benefits or adequately quantifying the benefits because they are mainly supported by conventional management accounting measures (e.g., return on investment (ROI), return on assets (ROA), or revenue growth rate) (Ward and Daniel, 2006; Ward *et al.*, 1996; Jurison, 1996).

The benefits identification activities as well as the changes required for the delivery of each benefit along with IS/IT capabilities which enable its realization can be expressed as a “benefits dependency network” (See Figure 2). Through a combination of business changes and new IS/IT capabilities, this benefits dependency network shows how each of the improvements can be achieved (Peppard *et al.*, 2007; Ward and Daniel, 2006). “The high-level view of stages of benefits dependence [network] is a useful mean to understand how benefits come from changes within the business” (Dhillon, 2005, p.504).

Figure 2 The benefits dependency network



Adapted from Ward and Daniel (2006)

The completed network contributes to developing a robust business case for investment and a practical change management plan to deliver the benefits (Peppard *et al.*, 2007). The ‘business case’ is an approach used to appraise IS/IT investments,

usually in financial terms, and is preferred by managers because, while benefits appear only as future expectations of imprecise value, investment costs are immediate and highly visible (Jurison, 1996). However in the view of some authors (see Ward and Daniel, 2006; Ward *et al.*, 1996) the business case is not very effective in capturing all available benefits, particularly those that are more intangible and difficult to quantify.

In this IS/IT management approach, it is important to distinguish the differences between business changes and enabling changes for a better understanding of the benefits dependency network (Ward and Daniel, 2006).

Business changes are new ways of working that will be systematically required in the future if the benefit is to be achieved and sustained. By contrast, enabling changes are prerequisites and specific requirements for achieving the business changes and “tend to be required either before the system goes live or shortly thereafter” (Ward and Daniel, 2006, p. 136). They are essential to the effective functioning of IS/IT within the organization.

In general, changes cannot be made until the new system is available for use and the necessary enabling changes have been implemented. Examples of business changes are: assignment of new roles and responsibilities, implementation of new or redesigned processes, new practices for managing and sharing information, and the use of new appraisal and incentive systems.

The enabling changes can be for instance: training in new business skills, instruction in the use of the new system, reallocation of resources/budgets, publicising how the new systems can improve the performance of individuals, groups or the whole organization, and defining and agreeing new working practices.

The IS and technology required to assure the realization of benefits and to allow the necessary changes to be carried out are known as IS/IT enablers.

2.3.1 IT Benefits Realization

The relationship between IT and organizational change is a central concern in the field of IS (Ward *et al.*, 2005; Markus, 2004), being an important and necessary issue for the achievement of benefits from IS/IT.

Many IS require a significant amount of associated change in working practices and processes, even down to the culture of an organization, in order to deliver benefits (Dhillon, 2005; Markus, 2004; Markus *et al.*, 2000; Ward *et al.*, 1996; Benjamin and Levinson, 1993). This is what distinguishes the “technochange” perspective and more conventional approaches (Markus, 2004).

The real benefits are not inherent to the IS/IT, but instead, they result from the changes in the organizational activities that the IS/IT has enabled (Peppard *et al.*, 2007; Dhillon, 2005). IS/IT on their own do not deliver benefits; what IS/IT can do is to enable benefit opportunities to arise. To take advantage of these benefit opportunities, changes must take place in the way that business activities are performed or in the way that information is used (Peppard *et al.*, 2007; Ward and Daniel, 2006). In this way, benefits realization is intrinsically linked to change management and the changes must be identified and managed successfully (Peppard *et al.*, 2007).

The overall process of evaluation and realization of IS/IT benefits is known as “benefits management”. It could be defined as the process of organization and management that allows the potential benefits arising from the use of IT to be in fact, achieved (Peppard *et al.*, 2007; Ward *et al.*, 1996). The central concept of this methodology is that benefits are derived through business changes (Ward *et al.*, 1996).

The interactive process of a benefits management integrates five interconnected stages: (1) identifying and structuring benefits, (2) planning benefits realization, (3) executing the benefits realization plan, (4) evaluating and reviewing results, and (5) establishing potential for further benefits (Ward and Daniel, 2006).

Many of the existing methods reproduce best practices in effective management of IS/IT, that is, through activities such as project management and systems development. However, according to Ward and Daniel (2006, p.363), “they do not directly address many of the organizational or socio-technical issues”.

In the next section some ways to manage change are briefly addressed, where the objective of assuring the achievement of the desired IS/IT benefits is of ultimate importance.

2.3.2 Organizational Change and Benefits Management

IS development is sometimes more political than technical and the way to manage social change must be based on the acceptance of its political nature and the need for appropriate authority (Symons, 1991; Keen 1981). This political nature of IS/IT is well represented in Symons’ thinking when he says: “Where there are conflicts in hidden goals IS evaluation becomes an arena for organizational politics” (Symons, 1991, p. 206).

Some groups are frequently motivated to make the changes whereas for others, the introduction of technology is considered threatening. For instance, in many healthcare organizations, medical staff have different views about IS/IT (Linberg, 1999) and the role of IT in their jobs. While some are enthusiastic about the possibility of enhancing their reports and see the IT as an essential tool others consider IT as a barrier in the care delivery process and a waste of time. On the other hand medical staff approach IT with differing levels of ability (Ward and Daniel, 2006; Dhillon, 2005; Lapointe and Rivard, 2005).

According to Pettigrew (1985), the analysis of organizational change should accurately explore the relationship and interplay between the content of change (what), the context of change (why) and the process of managing change (how).

Ury *et al.* (1993) proposed three kinds of management approaches to address change management issues, linked to stakeholders. However, they remarked that each one of them could also lead to adverse behaviours. The management approaches were:

- Top down – occurs when the changes are imposed by senior management. This can be effective but, in the short term, it can lead to a feeling of resentment and reduce future collaboration.
- Coalition - consists of working together to understand and resolve the concerns and, if possible, their causes, at least during the project.
- Negotiation - relates to the creation of very specific trade-offs between the organization's need for the benefits and the ways by which the stakeholders will make those benefits happen.

Other authors suggest a combination of management approaches to best implement organizational change. For instance, Ward *et al.* (2005) studied how different approaches to managing Enterprise Systems (ES) implementations can influence the behaviours of key stakeholders and consequently the achievement of the benefits expected from the investment.

In their study, Ward *et al.* (2005) explored the organizational issues of ES implementation by considering both the interactions between a project team's management approach and stakeholder types of behaviour. Their framework, represented in Figure 3, addresses management approaches to implementing change from Ury *et al.* (1993) and stakeholder rationalities regarding IT implementation from Kling (1980) and Kumar *et al.* (1998). These rationalities are system rationalism or a segmented institutionalism (Kling, 1980), and trust-based rationalism (Kumar *et al.*, 1998). The first assumes that all stakeholders in an organization look for an organization's efficiency and effectiveness through the use of technology. The second views stakeholders as pursuing their personal interests, even at the expense of the

organization, while the last suggests that, although protecting self-interests, stakeholders also collaborate with one another to look for common gains based on trust relationships.

Though representing different ways of describing stakeholder behaviour surrounding IS implementation, Ward *et al.* (2005) argue that the three rationalities are not mutually exclusive.

Figure 3 The Combined Framework

ES project team's stakeholder management approach			
Information systems' rationalities & behaviours	Top down (Power) Those responsible for ES implementation make decisions with or without consultation of stakeholders	Coalitions (Interest) ES project team facilitates stakeholders by identifying courses of action that satisfy all of their requirements	Negotiation (Rights) ES project team uses the project plan and other documents to define how change will be implemented and how benefits will be delivered
	Rational (System rationalism) Stakeholders focus on maximising the organization's effectiveness and efficiency.		
	Trust (Trust-based rationalism) Stakeholders trust each other to work in a way that is mutually beneficial.		
	Self-Interest (Segmented institutionalism) Stakeholders focus on satisfying their private interests by negotiating with Stakeholders.		

Source: Ward *et al.*, (2005, p. 102)

There are a variety of factors that can also influence the planning and execution of IS/IT implementations, as well as managing organizational change. They include investment objectives, how the organizational vision is communicated, the extent to which areas of potential divergence are identified and resolved in the early stage of implementation (Markus *et al.*, 2000; Swanson and Ramiller, 1997), the extent to which technological and process change issues can be addressed simultaneously (Robey *et al.*,

2002), and how well the adopted management approach prevents adverse behaviours of key stakeholder groups (Ward and Daniel, 2006; Ward *et al.* 2005).

The choice of approach used to manage change will depend on the type of organization, adopted management style and organizational context in which the IS will be introduced. Various approaches can be useful depending on the stage of implementation and knowledge of stakeholders' behaviours. For instance, the findings of Ward *et al.* (2005) show, in agreement to Ury *et al.* (1993), that whilst "top-down" management appears beneficial in the early phase, maintenance of this approach during all implementation phases may damage existing relationships between interest groups as well as their relationships with the project team. Other approaches like coalition or negotiation might be more appropriate.

The project team's adoption of an effective communication approach towards individuals and groups has been identified as a significant factor in increasing their collaboration and reducing resistance to change (McGrath, 2002; Akkermans and Van Helden, 2002). Lack of such an approach has been proposed as a risk factor in IS/IT implementation (Sumner, 2000).

A key piece of the planning process when implementing an IS/IT is to determine if the change can be supported by a critical mass of stakeholders, i.e., to test organizational readiness (Benjamin and Levinson, 1993). Projects often fail due to the lack of cooperation by people whose skill or motivation for accepting change is essential to delivering the benefits required because they have not been sufficiently involved in the project by the implementers (Ward and Daniel, 2006).

An important aspect of the benefits management approach is the consideration of the project from the perspective of a large set of stakeholders to encourage their participation in planning and implementation activities (Peppard *et al.*, 2007; Ward and

Daniel, 2006; Dhillon, 2005). This is the main objective of stakeholder analysis (see Ward and Daniel, 2006; Benjamin and Levinson, 1993).

Benjamin and Levinson (1993, p. 31) proposed a method of a stakeholder analysis that integrates seven steps: (1) identify a vision or objective; (2) describe a number of goals held by the stakeholder group; (3) break the goals down into: the process, technology, organization, and culture steps necessary to balance the organizational equilibrium; (4) identify the stakeholder groups whose commitment is necessary to achieve each goal; (5) for each type of stakeholder, describe the changes needed, perceived benefits, and expected kinds of resistance; (6) analyze the effort required to gain the necessary commitment from the stakeholder group; (7) develop action plans for those stakeholder groups who are not strongly committed.

To conclude this chapter we must establish a bridge between commitment and change management, since it underlies any information system that is implemented, particularly if it introduces significant changes in the way of doing things.

Herscovitch and Meyer (2002) proposed that commitment could take different forms and have different implications for the nature and level of employees' behavioural support for change. They based their model of commitment of organizational change on the general theory of workplace commitment by Meyer and Herscovitch (2001), as presented before.

Herscovitch and Meyer (2002, p. 475) define commitment to a change as "a mindset that binds an individual to a course of action deemed necessary for the successful implementation of a change initiative". As with previous contributors to the area, they recognize all the three psychological states to commitment. According to Herscovitch and Meyer (2002), these mind-sets "can reflect (1) a desire to provide support for the change based on a belief in its inherent benefits (affective commitment to the change), (2) a recognition that there are costs associated with failure to provide

support for the change (continuance commitment to the change), and (3) a sense of obligation to provide support for the change (normative commitment to the change)” (Herscovitch and Meyer, 2002, p. 475).

Herscovitch and Meyer (2002) studied the relationships between the components of commitment, individually and in combination, and two forms of change-relevant behaviour: compliance and discretionary support which includes two forms – cooperation and championing. Compliance refers to employees’ willingness to do what was required of them by the organization in the implementation of the change, (i.e. demonstrating minimum support for a change by going along with the change, but doing so reluctantly); Cooperation refers to employees’ acceptance of the ‘spirit’ of the change and willingness to do little extras to make it work, and Championing relates to employees’ willingness to embrace the change and ‘sell’ it to others (i.e., demonstrating extreme enthusiasm for a change and promoting the change to others) (Meyer *et al.*, 2007; Herscovitch and Meyer, 2002).

The forms of change-relevant behaviour described by Herscovitch and Meyer (2002) make part of their behavioural continuum, which reflects a range of support behaviours that can be exhibited toward a change. Points along the continuum were classified as follows: active resistance, passive resistance, compliance, cooperation and championing.

Founded on the principle stated by Meyer and Herscovitch (2001), that any form of commitment binds an individual to the behaviours defined within the ‘terms’ of that commitment, Herscovitch and Meyer (2002, p.187) found that all three forms of commitment (affective, continuance and normative) correlated positively to compliance with the requirements for organizational change, but only the affective and normative commitment relate positively to higher levels of support as with cooperation and championing.

The findings of Herscovitch and Meyer (2002) have been supported by other researchers (Meyer *et al.*, 2007; Gellatly *et al.*, 2006).

2.4 Summary

In this chapter a literature review was presented surrounding the subject area under investigation. To this end, literature on organizational commitment, benefits management, organizational change, resistance to change and organizational context was surveyed. The existent theory of commitment was discussed, the dimensionality of the construct and the way in which it has been studied in the IS literature. The three component model of commitment of Meyer and Allen (1991, 1997) was identified as being most relevant, and the literature on benefits management was reviewed to guide the research and help build a data collection guide. The following aspects of the literature with relevance to the research are of note:

1. There are numerous issues within or outside of the project that can affect a stakeholder's perceptions, interests and priorities, which can, in turn, change their commitment to the project (Jurison, 1996).
2. It is widely accepted that commitment to an information system (IS) development project affects the eventual success of the system (Sabherwal *et al.*, 2003).
3. Projects often fail due to the lack of cooperation [commitment] by people whose skill or motivation for accepting change is essential to delivering the benefits (Ward and Daniel, 2006). Therefore, "the introduction of new technology requires conscious work in securing acceptance, as well as, commitment among users" (Jensen and Aanestad, 2007, p.675).
4. Top management commitment is rated as the most important factor in the planning and the implementation of IS (Basu *et al.*, 2002) as well as in the influence it has on the commitment of other stakeholders (Sabherwal *et al.*, 2003).

5. IS are complex social objects that are inseparable from the organizational context, thus the choice of an appropriate methodology and the observation of the organizational context in which the information system is being developed is essential to ensure project success (Dhillon, 2005).
6. The project team's adoption of an effective communication approach towards individuals and groups has been identified as a significant factor in increasing their collaboration and reducing resistance to change (McGrath, 2002).

The next chapter presents the literature review related to hospital and HIS.

Chapter III Healthcare and Hospital Information Systems

3.1 Introduction

The hospital is a modern and complex organization, “...gradually incorporating the modern notion of utility and principally consisting of knowledge production and the practice of medicine” (Carapinheiro, 1998, p. 45).

Public hospitals, apart from being a strategic sector in the health care delivery network, stand out for their technical and scientific high standards as well as for their clinical impact on care, contributing significantly to the health of the population (McKee and Healy, 2000). They play an important role in scientific research, in the education and training of healthcare professionals, incorporating the latest medical technologies (Ministério da Saúde, 2003).

3.2. The Organizational Context of Hospitals versus Commitment

Hospitals are professional and bureaucratic organizations (Bate, 2000), and as such they have the specific characteristics of professional organizations. However, they are viewed as controversial and heterogeneous institutions, whose environment is characterized by tensions between different groups of actors with different perspectives whilst at the same time collaborating with the goal of evolving and renewing the institution (McKee and Healy, 2000, 2002; Carapinheiro, 1998).

The importance that hospitals assume depends on the specialists who work in them offering a professional leadership, representing the institutionalization and the specialization of medical expertise. For that reason, hospitals are also seen as a symbol of the social power of the medical profession (Carapinheiro, 1998).

The aspects related with organizational context, that seem to have relevance to the study of how organizational commitment can influence benefits realization in IT/IS projects, are those related to organizational structure (professional bureaucracy and a high degree of formalization), existence of different groups of professionals (Ward and Daniel, 2006; Wallace, 1995), and the existence of strong social and consultative cultures (Bate, 2000; Carapinheiro, 1998). Hence, the environmental conditions are charged by political aspects.

While Mechanistic Bureaucracy is based on the formal authority provided by hierarchical structure, Professional bureaucracy is supported by the power of knowledge (of a professional nature). Hence, in these types of organizations, the professional groups take their “directions for performance” primarily from their profession rather than their organization. The result is that professionals cannot be managed in the normal hierarchical way because they simply refuse to accept the controlling legitimacy of the management position (Mintzberg, 1981).

According to Mintzberg (1979), cited by Bate (2000), hospitals have a tribalism culture (a situation in which different professional groups adopt a tribal attitude, and dedicate themselves to making gains for their “space”, not considering the damage that they cause to other parts of the organization). This situation generates a separatist organization, where subcultures proliferate. But tribalism should not be regarded as a failing or dysfunctional part of an organization like a hospital: it is innate within it, an intrinsic and inseparable part of the professional process itself (Bate, 2000). Bates (2000) highlights the “hospital culture” as one of the most important issues that must be considered in the organizational context of hospitals.

Quinn *et al.* (1996, p.11) note this particular cultural mentality in professional organizations such as law and education, as well as medicine, when they say:

“The problem is one of managing elites. Each profession tends to regard itself as an elite. Members look to their profession and to their peers to determine codes of behaviour and

acceptable performance standards. They often disdain the values and evaluations of those outside their discipline. ... Most professionals are reluctant to subordinate themselves to others, or to support organizational goals not completely congruent with their special viewpoint.”

In organizations, such as hospitals, where the majority of members are professionals, the content of their work is central to the mission of the organization, and the goals of the organization are largely consistent with those of its employees. Examples of professional organizations include medical clinics, research institutes, architectural offices, accounting firms, and law firms (Wallace, 1995).

Wallace (1995) studied how the organizational and professional commitment of workers vary with their structural conditions across the two work settings (bureaucratic professional and nonprofessional organization), and found that when highly skilled workers labour in bureaucratic organizations, they sometimes experience conflicting goals and feel constrained to choose loyalty to their job over the organization, but they preserve their sense of professionalism, which allows them to adapt to different work settings. They redefine their work principles so that they are consistent with their workplace conditions and organizational goals (Nelson and Trubek, 1992). In this way, they know what is important to them and in their establishment of commitment to the organization (Wallace, 1995).

An important issue that seems to have a relationship with the commitment of experts in both professional and nonprofessional organizations relates to the four general structural dimensions that are critical in performing their work: (1) authority and autonomy, (2) career opportunities, (3) specialization, and (4) collegiality (Wallace, 1995). The first two factors can be considered to be of primary importance.

The authority and autonomy of professionals in performing their work tasks are two essential aspects of professionalism related to the right to control their own work (Tolbert and Stern, 1991).

It is an exclusive right of professionals when executing highly skilled tasks and activities to be evaluated in their competence by other fellow colleagues (Freidson, 1984). Evidently, these colleagues will subsequently be tasked with making decisions involving the evaluation of their work according to professional standards (Tolbert and Stern, 1991), which often occurs in their hiring and promotion. The competence to evaluate other colleagues is reflected in the amount of authority that professionals have when they participate in decision making within their workplace.

Autonomy is a critical attribute used to define professional work and refers to the degree to which specialists have control over how they carry out their work tasks (Hall, 1999; Engel, 1970). Basically, autonomy refers to the right of individual members to make independent (autonomous) decisions concerning the appropriate procedures for work tasks and activities. As such, greater participation in decision making should result in greater organizational commitment, because participation integrates employees into the organization and commits them to organizational decisions (Hackman and Oldham, 1980). When professionals are granted insufficient autonomy they will be less committed to the employing organization. Following the adaptation thesis, autonomy should be an important determinant of organizational commitment (Wallace, 1995).

Autonomy and discretion are recognized as legitimate aspects of a professional work role, and given that they are the only legal experts in the organization, no one else has the expertise to tell them how to legally perform their tasks. They expect considerable freedom, independence, and discretion in scheduling their work, determining the content of their work tasks, and choosing the methods to carry it out (Engel, 1970).

Specialization can increase the (high) degree of interdependence among specialists and should result in a greater commitment to the employing organization (Wallace, 1995).

Collegiality is another dimension of the professions. The high degree of collegiality among members of the same profession enables them to cope with the uncertainties encountered in their work. A strong sense of collegiality serves to maintain a sense of community and solidarity (Freidson, 1984).

Highly skilled workers appear to be working under conditions in which they have retained control over the objectives of their work and participate in policy making, thus helping to manage their employing organization by making explicit their professional system of norms and values and by maintaining collegial and supportive ties (Wallace, 1995).

Professional organizations, like any bureaucracies, are good for the purposes for which they were created, specifically stability and order, not change. Efficiency is its strong point, not innovation. The problem must be seen as a broadly cultural one. This is one reason that explains why hospitals traditionally have difficulty embracing innovation and making changes of any kind (Bate, 2000).

The prevailing mindset and directional orientation of a professional bureaucracy is stability-oriented rather than change-oriented. As James (1994) argued, there is a decisive incompatibility between the traditional stability-oriented culture of the professional bureaucracy, and the newer market-based and change-oriented healthcare organization, which calls for constant change and flexibility.

The introduction of HIS is an increasingly common phenomenon that will help healthcare organizations in general and hospitals in particular, to become environments of transformation and change towards a more effective and safe healthcare system (Davidson and Chismar, 2007). As referred to by Davidson and Chismar (2007, p. 740),

“healthcare organizations have experienced profound institutional and technical pressures for change”.

3.3 Healthcare Information Systems/ Healthcare Information Technology

Over the last few decades, IT has significantly transformed the nature of work and existing organizational structures in many industries (Wheeler, 2002). One industry that has been the target of dramatic changes in technology is the healthcare sector (Davidson and Chismar, 2007; Jung 2006; Davidson and Chiasson, 2005).

Various aspects of quality management have been introduced into healthcare organizations resulting in a number of diverse technological innovations that have influenced both clinical and administrative aspects of the delivery of medical services (Jung 2006).

Healthcare Information Technology (HIT) is presently receiving much interest by many researchers (Davidson and Chiasson, 2004, 2007; Cho, 2007) and plays an important role in healthcare organizations, allowing better healthcare delivery (Jung 2006; Baus, 2004).

The clinical information of patients assumes critical importance as part of quality of care and patient safety. In this way, IS/IT play a significant role in managing that information.

IS/IT in healthcare has a significant potential to improve patient safety, organizational efficiency (Bhattacharjee and Hikmet, 2008; Davidson and Chismar, 2007; Davidson and Chiasson, 2005) and the satisfaction of patients. Consequently, the realization of these benefits is especially important to successful HIT adoption (Menachemi and Brooks, 2006; Johnston *et al.*, 2003; Wong *et al.*, 2003; Bates, 2000; Overhage *et al.*, 1996).

Consistent with the general definition of IS provided by the UK Academy for Information Systems, Healthcare Information Technology (HIT) is defined as:

“the application of information processing involving both computer hardware and software that deals with the storage, retrieval, sharing, and use of healthcare information, data, and knowledge for communication and decision-making” (Brailer, 2004, p.23).

Although references to HIS are so numerous (Baus, 2004), within the United States (US) and abroad, there is little consensus in the terminology used to describe and examine the numerous forms of IS in healthcare settings.

HIT and HIS have been used interchangeably by the researchers (Davidson and Chismar, 2007; Jensen and Aanestad, 2007; Baus 2004). However, from the literature review analysed it seems that HIT includes a greater range of applications than the HIS.

HIT includes applications whose objectives can be clinical, operational or strategic (Hikmet *et al.*, 2008), or in the Bhattacharjee *et al.* (2007) perspective, they may integrate administrative, clinical and strategic systems used in hospitals. Examples of HIT are: Electronic Health Records (EHR), Electronic Medical Records (EMR), Computerized Physician Order Entry (CPOE), patient billing systems and Clinical Decision Support Systems (CDSS). Instead, HIS refers generally to the applications designed to improve patient care, which include Electronic Health Record (EHR)/Electronic Medical Record (EMR) systems, CPOE, pharmacy IS, and other electronic prescribing systems which influence the care process (Bhattacharjee *et al.*, 2007; Baus, 2004).

Berg (1999) and Marietti (1998) give more examples of HIS: Electronic Patient Record (EPR); Computerized Patient Record (CPR); computer-based patient record system (denoted as HIS); EHR, comparable with EMR (Baus, 2004); computerized medical record (CMR), etc.

For the purpose of this research, the term HIS, will be used, because the information system that we are investigating pertains to the category of CPOE and/or

EHR/EMR. However, the term HIT is also used when the authors refer to it in its specific context.

Felt-Lisk (2006) described six kinds of HIT which are described as follows: (1) Electronic Prescribing, (2) Electronic Lab Results, (3) Electronic Lab Orders, (4) Electronic Clinical Note Systems, (5) Electronic Images and (6) Electronic Reminders for Guideline-Based Intervention.

- 1) Electronic Prescribing or prescribing applications, are also known as Computerized Physician (or Provider) Order Entry (CPOE) that consists of “Entering a prescription for Medication into automated data entry systems such as [Personal Computer (PC), Personal Digital Assistant (PDA)] or other, and thereby generating a prescription electronically, instead of handwriting the prescription on paper” (First Consulting Group, 2001, p.9). These applications involve Clinical Decision Support to the clinicians such as a drug database for prescribing, formula checking, drug interaction checking, and a drug reference database.

Computerized Provider/Physician Order Entry (CPOE) is a prescription ordering system that allows physicians to enter an order for a medication and clinical laboratory or radiology test directly into a computer instead of handwriting, preventing medication errors (that often happens with the transcribing of texts).

- 2) Electronic Lab Results applications allow clinicians to acquire a significant time-saving, realized between the ordering of the test and obtaining the final result.
- 3) With Electronic Lab Orders physicians can electronically order tests, manage their laboratory testing needs, and receive results by eliminating concerns associated with paper requisitions and reports.
- 4) Electronic Clinical Note Systems are central in healthcare because Clinical notes constitute an important part of Electronic Health Records (EHR). These E-clinical health systems include information on patients’ demographics, clinical notes, medical history and follow-up orders.

- 5) The software based on Electronic Images allows the visualization and management of all exams related with an image, improving the image quality and therefore, their expected results.
- 6) The electronic clinical reminders (or “alerts”) are delivered directly through EHR to better integrate the clinical decision support and physician workflows and are patient-specific. Patient summary screening helps physicians to be able to click (to open) the reminders to obtain more information about the content or to turn the reminders off.

As it can be seen from the examples above, all HIS have as their main objective the quality of care provided and patient safety, matching the definition of HIS presented by Baus (2004) and Bhattacharjee *et al.* (2007).

3.3.1 Benefits of Healthcare Information Systems

The construct of perceived benefits associated with HIS has been detailed by various authors (Jung, 2006; Glanz and Rimer, 2005). This approach is very common in health behaviour theories, and provides a central measurement of the Health Belief Model (HBM) with perceived barriers.

In the HBM the definition of perceived benefits is the belief in the efficacy of the recommended action to reduce risk or seriousness of impact (Glanz and Rimer, 2005), and the direction of the action that a person adopts will be influenced by the beliefs regarding the action. Following this view, Jung (2006) believes that people make choices based on their perceptions, and attitudes towards the adoption of HIT (an aspect supported by other studies (e.g. Lapointe and Rivard, 2005; Markus, 1983)).

The perceived benefits refer to the anticipated advantages that the application can provide to the organization (Leapfrog Group, 2006; RAND Health, 2005).

Perceived benefits of HIT adoption must be considered as an important factor in the continuing process of improving and implementing HIT systems, in an effort to improve the quality of healthcare (Jung, 2006).

Many findings in the literature concerning HIT implementation contain empirical data and evaluation of benefits, and effects of HIT/HIS use on the healthcare professionals' performance (Bhattacharjee *et al.*, 2007; Menachemi and Brooks, 2006; Jung, 2006; Leapfrog Group, 2006; RAND Health, 2005).

Most of the benefits induced by the use of the HIT/HIS fall under one of the following categories: (1) quality of care (Leapfrog, 2006; Dexter *et al.*, 2004; Chertow *et al.*, 2001; Schriger *et al.*, 2000; Evan *et al.*, 1999; Overhage *et al.*, 1996); (2) effect on efficiency (Leapfrog, 2006; Wong *et al.*, 2003); (3) effect on cost (Caldeira *et al.*, 2010; Menachemi and Brooks, 2006; RAND Health, 2005; Erstad, 2003; Agrawal, 2002; Jacobs *et al.*, 2000) and (4) additional benefits (Agrawal, 2002; Bates *et al.*, 1998). Below are presented in more detail each of these four categories of benefits.

1. Quality of Care

In recent years, greater attention has been paid to the quality of healthcare, reflecting the many complaints by patients reporting that they often do not receive proven therapies or preventive measures, as well the need to tackle the increasing rate of preventable medical errors (Jung, 2006).

Much research is focused on how technologies and medical records can influence the quality of care (see Leapfrog, 2006; Dexter *et al.*, 2004; Chertow *et al.*, 2001; Schriger *et al.*, 2000; Evan *et al.*, 1999; Overhage *et al.*, 1996). For example, Martin *et al.* (2004) argue that the effective use of IT is essential for the provision of high quality care in the increasingly complex field of healthcare.

Specific benefits of HIS regarding the quality of care include:

- a) Reduction of medical error - insufficient or improper point-of-care treatment information is a frequent and significant cause of medical errors, as well as the communication problems which are the likely cause of most of the medical errors that occur (Chertow *et al.*, 2001 and Evan *et al.*, 1999). Medical error should be defined in terms of failed processes that are clearly linked to adverse outcomes (Hofer *et al.*, 2000). The National Coordinating Council for Medication Error and Prevention (NCCMERP) has an approved definition of medication errors:

“Any preventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of the healthcare professional, or patient. Such events may be related to professional practice, healthcare products, procedures, and systems including: prescribing; order communication; product labelling, packaging and nomenclature; compounding; dispensing; distribution; administration; education; monitoring; and use” (NCCMERP, 2005, p.4).

- b) Effective Disease Management - HIT systems increase documentation advice and recommendations for laboratory testing and treatment (Schriger *et al.*, 2000).
- c) Adherence Support - HIT can improve quality of care by increasing adherence to guideline-based care (Dexter *et al.*, 2004; Overhage *et al.*, 1996).
- d) Efficiency Saving - healthcare organizations can potentially reduce healthcare professionals' administrative time such as when nurses take care of documentation (Wong *et al.*, 2003), and treatment is delivered through CPOE (Kuperman *et al.*, 1999), as well as enhancing hospital stays through increased patient safety and care coordination (Wong *et al.*, 2003; Kuperman *et al.*, 1999).
- e) Drug Utilization - when physicians order through CPOE or CDSS, they can be advised about the cost-benefits of specific drugs and receive recommendations for alternative drugs (RAND Health, 2005).
- f) Improved Laboratory Tests - EHR, CPOE and CDSS have the potential to reduce redundant tests by making clinicians aware of current results and by alerting them of excessive new orders (Jacobs *et al.*, 2000). This contributes to the reduction of patient exposure to sometimes aggressive techniques.

2. Effect on Efficiency

As in other industries, the search for efficiency has become a central objective within most healthcare systems. However, the multiple objectives of healthcare organizations and the many gaps in HIT/HIS systems make the analysis and measurement of efficiency a difficult task (Leapfrog, 2006; Wong *et al.*, 2003). Some advantages of HIS are improvements in various metrics of efficiency.

3. Effect on Cost

An effect on cost can also be realized when implementing HIS/HIT.

The potentially for increased revenue opportunities related to HIT implementation are related to improvements in productivity. HIT can improve workflow through: (1) better resource utilization by reducing redundancies (Erstad, 2003); (2) paper reduction (Menachemi and Brooks, 2006; RAND Health, 2005; Erstad, 2003; Agrawal, 2002; Jacobs *et al.*, 2000); (3) reduction of transcription costs (the process of transcription is widely known to be expensive, slow, inefficient, and prone to communication error) (Agrawal, 2002); (4) better drug utilization (RAND Health, 2005) and (5) improvements in prescribing laboratory tests (decreasing the number of redundant tests) (Jacobs *et al.*, 2000).

With respect to drug utilization, when physicians order through CPOE or CDSS they can be advised about the cost-benefits of specific drugs, and receive recommendations for alternative drugs (RAND Health, 2005).

4. Additional Benefits

The utilization of HIT allows the achievement of many other additional benefits, including the improvement of patient safety (Bates, 2000; Bates, *et al.*, 1998) and regulatory compliance (Agrawal, 2002).

Patient safety is a matter of primary concern in healthcare, focusing on reducing medication errors (Jung, 2006). For example, CPOE can help the physician's decision at the point of prescription as well as providing the latest information about a drug and cross reference allergies and interactions, whilst contributing to a reduction in transcription errors, as physicians prescribe directly via the computer instead of hand writing (Bates, 2000).

Also, the alerts and reminders delivered by EHR and CPOE systems for medications (e.g., warnings about a potential adverse reaction for a patient and alternative drugs), favour a reduction in medical error, and thereby an increase in patient safety (Bates, *et al.*, 1998).

Improved regulatory compliance refers to the fact that the use of HIT systems can aid conformity with government policies (Agrawal, 2002), namely increased security of data and patient confidentiality. In Portugal, the National Commission for Data Protection (NCDP) is the regulatory entity responsible for patient confidentiality and data privacy.

The NCDP is an independent body, with powers of authority, which is attributed with the control and monitoring of personal data processing and storage, with strict respect for human rights and fundamental freedoms and guarantees enshrined in the Constitution and law (NCDP, 2011).

3.3.2 Issues Related to Clinical Information Systems' Implementation

The evaluation of IT implementation in healthcare organizations is not easy due to the complex healthcare environment (Davidson and Chiasson, 2005) different healthcare professional groups with different practices, and external factors such as economic constraints, regulatory issues, and the growing gaps between different communities' access to technologies (Ward and Daniel, 2006; Jung, 2006).

Despite the potential benefits referred above, many healthcare organizations have delayed CPOE implementation. The reasons behind this phenomenon are: CPOE is expensive and a highly complex application; the system development phase must involve physicians, nurses, and other healthcare professionals; it is necessary to train clinicians to use the system, and, keep them informed during all phases of development and implementation inside the organization (Davidson and Chismar, 2007; Jung, 2006).

CPOE implementation takes time and the process is complex and difficult. There may be also cultural barriers to the CPOE implementation such as a resistance by physicians to use computers when they order prescriptions (Bhattacharjee et al., 2008; Davidson and Chismar, 2007). Also, healthcare organizations present a particular difficulty in embracing this challenge due to their existing organizational structure, assumptions about clinical work processes, and financial challenges. On the other hand, several other barriers are still present: the high costs of investment in HIT, the maintenance required for all the IS, security and privacy issues, and the decrease in productivity due to the time that healthcare staff need to adapt to new systems (Jung, 2006).

The adoption of HIS concentrates on the challenge of getting clinicians and customers to use the electronic applications and information networks necessary to keep medical records, to access relevant information about a patient's data and illness, and to offer patient safety and better medical decisions. It implies the need to prepare healthcare staff until they are comfortable with any HIS, provide technical support and make the healthcare professionals and customers aware of the benefits of HIS (Bhattacharjee *et al.*, 2008; Bhattacharjee and Hikmet, 2007; Davidson and Chismar, 2007; Jung, 2006).

The value of HIT depends on how well healthcare organizations adopt and implement it, and how well clinicians use it in their practices (Jung, 2006).

3.4 Summary

In this chapter the hospital is characterized as an organization having considerable weight in the NHS and clinical impact on care while contributing considerably to the health of the population. Hospitals assume an important role in scientific research and in the education and training of healthcare professionals, incorporating the most modern medical technologies.

The specificities of the organizational context of hospitals related to their organizational structure and political environment were also described. Hospitals have characteristics of professional organizations and are viewed as controversial and heterogeneous institutions, whose environment is characterized by tensions between different groups of actors with different perspectives (McKee and Healy, 2000, 2002). Their specialists offer a professional leadership, representing the institutionalization and the specialization of medical expertise.

This chapter also presented the range of HIS, their features and associated benefits, along with the issues associated with implementation evident in the existing literature.

Chapter IV Philosophical Perspective and Research Strategy

4.1 Introduction

In the past two decades, the IS field has been seen by IS scholars as an applied discipline drawing upon other, more fundamental, reference disciplines (Baskerville and Myers, 2003). Villiers (2005, p.112) refers to Information System as a multi-perspective discipline. In this way, IS research has been supported by diverse research methods, research paradigms and research approaches shared by other disciplines. Hence, it is not surprising the growing interest that has been developed by the scientific community of IS with respect to their philosophical and methodological assumptions (Chen and Hirschheim, 2004).

Historically the bulk of research in IS, particularly in the US, has been based on a positivist philosophy (Mingers, 2004). The findings of Orlikowski and Baroudi (1991) indicated that the positivist paradigm overwhelmingly dominated the IS research community (96.8%), while the interpretive paradigm represented only 3.2% of the studies analyzed by the authors. However, this prevalence of the positivist paradigm has been declining, according to Chen and Hirschheim (2004).

Chen and Hirschheim (2004) examined 1893 research papers published in eight major publications of IS between 1991 and 2001 and reached the same conclusion with regard to the supremacy of the positivist paradigm, account for 81% of published empirical research, compared to the 96.8% found by Orlikowski and Baroudi (1991). Additionally, they verified that the case studies have gained substantial recognition (36%) as well as the qualitative research (with 30% of empirical studies).

According to Chen and Hirschheim (2004), much has changed in the IS research community since 1990. Research diversity and methodological pluralism have received

substantial attention during the last decades (Mingers, 2001; Walsham, 1995a; Galliers, 1991) being advocated for any serious IS research agenda (Klein *et al.*, 1991).

In the IS discipline, political and professional contexts have changed significantly (Chen and Hirschheim, 2004) and the alternative paradigms such as interpretivism (Walsham, 1995b) have become more widely accepted even in the mainstream journals such as MIS Quarterly (MISQ), traditionally positivist-oriented (Trauth and Jessup, 2000).

In contrast to the dominant quantitative methods, qualitative research methods, have also become more popular in the IS field (Silverman, 1998; Walsham, 1995a; Lee, 1989).

Knowledge is developed, specified, and used in different ways, depending on the academic field. Therefore, the area of interest of any discipline is likely to influence the nature of its theory.

What distinguishes IS from other fields is its concern for the use of artefacts in human-machine systems. This domain of interest locates the discipline of IS “at the intersection of knowledge of the properties of physical objects (machines) and knowledge of human behaviour” (Gregor, 2006, p.613). Therefore, according to the same author, to understand IS, “theory is required that links the natural world, the social world and the artificial world of human constructions” (Gregor, 2006, p.613).

According to Orlikowski and Baroudi (1991), each research paradigm provides unique attributes for different purposes of scientific inquiry. Whereas positivism could aim for replicability and generalizability, the interpretivist paradigm could improve the in-depth understanding of the phenomenon studied.

Chen and Hirschheim (2004) argue that the alternative paradigms or methodologies such as, interpretivism and qualitative methods should be used and

stimulated because they provide different dimensions for research that the positivist paradigm and its quantitative methods would not be able to accomplish.

Since, according to Lee (2001, p. iii), “research in the information systems field examines more than just the technological system”, and “investigates the phenomena that emerge when the human and technology interact”, the epistemological choice between interpretivism and positivism assumes an important role for IS researchers (Walsham, 1995a, p. 376)

Because different schools of theory depend to some degree on philosophical and disciplinary orientations (Gregor, 2006), this chapter offers an overview of the adopted research paradigm in its three dimensions (ontological, epistemological and methodological). The way the field work was conducted and the data collected and analysed is also detailed.

4.2 Research Paradigm

The term paradigm was introduced by Kuhn. He argued "Something like a paradigm is a prerequisite to perception itself" (Kuhn, 1970, p. 113).

A paradigm provides a conceptual framework for seeing and making sense of the social world, “the primary philosophical point of departure” (Villiers, 2005, p.113). Patton (2002, p.69) defines paradigm as a “worldview”, a general perspective, a way of breaking down the complexity of the real world. According to Guba and Lincoln (1994, p.107), “it represents a worldview, that defines for its holder, the nature of the “world”, the individual’s place in it, and the range of possible relationships to that world and its parts”. Williams (1998) argues that paradigms shape how we perceive the world.

Guba and Lincoln (1994, p. 108) argue that “The basic beliefs that define inquiry paradigms can be summarized by the responses given by the proponents of any given paradigm to three fundamental questions”. These questions according to Guba and

Lincoln (1994, p.108) “are interconnected in such a way that the answer given to any one, taken in any order, constrains how the others may be answered”. They are: (1) ontological questions – what is the nature of reality? (2) epistemological questions - what is the relationship between the researcher and what can be known? And (3) methodological questions - how can we get to know the world, or gain knowledge of it?

According to Burrell and Morgan (1979, p.24), "To be located in a particular paradigm is to view the world in a particular way." Therefore, all research is influenced by the philosophical position of the researchers, their ontological and epistemological perspective. So, in this section we discuss ontology and epistemology, and lastly present the research paradigm.

4.2.1 Ontology and Epistemology

Ontology is concerned with the nature of reality (Walsham, 1995b). For Caldeira and Romão (2002), ontology is the science of being, their properties and how it manifests itself. The ontology includes a set of principles assumed as true that influences the way the researchers perceive the social reality. According to the positivist researchers “a single objective reality exists external to human beings”, as an alternative, the interpretive researchers follow the ontological assumption of multiple realities, which are time and context dependent (Villiers, 2005, p. 111).

Epistemology is the science of knowledge and represents the way one can acquire knowledge (Caldeira and Romão, 2002; Caldeira, 2000). It serves to answer the “Epistemological questions: How is theory constructed? How can scientific knowledge be acquired? How is theory tested? What research methods can be used?”(Gregor, 2006, p.612).

Often, discussion is related with distinctions between “positivist” and “interpretivist” paradigms or concerning qualitative and quantitative methods (Gregor,

2006). Some authors advocate pluralism in methods (Mingers, 2001), while others support the integration of approaches (Lee, 1991).

Following this tendency we analyse the main differences between these two paradigms and briefly another philosophy also frequently used in research of IS, that of critical realism.

Ontology

The positivist perspective is based on an ontology in which the empirical world is assumed to be objective and hence independent of humans' knowledge of it and their experiences (Orlikowski and Baroudi, 1991). Positivist studies are based on the principle that there exist fixed relationships within phenomena, that can be discovered and contribute to create the general principles or laws which govern the natural and social world (Orlikowski and Baroudi, 1991). The positivist research can produce an exact representation of reality, which is both unbiased and value-free (Villiers, 2005). It depends mainly on quantitative methods, where data includes principally numbers, measurements and statistical methods are used to analyse the data (Villiers, 2005).

The interpretivist approach, by contrast, emphasizes the subjective meaning of the reality. The reality is "a social product constructed and interpreted by humans as social actors according to their beliefs and value systems" (Darke *et al.*, 1998, p.276) and their theories about reality are ways of making sense of the world (Walsham, 1993, 2006). Interpretive research "rejects the possibility of an "objective" or "factual" account of events and situations" (Orlikowski and Baroudi, 1991, p.5). Instead, they seek to understand the meaning embedded in human and social interaction (Chen and Hirschheim, 2004).

According to the interpretivist perspective, people create and associate their own subjective and intersubjective meanings when they interact with the world around them

and “Interpretive researchers attempt to understand the phenomena through accessing the meanings that participants assign to them” (Orlikowski and Baroudi, 1991, p.5).

In critical realism, Bhaskar (1978, 1986), cited by Caldeira and Romão (2002), structures the reality into three interdependent domains: the Empirical (composed of observable events and experiences), the Actual (composed of observable events or not) and the Real (consisting of structures and mechanisms that produce the events). For realism the concepts, models and real-world entities should be viewed differently, where the models represent attempts to explain the reality from the subset of observable events, the empirical domain (Caldeira and Romão, 2002).

In this philosophical approach the theories should be essentially explanatory. The concept of explanation involves the statement of exploration mechanisms and an attempt to demonstrate their existence.

Bhaskar (1978, p.250) quoted by Caldeira (2000, p.76), argues that with respect to an ontology of critical realism “things exist and act independently of our descriptions but we can only know them under particular descriptions”, and science is seen as a systematic attempt to express in thought the structures and behaviours of things that exist independently of thought. In this way, critical realism admits the existence of the real but considers it is impossible to know its essence. Nevertheless, based upon observable events that are part of the empirical domain, it is possible to identify the potential mechanisms and explanations that are the basis of social behaviour.

Walsham (2006) accepts critical realism as one possible philosophical position underpinning interpretive research, along with others such as phenomenology and hermeneutics.

Epistemology

Positivism is linked with the scientific method, whereby knowledge is discovered by controlled empirical means, such as experiments. Research findings

should be reliable and consistent, free from perceptions and biases of the researcher, be replicable by other researchers and can be used for prediction (Villiers, 2005).

Positivist studies typically investigate the existence of *a priori* fixed relationships within phenomena (Orlikowski and Baroudi, 1991), seeking verification or falsification. For Interpretivists, by contrast, scientific knowledge must be obtained through the understanding of human and social interaction (Walsham, 1995a).

Whereas positivism tests hypotheses, interpretivism investigates research questions, focusing on understanding phenomena that occur in natural settings (ethnographic) and use verbal data (Villiers, 2005).

In the interpretivist paradigm, researchers need to engage in the social setting investigated and learn how the interaction takes place to understand the meaning embedded in human and social interaction (Chen and Hirschheim, 2004). Since the researcher uses his or her prejudices in order to guide the process of enquiry and interacts with the human subjects of the enquiry, changing the perceptions of both parties (Walsham, 1995b), the notion of value-free research is rejected by interpretivist research. The interpretivist researcher attempts to gain a deep understanding of the phenomena being investigated, and acknowledges their own subjectivity as part of this process (Darke *et al.*, 1998).

According to Bhaskar (1989, p.3), critical realism aims to explain the relationship between human activity and social structures. As he states, “the existence of social structure is a necessary condition for any human activity” (p.3). Social phenomena are perceived as a result of a multiplicity of structures, which cannot be directly perceived, but may be inferred and identified through the examination of their effects.

“While accepting that the social world is real and exists, a realistic perspective of the social sciences also accepts the interpretive view that society is both produced

and reproduced by its members, who may have different perceptions and interpretations about the same reality” (Caldeira, 2000, p.77).

From an epistemological perspective, realism is “methodologically open” in the sense that it does not define a method. Blakie (1993, p.58) states that realism “is concerned with developing methods appropriate to the particular subject matter of the social sciences”.

According to Iivari *et al.* (1998, p.174) “epistemological assumptions are concerned with the nature of knowledge and the proper methods of inquiry”. It includes the procedures or means by which “any person or group” can obtain knowledge.

4.2.2 The Adopted Research Paradigm

Logical positivism has had an enduring influence on the way in which theory is regarded by some philosophers of science (Gregor, 2006). However, interpretivism steers researchers towards a different stance, where the primary goal is not to develop theory that is testable but in “understanding the complex world of lived experience from the point of view of those who live it” (Schwandt, 1994, p. 118).

As we have seen before, paradigms can be interpreted as worldviews or a set of beliefs that sustain an individual’s understanding of the world, relationships and their place within it (Guba and Lincoln, 1998). In this way, all researchers have their own ontological and epistemological perspective through which they conduct their research.

Miles and Huberman (1994, p.8) say that researchers have “their own understandings, their own convictions, their own conceptual orientations; they too, are members of a particular culture at a specific historical moment”.

Williams (1998) says that within the research process the researcher’s beliefs will be reflected in the way they research is designed, how data is both collected and analysed and how research results are presented. Therefore, it is important the

researchers recognise their paradigm, because it allows them to identify their role in the research process, determine the course of any research project and distinguish other perspectives. The researcher needs to reflect on his/her own philosophical stance and make it explicitly stated in the work (Walsham, (1995a).

In this research, interpretivism is adopted as a philosophical perspective because the assumptions inherent in this paradigm are shared with the approach taken, as concerns its ontology, epistemology and methodology. An interpretivist epistemological position is concerned with the understanding of reality and states that knowledge is subjective, being a social human construction (Walsham, 1993, 1995, 2006). This research aims to understand how the commitment and TF of individuals influence the benefits achieved by a specific healthcare information system from the participants' perspective as Orlikowski and Baroudi (1991) established, because people when interacting with the world around them "create and associate their own subjective and intersubjective meanings"(p.5). The purpose of this work is to interpret "the deeper structure" (Orlikowski and Baroudi, p.5) and the issues around the phenomena under investigation, "to understand human thought and action in social and organisational contexts" (Klein and Myers, 1999, p.67).

Though positivism seeks to explain and predict what happens in the social world by looking for regularities and causal relationships, this thesis aligns with Walsham (1993, p.5), when he argues that "there is no objective reality which can be discovered by researchers and replicated by others".

According to Lee and Baskerville (2003), interpretivist researchers consider that the goal of universal laws is inappropriate in human studies because social units are all unique, and they require idiographic theorising.

Methodology

Positivism is a philosophical perspective that defends the unity of a logical-deductive method of scientific explanation of phenomena that must be followed by both the natural and social sciences (Caldeira and Romão, 2002). The methods it employs to acquire knowledge are predominantly quantitative (Villiers, 2005; Caldeira and Romão, 2002). Positivist research relies primarily on quantitative methods, where data comprises mainly numbers and measurements and analysis are carried out using statistical methods (Villiers, 2005). In this perspective scientific knowledge should allow verification or falsification and seek generalizable results (Chen and Hirschheim, 2004). A quantitative method, such as survey, is a typical positivist instrument (Chen and Hirschheim, 2004).

Realism shares with positivism the same need for finding causal explanations for social phenomena, and shares with interpretivism, the principle that there are fundamental differences between natural and social phenomena (Caldeira and Romão, 2002).

The philosophical perspective of Realism is advocated by some authors such as Mingers (2004) for research in IS. In respect to research in IS, realism does not favour any particular method of inquiry. Lee (1989, 1991), for example, argues that realism is basically a combination of positivist and interpretive perspective, suggesting a research strategy that combines quantitative and qualitative methods.

Interpretivism is a philosophy of science that is more recent and radically opposed to positivism. In interpretivism, reality is subjective, and socially constructed through the interpretation of social phenomena, originating in the study of phenomenology and hermeneutics (Guba and Lincoln, 1994).

Phenomenology sees social phenomena as perceptions that are not independent of the observer, which is part of the observed object. Concerned with how people think

and interpret the world around them, hermeneutics is essentially concerned with the interpretation of texts and meanings (Caldeira and Romão, 2002). This study has adopted a phenomenological approach as a methodology for social inquiry.

There are a variety of activities that may be identified to help carry out an interpretive research. Klein and Myers (1999, p.72) suggest a set of principles for conduct and evaluation of interpretive field research in IS.

Even though ontology, epistemology and research methodology are independent in principle, they tend to be interrelated in practice. Most researchers who have taken a realist view of the ontology of IS have also adhered to a positivist epistemology. Realists prefer empirical surveys, laboratory experimentation, and to some extent case studies (cf. Orlikowski and Baroudi, 1991; Lee, 1989). Social constructivists prefer case studies or action research, applying ethnography or grounded theory and a congregation of other “interpretive” methods of inquiry (Iivari *et al.*, 1998).

4.3 Research Strategy

According to Silverman (2006), methodology is a general approach that establishes the ways in which any phenomenon can be studied.

In the IS field many different research methods and approaches (e.g. positivist or interpretive, quantitative or qualitative) are accepted as appropriate (Myers, 1997).

Methods refer to specific research techniques, that include quantitative methods as statistical correlations, surveys and experiments or qualitative methods that embrace techniques such as observation and interviewing (Silverman, 2006). There are many ways of conducting social science research: experiments, surveys, history, analysis of archival information and case studies (Yin, 2003).

According to Denzin and Lincoln (2011, p.2), “qualitative research is a field of inquiry in its own right”. It consists in a set of interpretive practices that make the world

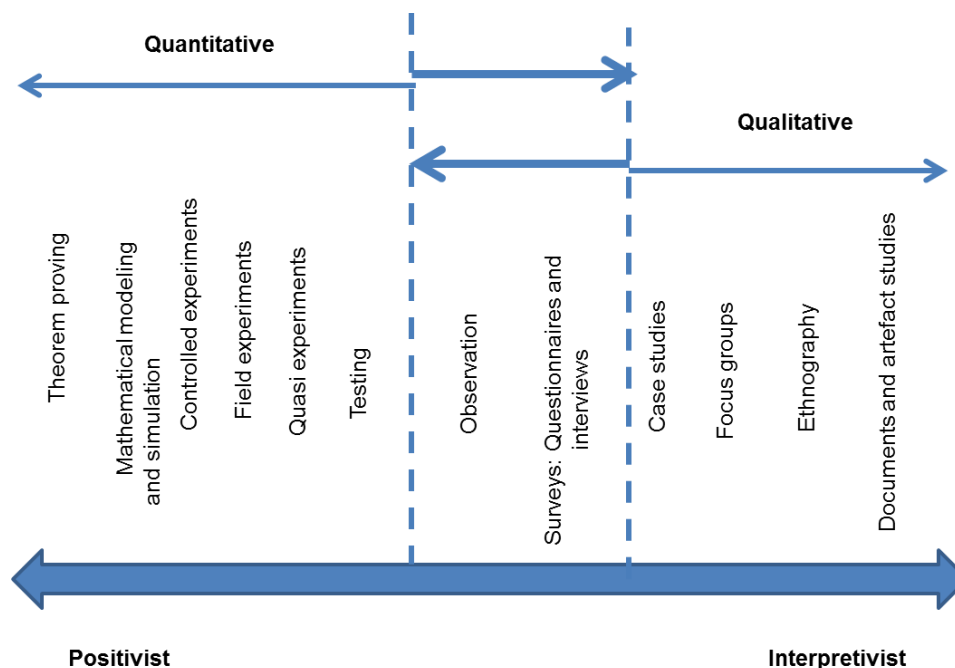
visible through a series of representations that include: field notes, interviews, conversations, photographs, recordings and memos to the self. In this sense, as they say, qualitative research “locates the observer in the World”. “The qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meaning people bring to them” (Denzin and Lincoln, 2011, p.3-4) .

In qualitative research, the value–laden nature of enquiry is accepted, in contrast with quantitative studies that focus on the measurement and analysis of causal relationships.

Mertens (1998) describes qualitative research as a naturalistic interpretive science that provides insights into cultural aspects, organizational practices and human interactions. This methodological approach is naturally considered multi-method in its stance (Flick, 2002; Mertens, 1998). For example, in qualitative research it is possible to integrate methods such as: case study, politics and ethics, participatory inquiry, participant observation, interviewing and interpretive analysis (Denzin and Lincoln, 2011).

Figure 4 shows leading research methods situated on a Positivist/Interpretivist axis, tending from the quantitative to the qualitative, yet at the same time overlapping (Villiers, 2005).

Figure 4 Research Methods/Strategies



Source: Villiers (2005, p.212)

The qualitative research methods, such as action research and case study, focus on understanding social phenomena in their natural setting and cultural context (Myers, 1997), and therefore these research strategies are appropriate to the IS discipline.

Grounded theory has also been seen as a relevant qualitative research method that offers a “comprehensive and systematic framework for inductively building theory” (Punch, 2000, p.103) from “data collected in an investigation of ‘real-life’ situations” (Gasson, 2004, p.80). However, according to Gasson (2004, p.80), “grounded theory is an approach, rather than a method, as there are many alternative methods that may be employed”.

The grounded theory approach involves the generation of emergent theory from empirical data. A diversity of data collection methods may be used, such as participant observation, interviews, experimentation and indirect data collection. The singularity of the grounded theory approach lies in two elements (Strauss and Corbin, 1998; Glaser, 1992):

1. Theory is based upon patterns found in empirical data, not from inferences, preconceptions, or the association of ideas.
2. It relies upon a continuous comparison between emergent theories (codes and constructs) and new data. Constant comparison confirms that theoretical constructs are found across and between data samples, driving the collection of additional data until the researcher feels that "theoretical saturation" (the point of diminishing returns from any new analysis) has been reached.

From the viewpoint of Villiers (2005), grounded theory has similarities to case study research and ethnography, since the latter two methods aim to detect and interpret patterns within activities and events. The data may be quantitative, qualitative or a combination, but in the case of qualitative data, it is essential that it be systematically collected, analyzed and coded.

According to Walsham (2006, p.325-326), the methodological approach adopted in particular interpretive field studies, needs to be justified by appropriate means for acceptance by the IS research community. He argues that researchers can adopt one of two means: 1) the three criteria given by Golden-Biddle and Locke (1993) of authenticity, plausibility and criticality or, 2) The seven criteria provided by Klein and Myers (1999), for the methodological justification of interpretive field studies in IS, as presented in the Table1.

Authenticity concerns the ability to demonstrate through the written text, that the authors “have been there”, “by conveying the vitality of life in the field”. Plausibility emphasis “how well the text links to the personal and professional experience of the reader”. Criticality “concerns the way in which the text probes readers to consider their taken-for-granted ideas and beliefs” (Walsham, 2006, p.325-326). In his article Walsham provides detailed examples.

Table 1 A Summary of Principles for Interpretive Field Research

Principles	Description
1. The Fundamental Principle of the Hermeneutic Circle	<p>This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles.</p> <p>Example: Lee's (1994) study of information richness in e-mail communications. It iterates between the separate message fragments of individual e-mail participants as parts and the global context that determines the full meanings of the separate messages to interpret the message exchange as a whole.</p>
2. The Principle of Contextualization	<p>Requires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.</p> <p>Example: After discussing the historical forces that led to Fiat establishing a new assembly plant, Ciborra <i>et al.</i>, (1996) show how old Fordist production concepts still had a significant influence despite radical changes in work organization and operations.</p>
3. The Principle of Interaction Between the Researchers and the Subjects	<p>Requires critical reflection on how the research materials (or "data") were socially constructed through the interaction between the researchers and participants.</p> <p>Example: Trauth (1997) explains how her understanding improved as she became self-conscious and started to question her own assumptions.</p>
4. The Principle of Abstraction and Generalization	<p>Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.</p> <p>Example: Monteiro and Hanseth's (1996) findings are discussed in relation to Latour's actor network theory.</p>
5. The Principle of Dialogical Reasoning	<p>Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings ("the story which the data tell") with subsequent cycles of revision.</p> <p>Example: Lee (1991) describes how Nardulli (1978) came to revise his preconceptions of the role of case load pressure as a central concept in the study of criminal courts several times.</p>
6. The Principle of Multiple Interpretations	<p>Requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it.</p> <p>Example: Levine and Rossmore's (1993) account of the conflicting expectations for the Threshold system in the Bremerton Inc. case.</p>
7. The Principle of Suspicion	<p>Requires sensitivity to possible "biases" and systematic "distortions" in the narratives collected from the participants.</p> <p>Example: Forester (1992) looks at the facetious figures of speech used by city planning staff to negotiate the problem of data acquisition.</p>

Source: Klein and Myers (1999, p 72)

Here, the case study was adopted as the research strategy with the study being essentially exploratory. The methodology that was selected in this research was qualitative and interpretive. This research strategy and approach is appropriate when the

investigator is faced with a reality that is complex, subjective and socially constructed, that is, when the interpretation and understanding of the phenomenon constitute its central concern (Caldeira and Romão, 2002; Milliken, 2001).

After an overview of IS research methods has been presented, the adopted research method, that of the case study, is discussed.

4.3.1 Case Study

Case study research has been seen by IS researchers as a useful means of investigating the development, implementation and use of IS within organizations. It allows the capture and understanding of the context of the phenomena studied. The case study can be employed to achieve a variety of research purposes, using diverse data collection and analysis methods. However, weaknesses pointed out to case study research include: difficulties in generalizing research results and the subjectivity of the data collection and analysis processes (Darke *et al.*, 1998).

Case study research is considered a versatile method, because it can be used with any philosophical perspective, be it positivist, interpretivist, or critical (Dubé and Paré, 2003; Doolin, 1996). As such, it carries with it all the methodological implications of those philosophical perspectives, including the methods for collecting and analysing data and research outcomes (Denzin and Lincoln, 2011; Darke *et al.*, 1998; Doolin, 1996).

Case study research can adopt single case (e.g., Myers, 1994; Markus, 1983) or multiple case designs (e.g. Lapointe and Rivard, 2005; Cavaye and Cragg, 1995). A single case study is appropriate when it represents: (1) a critical case (i.e., when it meets all the required conditions for testing a theory), (2) an extreme or unique case (for example, a rare disease) (3), a representative case or typical case, (4) a revelatory case or, (5) a longitudinal case (Yin, 2003).

Single cases allow researchers to investigate phenomena in depth to provide a rich description and understanding. Multiple case designs allow cross-case analysis and comparison, and the investigation of a particular phenomenon in diverse settings. They may also be selected to predict similar results (literal replication) or to produce contrasting results for reasons of prediction (theoretical replication) Yin (1994, p.46).

In the positivist paradigm, case study research is designed and evaluated according to the criteria of the natural science model of research: controlled observations, controlled deductions, replicability and generalizability (Lee, 1989). Instead, in interpretivism the value of an explanation is judged in terms of the extent to which it allows others to understand the phenomena and makes sense to those being studied (Walsham, 1995a).

Examples of an interpretive approach to qualitative research include those of Boland (1991) and Walsham (1993). Myers (1995) study represents another illustration of interpretivist case study research in the IS field. Examples of a positivist approach to qualitative research include the work of Yin (1994) on case study research.

Klein and Myers (1999) consider that interpretive research within the IS field can help researchers to understand human thought and action in social and organizational contexts; it has the potential to produce deep insights into IS phenomena which include the management of IS and IS development.

In the same way that Lee (1989) provided principles and guidelines for analysing positivist case studies, Klein and Myers (1999), provided a set of principles for the interpretive research field (presented above), but from the philosophical perspective of hermeneutics. This set of principles is derived primarily from anthropology, phenomenology, and hermeneutics.

Case study research is “the preferred strategy when ‘how’ or ‘why’ questions are being posed, when the researcher has little control over events, and when the focus is on a contemporary phenomenon within some real-life context” (Yin, 2003, p.1). To overcome

the traditional criticisms of the method it is important that the researcher “exercise great care in designing and doing case studies” (Yin, 2003, p.1).

Silverman (2006) considers that qualitative researchers have still had limited success in convincing policy makers of the relevance of their findings. Therefore, the issue of “validity” or accuracy of our descriptions is vitally important, whether our methods are qualitative or quantitative (Silverman, 2006). Similarly, Darke *et al.* (1998) point out the practical difficulties when attempting to undertake a case study. They argue,

” Although Case Study research is useful as a means of studying IS development and use in the field, there can be practical difficulties associated with attempting to undertake case studies as a rigorous and effective method of research”(Darke *et al.*, 1998, p. 274)”

According to Darke *et al.* (1998), two kinds of prejudices may be recognized in the case study research: (i) the effects of the researcher on events and the behaviour of participants at the case study site, and (ii) the researcher's own beliefs, values and prior assumptions. Biases of researchers in collection and analysis of case data can be countenanced by using multiple sources of evidence (triangulation of data) to provide multiple illustrations from different sources (Yin, 2003).

The convergence of information from a variety of sources provides multiple measures of the same phenomenon, strengthening the case study findings (Yin, 2003). However, Walsham (1995a) highlights that biases arising from researcher effects at the site are in one sense mandatory, because the researcher is influencing what is happening just by the sharing of concepts and interpretations with personnel at the site. The interpretive researcher recognizes that they are implicated in the phenomena being studied, by attempting to understand, describe and interpret the situation from the participant's perspective, or by creating and enacting the reality being studied through the constructs they use to view the world (Orlikowski and Baroudi, 1991).

Flick (2002, p.227) states that “objective reality can never be captured. We know a thing only through its representations”. He agrees that the adoption of multiple

methods, or triangulation, reproduces an effort to assure an in-depth understanding of the phenomenon in question, but in his point of view “Triangulations are not a tool or a strategy of validation” (Flick, 2002, p.227). They are a “combination of multiple methodological practices, empirical materials, perspectives and observers (...) that add rigor, breadth, complexity, richness, and depth to any enquiry” (Flick, 2002, p.229).

Whatever research philosophy adopted and whatever the data analysis techniques used, it is important to demonstrate the trail of evidence that the analysis has followed so that the derivation of the case study conclusions from the case data is made explicit (Darke *et al.*, 1998).

In relation to positivist case studies, (Yin, 2003, p.97-108), three principles are established that must be followed in order to make the process reflect a concern for construct validity and reliability:

The use of multiple sources of evidence – in order to get multiple measures for the same phenomenon (converging lines of inquiry), it is important to triangulate the data sources. This helps respond to the problem of construct validity.

The creation of a case study database - refers to the organization and documentation of the data collected for the case studies. The main purpose is to document the connection between specific pieces of evidence and various issues in the case study.

Maintaining a chain of evidence - this principle allows an external observer to follow the derivation of any evidence, ranging from initial research questions to case study conclusions. It deals with the problem of reliability of the study.

Multiple sources of evidence also assist in corroborating information provided by different participants where there are conflicting accounts of events and actions (Darke *et al.*, 1998, p.286).

Generalizations from case study research

In the positivist perspective, multiple-case studies can strengthen research findings (Yin, 1994, p.31). However, with regards to case study research, Yin (2003) highlights that it is necessary to differentiate “statistical generalization” from “analytic generalization”. In statistical generalization the goal is to make inferences about a population, on the basis of empirical data. Statistical generalization to a population is not the goal of case study research, because the cases are not “sampling units” (Yin, 2003).

In a case study research the kind of generalization is “analytic generalization”, in which a previously developed theory is used as a model with which to compare the empirical results of the case study (Yin, 2003). In carrying out a case study, Yin (2003, p.10) recommends "your goal will be to expand and generalize theory (analytic generalization) and not to enumerate frequencies (statistical generalization)".

In discussing generalizability from the perspective of interpretive case study research, Walsham (1995a, 2006) identifies four possible types of generalizations: development of concepts; generation of theory; drawing of specific implications; and contribution of rich insight. These kinds of generalization allow “explanations of particular phenomena derived from empirical interpretive research, which may be valuable in other settings and organizations as interpretations of phenomena but which are not wholly predictive for future situations” (Walsham, 1995a, p.79). Table 2 presents the types of generalization and some examples of case studies.

Table 2 Examples of Generalizations from IS Case Studies

Type of generalization	Interpretive IS case study
Development of concepts	Automate- Zuboff(1988)
Generation of theory	Theory of organizational consequences of IT – Orlikowski and Robey(1991), Jones & Nandhakumar(1993)
Drawing of specific implications	Relationship between design and development and business strategy- Walsham and Waema (1994)
Contribution of rich insight	Limits of machine intelligence; differences between plans and practical actions; the need for more thoughtful machine design- Suchman(1987)

Source: Walsham (1995a, p. 79)

Lee and Baskerville (2003), in an attempt to respond to those who doubt the generalizability of case studies, describe a generalizability framework with four components: from data to description; from description to theory; from theory to description; and from concepts to theory. All of these are feasible from a single case study or a small set of case studies

The focus of this study is highly complex and context-dependent. Thus, research methods are required that allow such complexity to be observed, recorded and understood within their unique setting. Following an interpretivist view of the world, a qualitative and interpretive case-study strategy is adopted, using multiple case studies.

This research strategy was chosen because it can provide a deeper understanding of the research phenomenon and can cope with the detail that is present in complex real-world situations (Darke *et al.*, 1998; Lee, 1989). The case study is a strategy of inquiry that will allow us to grasp the different aspects of the complex social reality that surrounds the organizations (Yin 2003; Caldeira and Romão, 2002). So, it is perfectly appropriate to generate knowledge from social interactions such as those that occur in organizations when an IS project is implemented. In addition, it is believed that the real-

life factors present in healthcare organizations are highly pertinent to the study of a HIS implementation.

According to Cavaye (1996), the case study strategy was often aligned with the development of theory and exploration of an area where existing knowledge is limited, with the objective of providing evidence for further hypothesis generation. In this research, the case study strategy has been chosen with the explicit purpose of exploring an area where existing knowledge is limited. This kind of study is associated with research questions that ask ‘how’ and ‘why’.

There now follows a description of the research design which serves to provide some details concerning the procedure employed.

4.4. Research Design

Yin (2003, p. 20) defines a research design as the “logical plan for getting from here to there, where here are the initial set of research questions to be answered, and there are the conclusions”.

To carry out the fieldwork, two public hospitals were selected (A and B) that have as a common feature, the adoption of the same information system, the Paper Free Software Solution¹ (PFSS).

The reasons behind the choice of these cases relates to the facts that: (1) their location in two different geographical and cultural contexts (Alentejo and Trás-os-Montes and Alto Douro); (2) these hospitals were the first to acquire and implement the Paper Free Software Solution (PFSS) in the whole area of the hospital; (3) one was the "cradle" of software development (Hospital B); and, (4) the different hospitals serve different target audiences.

¹ Fictitious name

These aspects make these chosen cases ‘critical’ and provide the possibility of a deep understanding and rich description of the phenomenon under study (Yin, 1994, 2003). On the other hand, the study of these two organizations did not only allow their comparability in terms of implementation results, but also revealed patterns in the levels of commitment of the healthcare professionals towards the organization and the information system adopted, as well clarifying how commitment can contribute to benefit realization.

We consider as units of analysis in our study both, the organization (hospital), as an entity that develops a particular course of action (implementation of a healthcare information Systems) that represents a rich context where the actions of actors connected with the technology are developed and, the three groups of healthcare professionals (physicians, nurses and assistants) who use the software and from whom the required information to answer the research questions was obtained.

The decision was made to study these three professional groups as these professionals, particularly physicians and nurses, have significant weight in the performance of healthcare organizations and may also have different TF (Orlikowski and Gash, 1994). Thus, it makes sense to examine their perspectives and behaviours related to technology implementation.

In the following section the research design is presented and some aspects related to access to the research site are discussed.

4.4.1 Overall Strategy

It is important for the researcher to develop a general data analysis strategy as part of the case study design (Yin, 2003). “This will indicate what to analyse and why, and will help to ensure that data collection activities are appropriate and support the ways in which the evidence is to be analysed” (Darke *et al.*, 1998, p.284).

Before moving to the stage of information gathering, it is necessary to fulfil certain requirements such as: gaining access to key organizations or interviewees, ensuring adequate resources for the development of field work (place and devices for the collection and processing of information), and requesting access to sources of general information (Yin, 2003).

Walsham (2006, p. 322) says that “whatever the style of involvement, interpretive researchers need to gain and maintain good access to appropriate organizations for their fieldwork”. In order to gain access to the fieldwork as Walsham (2006) recommends, a formal request was made asking permission to carry out each case study, in which the confidentiality of the data collected was ensured (see Appendix A). Meetings with members of the Board of Directors (BOD) of each hospital were requested, as well as access to other relevant project implementation data (e.g. documents and reports).

When access was requested to the organizations, the confidentiality of data was ensured, including the name of organization, if this was so desired. From the two organizations contacted, only one tacitly accepted disclosure. In this way, for questions of equity, fictitious names were given to both organizations.

To establish credibility for the reader it is important to describe the way in which the empirical research was conducted (Walsham, 1995a). To this end, the research design is now presented.

4.4.2 Research Design

In the first part of the research a comprehensive literature review was conducted to help define the bounds of the research topic and the research questions, as well as to develop the interview guidelines with semi-structured questions.

In a second phase of the research, hospitals were selected that could provide rich contexts for the research. The necessary procedures for gaining access to the sites were followed where preliminary and personal contacts with the respective Boards of Directors were made, followed by formal requests by letter. The initial personal contact enabled a close proximity to the key elements involved in the project's implementation. Some familiarity with the context was achieved due to the researcher's occupation (nurse) and previous experience as a member of the Board of a hospital. This experience facilitated contact with stakeholders and movement from one place to another in the hospital.

Personal contacts were also made, by letter, with the managers of the company that supplied the software, requesting permission to conduct interviews with the members of the monitoring team present in each hospital and access to available information.

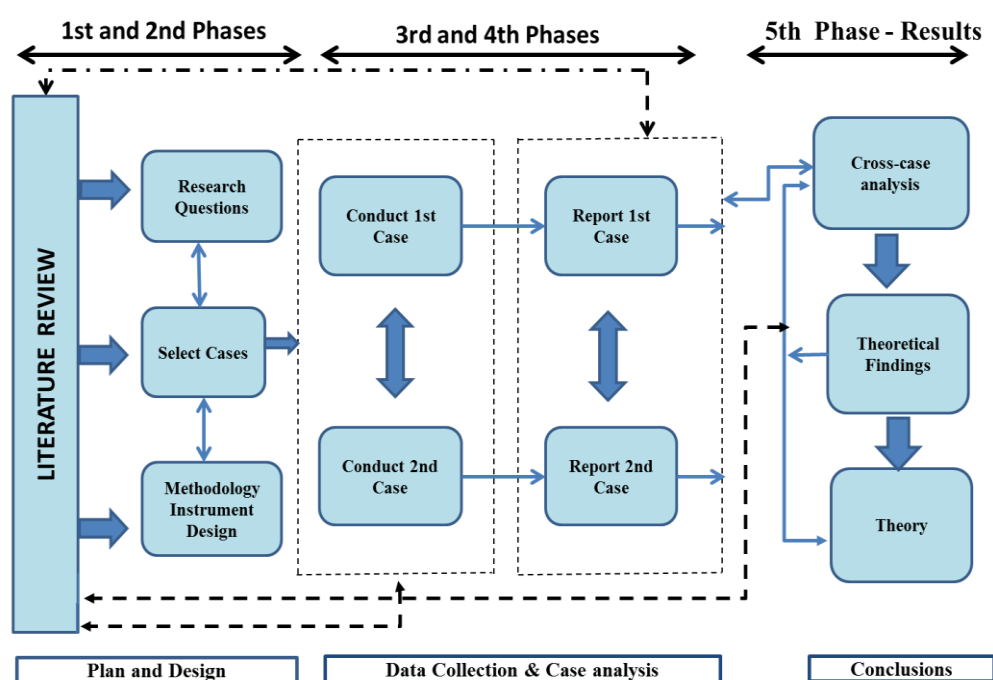
The third phase of the research included the accomplishment of fieldwork, which was based on interviews, direct observation (of local situations and use of the software) and consultation of documents. At this stage, a database was also created using the application NVivo, in which the data collected from various sources from each organization were stored, organized and ordered individually (for each organization an individual database was created).

The second and third phase of the research were carried out simultaneously in the two hospitals: (1) for time-scheduling reasons related to the researcher, (2) because the implementation processes were taking place almost simultaneously in the two hospitals, and, (3) because it permitted the capture of situations in their relevant context, the social interactions and interactions between actors and technology first hand, giving an in-depth understanding of the phenomenon under study.

The fourth phase involved the processing and analysis of data from the first case and the production of the written report. Following from this, the same procedure was carried out for the other case, after which a cross-case analysis of findings was conducted. The fifth phase relates to the generation of theory and production of rich insights.

Figure 5 provides an overview of how the research was conducted.

Figure 5 Research Design



4.4.3. Data Collection

Any findings or conclusions in a case study are likely to be more convincing and accurate if they are based on several sources of information (Yin, 2003). Following an interpretive line of inquiry, this research aligns with Flick (2002) that supports triangulation of data using multiple sources of evidence, rather than for the purpose of providing validity, to offer rigor, richness, and depth to any research.

Darke *et al.* (1998) also highlights that, independent of the research philosophy adopted and the research methods used, it is important to establish the path of evidence

that the research has followed to produce conclusions from the data of the case study. Therefore, to obtain an appropriate degree of internal validity, rigor, richness and depth, several sources of evidence were used to collect data. They were:

1. Preliminary interviews (at the initial stage);
2. Document analysis;
3. Direct observation;
4. Semi-structured interviews.

Data collection was based mainly on semi-structured interviews, following Walsham (2006), Yin (2003) and Darke *et al.* (1998) as the main sources of data. Document analysis related to the implementation process and field notes resulting from direct observation, meetings and informal talks were also subject to analysis and interpretation, aiming at a deeper understanding of the phenomenon under study.

With respect to the use of multiple data sources, Walsham (2006) states that in an interpretive study there is an advantage in supplementing interviews by other forms of field data, such as: internal documents, press, media and other publications in the context of the organizations being studied. He also highlights direct and participant observation of action as data sources. Even surveys can be a useful complement to other data sources, because ‘interpretive’ is not equal to ‘qualitative’.

With the adoption of several sources of evidence for data collection, the triangulation of data was constructed with the aim of provide common ground for the same event or phenomenon and assures an in-depth understanding of the phenomenon in question while increasing its validity.

The first technique served to increase the field knowledge, identify the key actors and gather information for the subsequent interviews. Some explanations regarding how each technique was applied are presented below.

Direct Observation

Direct observation takes place when one visits the case study 'sites', and it can involve observations of meetings, routines, and daily activities (Yin, 2003). Bearing this in mind, direct observation can be considered a way of observing things in general as well as participants' activities in their context.

Observations of the technology at work are helpful for the understanding of the daily use of technology or potential problems being encountered when doing so (Yin, 2003). Therefore, some days were spent at each site observing how the information system under study was used in the health units where it was implemented. The purpose here was to identify representative or revealing situations, or corroborate other information obtained from interviewees.

Some observations were made simultaneously with the collection of other sources of evidence. For instance, the visits made to each organization to conduct interviews provided an opportunity to talk to the professionals or participate in meetings. When possible, observation was extended to the regular meetings with administrators, project teams, software suppliers and representatives of system users.

During observation, an effort was made to capture the degree of knowledge demonstrated by those using the system, verbal expressions and both extreme negative or positive reactions in relation to the information system.

In meetings with the work group, where participation was invited, a point of view was expressed regarding the implementation process. Having previously held a position as a nurse in the healthcare sector proved to be an advantageous element in obtaining confidence with the participants.

All events and interactions that took place were reported through hand notes made at the time. More extensive notes were made immediately after each observation session or audio recordings were used (when allowed).

Document Analysis

The analysed documents included official communications (administrative documents, proposals, progress reports and other internal reports), training reports, minutes from committee meetings, extracts from the press, system and project documentation, as well as memorandums and letters. Data gathered from these sources were used to corroborate, validate, and complement the interview data (Denzin and Lincoln, 2011; Walsham, 2006; Silverman, 2006; Yin, 2003).

Interviews

According to Holstein and Gubrium (2004, p.141), “interviews are special forms of conversation” that vary from being highly structured and quantitatively oriented (survey), to semi-formal guided conversation (semi-structured interviews) or, free-flowing informational (open interviews).

Smith *et al.* (2009, p.57) define qualitative research interviews as a “conversation with a purpose”. To them the aim of an interview is to facilitate “an interaction, which allows participants to tell their stories in their words”. This definition is also shared by Darke *et al.* (1998, p.283) that classified the open-ended interview as an “interesting conversation” between researcher and interviewee.

Interviews are essential sources of information for case study research (Yin, 2003) and are arguably the principal data source where interpretive case study research is undertaken, as it is through interviews that researchers can best access case participants' views and interpretations of actions and events (Smith *et al.*, 2009; Silverman, 2006, 2009; Walsham, 1995, 2006).

The audio-recording of interviews is often suggested as a means of providing a complete description of the interviewees' responses and comments. However, audio-

recordings are recognized as incorporating some advantages and disadvantages (see Table 3).

The advantages are: (1) the ability to replicate fully what was really said. It is “a truer record compared with the taking of notes during the interview”; (2) the audio-recorded interview allows the “return to the transcript later for alternative forms of analysis”, (...) or (3) “picking out direct quotes when writing up” and (4) it “frees the researcher to concentrate on engaging with the interviewee” (Walsham, 2006, p.323). The disadvantages are related to the time spent on transcription, the likelihood of inhibiting the interviewees and finally, the incapability of capturing the nonverbal aspects of an interview.

Table 3 Advantages and Disadvantages of Record Interviews.

Advantages	Disadvantages
It is an exact record of what was said (Walsham, 2006, p.323 ; Darke <i>et al.</i> , 1998).	It can inhibit the interviewee (Walsham, 2006, p.323; Darke <i>et al.</i> , 1998, 283).
It is possible to return to the transcript later for alternative forms of analysis.	It is very time-consuming and/or expensive to transcribe.
It is useful for picking out direct quotes when writing up.	It does not capture the tacit, non-verbal elements of an interview (crucial aspects of the experience for the researcher).
It frees the researcher to concentrate on engaging with the interviewee.	
It is popular with neo-positivist reviewers in some establishment journals.	

Source: Adapted from Walsham (2006)

To obtain the participants’ views and experiences with the PFSS and its implementation process, semi-structured interviews were realized, following the agreement of the case participants, including confidentiality and anonymity clauses, as Walsham (2006) recommends. All participants were interviewed individually by the researcher, on a face-to-face basis.

In the present research most of the interviews were audio-recorded except when interviewees manifestly objected. In these cases hand notes were taken.

To prevent the third disadvantage of recording (see table), after each interview hand notes were made about the environment, expressions, and knowledge concerning the specific IS, the subject of research.

The questions were prepared in accordance with the user profile of each individual with the aim of collecting responses to the research questions submitted.

The interviews followed the scripts that are attached (Appendix B), but from interview to interview, questions were revised in order to adjust their format or add others that proved to be relevant for the study, particularly when new topics emerged. In this way the script of interviews became flexible.

Walsham (2006) states that the researcher must pay attention to the time and length of an interview because staff in contemporary organizations are generally very busy. This is particularly true in healthcare organizations, where professionals work with diseases and urgencies that make them very stressed. For this reason, some of the interviews were conducted in less time than others (thirty minutes) and in places close to the workplace, with some constraints relating to noise and privacy. Sometimes the interviews were delayed. The average length of interviews varied between forty and sixty minutes. Only the interviews with some members of the working group, and the monitoring team exceeded sixty minutes, stretching to a maximum of two hours.

Those individuals who had shown strong viewpoints, either for or against the IS, were interviewed. A snowball sampling strategy was adopted by asking the initial respondents to point out subsequent individuals for interview who exhibited extreme behaviours during implementation. The people interviewed represented a representative group of the professionals working in departments in which the PFSS was adopted (Punch, 2000; Polit and Hungler, 1995).

The range of interviewees included: managers (administrators, IT managers, service directors and heads of nursing), implementers, both of the supplier firm (the

project manager and members of monitoring team) and from the organization (members of the working group) and, users (physicians, nurses, and assistants) from each site where the system was implemented (ER, out-patient, surgery and in-patient services).

In the hospitals, the sites that were part of the study beyond the emergency unit were the departments of medicine, surgery and orthopaedics, out-patients and surgery rooms. This is because the physicians who work in the emergency units, usually also work in the out-patient and in-patient departments. These professionals have a broader view of the functioning of IS in the various activities they carry out, and could therefore better express their point of view of the system.

The interviews followed a particular order. The initial respondents were those who occupy managerial positions or are responsible for any given stage in the implementation of the project. Thus, the first interviews included members of the Board of Directors (BOD), project managers, IT managers, members of the project team, service directors, heads of nursing, and the remaining operational users (physicians, nurses and assistants).

The procedure described above was useful because the decision makers regarding acquisition and implementation of the IS and other managers were able to state the reasons and objectives that influenced their choice of information system implemented, as well as the benefits expected. Another advantage was gaining an understanding how these objectives and benefits were communicated to professionals and the forms that were adopted by implementers to involve stakeholders in the project and actions taking in the face of resistance.

The project managers and project team played a crucial role in giving a comprehensive view about the whole process of implementation (methodologies adopted, issues and problem solving) and provided a better understanding of the users' views.

Interviews typically began with a generic question that allowed respondents to express how they felt about the importance of IS/IT in healthcare, and how they experienced the information system implemented (user's profile). The first questions to the group of managers were aimed at understanding the reasons behind their motivation to adopt the new technology and relevance of IS to the business. More specific questions were made to ensure that the data from each case would cover similar material allowing cross-case comparisons (Miles and Huberman, 1994).

Walsham (1995, 2006) distinguishes between an 'outside researcher' and an 'involved researcher'. The former represents, for instance, a researcher that conducts research primarily through formal interviews, without direct involvement in the field action, and the second, can be seen as a participant observer or action researcher. With respect to the involvement of the researcher, he states that "it is possible to weigh up the advantages and disadvantages and make a choice" of being an involved researcher or not and the degree to which he or she assumes this to be more appropriate for the research.

This research was not conducted as an 'outside researcher' although complete involvement did also not occur. Following Walsham (2006), the involvement varied according to two situations: the circumstances where the interview took place and the degree of openness of interviewees. Participants that were "less open or where he or she is perceived to have a vested interest" (Walsham, 2006, p.321), received reduced involvement. This last situation occurred a few times during the fieldwork when it was necessary to make clear to some interviewees that no involvement existed either with the administration or with the provider of the software.

4.4.4 Data Analysis Method

Qualitative data analysis is not an easy task when it comes to analysing huge amounts of data such as transcripts of interviews, and no standard format exists (Miles and Huberman, 1994; Eisenhardt, 1989).

“the goal of analysis in interpretive studies in Information systems is to produce an understanding of the contexts of information systems and the interactions between these systems and their contexts. The strength of analysis in interpretive studies derives from the strength of the explanation of the phenomena based on the interpretation of data” (Darke *et al.*, 1998, p. 285).

Some methods of analysis associated with interpretive research comprise: (1) hermeneutics that suggests a mode of understanding the meaning of text data or text analogues, (2) narrative, which is a story or presentation of facts, and (3) semiotics, which is concerned with the meaning of signs and symbols in language in particular. This last method is also considered as a source of techniques that can be used to analyse qualitative data. These techniques, as in content analysis, conversation and discourse analysis, are based on assigning conceptual categories to words (or signs) which represent aspects of the particular theory being investigated (Denzin and Lincoln, 2011). The technique of content analysis consists of searching for structures and patterns in text, with the aim of making inferences, whereas conversation and discourse analysis are related techniques which take into account the context in which interaction, represented by signs, takes place (Denzin and Lincoln, 2011).

Huberman and Miles (1994, p. 428-429) describe data analysis as consisting of three simultaneous activities: data reduction, data display and drawing conclusions/verification. Data reduction consists of the process of selecting, simplifying, abstracting and transforming the raw case data, (that includes, for example, data summaries, coding, and finding themes). Data display refers to the organized assembly of information to enable the drawing of conclusions. “The researcher needs to see a reduced set of data as a basis for thinking about its meanings” (p.429).

Data display comprises narratives, tables and matrices with text rather than numbers. Drawing conclusions/ verification refers to drawing meaning from data and building a logical chain of evidence. Varied types of matrices, clustering diagrams and causal networks are used. Several techniques are similar to those of grounded theory including: the coding of data segments into categories identified from the initial conceptual framework of study or hypotheses and subsequent coding to identify patterns or repeatable regularities in the data and looking for emergent themes, as a step towards producing a conceptual coherent explanation of the phenomenon being studied.

Case Analysis

This empirical study tries to extract meaning and insight from the words used and patterns found in the texts. In this way, during data analysis the complete transcripts were examined (resulting either from interviews, observation notes or documents) with an open approach, seeking to find the most interesting themes in order to answer the research questions (Seidman, 2006).

Data was examined from PFSS case study implementations focusing on behaviours, users' perspectives of IS/IT, particular aspects of organizational context, and existing relationships between commitment of participants and benefits achievement. Meaning was attributed to the data, and efforts were made to ensure that the coding process preserved existing relationships in the data (Miles and Huberman, 1994). In this process the verbatim records of interviewees' comments was used.

The coding process was carried out using NVivo software² allowing themes to emerge naturally, rather than being imposed *a priori*.

Data was analysed in two stages (Eisenhardt, 1989). First, within each case an analysis was carried out to allow the unique patterns of each case to emerge, and to

² Is a specific software for qualitative research, allowing the collection, organization and analysis of non-numeric data.

provide researcher with an in-depth understanding of each case, therefore increasing the potential for cross-case comparisons. Second, a cross-case analysis was fulfilled using an analytic induction, trying to find common patterns and unique features.

Within each case analysis, data reduction and data display techniques were used (Miles and Huberman, 1994). First, tables were created to map stakeholder perceptions and behaviours, defining the different categories and placing the empirical evidence within such categories, using segments of transcripts, like vignettes (short narratives which usually cover a summarized experience of participants) (Seidman, 2006). Second, the segments were examined to identify specific users' perceptions, commitment to the project, and its potential antecedents. After comparison, they were organized in matrices to build a logical chain of evidence (Yin, 2003).

Cross Case Analysis

“Technically the Cross-case analysis are most easily made with “displays”: matrix or other arrays of the data that allows the researcher to analyse, in a condensed form, [the full set of data], in order to see literally what is there” (Huberman and Miles, 1994, 437).

Cross-case analysis was conducted using two tactics thought to enhance the possibility of capturing new findings among the data (Eisenhardt, 1989). The first was to select categories for identifying patterns, looking for within-group similarities coupled with intergroup differences. Second, through comparing cases in pairs the subtle similarities and differences between them could be identified. In addition, the chains of evidence developed within the case analyses could help make comparisons of the emergent concepts with the relevant constructs in the literature (Miles and Huberman, 1994; Eisenhardt, 1989).

“The central idea is that researchers constantly compare theory and data-iterating towards a theory, which closely fits the data. A close fit is important to building a good theory because it takes advantage of the new insights possible from the data and yields an empirically valid theory” (Eisenhardt, 1989, p.541).

Walsham (2006, p.324) argued that theory can be used as an initial guide to design and data collection, as part of an iterative process of data collection and analysis, or as a final product of the research.

Theory provides one of the ways in which data can be analysed. The selection of a theory is essentially subjective. It depends on the researcher's own experiences, background and interests. Walsham (2006) says that the researchers must choose "theories which they feel are insightful to them"; but, that choice needs to be justified in the reports by arguing how "it was relevant to the research topic and the field data" (Walsham, 2006, p. 325).

In this case-based research a TF theory was used from Orlikowski and Gash (1991, 1994) as a theoretical lens to analyse our data, along with commitment theories of Meyer and Allen (1991, 1997) and subsequent developments.

4.5 Theoretical Framework

When conducting IS research, an explicit theoretical framework or conceptual model should, ideally, support the study and provide internal continuity and cohesion in the reasoning process (Villiers, 2005).

As we have seen before, the possibility of different groups having different perceptions, understanding and interpretation of the same technology is consistent with previous research in this area (Lin and Silva, 2005; Menon *et al.*, 2000; Bijker, 1995; Orlikowski and Gash, 1991, 1994; Symons, 1991). Although these perceptions could be divergent (sometimes conflicting) according to their views and their role within the organization (Lapointe and Rivard, 2005; Lin and Silva, 2005; Symons, 1991; Markus, 1983), they can illustrate how stakeholders see the balance of changes and benefits affecting them when an information system is introduced in their working

life. So, it is important to analyse how the significance they attribute to the new technology influences the actions they take when around it.

According to Lin and Silva (2005), the successful adoption of an information system depends to a great extent on the users' perceptions of the information system.

The next section presents and discusses the adequacy of the theory of TF (Orlikowski and Gash, 1994) discussing why and how it is relevant to the research topic and analysis of field data.

4.5.1 The Theory of Technological Frames

The work of Orlikowski and Gash (1991, 1994), based on research in social cognition and organizational change, developed a theoretical approach to the study of technological change. Their framework is based on the principle that “people act on the basis of their interpretations of the world, and in doing so they enact particular social realities and endow them with meaning” (Orlikowski and Gash, 1991, p.1). This theoretical framework focused on technological frames of reference (TFR) to investigate interpretive processes related to IT in organizations.

The framework of TFR has been used in several research applications (Aguilar-Zambrano and Gardoni, 2012; Lin and Silva, 2005; Davidson, 2002, 2006).

A frame can be defined as a set of assumptions, understandings, perceptions, and expectations that individuals have about a new IS project which they subsequently employ to deal with the technology (Bijker, 1995). In the view of Orlikowski and Gash (1991,1994), the frames of organizational members incorporate not only the interpretations related to the nature and role of technology but also to the specific conditions, applications and consequences of that technology in specific contexts (Orlikowski and Gash, 1994).

When people interact with technology, they make sense of it; and in this process of making sense, they develop particular “assumptions, expectations, and knowledge of the technology” that “they use to understand technology in organizations” and “to shape subsequent actions toward it” (Orlikowski and Gash, 1994, p. 175,178).

Lin and Silva (2005, p. 50) argue that “technological frames structure experience, allow interpretation of ambiguous situations, reduce uncertainty in situations of complexity and change, and provide a basis for taking action” as well as “emerging from and being transformed by interactions among individuals, technology and context”. They reinforce the idea that the management of IS implementation is a social and political process in which stakeholders frame and reframe their perceptions of an information system.

A technological frame has particular characteristics. It functions as a device for making sense that individuals use to interact with the technology; it serves as a filter through which it is possible to understand some things and to ignore others. This feature enables an individual to deal with the new technology according to his/her previous experience and knowledge (Lin and Silva, 2005). Furthermore, a frame is interpretive, flexible, and context specific, which permits each individual to arrive at different interpretations and conclusions about the same object in different contexts (Lin and Silva, 2005; Orlikowski and Gash, 1994). It follows that users of IS could respond in different ways to a new technology. They can actively resist it, refuse to use it completely, partially use it, reluctantly accept it, or embrace it entirely, showing their commitment to project and organizational changes.

Tyre and Orlikowski (1994) argue that early interpretations of a technology are particularly influential because they are established rapidly as the technology is assimilated into work practices and becomes built into organizational routines. Such

embedded understandings and assessments of a technology are particularly difficult to change later.

According to Davidson (2006), the understanding and guiding of interpretive processes can help managers to improve organizational change outcomes. Therefore an understanding of users' perceptions about technology should be a key factor in managing the adoption of IS and will be decisive in understanding their interaction with technology and studying their subsequent actions towards IS/IT in as much as it enables changes and realizes benefits. "The more all participants perceive that a particular type of change is desirable and expected, the greater their readiness to change is likely to be, and the better the likelihood of success" (Orlikowski and Gash, 1991, p.24).

Orlikowski and Gash (1991, 1994) identified three distinct social groups which are involved in technological use or change within organizations. These groups (managers, technologists and users) have distinct TF representing that group's particular experience, interaction, and understanding of the IT. Managers are those who make decisions about implementation, who establish organizational goals and strategy, control resources, and therefore influence the course of change; Technologists are the systems developers, either internal or external, that design, construct, install, and maintain the IT to be used in the organization; and users are the people that use IT in their daily tasks to accomplish productive work for the organization.

The alignment of frames on key elements is referred to as congruence in TF. According to Orlikowski and Gash (1991, 1994), congruence in TF refers to the alignment of assumptions, meanings, expectations, and knowledge. Being aligned does not mean equal, but rather falling within a certain range on a continuum, related in structure (i.e., common categories of frames, like similar expectations) and content (i.e., similar values of common categories). On the other hand, when the TF of key groups in

organizations such as managers, technologists, and users are significantly different, the frames are incongruent.

To Orlikowski and Gash (1994, p.174), the incongruence of TF is likely to create “difficulties and conflict around the development, use, and change of technology”. Consequently, “the greater the congruence of perception across frame dimensions, the greater the likelihood of success” (Orlikowski and Gash, 1991, p.24).

In this research the TF of users, are analysed to understand how their commitment to an IS implementation project or to the changes induced by IS/IT can influence the realization of benefits.

The understanding of underlying TF has particular relevance, because they have a significant effect on an individual’s acceptance of the technology (Orlikowski and Gash, 1991), can contribute to preventing resistance and operational problems (Symons, 1991), and increase the users’ commitment to organizational change, enabling the accomplishment of the expected business benefits.

Considering that the TFR framework has a central premise that TF are specific to particular users, technologies, and organizational contexts, TFR analysis requires that researchers recount deeply held assumptions and knowledge about a specific IT in its organizational context (Davidson, 2006)

Drawing on the literature review realized, many relevant issues were found that support the use of a TF lens to study how organizational commitment affects the achievement of IT benefits following the implementation of HIS. They are: (1) the ambiguity of the organizational environment that characterizes hospital settings, (2) the difficulty and complexity of change associated with implementation of HIS as CPOE or EHR, (3) the political context that characterizes the environment of healthcare organizations, transforming the management of IS implementation into a social and political process, (4) the existence of various groups of professionals that can share

different TF about the same technology, (5) the fact that the study of organizational commitment is connected to the Organizational Behaviour discipline, (6) the TF analysis of Orlikowski and Gash (1991, 1994) is rooted in social cognitive research, and (7) it is interpretive in nature (Orlikowski and Gash, 1994), since researchers attempt to understand perceptions and interpretations surrounding technology from the participant's perspective (Orlikowski and Baroudi, 1991).

4.5.2 Conceptual Model

Information technologies (IT) have a central role in organizational change programs, and understanding how organization members make sense of technology is critical to influencing their actions and to achieving planned outcomes (Davidson, 2006).

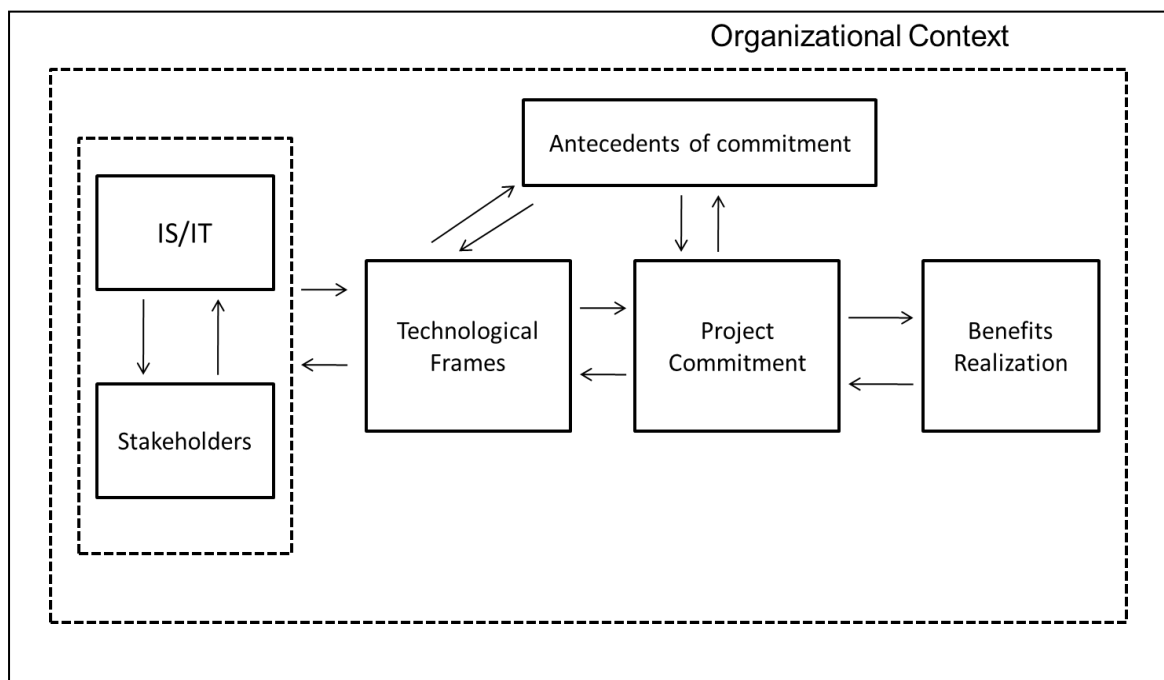
Based on the literature review realized it is argued that: (1) stakeholders (healthcare professionals in this research) develop some assumptions, perceptions and interpretations about technology when they are faced with a new IS (Orlikowski and Gash, 1994). These perceptions are related to their previous experience of IT, the knowledge they have about the IS and their objectives, as well as their involvement/participation in the implementation process (Lin and Silva, 2005; Lapointe and Rivard, 2005), (2) stakeholders are also influenced by some antecedents of commitment (Meyer and Allen, 1997) that reinforce or decrease their commitment to the organizational goals, and IS, (3) the TF and commitment antecedents influence each other, increasing or hindering the project commitment, (4) the ambiguity, complexity and political nature of organizational context (Davidson and Chiasson, 2005; Lin and Silva, 2005) are also relevant aspects, either in the shaping of TF, or in influencing the stakeholders' commitment, and (5) project commitment is an influencing factor in

utilization of systems as well as in the consequent realization of benefits (Lau and Herbert, 2001; Benjamin and Levinson, 1993).

In this research, stakeholders perspectives and their behaviours are studied in order to understand their commitment to the IS/IT project and the achievement of business benefits from IS/IT investments.

The conceptual model presented in Figure 6 aims to explore how the organizational commitment affects business benefits derived from the implementation of clinical IS in a hospital setting.

Figure 6 Conceptual Model



4.6 Summary

In this chapter an overview of the various philosophical perspectives is made before discussing the adopted philosophical perspective and research strategy. Among different philosophical perspectives this work aligns with statements of phenomenology and the perspective of interpretivism. In researching the area of IS, numerous research methods can be applied; here the chosen method was that of multiple case studies. In order to analyze the data collected two main theoretical approaches were used: TFR as developed by Orlikowski and Gash (1991, 1994) and the Three-Component Model of Organizational Commitment of Meyer and Allen, (1991, 1997).

The next chapter presents the description and discussion of two case studies.

Chapter V Case Studies

5.1 Introduction to the Case Study Description

Two case studies following the implementation of an HIS in a hospital setting were analysed with the objective of answering the research questions: How does the commitment of stakeholders affect the realization of expected benefits for the implementation of clinical information systems? What is the role of the TF of users in the development of commitment towards a project? How do TF of reference and commitment to a project interact to influence the achievement of desired benefits?

Each case will describe the software implementation process from selection to installation, and whether (and how) it is used, or not used, by the professionals studied.

The description of the cases resulted from an exploratory research conducted in two public Portuguese hospitals that have adopted a Healthcare Information System (HIS) to computerize all care services (cases 1 and 2).

The computer application, which is designated the Paper Free Software Solution (PFSS), and installed in the hospitals studied, is an IS for healthcare services (HIS). The PFSS was originally developed to facilitate the registration, consultation and analysis of information produced in the clinical care process of Emergency Room (ER) patients. However, it was later improved and modified for other purposes, so as to enable it to be used in the support of clinical activity for in-patient and out-patient services and surgery rooms ('paper free' package).

The suite of PFSS includes independent solutions (modules) that can interconnect with each other, "for computerization of the ER, external consultations, surgery rooms and in-patient services". All modules of the PFSS have similar

characteristics, adapted to the specific characteristics of each department (out-patient, in-patient, emergency or surgery room).

This HIS accumulates simultaneously the characteristics of CPOE, EMR and Decision Support Systems (DSS). As a DSS this software supports decision making in medical, administrative and management levels.

The two versions of this software, Paper Free Solution for ER (PFSER) and PFSS were financed by the government and the European Union, but the software for ER has had a wider uptake by hospitals compared to the 'paper free' package. More than thirty hospitals in Portugal have purchased and implemented PFSS software.

The PFSS is a patient-centred information system that records, archives and links the whole patient's clinical information including that originating in other applications and organizations, integrating the whole clinical history for each patient.

In this information system, professionals can access different levels of information according to their roles and responsibilities (physicians, nurses, managers, assistants, administrators and laboratory and imaging technicians). The access is made through biometric identification or through username and password.

The PFSS also has a management module, data warehouse (DW), which allows the storing and analysis of all clinical and operational information, allowing analytical processing providing business intelligence for managers.

This computer application is installed by versions and each version has several updates.

The way that different professional groups operate, interact and react with the technology was studied along with the changes induced in two hospital settings. This study focused on three groups of professionals: physicians, nurses, and assistants.

The field work was carried out in both organizations between 2007 and 2011. The data collection in the organizations continued for several years for various reasons.

First, the implementation took some time to complete. Second, it was an explicit aim to capture the evolution of the perceptions of users and their commitment to the information system while the implementation process was progressing. And third, the availability of the researcher to move to the local of the research.

The data collection strategy was also based upon the fact that the TF that individuals have towards IS/IT change over time, (Lapointe and Rivard, 2005; Orlikowski and Gash, 1994) and influence their actions relating to technology (Lin and Silva, 2005).

Among other varied sources of information, in organization ‘A’ a total of 64 interviews were held and 32 minutes of meetings analyzed, and in organization ‘B’ 65 interviews were performed and 15 minutes of meetings examined. A detailed description of the sources of information of each case as well as the interviewees by professional position is presented in more detail in the Tables (4 and 5).

Table 4 Sources of Data

Hospital A	N°	Hospital B	N°
Documents		Documents	
Web site information	2	Vendor Website	1
Report and Accounts 2010	1	Web site information	1
HR records	1	Reports and Accounts 2010	1
Vendor Web site	1	Reports and Accounts 2007	1
Letters ³	3	Journal of Hospital Centre	2
Meeting reports	32	Implementation Folders	3
Other reports	2	Letters	7
Meetings		Formal Documents	4
with project team	3	Meeting reports	15
Oracle conference	1	Other reports	7
Interviews	64	Written work about the Hospital	1
Field Notes		Interviews	65
Conversations	3	Field Notes	
Observation	2	Observations	3
		Conversation With MT	1
Total	115	Total	112

³ Letters exchanged between users and the Board of Directors containing complains or opinions on the IS and its implementation process

Table 5 Interviews Realized

Hospital A	Nº	Hospital B	Nº
Implementation team		Implementation team	
Project managers	1	Project managers	2
MT	2	MT	2
Managers		Managers	
Board Members	3	Board Members	3
IS Manager	2	IS Manager	1
Service Directors	3	Service Directors	6
Nurse Managers	3	Nurse Managers	12
Users		Users	
Nurses	27	Nurses	19
Assistants	8	Assistants	8
Physicians	15	Physicians	12
Total	64	Total	65

Data were analyzed within an interpretive and qualitative perspective. The qualitative approach allowed the analysis of respondents' speeches which facilitated the understanding of their interpretations of the technology, their level of commitment to the project and change, the implications the IS had in their work as well as, the behaviours and attitudes adopted towards the information system.

Although the theory of TF proposed by Orlikowski and Gash (1991,1994) is aimed at understanding the perceptions and interpretations that managers, technicians (technologists) and users have in relation to technology and the actions that develop around it (in order to identify the congruence between them and its influence to the processes of change associated with the introduction of new technologies), in this investigation, only the frames of the users are considered in any detail, with the specific aim of discovering the influence that they have in commitment to the IS project and its benefits. However, frames, feelings and statements of managers and technical implementation staff [project manager and on-site monitoring team (MT)] are

considered in order to validate/ improve the frames of users and contribute to a better interpretation and triangulation of data, as Yin (2003) recommends.

Using the actual structure of the categories found in the data analysis, which was naturally incorporated in the construction and description of the history of each organization, the description of the cases is made in four distinct parts: 1) characterization of the hospital in relation to its history, business, mission, organizational structure and context, (2) TF for the implementation of PFSS (which describe the whole process of implementation, images of the information system developed by users and the system's impact on the daily activities), 3) the description of the various dimensions and antecedents of commitment found in professionals studied, and finally, 4) the discussion of the findings found leading to inferred answers to our research questions.

In all cases, the verbatim used to illustrate the perceptions, interpretations and other statements made by those interviewed, contains in its final section identifying information with the initials of the name, the profession, and the number allocated to the interview or source of data (e.g., letter, conversation, document or meeting), without compromising the anonymity of the participants or affecting the information given. Table 6 presents some examples and their respective illustration.

Table 6 Examples of Verbatim Identification

Source Identification	Description
(CB_P_I1)	Name_Physician_Interview 1
(CB_P_I1.1)	Name_Physician_2nd interview (to the same Interviewee)
(A_A_I2)	Name_Assistant_Interview 2
(L_MT_I1)	Name_ Monitoring Team _Interview 1
(P_N_I10)	Name_Nurse_interview 10
(VF_Mg_I1)	Name_Manager_interview 1
(Meetings_PFSS)	Meetings_Paper Free Solution
(C.B_P_Conv_1)	Name _ Physician_Conversation 1
(WW_Doc_2)	Written_Work_Document 2
(Int_Journal1_doc3)	Internal Journal 1_Document 3
(Press_2006_Doc5)	Press_ Year_Document 5
(F_P_letter1)	Name_Physician_letter 1
(ACSS_NC_Doc1)	Entity_Document name _Document 1
(W_Meetings_PFSS)	Work Meetings_PFSS
(G_P_Obs_3)	Name_Physician_Observation 3

5.2 Description of Case 1 (A)

5.2.1 Introduction

The description of this first case study, resulted from an exploratory study undertaken in a public hospital situated in central Alentejo that provides healthcare to a population of about 173000 people in that area.

From analysis of the data collected, it was possible to place the statements of those interviewed into the four most relevant themes for the study: (1) organizational context, (2) technological frames, (3) commitment, and (4) usage; which in turn encompass categories and sub-categories. In Table 7 only the main themes and categories are presented with their respective description. Appendix C shows a complete list of the categories and their respective sources and the number of coded references extracted directly from the NVivo Software.

Table 7 Relevant Categories

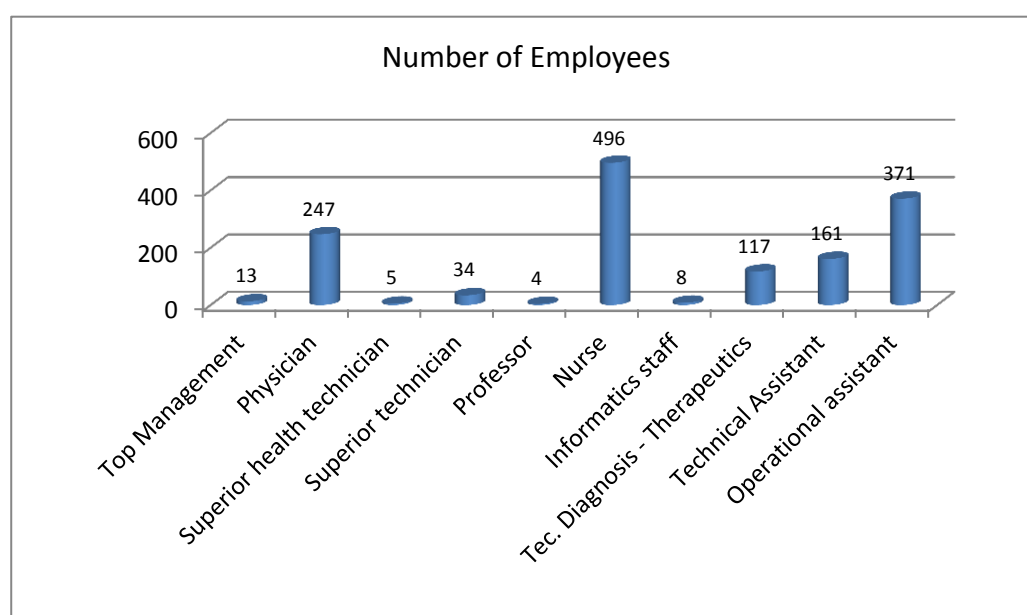
Categories	Description
Usage <u>Correct Use</u> <u>Partial use</u>	Includes relevant observations for users regarding their utilization of the system - also includes other professional groups.
Technological Frames <u>Technology-in-use</u> <u>Attitude</u> <u>IS perceptions</u> <u>System significance</u>	<p>The underlying assumptions, expectations, and knowledge that people have about the technology, which are central to understanding technology, technological development, usage, and change in organizations (Orlikowski and Gash1994).</p> <p>Understanding of technology usage, and perceptions of IT, (features, functionality and usefulness (Weick, 1990). Refers to people's understanding of how the technology will be used on a day-to-day basis.</p>
<u>Implementation</u> <u>Evaluation</u> <u>System objectives</u> <u>Process</u> <u>Motive for adoption</u>	All knowledge, expectations, experiences, interpretations, understandings about all parts of the implementation process, since the decision to apply and use technology.
<u>Impact of System</u> <u>Perceived Benefits</u> <u>Decrease patients Relationships</u> <u>Decrease in professional relations</u> <u>Workload</u>	Includes positive and negative perceptions about consequences and benefits of the system, as well as including the ways in which individuals evaluate a specific IT. Perceived benefits are advantages obtained from the project, from users' perspective.
Commitment <u>Project Commitment</u> <u>Top-management commitment</u> <u>Lack of commitment</u>	Commitment is a force that binds an individual to a course of action of relevance to one or more targets and it can be accompanied by different mind-sets (Meyer and Herscovitch, 2001, p. 299)
<u>Commitment Dimensions</u> <u>Affective</u> <u>Normative</u> <u>Continuance</u>	States of mind that play a role in shaping behaviour. These three components reflect the intensity of the psychological connection that binds the employee with the company or course of action.
<u>Commitment Antecedents</u> <u>'Close'</u> : Work Experiences <u>'Distant'</u> : Personal characteristics (Individual differences and Demographics)	There are numerous factors that were considered as precursors of commitment that can be grouped into two categories, called close and distant causes.
Organizational context <u>Outer context</u> : Political Ext. context, NHS IS Strategy, inefficacy of NHS <u>Inner context</u> : Workload, size and complexity, political context, organizational climate, lack of HR	The aspects related to the organizational context, both internal and external, that have emerged from the data analysis

5.2.2 Characteristics of the Site

Hospital A is a large hospital and is distributed over a wide geographical area. Its clinical activity operates through functional services and units, grouped in several areas (departments) surgical, medical, maternal/ paediatric, physical therapy and convalescence, mental health, urgency/emergency and Complementary Methods of Diagnosis and Therapy (CMDT).

On the 31 December 2010, the hospital employed 1458 people according to the HR records (see Figure 7) and had capacity for 332 beds. During the year of 2010, 191262 outpatients were seen, 13637 surgical operations took place, 76014 emergencies were dealt with, and more than 13000 patients were admitted.

Figure 7 Distribution of Staff by Professional Groups on 31 December 2010



Source: Adapted from HR Records of Hospital A (2010)

In this distribution of staff by professional groups, there are a large number of professionals in the nursing, assistants and medical groups, which in total represent 76.4% of the total employees.

The ER of Hospital A is *polivalente* in accordance with the legal directive given by the *Despacho* n° 5414/2008 issued by the Ministry of Health, which establishes the emergency network. This rating requires compliance with a series of requirements that demand higher levels of quality and an ability to respond to critical situations, including the existence of certain medical and surgical specialties, specific diagnostic equipment, air transport of patients, as well as improved facilities of emergency and intensive care.

The ER has a fixed team of nurses and assistants with 50 and 40 elements respectively, and medical and surgical teams that perform functions in weekly turns, so-called rotating ‘banks’, of twelve and twenty-four hours. Most physicians from various specialties perform emergency work.

The implementation of the information system in the ER as a first step seems to have facilitated the process of implementing the PFSS in the remaining areas of the hospital, because the whole medical team had already come into contact with the system in some way, before using it in the out-patient, in-patient or operating room areas. As the on-site monitoring team (MT) coordinator confirmed: "(...) we found a direct relationship between people who do not perform emergency work, and those who do not work with the application in the course of their consultation work"(L_MT_I1).

The physical space of the ER is limited, being characterized as follows: "(...) the space is very small, it does not have the capacity for the three hundred or so patients we receive here every day (...). The patients are here in the hallway; (...) no one can move" (A_A_I2). In the opinion of the professionals, the characteristics of the work context in the ER sometimes make attending the patients at peak times difficult. The Service Director argued that she needed to have the double of the space to be able to organize the logistics to be truly operational. "...the logistics are truly congested" (CB_P_I1).

As it happens, the conditions have been improving, as can be seen by the installation of new desks for attending the lower priority patients, classed as green and blue, freeing space in the corridor and other observation rooms.

5.2.3 Organizational Context

To characterize the organizational context, several sources are relied upon: (1) information from interviewees, (2) the consultation of documents from the hospital and (3) website information from the hospital. This analysis resulted in the identification of aspects that fit within either the internal or external context.

5.2.3.1 *External Context*

According to the hospital's accounts for 2010, the hospital operates in an external environment of uncertainty and continuous change, which has been exacerbated with the recent political instability and economic crisis environment. This influences the internal environment and how the Hospital conducts its business. As a public hospital, it is more susceptible to changes in health and financial policies, which are reflected in the increased influx of patients to its emergency department and human resources available, as some people reported:

"In one year they increased the number of patients in the emergency room to 10500 (...) because they closed the BEUs [Basic Emergency Units] and because people do not want to go to health centres and family health units (...) "(CB_P_I1).

"(...) Today, the influx is huge, and physical capacity remains the same" (R_N_I9).

"(...) This Emergency room lacks human resources" (P_N_I10).

The lack of a clear strategy by the Ministry of Health for IS in health, which affects all hospitals, and the inexistence of common or compatible applications that improve the exchange of information between health organizations, are often mentioned by users as the most critical difficulties in motivating people to use the system, because in their opinion: " it is not thinkable that the patient who is now staying here (...),

tomorrow will be transferred to the hospital in Lisbon and (...) there, they do not have access to the files here, and vice versa. Therefore, systems could be different but must be compatible "(SB_P_I13).

5.2.3.2 Internal Context

Internally the environment is characterized as being "calm and relaxed and open to change" in the words of two of the Board members, that also consider this an important element in the process of implementation. The executive member responsible for the project states that culture "has been a catalyst to accepting this project in a positive light. There are hospitals, (...) in which to make this kind of change, I would say it would be very difficult, if not impossible. Our hospital [A] is not among those hospitals" (VF_Mg_I1).

a) Organizational Climate

The internal climate and environment is clearly marked by the leadership of the Board and the changes that have been made, either to the physical infrastructure or the IT. At a conference on IS, the Chairman of the Board said, "Three years ago nothing had been done!" On the other hand, "the concern (...) to combine the expectations of employees and the expectations of the organization and (...) [keep] the dialogue going between people", were, in the opinion of the Head Nurse, aspects that positively influenced the environment of calm and openness to change.

This feeling of calm and a friendly attitude to change transmitted by top managers was shared by other professionals, both, in the area of management and in the operational area. The head of the IT Service explains that people are open to change (...) but she stresses that this is essentially due to "the action, vision and attitude of the current BOD". Some professionals interviewed (even some who classify themselves as

being against the IS project and its implementation) seem to recognize this leading role that the Board has taken in bringing about change:

“At this time the hospital [A] has a climate predisposed to change (...). It has a management team (...) that is in favour of implementing changes "(AS_P_I8).

"The Board connects with us and exceeds our expectations, (...)" (AS_P_I6).

"The Board was able to streamline the hospital at all levels, not only in terms of information technology" (SM_Mg_I3).

b) The Political Context

Along with this climate of relative tranquillity and openness to change, the hospital exhibits, like other organizations whose supervision is controlled by the state and whose BOD is appointed by the government, the existence of a strong political component that it is perceived and recounted by some professionals and members of the monitoring team. It is sometimes expressed during the interviews as a factor that influenced and influences the process of involvement in the implementation and even acceptance of the PFSS:

"(...) This structure is all conceived in a partisan way, we elected the Prime Minister, the Prime Minister appoints the Minister of Health who in turn appoints the directors of the RHA [Regional Health Authority], which in turn appoint the Boards of Directors(...)" (IL_P_I10).

"(...) the political question [partisan], is very evident in [A] (...). As the PFSS emerged aligned with a 'left-wing' administration, I think people of the 'right' react more to it. (...) In the medical area this is very evident; I think there is political influence in the matter ..." (L_MT_I1).

On the other hand, the fact that this hospital is, in the Clinical Director's opinion "a great institution, (...) with many doctors and many nurses (...)" allows the existence of different personalities, goals and priorities. In this sense, "personal and group interests emerged, on the one hand, related somewhat to corporatism and loss of autonomy by professionals and the medical specialties of medicine and surgery, and on the other hand, to interests of a particular nature", added the Clinical Director.

The manager of the on-site monitoring team for the implementation (MT) refers to the "great split in the different classes in the context of health" (L_MT_I1), which is

also illustrated by other comments, this time from a nurse and an assistant who are working in the ER:

“There is an attempt (...) by the surgical teams to overlap with other groups. (...) they try to discard what they think is not theirs (...). They [doctors] (...) come and tell us screaming that a case is not for them (...), to try to get us to change our screening” (HF_N_I16).

“There is sometimes a lot of friction between them related to the screening process (...)” (A_A_I1).

These comments relate to the impact on the group of nurses that the screening module has had in terms of transferring decision-making power, since they are the ones who do the screening. Note that screening is based on discriminators that are being applied in accordance with the complaints of patients and lead to the decision to assign a clinic priority to the patient. According to previously defined logistics, the nurse can, according to the discriminators provided by the system, immediately refer patients to a general, orthopaedic or surgical specialty. This ‘decision- making power’ in terms of referral to a medical observation appears to be seen by some medical experts as an intrusion on their skills and an associated loss of autonomy. On the other hand, if they can shift these patients to another specialty (e.g. Medicine), they can benefit in terms of the number of patients seen and all the procedures and responsibilities associated with them. This can be seen in the following statement from a nurse:

"It was just what was missing! It was just what was missing! We are ordering them about, we are taking power from them"(HF_N_I16).

The existence of personal and group interests that came to be compromised by the introduction of the IS project in the out-patient department, proving to be the source of some resistance, can be seen in the following situation, espoused by a member of on-site monitoring team (MT):

"The IS project will cause adverse interference [in the interests of some professionals], for example in the out-patient department because the hospital is eventually used as a platform for (...) exams for most surgical specialties that do private practice. The [PFSS] does not allow much of that, because it exposes a series of these processes, and the ordering of exams requires a registered consultation"(LP_MT_E1).

5.2.4 Infrastructure and Strategy for the IS/IT

The computerization of Hospital A, which includes the implementation of the PFSS suite, was part of the management strategy for the hospital, with a “significant investment in the IS/IT areas ... being included in the business plan for 2006-2009”, according to the Executive Member responsible for the project.

The focus of the BOD was to improve the technological infrastructure and communications, develop partnership projects in IS/ IT and gain control over the information of clinical production. In this sense, a Data Center was built, the entire computer network was renovated, the PFSS in the hospital was implemented (covering all departments of clinical care: emergency, in-patient, out-patient and operating rooms), as well as other HIS that support the clinical activity, such as, digital imaging (e.g. PACS), electronic prescribing (e.g. Glint) and laboratory (e.g. Confidentialia).

Referring to the significant technological transformation of the hospital and the associated changes, the Chairman of the Board commented at a conference of IS: "There was a paradigm shift. All professionals have access to all applications on the hospital intranet. The production is controlled in real time (...)"

Currently, the hospital has seven "computer applications in use in the sector,⁴ involving access to care and provided by the Ministry of Health/Central Administration of the Health System (CAHS), under contracts awarded by central services.” Of these applications, SONHO can be singled out, being the application over which all the others run, and with which all HIS need to interact to provide information to the Central Health Services.

Besides SONHO, other clinical IS are in use in the hospital (laboratory support, imaging, pharmacy and specialty specific systems).

⁴ Healthcare sector

Within each clinical data application, there are different information access profiles according to the function performed by each professional group.

However, the existence of applications such as Glint and PFSS which replicate electronic prescribing functionality creates some redundancy and causes some reactions of revolt in various professionals, such as the following:

"it must be the same system for everything, it's obvious! It has to be a single system, because otherwise it is a chaos. The institution has several systems working simultaneously (...)" (SB_P_I13).

5.2.5 Implementation of PFSS: Technological Frames of Users

The various interpretations of technology are fundamental to the understanding of technological development, their use and change in organizations. The frames are flexible in structure and content, having variables that change in size and importance over time.

The qualitative approach facilitated the capture and analysis of the different interpretations of the PFSS by the professionals of Hospital A, the way it was implemented and their actions relating to it. A set of themes was found, then later grouped in order to form the following "core domains", which are used in the description of the implementation process:

(1) Implementation - refers to all knowledge, expectations, experiences, interpretations, and understandings that healthcare professionals have regarding the implementation of the IS project, starting from the point when the BOD decides to proceed. It includes objectives, motivation, process (and the issues around it) and evaluation;

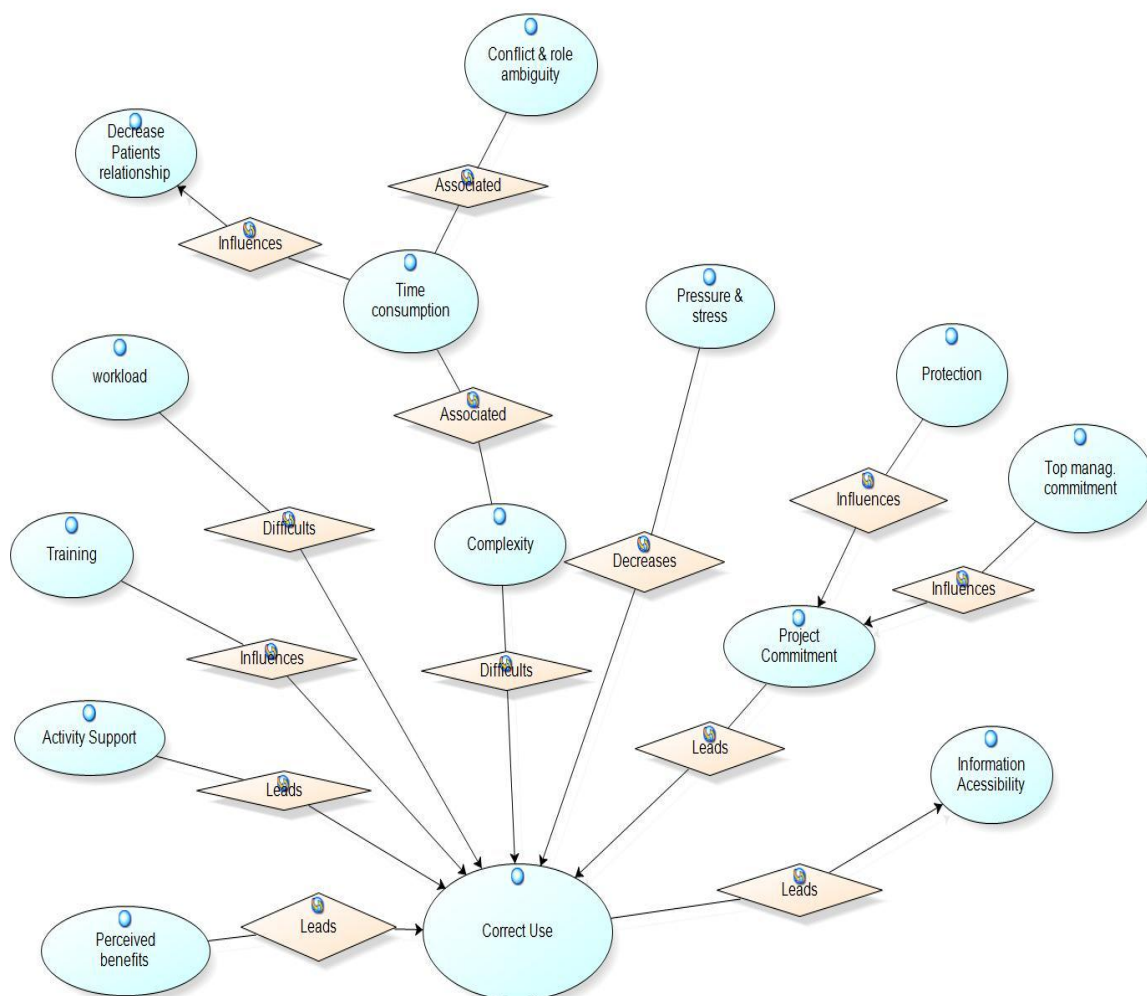
(2) Technology-in-use - refers to the understanding that people have of how technology is used in their day-to-day activities. It also includes the perception of its

attributes, capabilities and functionality and its meaning, ie, how they interpret the real goals behind the choice of the IS project (the goals of those who implement it) and,

(3) Impact of system - refers to the positive and negative perceptions in relation to the consequences of the system, namely the perceived benefits and ‘*disbenefits*’ accruing to the adoption of the system.

These domains are not independent, quite the opposite, relationships between each domain as well as relations between these categories with other domains of commitment, usage and organizational context were discovered in the data. Figure 8 illustrates some relationships between categories that pertain to different domains. In the Appendix D are presented all perceived relationships found in data.

Figure 8 Relationships between Categories



5.2.5.1 Implementation

The implementation of the PFSS began in June 2006 with the completion of the first meeting, during which the working group was formed, and the whole process was started, namely the identification of electricity and IT infrastructures, hardware, training plans, and everything covering the whole of the preparatory process for the introduction of the PFSS, which was first implemented in the ER. The starting date, however, was February 28, 2007.

Taking part in the working group (WG) involved in the implementation was the director of the emergency department, one member of the executive board (responsible for the project and representing the BOD, the head nurse from the ER, a computer technician (responsible for the computer service) and an element responsible for training. Later, a Nephrology specialist joined the working group to support the implementation of the PFSS in the out-patient department.

Initially, the intention of the BOD was to implement the PFSS medical software simultaneously in the ER, out-patient, in-patient and surgery room departments, however, according to the executive member responsible for the project "due to difficulties in implementation and individual characteristics of each of the specialties, a conclusion [was reached] that it was preferable to implement IS sequentially but use a single specialty [general surgery]".

Thus, it was implemented in the ER, out-patient department, and later in in-patient department and in the operating room of general surgery, "to finish the hospital with a specialty and in this way, gather all the information for subsequent specialties (...)" was stated by a member of the Board. Hospital A sought, with that strategy, to apply all the "assimilated know-how" in future implementations in other departments.

The process was extended until July 2011 (date of the investigator's last visit to Hospital A) and was not yet fully completed at the time of that visit.

a) Motivation for IS project adoption

According to the information gathered from the site of the Hospital A, the computerization project of the ER is part of the basic guidelines of the Clinical IT Programme for the ERs provided (...) by the Institute of Financial and IT Management for Healthcare, a non-departmental public body.

With reference to the decision process for the IS project adoption, the executive member responsible for the project explained that “the motivation for the hospital to acquire this clinical software arose from the realisation (in 2005) that the hospital, as with all hospitals in the National Health Service (NHS), had no clinical software that would guarantee the application of IT to the production area”. It also was pointed out, that without the application of IT it would not be possible for a large business to survive and manage itself, when it had a budget of some 80 million euros.

The choice of the application depended on the available packages on the market and the decision made earlier by another BOD for the computerization of the ER, as explained by the same member of the Board:

"We looked at the market to understand what the tool was (...) that could be adopted by the hospital. The Board at the time advised the system [PFSS] for the Emergency room and the company was in the process of developing modules for in-patient, out-patient and surgery room use (...) we submitted an application (...) for the funding program of the Portuguese Society of Knowledge" (VF_Mg_I1).

Despite the conviction of the Board that most users of the PFSS, share that view, [objectives and benefits] and that "a constant effort was made from the time it was decided to share that vision with the people" the reasons that led the organization to adopt and purchase this software do not seem to have been disclosed or properly understood by the users, who stated that the importance of the system had not been explained to them, along with the advantages of the system implementation, as shown by the comments of two physicians in the ER:

"It was important that it was explained to us why, and what the system would be used for, and that we were given information about the importance of the IS project" (MJP_P_I7).

"Now, I cannot understand why the PFSS was chosen (PG_P_I4).

During the on-site data collection the existence of information regarding the adoption and implementation process, objectives and potential benefits of the information system in the hospital site and the intranet, became evident, as well as the existence of circulars and briefings, according to some informants (belonging to the WG), which brought into doubt the accuracy of some of the information obtained in the interviews. However, a member of the monitoring team also emphasised a lack of knowledge when he stated that "people cannot see what the objectives of hospital computerization are" (AI_MT_I3).

An understanding of the hospital environment may explain the lack of knowledge. Most healthcare professionals and doctors in particular, are not used to consult the official information transmitted by the organization in digital format (via internet, intranet or e-mail).

On the other hand, it was found that for some of the professionals interviewed, the assumption remained that the information system was imposed by third parties or by the Ministry of Health. In other words, the idea prevailed that the decision of the choice of system by the BOD was not autonomous and independent. For some professionals, such as the service manager of a mobile unit, the choice was motivated "basically for the convenience of the software provider [PFSS firm], and the convenience of the people who bought it and installed it in the institutions without asking if we wanted the [PFSS], or if we wanted a different one (... "). Other users stated that the Board decided to adopt it "because there were directives (...) to adopt (...) from the ministry" (JM_N_I4) or even that it is "a completely external system, sold to us, enforced" (SB_P_I13).

This assumption that something was "imposed from above", appears to have caused some hesitation to accept the project by some users, and their commitment to the same. It was seen as a decision not solely dependent on the Board, and therefore, it would not fit in with the organizational goals and objectives [interpretation of the investigator]. As such, its impact, according to the reasons identified by the respondents, proved to be negligible in the use of the system, with some exceptions.

b) System Objectives

According to a member of the Board, the intent and objectives underlying the adoption of the PFSS were predominantly strategic in nature, to the extent that "it is not possible to manage an institution without clinical software that allows the management of all clinical information".

Interpreting statements collected, either from the executive member responsible for the project, or from other members of the Board, or even from other documentary sources available, the strategic objectives inherent in the adoption of the system are divided into three categories: (1) improve clinical management (clinical management), (2) improve information management (information management), and (3) make the hospital paper free (paper free hospital). This last objective influences the other two, in that it enables respectively, greater transparency of information and process flexibility.

Clinical Management: Is a goal assigned to the IS project that includes aspects connected specifically to clinic management and the efficiency and improvement of the processes. It relates the desire for "an information system that is able to deal with clinical and non-clinical information," and that provides a management tool "that enhances the clinical aspects while conjugating them with indicators for output and efficiency." To this end the Board hoped that (in the words of its executive member), "there will be a clinical component that is perfectly 'manageable' by the medical staff of

the hospital and that this will also translate into management indicators through ADW (Data Warehouse)”

This main goal includes the expectation that through application of the system the "bureaucratic formalities will become (...) more fluid; the processes will become automated (...)" and that it will contribute to the improvement of medical records, making "the interconnection of all structures in order to optimize everything", as according to the Clinical Director and a member of the WG. Thus, the managers of unit expected more flexibility and transparency in the processes, leading to an increase in efficiency.

Information Management: With this second strategic goal, the managers wanted to obtain a more secure, accessible and reliable clinical information (available in real-time and of good quality). When attained, these objectives would provide a better service and continuity of patient care, fewer invasive procedures (because access to information and previous exams undertaken is available), providing greater safety for patients and professionals who care for them. They are therefore targets with strong links to the patients’ welfare. Some of the interpretations and perceptions of respondents for this objective are revealed through the following observations:

“facilitating the consultation of records by various professional groups (...) The increase in fidelity and availability of records”. (A.S._P_I8).

“(...) with paper, maybe there are things that are lost, whereas here everything is recorded in this system.” (S.A._N_I6).

“(...) have records produced in a reliable, standardized and continuous way (...) because the quality of paper records is very fragile, (...)” (DC_Mg_I4).

c) Process

This frame includes the perceptions and interpretations that users hold for the whole process of PFSS implementation, including: (1) phases of the project, (2) the way the project and its respective objectives were reported (communication), (3) the manner in which the training took place (training), (4) the experiences and perceptions that they

had of the support of the organization (management support), (5) technical support with the adaptation of the application (customization), and (6) the problems or difficulties experienced during the process of implementation (issues of implementation).

Project Phases: The PFSS was implemented gradually and in stages starting at the end of February 2007 with the ER. The PFSS in this service had overall two main phases: the PFSSER (a legacy application), and a new technology, PFSS EDIS (a new version of the PFSS). At this time, according to the words of the director of the ER, the PFSS in the ER "is not yet optimized. Although there is almost no paper being used, we still request blood samples on paper (...) and in the observation room (OR) (...) we continue to use a handwritten list of patients".

At the same time that the implementation of the PFSS in the ER took place the out-patient department was set up. In November 2007 some consultations took place. The implementation process for consultations was very gradual and slow, due to some instability that occurred in the application, which was replicated across the ER and out-patient departments, and led to the implementation of the remaining consultation processes only towards the end of 2008 and early 2009. A member of the on-site MT explained that, "only at the end of 2008, did we start processing (...) the rest of the consultations. (...) In early 2009 we had practically everything in PFSS "(AI_MT_I3).

The implementation of the PFSS in the Out-patient department (OD) began with the specialty of Nephrology, and only after that did it spread to the surgical specialties, as described by the IS director and member of working team:

"After going ahead with the Emergency room, we decided to proceed with the out-patient department with a small cluster in nephrology. (...) And only after that did we move to all the surgical specialties. After (...) that it was one specialty at a time" (SM_Mg_I2).

There are still some services that do not use the system for consultations, but about 70% are already using PFSS, especially for new clinical processes (first consultations), albeit partially, "Everybody uses it only partially. The fields most used

and needed are: medical history, reason for consultation, test requests, and during the consultation it is compulsory to write the prescription "(CB_P_I1.1)

The implementation of PFSS in the in-patient services began in a surgery service with a limited number of patients to gain experience. This was later generalized to the entire service as the head nurse explained: "We started the implementation of the INPATIENT module in only one service and that service had only six beds. (...) Only after this test phase, (...) will we generalize it to the entire service (...) "(DC_Mg_I4).

After completion of implementation in the surgical services it was extended to more services. As of July 2011 the PFSS had also been implemented in orthopaedics and ophthalmology. "In both medical services the PFSS is partially implemented (test ordering is missing)" (AI_MT_I3).

The remaining in-patient services have been implemented in a gradual manner. However, according to the head of the IT department at the time of the second interview (06.07.2011), the implementation of PFSS in the remaining in-patient services was stalled because of nurses' demands relating to system functionality and their objections to the ICNP language, as well as the need to make changes to the therapy registration scheme. According to the same informant, the "head nurse had had a meeting with the nurses and stopped the implementation of the PFSS in the hospital (...). The Board had agreed and we had been at a standstill for five or six months".

The total services where PFSS is working "was around 95% in the OD and 65% in the in-patient department (implementation was pending for five services), according to the information provided by the person responsible for the monitoring team (AI_MT_Email2).

The implementation of the application in the operating room was restricted to surgical specialties that already had the PFSS implemented in their respective departments, because "the priority of the hospital has been the in-patient department,

(...) the hospital ended up not wanting to proceed with the rest of the Surgery Room before the in-patient department was completed"(...) (AI_MT_I3)

When asked to predict the completion date for the implementation of PFSS, the MT Coordinator replied: "We [company name] and the hospital are working towards the implementation of PFSS, to be completed by the end of this year [2011] but there may be changes at board level, so There are no certainties "(A_MT_I3). This statement shows how the hospitals and the decisions of its managers are dependent on political and partisan changes and become hostage to the decisions of the Ministry.

Communication: The communication to employees regarding the implementation of the PFSS and its entering into service followed the normal procedure as regards formal communication in this type of public organization. This has already been briefly addressed in the section on the underlying motivation for the adoption of the PFSS. Some excerpts presented below (taken from the website and interviews) illustrate the concern held by the Board to inform and communicate the objectives of the information system:

"[The Hospital A, E.P.E.] is starting its clinical computerization of ER (...). The project's starting date was 28 February 2007 and the aim is to remove the paper from the ER."

"The Hospital A E.P.E. authorized the [PFSS], a software suite that allows the replacement of paper by digital format. (...) and an increase in the quality of the healthcare provided (...)"

"There was (...) more than one meeting where people were called, and were in fact heard ... (SM_Mg_I2)".

"In relation to the Emergency room there were circulars, and it was a gradual process of information supply" (PG_P_I4).

However, for a great number of professionals (doctors, nurses and assistants) the process of communication and information dissemination of the project was insufficient:

"What we were told was that it was to remove paper (...) they did not go (...) into great detail" (J_A_I3).

"I wasn't consulted neither personally, nor as a group member" (MJP_P_I7).

An element of the monitoring team of the PFSS commented on the way users had been notified of the project stating that it was important that in these processes, communication should start at the management level, so they could share and engage the rest of the team they managed, "(...) I often feel (...), both here and in other hospitals that this is not done. (...) And we end up (...) taking on that role ourselves" (AI_MT_I3).

The importance of a good communication for the project and its objectives is also highlighted by the PFSS project manager: "they are projects where there is a large component of change management and in that management of change communication is very important". This is because from his perspective, "there is always great anxiety among professionals when systems like this are introduced." This manager also recognizes that although communication had been an on-going concern during the implementation, it is necessary to improve it because, "we still don't do it in the best way".

Some of these communication problems have also been recognized by the Chairman of the Board himself during a work meeting, at a time when there was much dissatisfaction among users with the performance of the application:

"I think we have some communication problems. It is necessary to arrange a communication channel (...) to schedule a meeting between the heads of the emergency team, the Board and the clinical director to discuss these problems (...) "(Meetings_PFSS).

Training: Training was planned and given to each professional group involved with patients, from administrative staff, to the therapy and diagnosis technicians, nurses, doctors, medical assistants and social workers. The length of training varied according to the complexity of each profile, with the training module of the assistants being the shortest. In this category, 49 references were registered by 23 interviewees. Some of the interviewees' quotes are evidence of this training process:

"All healthcare professionals working with PFSS were adequately trained for the job they do" (SM_Mg_I2).
 "We all had a training day, (...) that was staged, it was a group at a time" (C V_N_I1).

However, the perceptions/ interpretations of professionals differed when it came to the way such training was planned and executed. While some have a favourable opinion, like a surgeon who stated that, "although it needed improvement, the training that took place facilitated the implementation of the program" (AS_P_I8), other users (not representing a particular professional group or level of competence in IT) had a more negative perception of how the training was conducted. They believed that the training period was: (1) quite out of phase with the use of the information system, (2) insufficient, or that (3) the training received was not relevant to the system implemented. Some excerpts presented below are quite illustrative of these frames:

(...) I did the initial training, but later (...) when I started using it I could no longer remember anything (CO_P_I 11).

"The greatest difficulty is that between the time of training and the time of application, there was a big difference (...)" (AC_N_I21).

"We had the training which was for a short while, we were there for about 2 hours, (...) we were learning from each other and with the staff of the PFSS (...)" (O_A_I5).

"We had the training with a version that was not the one that was used. So for me it was useless." (PP_P_I5).

"And the system, i.e., the model we had the training with, was different from that was installed here" (NR_N_I8).

Management Support: This frame encompasses all the perceptions that participants have of the support provided and obtained by and from the Board, and the working group, both in terms of availability of resources as well as the level of involvement of the professionals in the project implementation.

The Board, as part of its implementation strategy chose to intervene in the proceedings through a team of professionals (working group) in which a member of the Board was also present. These professionals were chosen among people with a leadership profile and ability to influence the progress of the project. Referring to that phase, the executive member responsible for the project explained: "We chose a working team (...). We went to the leaders who were on the field, particularly in the ER and in other areas that help us implement the project (...)" (VF_Mg_I11).

The WG participated in meetings with the PFSS team, helped to implement the measures decided by the Board, encouraged the use and participation of professionals, all while dealing with any difficulties that arose, as demonstrated by one of its members:

"I had several meetings with team leaders and the older interns of each team to organize how we would proceed in terms of implementation, (...) and [tried] to solve all the problems that [would] arise on a daily basis" (CB_P_I1).

The support of the Board also included backing the measures that the working group adopted, either through formal communication or by providing the necessary means and resources as mentioned by a member of the working team (responsible for the implementation of the OD): "(...) there was never a lack of support. (...) The biggest hurdles were overcome (...) with a bit of encouragement by the BOD, with their letters alerting every one of the need to cooperate (...) "(PP_P_I5).

When asked how they were involved in the process, only the elements of the WG or those who ended up training the team, replied affirmatively:

"They asked me to join in. (...) But in fact my job would be to coordinate and implement the PFSS in the out-patients (...) "(PP_P_I5).

"I was involved in the planning stages of training, etc. (...) "(JP_N_I1).

When a member of the WG was asked about the adopted strategy to involve users in the project and influence their commitment, he explained that there had not been an organized way to involve users. The process was conducted in an informal way because as this member commented, "(...) we are not a very large hospital, are we? (...) We talked with each other. We'll change and make things happen, we will try to implement this... then there was the training, people were trained and experienced the application..." (C.B_P_I1).

However, the vast majority of professionals, mainly from the doctors and nurses group, believe that their participation in the process was insufficient or even non-existent, and that there should have been a greater involvement of various professional

groups in the process. A service director in a letter to the Board argued that "I heard that the PFSS program for consultations would begin in November, and regret not having been informed by people other than the BOD" (P_letter2). Another doctor of internal medicine also expressed his disappointment at the lack of involvement: "(...) people should be heard and give their opinion!(...)" (MJP_P_I7).

From the point of view of the coordinators of the monitoring team, the support to implement the PFSS they expected from the hospital's management team sometimes did not meet their expectations, particularly in relation to decisions taken by some board members (in the clinical area) that would have helped resolve or minimize some of the difficulties encountered in implementation:

"The Clinical Director is not part of the working group which is a problem for me from the start(...). There are a number of decisions, (...) a series of mandatory procedures that we needed (...) which are currently of a clinical nature and the Clinical Director is not present "(L_MT_I1).

On the other hand, the permanent monitoring presence for almost two years, by the MT the firm supplying the IS (supported financially by the hospital), was highly valued and recognized by the users. Here are some testimonials from those interviewed, which reflect this sense of support from the monitoring team present:

"Not as far as organization is concerned. In terms of company staff, (...) during the implementation phase there were very present (...) they were available to provide the necessary support, it was done through a gradual weaning "(PG_P_I4).

"I felt supported by staff of the PFSS, every time! They were always present (...) "(J.M._N_I4).

Customization: One of the features of the PFSS is the ability to be adjustable to the specific characteristics of each medical specialty and the requirements of users, through customised usage profiles (e.g. 'My PFSS').

Since its introduction, and like other hospitals, the information system has being customized to meet the needs of the organization on one hand, and the suggestions from users on the other:

"(...) I complained, (...) and they finally (...) did a thing called summary report of the episode".
(C.B (Conv1)

“As we make suggestions for improvements they have been steadily improving” (C. V._N_I18)

However, this customization of the PFSS, which on one hand contributes to the satisfaction and improved compliance by some professionals, also makes the system gradually more complex, with some of the changes potentially contrary to the expectations of other users, because not everyone's needs can be met, as explained by a in-patient surgery doctor: "(...) there's that question of some people giving an opinion and others giving another, and there is also the question of the software programmer understanding exactly what each one wants as well as the question of the final result, which may be neither what I want, nor what my colleague wants, not what the software programmer wanted to do "(AS_P_I8).

For example, the modification of the usual requisition procedure for the transport of patients to radiology exams was the cause of numerous conflicts between the medical team and the assistants, and among them and the radiology technicians.

In that doctor's opinion, the fact of listening to the users after introducing the program in order to adapt it can create situations where the result is no longer what was originally desired. "The programs should be delivered ready to use (this is not the case of PFSS) and subsequent updates would then bring the necessary modifications and improvements, similar to what happens with the office programs".

Implementation Issues: This category includes all the difficulties and problems frequently mentioned by participants during implementation. Due to application reliability problems between 2008 and 2009 the implementation was almost suspended. This led the participants to think that it would not be possible to use it, and was associated with a large delay in the implementation process, as explained by one member of the monitoring team:

“There were many difficulties with the performance of the application (...) There was a problem that the first version at the beginning was very poor, and after all the updates that it underwent (upgrade to version 2.4.2) [resulting in a slow upgrade] it remaining in-operational for a long time (...) and basically spent a year without running (...).When things resumed, they were

extremely unstable, and this created a huge discomfort; there was in fact a stage where the project was really at risk.” (L_MT_I1).

These problems had a strong influence on the perception of the users in relation to the system, as well as their commitment to the project's implementation. Some excerpts from interviews reflect these perceptions:

"There was some resistance here because of some shortcomings of the system itself, (...)" (JP_N_I1).

"(...) Things did not work well, because the system would freeze, (...) it makes the adjustment period to the system too long, which generates great aversion to using it." (SB_P_I13).

The person in charge of the IT department in the first interview, which coincided with this period of application instability, underlined the concern the implementation team held to keep professionals committed to the project. According to her, early in the process it had been possible to ensure that people believed and adhered to the project and now the great difficulty "(...) is to keep people motivated given that we have a problem at hand, (...) manage to make people continue to believe in it, (...) that it is an advantageous tool for their job (...)" (SM_Mg_I2).

Another of the issues emphasised during the interviews relates to the use of the electronic prescribing module by the medical staff in the emergency Observation Room (OR) and its extension to other services of the Hospital. The lack of electronic prescriptions by physicians caused great discomfort to the nursing staff, since it is an interdependent function. Nurses are forced to duplicate records and still use paper, manually transcribing therapy prescribed by doctors (a potential cause of therapeutical errors). Some nurses expressed their outrage:

"(...) Why do we have to continue to do therapy on paper (...) when we have an information system? (...) Why do I have to be duplicating work (...)" (NR_N_I8).

"The prescription of therapy in 'Glint', [instead of the PFSS] implies that both applications must always be used " (CV_N_I18).

However, it does not seem that the reason for not using the system for prescriptions is only due to technical issues, to the extent that the prescription module

for the observation room (OR) of the ER is similar to the one of the in-patient's department. Here too there seemed to be a reluctance of the medical staff to use electronic prescription. The prescription of therapy by PFSS has been improved with a view to fully adoption for the entire hospital, including the OR of the ER, and is currently on trial in Surgery 2. According to the coordinator of the monitoring team: "(...) we began to experiment in Surgery 2 to assess the advantages and disadvantages" (AI_MT_I3).

Another of the issues observed and described by the informants during the project implementation was the occurrence of certain phenomena of resistance to the information system that were being addressed through the concerted action of the Board, the WG, and MT. These phenomena were more visible in the out-patient and some in-patient services and were essentially characterized by a refusal to use the application, or only its partial use.

The presentation of these cases of resistance as well as the measures taken to correct them, are set out further in the section on lack of commitment.

d) Evaluation

This category includes the perceptions that users have about all process (as at July 2011), the manner in which the process of implementation took place, the level of use of the system, what they think of the information system, its functioning and operation, how they interpret the phenomena of resistance, and how it should be managed, as well as, future expectations.

Perception of the Implementation Process: Most of the reviews are favourable to the manner in which the implementation took place in the ER, as well as in some out-patient and in-patients services, although there are some professionals who considered

the process to be too fast (doctors), or that it should have been better planned to avoid resistance and provide the services with the required resources (head nurse):

“I can’t point to faults in the way it was implemented in the Emergency room, because it was implemented as it should have been. In a gradual manner, with enough initial support of the PFSS staff and progressive weaning (...)” (PG_P_I4)

“implementation [in the inpatient services] went and is still going well! The nurses have adapted well. The greatest difficulties have more to do with the ICNP [International Classification for Nursing Practice] than with the PFSS itself (...)” (CV_N_I18).

As far as the healthcare professionals general views of the system's impact on the day to day activities in Hospital A:

“I would not say it was a success. I can guarantee that at this point most people could not see themselves working again with pen and paper. (...) I would say that overall it was worth it”
J.M._N_I4

“people (...) can identify the benefits of the application, but reject (...) the worst aspects, which are the increased workload and being forced to write in a way which is easier to read, (...)”
(CB_P_I1)

As far as this doctor from the working group is concerned, “to type on a keyboard has a higher cost than the benefit gained from access to information”. Referring to the size of the project as well as to its impact, this professional added: “[it was a fairly large change] (...) now I sit down and the patient even tells me “Look, I brought nothing with me, because they told me you see it all there on your computer (light laughter). And it is true, they then peek to see, to confirm, (...)” (C.B_P_I1).

When asked about the criteria, that in their perspective, describes the success and/ or completion of the process, some members of the working group and monitoring team answer:

“The process will be complete when we have successfully implemented the PFSS in the four modules (...) and we have removed paper” (SM_Mg_I2).

“The use of the system is tested by removing paper (...)” (M_MT_I2).

For these individuals, with responsibility for the implementation, the withdrawal of paper implicitly assumes that the records of the professionals have been transferred into digital format, and they therefore stress the importance of this measure:

"It was following the withdrawal of manual requests for general tests and imaging tests, that there was an increase of orders in PFSS " (AI_MT_I3).

However, for some healthcare professionals the success or positive outcome of the implementation of the system is a result not only of the extent of the services covered by the PFSS and the number of users, but also the type and quality of records that are held in the system. For example, for the director of the oncology service, "the system is only really useful if we put the information there." That is, "when every healthcare provider uses the system to produce their records, and do so well, so that they can be shared by all other professionals" (SB_P_I13). If this purpose is not achieved, "(...) instead of gaining from it and having access to information, the opposite will occur and we will lose the clinical information because people do not write it down," another doctor of internal medicine said (IL_P_I10).

The way people use the information system to make records of their professional activity, as we have just seen, is a critical point that deserves our attention due to the impact it has on the range of benefits that can be gained from the system, particularly in relation to patients.

Expectations for the Future: The expectations of some participants in the study concerning the PFSS system encompass the desire to bridge the remaining gaps, as far as the operation of the therapy module is concerned, explore the full potential of the program, integrate all clinical information into the PFSS and share this information with other healthcare organizations (e.g., health centres):

"I hoped for example, that the application would be 100% used in the observation room." (J.M._N_I4).

"(...) Information exchange with the health centre. (...) and there is no way, they have no access to patient information (...) " (IL_P_I10).

"A good solution would be to integrate all [all clinical information] into the PFSS" (JM_M-E12).

IS Usage Level by Professionals: The usage of the system varies according to numerous aspects that have already been mentioned. From an overall perspective and taking into account IT competence, the use of the application by users relates to how

often they use it, how the user sees the system and the meaning attached to it (significance of system) and even certain conditions pertaining to the context of work, such as the higher number of patients. In a general way, the nursing and assistant's groups exhibited a greater acceptance of the IS. Out of the three professional groups, doctors showed most difficulty in complying with and using the system.

In the sections "Usage" and "Lack of commitment", some of these issues are discussed in greater detail.

5.2.5.2 Technology-in-Use

This domain includes the perceptions and interpretations that the users have of technology, which result from their interaction with the information system in their daily activities, including: the 'Significance of System', 'IS Perceptions' (perceptions about the features of the system) and the 'Attitude' adopted towards the system.

a) Significance of System

For the users, the information system has a subjective, not quite explicit reason, which from the user's perspective hides the real reason the implementers have for the implementation of the IS. That is, the PFSS is assigned a meaning, a connotation that goes beyond what is stated in the objectives and the information transmitted. All the perceptions and interpretations within this situation are considered in this section on the significance of system.

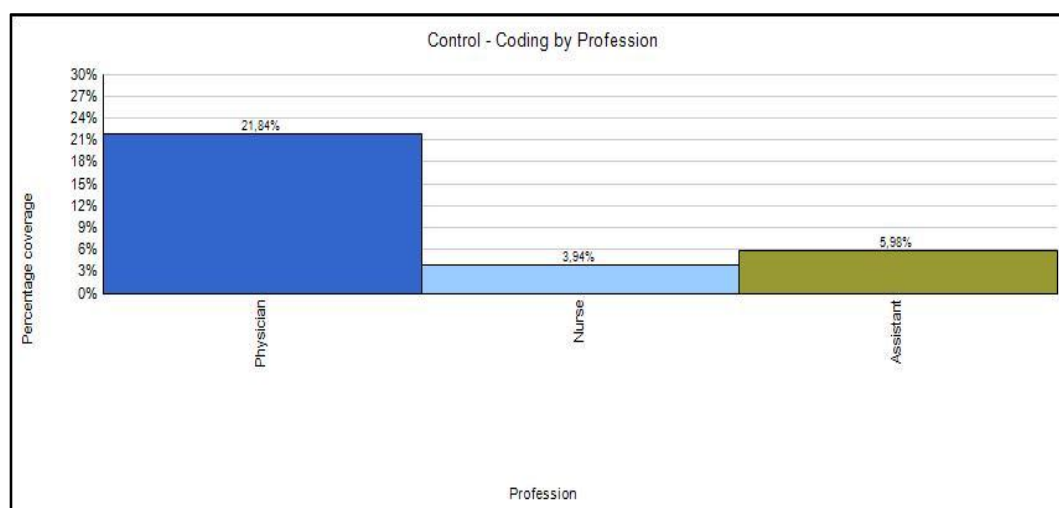
In the perceptions and assumptions that healthcare professionals have referred to, implicit meanings of the system emerge: (1) the intention to control the activities of professionals (control), (2) an instrument that can be used against you in case of complaints or medical error (liability), and (3) a way to register and protect their actions (protection).

It was interesting to observe that the last frame (protection), was more prevalent in the groups of nurses and assistants, while the other two are more closely associated with medical professionals who essentially are against the system or have little commitment to the project.

Control: Although the Board has been careful to convey that "the information would never be used in the strict sense of monitoring people" and that while "there management indicators are calculated, these indicators have to be always put into context, there is a belief by some professionals that [PFSS] (...) only serves as a control mechanism", said the Nurse Director.

The assumption that the PFSS is going to control activity is often mentioned by the participants in the study themselves, or when referring to other professional groups. The following chart (Figure 9) illustrates the distribution of this frame by professional groups.

Figure 9 Distribution of the Frame Control by Professional Groups



Some excerpts serve to illustrate this technological frame, which included 21 references made by 10 interviewees. The first example serves to clarify that interpretation and represents a contribution directed to one of the members of the working group, by other colleagues in the profession (female doctors):

"This is to control us, you'll see how much you'll regret having gone to so much trouble with it, it'll be simply used to see how many x-rays, how many tests we ask for, and to tell us that we cannot ask for so many, you will be controlled on the time you spend with patients ..."
(C.B_P_I1).

Liability: This frame attributes to the system the capacity to serve as a tool to be used against professionals in the event of complaints about the service or the occurrence of medical errors and subsequent disciplinary cases as exemplified by the following statements:

"We have to validate the medication we prescribe (...) say what we did to the patient(...) in case anything happens, right? Because nowadays everyone works in a defensive manner"(P_N_I10).

"(...) This system [PFSS] induces illegal practise in some situations. For example, in deaths, (...) it forces us to request an autopsy, (...) a decision that belongs to a judge not to a doctor.
(AS_P_I6).

"There is an important detail in the application, which is the fact that there is always a record, a time, (...) which will hold accountable those responsible (...) the application has a curious thing which is the acceptance of responsibility. (...) If we take on responsibility for the patient, (...) from then on he is our responsibility, it makes us more responsible and to be more careful"
(JM_N_I4).

User Protection: Contrary to the previous frames, this reflects a view that the users attach a protective role to the system, resulting on one hand of (1) a greater transparency in the processes (who does what and when) and (2) greater information security, avoiding filing errors. The following excerpts exemplify these perceptions:

"for starters it came to our defence. Defence in the sense that, it gives transparency to the situation. (...). It is a safeguard against our work" (A_A_I2).

"I think it's an organized thing, (...), sometimes (...) there are patients who disobey us, we do not know where they are. We have to take them to be tested and don't where they are. I make a note of it straight away (...)" (J_A_I3).

"Records are not lost (...) there is a safeguard of our profession there, (...) there were situations of lost documents, (...) but with this system (...) there is no way for it to get lost" (JM_N_I4).

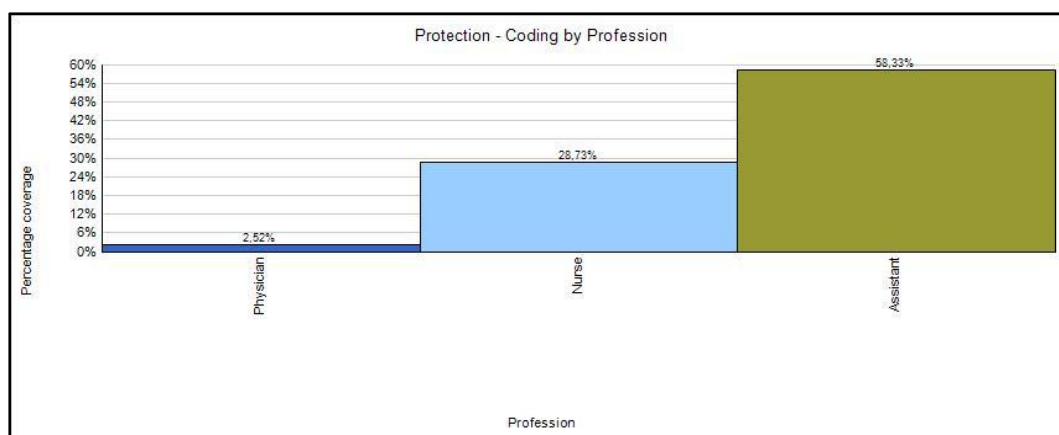
"(...) What used to happen often, and I think that safeguards us nurses somewhat, that is, what they [the doctors] write (...) they cannot delete!" (...) (SA_N_I6).

As a physician and service director mentioned "those who work well should not fear these systems, quite the opposite (...), these systems can legitimise more and better demonstrate who works best" (CO_P_I11). Therefore, in the opinion of a member of

on-site MT "(...) the nurses were always regarded as allies of [PFSS], why? Because their work has become more visible and they became more protected" (L_MT_I1).

Sharing this frame is the vast majority of assistants and nurses (representing 22 references in 13 sources (see Figure 10), an understandable fact since most of their functions are interdependent and also very much based on the fulfilment of clinical requirements.

Figure 10 Distribution of Frame 'Protection' by Professional Groups



b) IS Perceptions

Among the healthcare professionals, various interpretations of the system and its handling were found. Many of these perceptions were influenced by a troubled period, from the process in which the IS had great instability, with constant failures.

Although there were some positive perceptions about the system by seven interviewees, who considered the system intuitive and easy to use (easy to use), the system was rated mostly as a complex system, difficult to handle and inappropriate for clinical practice (more so with the ER), imposed by administration and time-consuming.

About two years after the system became institutionalized through daily usage, opinions were no longer so unfavourable, but some frames were maintained, in line with what Tyre and Orlikowski (1994) had stated. These authors argued that the initial

interpretations of technology tend to 'freeze'. That is, users tend to keep their initial perceptions about the system. Orlikowski and Gash (1994, p.198) point out that "the cognitive habits formed through initial exposure could prove difficult to change later".

Only the more relevant frames that have been mentioned the most by those interviewed will be referenced in this theme.

Complexity: Most of the perceptions recorded in this frame give an image of the system as being of great complexity, due to the number of features and record fields and the difficulty of moving between these fields, to which the professionals refer to as a lot of 'clicks' and too many 'oks'. This perception of complexity of the system was found to be most often associated with the work context in the ER, also being associated with the frames of, 'Unsuitability', 'Time Consumption' and 'Inoperability': This frame is more common in the medical profession (14 doctors out of 21 interviewed made a reference to complexity). We can see below some of their statements:

"there are too many steps that slow down the work, (...) is much more complex. (...) "
(I.L._P_I10)

"(...) The time it takes to navigate within the program is more than the time that I would take to write the medical notes of the patient and the prescription" (AS_P_I8)

"(...) being so complex, that is not a useful application for the Emergency room"
(CB_P_Conv_1)

Inoperability: This interpretation relating to the system was mentioned by 25 interviewees and has 53 references encoded by NVIVO. Like other frames it suffered from the instability of the PFSS which is reflected in expressions such as "[PFSS] is an unstable application" and "Some days it is horrible to work with this because (...) it is very slow" (HF_N_16).

Unsuitability: This frame refers to the perceptions of the professionals regarding the adequacy of the IS to their professional practice. For some professionals, with higher prevalence in the medical profession, the system "has little correlation with what they use on a daily basis" and believe that it does not respect their usual way of

assessing the patients until they reach a diagnosis. The way "(...) it keeps the data, what it forces us to do, is not our normal way of doing it," said a service director.

The requirement for a mandatory diagnosis was a feature of the information system that caused great discontent among physicians. In the opinion of these doctors it contradicted their normal way of acting to obtain a diagnosis. This requirement was removed by order of the Board following a suggestion by the users, as shown by the following comment from a doctor belonging to the work group:

"There was a time it forced you to insert the diagnosis, but not anymore. (...) Because if you get there with a headache the differential diagnosis can be a stroke, an aneurysm, or a migraine and if we were to correctly complete all the fields that they wanted, we would have to put these differential diagnosis (...) (PP_P_I5)

Several doctors said that IS should be simple and objective, allowing for extensive writing and that they should not take away too much time from the other activities they undertake.

Time Consumption: The data shows that in fact the 'time' factor used in keeping a record and analysis of patient information seems to be an important factor in the work done by clinicians and as such this influences their level of commitment to use, and adherence to, the technology. It is not therefore surprising that the vast majority of users who share this frame are from the medical profession, as shown in the excerpts from interviews presented below:

"We (...) during informal conversations hear (...)" This is nothing but a waste of time!" (JP_N_11).

This issue of time management in the use of the program, (...) gives me great difficulty in keeping to my timetable and seeing the same number of patients" (AS_P_I8).

"The register in electronic form (...) increased the time it takes us for each record, per person" (HF_P_I2).

This interpretation of time consumption associated with the IS was one of the most cited (36.42% of doctors and 22.53% of nurses), however, the percentage of doctors' comments does not fully reflect the reality because five of the references from a nurse refer specifically to the same perception shared by doctors.

The time consumption is important in relation to the commitment because it influences the way the system is perceived as damaging to the relationship with patients and creating a conflict related to their role. As explained by an ER nurse, "(...) one can say that the system makes us waste some time. And if we have many patients, (...) there is a tendency not to use it 100%" (JM_N_I4).

Imposition: There is on the part of those taking part in the study, a clear conviction that the system was imposed, without there being any involvement of professionals in the decision making process, and as such, in the opinion of an assistant, "even if we do not like it, we have to use it (...) ". Another doctor also argues, "no other alternative is given to people, so people are going to join 100%, right?" (AS_P_I8).

The imposition frame is related to the category of management support in so far as will be seen, the perceptions that users have about their lack of involvement in the project consequentially leads to the notion that something is imposed.

Confidentiality Breaches: The medical professional group has access to the clinical information of any patient who is in the hospital, however, this does not seem to be universally accepted as a benefit, as can be seen by some statements of participants who see that as a violating of privacy:

"(...) This computerized system is not completely secure. (...) Any person may have access to clinical data (...) and that is forbidden by law (...)" (P_N_I10).

"I am a doctor but I have to know the medical history (...) of a patient who is not under my care" (A_P_I3).

"(...) Anyone who has a code can have access to information from other patients not under our care (...), which does not seem quite, right "(AS_P_I6).

c) Attitude

In the interviews and other sources examined, attitudes of suspicion and scepticism regarding the objectives and benefits of the system and its successful implementation were found. This scepticism was sometimes related to unfulfilled

expectations, such as those expressed by a nurse from the ER: "There are many things here that could already be working and I do not understand why they are not!" (AD_N_I2), or moreover, because they did not actually believe in the completion of the project, as exemplified by the director of the ER: "(...) there were a lot of people early on that thought 'yeah right, I'll give it 3 months tops'(...)" (C.B_P_I1).

The attitude of suspicion was intimately related to the system migration and the selection criteria for the application, which according to some professionals were unclear and there were comments like:

"All information systems should serve those who use them, not serve those who use it for other purposes" (MJP_P_I7).

"Oh, this will be good, it will be down to us, you'll see, you'll see who is going to bear the workload, it's always the same ones" (C.B_P_I1).

5.2.5.3 Impact of the System

This domain includes TF of negative and positive perceptions regarding the consequences of the system. The negative frames (disbenefits) are: (1) the reduced relationship between professionals and patients, (2) the increase in the workload, and (3) the decline in relationship between healthcare professionals. The positive perceptions of the consequences of the system are denoted as perceived benefits.

a) Decrease Patient Relationship

Sometimes, a reason given for lower acceptance (commitment) and usage of the application by the professionals is their own relationship with the patient, believed by some clinicians to be negatively affected. Citing the PFSS, "the relationship with the patient is worse, because I'm facing the computer and hardly paying attention to the patient" (A_P_I3) while a nurse also states "we are forced to spend more time facing the screen instead of looking at the patient's face" (P_N_I10). This interpretation is more

noticeable in professionals who have more difficulties in using the software or are resistant to IS.

b) Workload

For people in general and doctors in particular, the PFSS system "is more of an annoyance, which adds to the workload," being seen as "an additional task and an overload", according to the clinical director and a member of the monitoring team. This work overload, referenced by 16 sources, makes it more difficult to explore and use the system properly:

"I think you could use the PFSS and all (...) of the features it has (...) but that would conflict with (...) the high number of patients (...) and (...) sometimes we place a more detailed record into the background in the application "(JM_N_I4).

c) Decrease in Professional Relationships

One of the consequences that the system had from the point of view of some interviewees (7 elements) was the worsening of relationships between healthcare professionals themselves. Formerly personal contact was given preference either in relating to the patient or seeking the support of another specialist, which is now limited to writing in the system. In their opinion this deteriorates some relationships that have already been difficult and compromises the patient's benefits, which suffers reduced contact.

In the opinion of a surgeon, that aspect distances people more, because if this "interpersonal contact was already relatively difficult, they will never need to talk now, (...) people have to talk to each other, and patients are much better dealt with, if they are dealt with personally and matters discussed "(JM_P_I12).

Sometimes the changes in some procedures are also likely to create misunderstandings and conflicts between professional groups, which further strengthens this perception of worsening professional inter-relationships.

d) Perceived Benefits

During the fieldwork and analysis of the interviews, we found that although there were less positive opinions regarding the system as well as some resistance, there was also a degree of unanimity in the recognition of some benefits that the system has brought, which coincide with the frames of the managers and the technical engineers, implementers of the system (congruence between the frames of users, managers and technologists).

In Table 8 all categories of benefits and some evidence in greater detail are presented.

Table 8 List of Perceived Benefits

Perceived benefits	Description
Attendance Improvement Sources:26 References:71	<p>"I think the process is faster. (...) Patients are screened with priorities (...)"</p> <p>"allows the best reorganization of professionals' work"</p> <p>"Professionals have a big advantage with this quality of records (...) and the quality of service provided to patients can be much better as a result of these records".</p> <p>"but the [big] gain, the only thing I see for now is to gain time, in terms of attendance."</p>
Activity Support Sources:22 References:60	<p>"I think that in the emergency, PFSS made our life much easier (...), it facilitates the doctor's work. (...) it is of great interest".</p> <p>"We feel more secure in what we do (...) we can plan what to do".</p>
Information Accessibility Sources:25 References:56	<p>"(...) the IS enables us to access information that otherwise we would not have, or would be harder or more time consuming to obtain (...)".</p> <p>"(...)with the information system, in a second, we can get this information, whereas with traditional filing systems this was impossible"</p> <p>One of the advantages (...) is that it is easy to read, and information is secure.</p>
Patient benefits Sources:24 References:38	<p>"Those who benefit most with this information system are the patients".</p> <p>"Saves time in terms of treatment or patient care".</p> <p>"(...) Allows me to better care for the patient, provide more security (...)".</p> <p>"The more information you have available the lower the risk of any mistakes any complications".</p> <p>"(...) the gain is really in quality of service"</p>
Information Security Sources: 13 References:17	<p>"(...) it is where we know that the information is (...) it is not likely to be lost"</p> <p>"Any entry you create in PFSS, even if it is an full stop, is registered there (...) and access to the application can only be attained through biometrics with a fingerprint".</p>
Decision Support Sources:6 References:9	<p>"Another advantage is that of control (...) a result of a thought out management process, which is, as I know where there the waiting times are longer (...) and I can mobilize resources".</p> <p>"(...) It also translates into management indicators through ADW"</p>

List of Perceived Benefits (continued)

Cost reductions	“In terms of imaging I think we made a crushing gain”. "We have considerably reduced human resources in the area of imaging and laboratories (...)"
Sources: 7 References:7	
Reliability of Data	“(…) to have records made in a reliable, standardized and sustained form. The medical records (...) on paper [have] very variable forms (...) and quality of paper records is very fragile, (...)” “The great benefit of the PFSS (...) is to give us really accurate information”
Sources:4 References:6	

Most users of the various professional groups believe that the system has brought: increased security, reliability and accessibility to information. These perceived benefits are associated to paper free “because (...) everything is recorded in legible writing, the information is accessible and above all reliable and archivable (...) Processes are not lost, they do not disappear” (PP_P_I5).

Attendance Improvement: This perceived benefit is based on the increased speed of the processes’ execution (agility), on process automation (promoted by a paper free environment), which reduces waiting times for patients as well as transcription errors (through the greater legibility of prescriptions) and better organization of work (work organization). In several statements and opinions given by professionals we can see that:

"Patients are transported faster (...)" (A_A_I2).

"The system was used to implement (...) more organization (...)" (A_A_I1).

"In terms of service (...) things are more efficient, faster," (SM_Mg_I2).

Decision Support: This benefit is referred to particularly by the managers, either at the top or operational level: "The great benefit of PFSS (...) is that it gives us really valuable information, (...) that allows management the service in function of patients it has and the resources available, which allows the Boards of Directors to make decisions, (...)” (SM_Mg_I2).

Decision support is also observed in clinical terms, particularly with regard to

diagnosis and treatment of patients, providing healthcare professionals with greater certainty in their decision making and consequently better patient care:

"It is a good system, much easier for us to realize what is happening in reality with the patient, (...) and this makes it much easier (...) the quality of work we provide" (JM_P_I12).

Cost reduction: The article by Caldeira *et al.* (2010) presents in a discriminated and quantified way the benefits achieved from an information system with visible cost reduction. In this research the vision of reducing costs associated with the PFSS system is mostly mentioned by managers, particularly with regard to imaging exams and the mobilization of human resources that are no longer needed in some areas. However, from the perspective of some healthcare professionals, cost reduction is still not very visible. On the contrary, there are at least some areas, such as the use of paper and requests for exams, where the perception is that costs have increased, which seems to contradict one of the original objectives of the system, as discussed in the following examples:

"We have considerably reduced human resources in the area of imaging and laboratories (...)" (VF_Mg_I1).

"The [PFSS] uses more paper than ever before, if we print the final report for each patient, we spend more paper than the old method did, we still have not saved any paper" (JM_P_I12).

On the last visit to Hospital A, the director of ER explained that at this stage she is already evaluating the process and has found that:

"for the average patient and those with less serious conditions, a large amount of analysis and complementary exams are being requested (...). There was an impact of excess. They ask for everything perhaps because it's easier, because with a click or two, it's done" (CB_P_I1.1).

This variability in the perception of the benefits related to cost reduction makes a more thorough analysis of the management of the real impact of the use of PFSS in these two areas (paper usage and requisitions for laboratory tests) necessary.

Activity Support: A good proportion of users regard the system as a useful working tool in their activity, showing that interpretation in many varied forms:

“(…) In the first approach for the patient (…) the [PFSS] helps us a lot, we start a diagnostic hypothesis, and I think that is extremely advantageous (…) (JM_P-I12)

“In my work as a nurse (…) I think it's an asset (…)” (NR_N_I8)

According to a member of the working group (the director of the IS), the healthcare professionals complain and verbalize dissatisfaction with the application, but when they have to resort to paper, due to system failure or during scheduled down time “they complain because they cannot access a range of information that they can currently see in the clinical process of the patient” (S.M._Mg_I2). This would seem to mean that the IS is recognized by professionals as useful and indispensable to the clinical activity.

Patient Benefits: The major concern of healthcare professionals is the patients, their well-being, the attainment of a diagnosis and effective treatment, in essence, the provision of quality care, which is in fact in line with the mission of the organization. The resulting benefits of the PFSS for patients are recognized by professionals from the three groups, particularly by those who are supporters of the information system, as we can see in some of the following examples:

“(…) Because everything is recorded we can get to a possible diagnosis faster” (P_N_I10)

“(…) For the user there is a very big advantage and that translates into an increase in the security with which the medical and nursing care can be provided.” (A.S._P_I8)

“The more information you have available, the lower the risk of any mistakes, or complications. The system itself helps to control, it has warnings for things that are not correct, etc. Therefore it decreases the risk for the patient” (SB_P_I13).

5.2.6 Usage

During the analysis of the data, two types of usage were interpreted, here classified as: (1) correct use of the system (Correct use) and (2) partial use of the system (Partial use). Cases also were observable of (3) ‘lack of use’, where professionals clearly stated “I will not do it until I am told I must”. However, as the implementation progressed, this latter occurrence diminished.

Correct Use: consists of using the computer application by entering the information in accordance with the functionality of the system in order that such information can be considered reliable and trustworthy for the continuity of care and for the production of management indicators. At this level of use, users record the required and fundamental information in their respective fields, as illustrated by the following excerpts:

“The whole team works with PFSS without any problem. At this point I do not see anyone there who has any difficulty in relation to using PFSS” (J_A_I3).

“I am able to use the IS in its totality. I use all the system's applications and features that the system allows and which are working here at the hospital” (NR_N_I8)

Partial Use: consists of partial use of the application's functionality, or the completion of fields which cannot be treated statistically. At this level of use, the information entered is sometimes woefully inadequate to monitor the patient efficiently, particularly due to the fact that in such cases the information is spread over two different media (paper and digital). Partial use of the system is characteristic of most professionals working in the emergency and out-patients departments, particularly the individuals in the medical profession:

"I myself do not use all the features. I use around 30 or 40% of that "(SB_P_I13).

"I'm using only the minimum necessary (...)" (PG_P_I4).

"People do not even write in the PFSS. They click "ok" "ok" "ok", end of consultation" (IL_P_I10).

Some of those interviewed favoured making the use of the system compulsory, the simultaneous implementation throughout the hospital and the strong support of the Board in order to overcome some instances of resistance to the system, as can be seen in the statements of two doctors, a nurse and a member of the monitoring team:

“(...) no matter how much resistance to change there is, or difficulties encountered, this is an irreversible process (...) in the right direction (...) it can never be undone, (...)” (SB_P_I13).

“What I say is this, if the whole hospital already had this, nobody would be able to argue against it, (...)” (CV_N_I18).

“I think that these things, if they are going to be used, must be imposed, (...) people must be forced to use the PFSS, (...) there is no other way to make these changes, (...) but I think that in

the small changes that have taken place, this administration has managed to impose its will (...)” (JM_P-I12).

“(...) Those who use OUTPATIENT now, do it much better than those who were using it a year ago. Due to the fact that the Board (at the time) did not take a position of saying that it was compulsory to use the fields A, B and C. (...)” (L_AT_I1).

5.2.7 Commitment

The findings found in this large theme are consistent with the theory relating to commitment, particularly as found in Meyer and Allen (1991, 1997) and similar work. More than being created by the theory, the categories within this theme emerged naturally from the interpretation of the data, with the following categories having been identified: (1) Commitment Dimensions, (2) Commitment antecedents and (3) Project commitment.

5.2.7.1 *Commitment dimensions*

Meyer and Allen (1991, 1997) and subsequent researchers (Meyer and Herscovitch, 2001) consider that commitment can be accompanied by three different psychological states ("mind sets") (affective, continuance and normative), which play a decisive role in shaping behaviour. In the analysis of data it was possible to identify these three dimensions of commitment in users of Hospital A, which now follows.

a) Affective Commitment

According to Meyer and Herscovitch (2001), affective commitment reflects a 'desire' and develops when an individual recognizes the importance of identifying himself with an entity or, moreover, to pursue a particular course of action.

This dimension relates to the type of connection the individual has relating him to the organization, the identification with his goals and objectives and the projects for

change that involve these goals, and how these align with the Paper Free project implementation.

There are a significant number of comments that show this to be the most common profile of commitment in the various professional groups, although there are some differences between the various professional classes. Some of the following excerpts reflect this 'desire' to stay in the organization and work towards achieving its objectives and goals, part of which reflects the implementation project of the PFSS.

"I do not imagine myself working anywhere else. (...) I really enjoy working here and I identify with the goals and values of this organization (...)" (CV_N_I18)

"We have to feel that we are part of something, in this case of a big family here (...)" (A_A_I1)

"I like working here because (...) I knew I would make a difference here (...)" (PP_P_I5)

b) Continuance Commitment

This dimension of commitment is associated with a cost. It develops when an individual realizes that he has no other alternative than to join an organization or pursue a particular course of action relevant to a particular goal, because not doing so would imply incurring losses (investment, personal, family, etc.) to himself. But these users have limits to their involvement in the project and do only the minimum necessary.

"I am the president of the district section of the Medical Association (...). And I have other activities related to the profession (e.g., university classes, coordinator of VMER) and it is not so easy to abandon them in case of change of hospital. These activities are the ones that give me the motivation to keep working here"(IL_P_I10).

"I try to do the best I can, but it's not always possible. The leadership is important and it is up to me to accept the guidelines, even if I don't totally agree with it"(IL_P_I10).

c) Normative Commitment

This commitment represents a sense of moral obligation to cooperate and fulfil the goals of the employing organization, be it out of gratitude for benefits received, or by internalization of the ethical standards obtained through the process of socialization. This state-of-mind is well characterized by the testimony of a doctor:

"I work because I need to earn money, if I didn't I wouldn't work, but when I work, I want the job to be well done, I try to do it the best I can, I try to meet the requests that are made and I like to collaborate with everything possible for the hospital to work as well as possible "(AS_P_I8).

It was interesting to note that the affective commitment as well as being the most common in the data, is also present in individuals who are equally committed to the project, which reinforces the theory that an employee with affective commitment is willing to go further to fulfil a certain course of action (Meyer and Herscovitch, 2001).

Table 9 is intended to illustrate the various dimensions of commitment in the group of healthcare professionals, through their statements.

Table 9 Commitment of Professionals

Dimensions Job	Affective	Continuance	Normative
NURSE	<p>"I like working towards the success changes make happen (including [PFSS]" (AD_N_I2).</p> <p>"I am a supporter of the System [PFSS]" (J.M._N_I4)</p> <p>"This is my hospital, it's my town (...)"(R_N_I9)</p> <p>"I like working here, (...) and I think people try to give the best they have" (L_N_I19)</p>		<p>"As a professional of this hospital I feel the obligation (...) to be prepared in order to respond to situations (...) in the best way" (NR_N_I8).</p>
PHISYCIANS	<p>"If you have a hospital like ours, you (...) feel like you are part of what is produced " (PP_P_I5)</p> <p>"I've invested a lot of myself in the hospital. This is what I do, no one asked me "(CB_P_I1.1)</p> <p>"If I didn't like the hospital I wouldn't have been here for 25 years" (HF_P_I2)</p>	<p>"I have other activities (e.g., university classes,) and is not so easy to abandon them" (IL_P_I10).</p> <p>"To change, only to get better conditions" (HF_P_I2)</p>	<p>"I am a physician I have to work in a hospital, and I want to work in this hospital and I want that this hospital does its best" A.S._P_I8</p>
ASSISTANTS	<p>"I like working here (...) and I think I'll continue to work here. When I am required to collaborate in any change, I do so with pleasure provided it's for improvement "(NV_A_I4)</p>	<p>"I enjoy working with the patient and (...) I always try to perform the best I can. My leaving this hospital is not likely because of my life "(J_A_I3)</p>	

5.2.7.2 *Commitment antecedents*

The antecedents of commitment found in the data collected were grouped into two groups according to the model of Meyer and Allen (1991, 1997): (1) close antecedents and (2) distant antecedents. The first consists of work-related experiences and the second includes the personal characteristics. The organizational characteristics also reported in the literature proved to be insignificant in this case. In each of these categories the aspects that will be presented can contribute to help understand how the commitment of professionals regarding the proposed implementation of the PFSS, and the achievement of expected benefits is developed.

a) Close Antecedents

During the course of the investigation, either during collection or analysis of the data, the existence of factors that somehow acted as precursors of commitment among professionals was looked for, first, in relation to the organization and then in connection with the proposed implementation of the PFSS. As such, the words of those interviewed were observed and interpreted to understand which individual, organizational or work-related aspects influenced directly their attitude towards the project, and that correlated with the theory of commitment could be considered close antecedents.

In general from the perspective of the users, the previous experiences related to their profession can contribute to a more proactive attitude to change, as for example occurs with the experience of nurses over the years, in the process of social recognition of their profession:

“Nurses have always lived with the need to improvise, (...) nurses have never been endowed with all the equipment, (...) insufficient human resources mean they have to make do (...) they always had to give more than what they were sometimes capable of. (...) They always had to give more of themselves...” (JP_N_I).

Work Experiences: In this category, the dimensions of professional work related to autonomy and authority are revealed, the tension and stress related to work,

the conflictual situations and the ambiguity of the role, as well as the organizational support and how they influence the commitment to the implementation of the project.

Autonomy and authority: The dimensions of professional work that are most evident are autonomy and authority.

With the exception of the group of assistants, that depend functionally upon the head nurse, whose role and career are not clearly defined (they have recently been placed in a 'general-role' category of the civil service), doctors and nurses pertain to two classes historically linked with great power and whose roles are interdependent, although there are separate well defined functions. In these two classes there is a strong hierarchical tendency characterized by formal authority. The formal authority in the medical profession is recognized among peers and is associated with career placement, as in the role of medical managers (service directors, for example). The recognized authority and leadership exercised by those in Hospital A is dependent on the way the professionals adhere to and accept the system.

What happened in the hospital is that this hierarchical power is not really enough to overcome the strong sense of autonomy and independence of the medical profession (referenced by 31 sources), creating a sense of impunity on the part of other professional groups, concerning the lack of commitment to the system and its use:

"I see doctors as a very independent class that have a more personal commitment and do not establish organizational commitment" (AI_MT_I3).

"(...) I think they have never been pressured in relation to these aspects [a need to make records and to follow orders]. What is different from us? We are more submissive (...). Probably because in fact we do not have much power in terms of class, when compared to the medical profession in the face of hierarchy and the power they have to face their managers" (AC_N_I21).

These issues related to the professional autonomy, and role assigned to their social and professional status, influence how some doctors see, for example, the work done by nurses in Manchester triage. In the opinion of some nurses, "they do not like to be ordered about! They are above everything and everyone" (AD_N_I2). The autonomy

and authority of the professional group of doctors also influences how they see the role of IS in their activity:

"First is the patient and the clinic, the Information System [PFSS] is just an accessory, and if I do not have time, I write less" (IL_P_I10).

"And the bad side of the [PFSS], is that the [PFSS], requires us to act as it wants, and not in the way we want. That is what is wrong" (S.B._P_I13).

The pressure and stress: both characteristic of the job or the places where this job is carried out, are themselves sufficient in the opinion of the participants to influence their commitment to the information system, and consequently its use. Therefore it is presented here as an antecedent of commitment of the professionals of Hospital A. In the opinion of a service director of a mobile unit: "Our job is not compatible with the fact that we often have to consult twenty or more patients" (CO_P_I11).

A nurse of the ER also argues that "what we have seen, (...) is first of all the fatigue of the professionals who work here (...) they are tired (...) physically and psychologically, so people do not spend much time to explore the potential of the program" (NR_N_I8).

The conflict and role ambiguity: is present and is related to, on the one hand, the primary need referred by professionals to provide the necessary and sometimes urgent care for patients, and on the other hand, having to record information in a system which details the work performed, by whom, how and when. The main conflict noticed and manifested by the interviewees is the duality experienced between the use of information system (fulfilment of an obligation) and the preservation of the relationship with patients and their care.

"When I have the system full of appointments to check, and appointments to delete and everything (...) I get the feeling that ... I gave up on my patients (...)" (C.B._P_I1)

"(...) the attention I should have in relation to the patient, now I have to dispend on more things" (PG_P_I4)

As can be seen, this antecedent influences the perception that professionals have of the impact that the information system has in the relationship with patients.

Organizational support: organizational support is considered to have a strong positive correlation with affective commitment of employees (Meyer et al., 2002). Among the aspects that can be put forward to support this include, the fair treatment of employees, the creation of a supportive environment and the exercise of strong leadership. At Hospital A, this antecedent has also been identified although it was more valued and perceived by those involved directly or indirectly in the implementation of PFSS.

The organizational support provided by management is referred to as proximity, support of the Board in relation to professionals, concern about their well-being and motivation, transparency and assertive communication, recognition of the work of professionals, etc. The organizational support was mentioned in a more marked way by the stakeholders who were involved more closely in the implementation, such as the head of IT department, the project manager, the WG and on-site MT:

(...) The Board of Directors (...) a few months ago, organized a meeting with all heads of service (...) to communicate to them the results of the previous year. To congratulate the people (...) And the people were amazed. (S.M._Mg_I2).

(...) Better facilities mean better results, obviously when you have a good Board of Directors (...) that is not only concerned with numbers but also with the rest and all that motivates them. (...) "(C.O._P_I11).

In the nursing class the organizational support is provided by line managers and by the top manager, the Nurse Director, which in the opinion of the responsible for MT, acts as a motivator for change and to increase the commitment of nurses, as he stated in his interview:

"(...) There is a well-established hierarchy for the nursing class that involves them, and I think that for them turns out to be more motivating, and helps the nurses to understand what the goals of the group are and I think that this has helped" (AI_MT_I3).

b) Distant Antecedents

The personal and organizational characteristics are distant antecedents, which act on the commitment in an indirect way through the close antecedents, particularly the experiences of work.

In interviews when asked for an opinion on the main causes for a lack of commitment to the system and difficulty or reluctance in using the application, the respondents pointed to personal characteristics as being essentially the most probable.

Personal Characteristics: The personal characteristics identified in this study comprise the categories classified as ‘individual differences’ and ‘demographic characteristics’. Included in the first set, there are: (1) IT experience, (2) motivation, (3) personality, and (4) social status and power; and in the second set, mostly referred to were age and literacy. The IT experience is almost always associated with the demographic variable of age and seniority, as the following excerpts show:

“most colleagues are older people and not everyone knows how to use the computer” (NV_A_I4).

“as professionals advance in the career, they find it more difficult to learn new technologies”(M_MT_I2).

Motivation (interest) and personality characteristics are described by many professionals as critical factors in the development of commitment and the proper use of the system:

When they were repeating the training stage I was already using it. (...) to keep up (...)" (HF_P_I2).

"For people to comply, I think it is all to do with motivation. A person who wanted to be up-to-date joined in quickly"(JM_N_I4).

“people who like to get the details right, who like to have their information recorded properly, (...) use the system correctly”(L_MT_I1).

"And I think that anyone who was filing records before still does it now, and those who did not file them before, also are not doing it now" (SA_N_I6).

Social status and power are also recognized by some individuals as an important factor. For example, this can be seen in the way the medical profession faces the need to work with a new technology that it previously had little knowledge of.

According to other informants, the physicians need to recognize that they have difficulties in handling the system, sometimes in front of the patient, causing constraints, which can jeopardize their social image. A nurse when asked about why some physicians have more difficulty or reluctance in using the system, said: "I think it has more to do with how they are seen and their social status, than with the training (...) we noted a large difference between the interns and the surgeons who have been here for years" (AC_N_I21).

Age has already been seen to influence compliance with the system, sometimes associated with previous experience and ease of using computers. A somewhat related factor is that of the literacy level, which was referred to as a barrier to compliance in the first phase, but this was not very substantial as these groups with lower schooling (assistants) are very compliant and quickly adopted the PFSS.

5.2.7.3 Project commitment

In this investigation the commitment to the project was viewed according to the perspective of Meyer and Herscovitch (2001), in which commitment can have several targets. In this study, these targets are the results (desired benefits) through the PFSS software implementation.

The analysis of interview data was also based on the assumption of Coetsee (1999) regarding commitment (or acceptance), that here is understood as being the opposite of resistance. Thus, this category represents the level of commitment that professionals of Hospital A have towards the PFSS system, and the changes that are associated with it. It includes all comments that were in favour of the information

system and its usefulness, somehow revealing its acceptance and a willingness to use it as best as possible. The commitment to the project was subject to 154 statements from 31 sources of information, encoded by NVivo.

The commitment to the system is demonstrated by the interviewees through some comments:

"The system [the PFSS] allows information to be shared widely (...) and because of that I am supporter ..." (PP_P_I5).

"We have a lot of work to do in improving the system, to involve professionals (...) and in the shortest space of time we can take from the IS all that it can offer" (SB_P_I13).

"It does not make sense that we are against information systems (...). There must be (...) an openness of people for this change and (...) I am ready for this change" (AC_N_I21).

According to the opinion of the Board member responsible for the project there was no marked resistance by the various professional groups. "There is not in fact any resistance to implementing the Information System (...). There is, in fact, some stress with the implementation, but that is very easy to overcome", the manager stated, further adding that, "an assessment of resistance was made during the first meetings in which the project was presented, but there was no one who actually put the project in question".

In fact, the nursing and assistants groups exhibited a greater acceptance of the IS and a recognition of its importance to the profession, despite initial difficulties.

As one nurse of ER explained, "the nurses (...) readily accepted the introduction of this application in the hospital (...) "(JM_N_I4). This compliance by nurses to the system is also recognized by the MT coordinator, which attributes this commitment to the effort of the Nurse Director (ND), "that engages people and tries to listen to them, (...) involving them in the changes ". Another nurse of the ER says that "people are fully integrated. Looking back now, it was a bit complicated "(SA_N_I6).

The group of assistants had a spectacular adherence and was extremely compliant, despite some initial difficulties learning the system. Respondents from

various professional groups described the commitment of the assistants with the following statements:

"The assistants were delighted because before they had nothing (...)" (SM_Mg_I2).

"We all accept and comply with the system as well. (...). We had to follow; patients have to do the exams "(A_A_I2).

"I think everyone complied really well (...) I was very surprised with the assistants. It seemed that they adapted without problems, perhaps because they now feel more involved and integrated into the team "(MJP_P_I7).

Out of the three professional groups, doctors showed most difficulty in complying with and using the system. According to the project manager, "the doctors are always the group that show more resistance" (M_MT_I2). The testimony of a doctor which is also presented below reinforces this evidence:

"The idea that people in general have of PFSS is negative. Now, I think it undoubtedly is much more negative for the professional group of doctors, rather than for the other professionals, particularly nurses and assistants "(PG_P_I4).

It was possible to find in the Project Commitment category, more two categories: Lack of commitment and Top management commitment.

a) Lack of Commitment

This category includes all verbatim accounts of the respondents that indicated less positive reactions, attitudes and adverse behaviours to the information system, which in a certain way would compromise the achievement of all or at least some of the expected benefits of IS.

Cases of resistance occurred in some specialties, and were more visible in the out-patient and in-patient medical services. These phenomena of resistance were mainly characterized by a refusal to use the application, or by using it only partially, and/ or by verbalizing opposition to the system and sending letters to the Board, expressing their disagreement. These situations of resistance, or lack of commitment, compromise the accessibility of information by other professionals and compelled the working group (WG) and the Board to take some actions, including: holding meetings, issuing

regulations or reduction/ withdrawal of request forms for exams and paper prescriptions.

Some cases of resistance to the system in the out-patient department are presented by a member of the MT:

"There are still some consultations where electronic prescriptions are not filed (...) because it was never made mandatory to issue the prescription in PFSS"

"We have physicians from various specialties who refuse to file these prescriptions [exams] in [PFSS], they continue with paper (...) although there is already the norm for the hospital that these requests are made only in [PFSS].

"Gastroenterology is a service that is totally against the PFSS. It is the only service that we have not implemented"

Other feelings expressed by the professionals demonstrate their lack of commitment to the project: "I do not, until I am forced" or "We would be happy on the day the system went down and we have to return to paper" (AS_P_I6).

The strategy that the hospital has taken to increase the degree of utilization of [PFSS] in the out-patient department was to "greatly reduce the number of paper prescription blocks" (AI_MT_I3), but that has not always been effective because "people bring in their briefcase requests from the in-patient department already signed, (...) to give to patients" (AI_MT_I3). Another element of the WG expresses its dismay at the failure of measures:

"With some colleagues, (...) I had to ostensibly remove the prescription forms and mandate that all kinds of forms were to be removed, yet they brought prescription pads in their pockets and we ended up having to tell the secretaries that they were prohibited from stamping them with the official seal, and they brought the seals from other services and were walking around with the seals (...) "(C.B_P_I1).

While the implementation of PFSS was performed more or less peacefully in the in-patient surgery and orthopaedics, other services were more problematic, as is the case with medicine:

"Medicine was one of the in-patient services (...) which was more complicated. There had to be several meetings with the director, until it was the hospital (...) who took the reins of the implementation in medicine where there was more resistance. The nursing staff (...) wanted to move over [to the new system] and doctors resisted (...). There was much resistance. The introduction of the IS project was postponed for two months (...), the hospital had several meetings with the service directors ... "(AI_MT_I3).

In the medical room of medicine in-patient services a number of documents posted on a placard were observed with the label "PFSS", underneath which was added in uppercase handwritten "Target for spitting."

The resistance shown by some medical specialties to IS "had to be overcome and this administration was also very demanding: those who do not adapt to new requirements have to find work that suits them, but then, they cannot stay in their current position", said the director of the ER.

Referring to the population of healthcare professionals who use the PFSS and the resistance that exists, the project manager said that "85% of the population of professionals (...) recognize the potential and the advantages of working with the PFSS. We had a lot of resistance initially, and then when there is a problem with the PFSS, the people ... 'My God', when will it arrive [PFSS]? We need the [PFSS], we want to work with [PFSS], we can no longer live without it" (M_MT_I2).

b) Top Management Commitment

The commitment of top management has been referenced in the literature as one of the most important factors in the implementation of IS projects (Basu, *et al.*, 2002) as well as its influence on the commitment of users (Sabherwal, *et al.*, 2003). Evidence of this was also found here, either stated by the members of the Board or from the other respondents.

In one of the meetings involving the Board, the working group, the project Manager, and MT with the author as a guest, a member of the Board stated:

"What is important is the need to focus on emergency room because the people who work there also work in the other services and if these people do not see the benefits and advantages there will be problems when it comes to installing the other applications. We should stabilize the emergency system"(Meetings_PFSS).

"My first priority is to solve problems and I can only do it if I have knowledge of the problems," so it is a requirement that the IT Service has knowledge of all the problems that arise" (Meetings_PFSS)

When the executive member responsible for the project was asked about the difficulties encountered during implementation he responded: "That's what we are working on, and in particular we are trying to reduce the number of failures in the implementation, so that we can finish up successfully" (VF_Mg_I1).

The Board's commitment to implementing the project is also perceptible in the following comments from various stakeholders (project manager and director of ER):

"There was a specialty [Urology] who had refused to work with the PFSS. And the board of directors solved the problem, (...), there was a clear imposition by the Board" (M_MT_I2).

"Does it not occur to anyone that the problem is the lack of investment in emergency, it's not true! I highlighted three or four key things and I found that they were all given to me! Ranging from equipment, (...) a social work technique (...) and the restructuring in terms of personnel that was authorized by the Board" (C.B_Conv_1).

5.2.8 Discussion of the Case

In the sense that this HIS can effectively produce all the benefits described in the literature, it was important to analyse the factors that positively or negatively influenced its proper use. For this purpose, first the relationship was analysed between use, commitment and the TF. Second, the factors identified as antecedents of commitment and their interactions with system usage, and frames were analysed. Finally, all categories were cross referenced based upon the relationships established between them.

Up to now the description of the PFSS implementation in Hospital A has been presented demonstrating the relationships that exist between themes and their respective categories while at the same time showing how they influence commitment to the project.

Throughout the description of the project implementation, reference was made to the TF and behaviours assumed by users in relation to the IS/IT.

Some TF shared by professionals were of particular relevance in influencing commitment to the project, such as negative perceptions of IS (complexity, time

consumption, inoperability and unsuitability). Some meanings associated with IS, such as the perception of system as a mechanism of control and liability, acted to reduce commitment, whereas others (such as protection) increased commitment to project as well its usage.

There were also identified the principal consequences of IS (Impact of System) from the users' perspective which affect the appropriate use of IS, and therefore, the benefits it produces. Additionally, it was found that some antecedents of commitment are related to some of those negative perceptions, as is the case for 'conflict and role ambiguity' and 'autonomy and authority' that encourage a lack of commitment and only partial use of the system, with consequences for the realization of benefits.

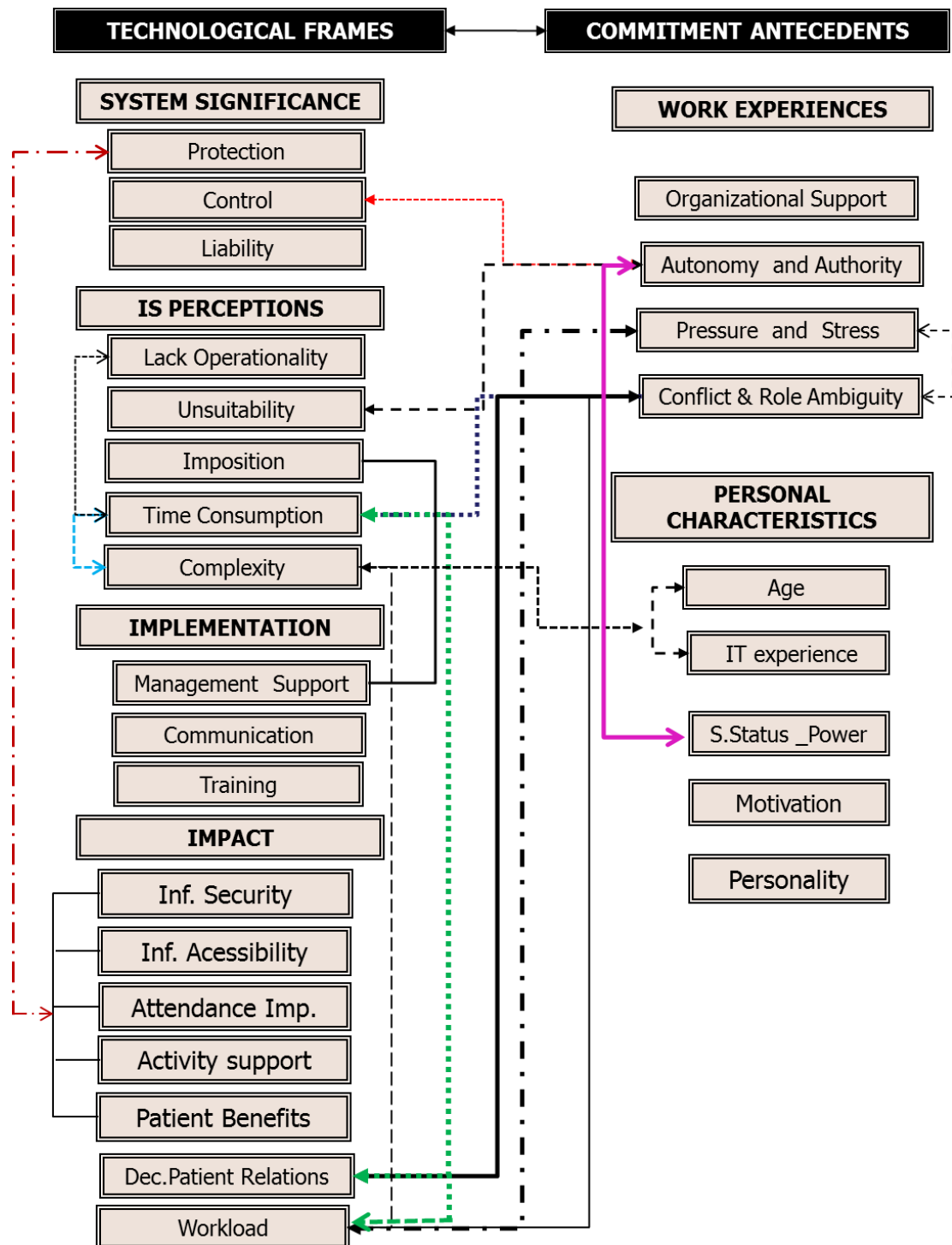
The organizational support, communication approaches, management support and top management commitment (demonstrated by a strong leadership) seem to have assumed significant relevance in this case, due to the fact that they influenced the commitment of individuals and their utilization of system. It is notable that a wide range of professionals only partially use the IS. This category (Partial use) was referenced by 23 individuals and 27 references were codified.

Informants of the two most significant professional groups in terms of use of the computer application (doctors and nurses), stressed the importance of the correct use (Correct use category) of the information system for achieving desired benefits.

In fact, while not being functionally new in the area of IS, without an appropriate and correct use of HIS, the scope of benefits, particularly for patients, can be significantly compromised. In the case of a HIS, whose main role is to collect, and manage all information related to a patient's visit to the hospital, it is important that this information is reliable, is of good quality and can be shared with all stakeholders in the care process.

The most important relationships between TF and antecedents of commitment, identified before, are presented in Figure 11.

Figure 11 Relationships between TFR and Commitment Antecedents



The respondents put forward various justifications regarding interpretations relating to the way they use the system, ranging from: (1) connotation given to the

system (system significance), (2) perceptions about the information system, (3) how the implementation was conducted, (4) communication of objectives and motivation of the system, and (5) their own perception of the benefits and the impact of system on their lives.

5.3 Description of Case 2 (B)

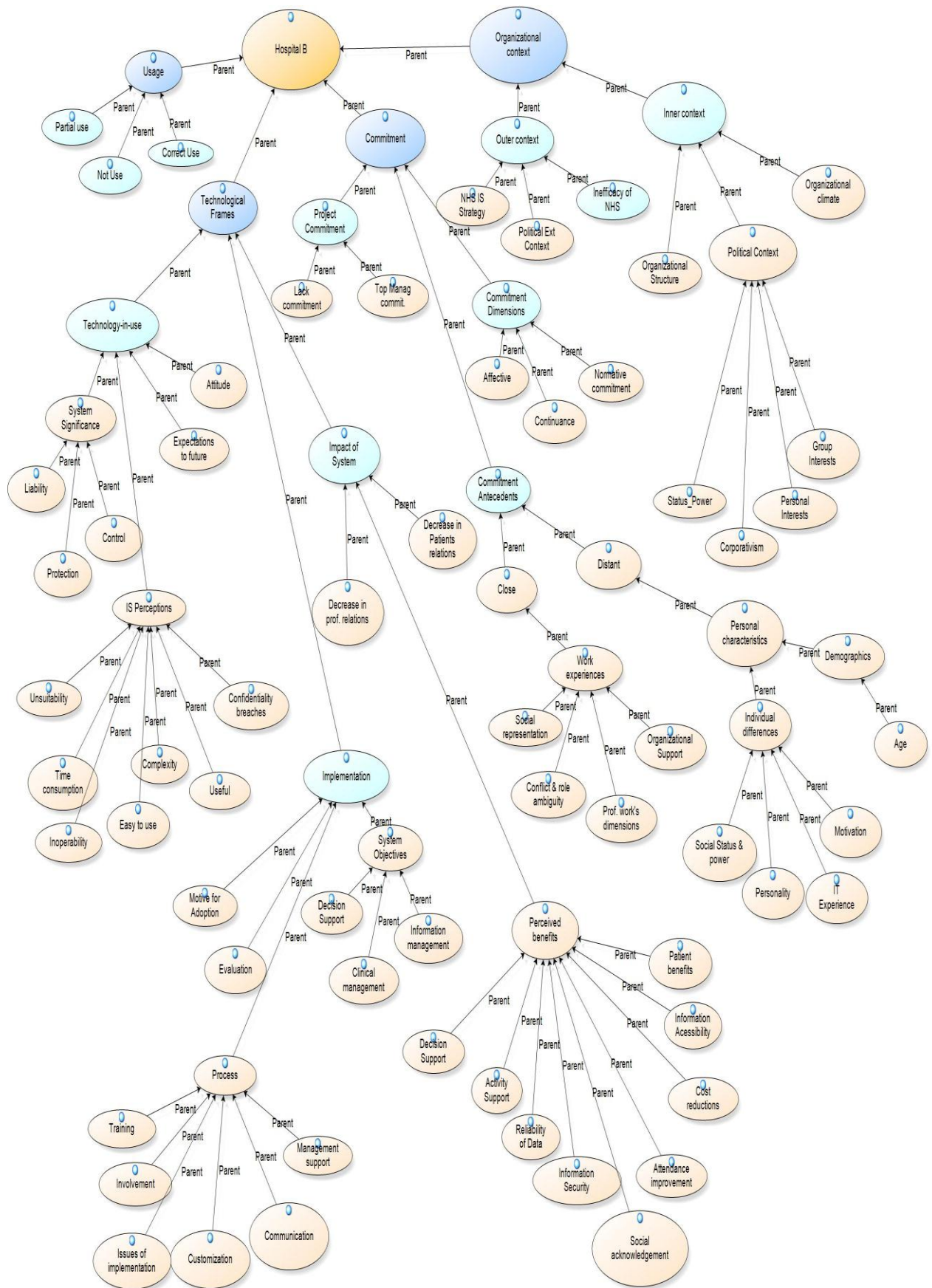
5.3.1 Introduction

This second case describes the results obtained following interpretive analysis of the data collected from organization B. The description of the case follows the structure adopted for the other case.

Here, just as in the previous case analysed, it was possible to identify common patterns and couch the information collected within four overall themes: (1) Organizational Context, (2) Technological Frames, (3) Commitment, and (4) Usage. Nonetheless, the study identified small differences in the subcategories found relating to the study of commitment in Hospital B.

Figure 12 presents only the main themes and the most relevant categories related to them.

Figure 12 – Tree of Categories



Appendix E holds the complete list of the categories with the respective number of sources and directly registered references that were extracted from the NVivo software.

5.3.2 Characteristics of the Site

Hospital B started operating as a district hospital on 2 July, 1983. In 2007, Hospital B was integrated into a Hospital Centre (HC) along with three other hospitals, becoming known as ‘hospital unit’ B; however, this study only relates to the hospital as an entity in itself. Reference to the HC will be made whenever there are relevant aspects that directly relate to Hospital B.

The HC was created on the 28 February, 2007, by merging Hospital B with three others (Int_Journal2_doc4). It was precisely at this time that the fieldwork was initiated.

The mission of hospital B is shared with the Hospital Centre:

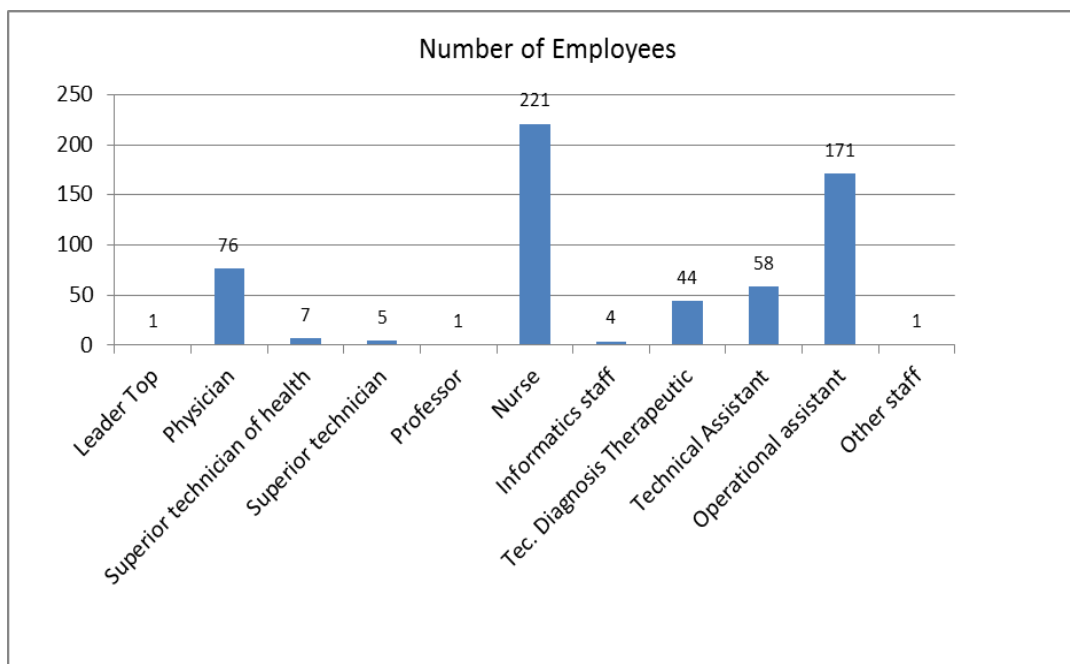
To provide healthcare services of high quality and professionalism to meet patients’ needs, to promote the professional and personal fulfilment of those that work there, always emphasising the value of their roles in achieving the institution’s objectives (Organization Website).

Hospital B “is part of the NHS network, within the Trás-os-Montes and Alto-Douro region, and carries out its work supplying different types of healthcare to the population of four boroughs totalling around 80 thousand inhabitants”(Organization website). It is a medium-sized hospital with a capacity of 182 beds.

Clinical activities are divided into functional services and units which are grouped into various clinical areas: Surgery, Medicine, Maternity/Infant Care, Physiotherapy and Convalescence, Mental Health, Emergency and CMDT.

In June 2011, Hospital B had a total of 589 registered workers, distributed according to Figure 13.

Figure 13 Distribution of Staff by Professional Groups on June 2011



Looking at the distribution of workers by professional groups it can be seen that the majority (79.4%) are Nurses, Operational Assistants and Physicians.

During 2010, the activities performed included: 4281 medical consultations, 1533 conventional surgeries, 62050 emergency processes and 6728 patient admissions.

The ER of hospital B is a surgical-medical facility as defined by the legislation that establishes an “ER Network”. It supports a fixed team of nurses and assistants and rotating medical and surgical teams that practice a weekly rota that varies between 12 and 24 hours. The great majority of doctors from the different specialties work in the ER. This factor was influential in the decision by the previous Board to expand the PFSS to the whole hospital. A member of the previous Board who was involved in the decision making process recalls: “Looking at the problem for the ER, why implement the IS in the ER? Because all the doctors work there” (T_P_I12).

The physical space of the ER is limited although it seems to be sufficient for the flow of patients that exists. It is important to emphasize that while the flow of patients that frequent the ER is somewhat variable, it is nonetheless significant for an ER

setting. A calm, organized and noise-free environment was observed during the study visits to collect data, which, in the opinion of the PFSS project manager, results from the PFSS implementation:

“Of all the things that they [users and managers] considered as having changed [with the PFSS], at least two are extremely important – a significant improvement (...) on an organizational level (...) and with respect to something that is very important in an ER, the noise level” (R_MT_I1).

5.3.3 Organizational Context

The organizational context of Hospital B is related to the environment of the main hospital as well as, to the hospital's own internal environment which was decidedly altered by its integration into the hospital centre.

5.3.3.1 External Context

In an external context, aspects were mentioned that related to:

(1) The ineffectiveness of the NHS, that is reflected in the number of patients that end up in the ER and the subsequent increase in workload of healthcare professionals as is shown by the following excerpt:

“The number of people that come to the ER and the reasons that bring them here, sometimes, it may be the case that these are situations that could have been resolved in the Health Centres (E_N_I16).

(2) The lack of strategy relating to hospital IS shown by the Ministry for Health and a conflicting imposition of rules against IT systems.

Examples are flagged up whereby redundant IT systems exist, as is the case for example with the two systems for electronic prescription (PFSS and GAFE) as well as cases of different IS existing in a hospital centre that do not communicate with each other conflicting with the objective of having a single record for the patient. The current manager of the unit, a previous Board member, and a head nurse all voiced their opinion

and discontent with the state of the IS systems in the hospital.

“We continue to have software for this, and software for that, and then, they don’t communicate and (...) the language (...) it is not interpreted in the same way, that is, I have an IT system for the service ... I have a hospital ... I have an electronic patient record, but this is not all real is it?!?” (E_Mg_I1.2).

“I think that the involvement of the Board hasn’t been sufficient in the case of the PFSS. (...) Then a subsequent Board wants to implement another program, (...) GAFE, for pharmacy prescription, and then it becomes a big confusion. I think that they have introduced here as many programs as one person can cope with ...”(P_N_I20.1).

Another orthopaedics doctor voiced his dislike of having to simultaneously use the installed IS as well as paper in his day to day work.

“(...) the system [PFSS] should be planned at national level and should be adaptable to all hospitals, because it doesn’t make sense that some have it and others don’t which then creates these problems. (...) every day we have to file here new paperwork and move around with paper files. Integration is an important aspect.” (G_P_I5).

Besides the multiplicity of IS projects that are in place (including paper-based systems), the Executive Member of the Board, responsible for Hospital B, pointed out that the Central Administration of the Health System (CAHS), previously responsible for the IS project development and currently responsible for the certification of IS projects, publishes guidelines that recommend the use of paper records rather than making use of computer based information, principally when it comes to coding clinical records for funding purposes.

“... one of the factors that has caused some difficulty as regards the electronic patient record in the PFSS is that activity monitoring and contract payment processing and (...) clinical coding, all require paper printouts” (E_Mg_I1.2).

This measure, in the opinion of this manager, makes little sense and is difficult to accept, as expressed in the following statement:

“(...) really, I ... have some difficulty in accepting it. (...) Why our own directives! Why?! Why is it that clinical coding is dictated by the Central Authority for Health Services (CAHS)? (...) Just now we had some directives that can be considered binding ... that go against the use of IS in hospitals. What they had to do was make use of the clinical coding software that currently doesn’t interact with the computer based systems implemented in the hospitals” (E_Mg_I1.2).

These directives can be found transcribed into a Procedural Circular that covers all hospitals in the NHS:

“Coding should be carried out on the in-patient or clinic coding sheet, available for printout from the site of the CAHS (...) and subsequently introduced in the Information System for the purpose of grouping into Homogenous Diagnostic Groups” (NC_ACSS_Doc1).

5.3.3.2 Internal Context

With the creation of the HC, the management body and its headquarters changed, moving location to the district capital (which holds a noted historical rivalry with the locality of Hospital B). With the new Board and the creation the HC the organizational structure is altered from one based on services and medical action units to a structure with departments in Integrated Centres of Responsibility (E_Mg_I1).

a) Organizational Climate

The new organizational structure resulting from the integration process and the movement of the Board to another hospital were aspects that contributed to a climate of dissatisfaction, uncertainty and ambiguity on the part of professionals.

During the first study visit to the hospital, shortly after the integration of the hospital in the HC, it was noted that the quality of treatment was pleasingly high. Afterwards, it became clear that this level of treatment was considered normal, as was a comfortable, calm and organized environment. The hospital and all its workers held a standpoint of continuous improvement, investment in quality and acceptance of change. While the no-smoking laws for enclosed areas had not yet been published, Hospital B was already a no-smoking area. The (previous) Board was seen as very communicative, a facet that seemed to reinforce the link between the workers and the organization, its goals and objectives.

The following interview excerpts provide evidence of this attitude to change on the part of the professional workers in Hospital B:

“We were the first hospital to go ahead with the concept of a ‘no-smoking-hospital’ and put it into practice” (T_P_I12).

“... we were pioneers in adopting the Paper Free Hospital” (A_N_I15).

“... a clean hospital, organized, futuristic; we sought out challenges, we were showcased in various places...”(T_P_I12).

Looking at the general attitude of the workers in Hospital B, it can be seen from

the varied statements collected that the people that work in the hospital involve themselves integrally “with all the processes, all the innovations, that bring improvement and keep things up-to-date” (F_N_I10). This opinion is equally shared by the project manager when he says: “they are extremely methodical people, organized, (...) whenever asked; they are always ready to do things to improve their own work. (...) I think they have a very open culture” (R_MT_I1.1)

With integration, the professional workers saw their hospital lose its identity and “its Board”. Almost all the service directorates moved to the central hospital, and the old directors moved to having only a support role to management.

“the feeling is one of loss... that we lost some of our identity. The middle management and the service level and department directors all went over to the Central Unit” (T_N_I5)

“it was a really good relationship. As regards the changes and the integration, we reacted really badly. (...) First we lost the director of nursing, our own. And then, we got a new director, but we didn't know who she was...” (G_N_I7)

A lot of doubts were raised about the continued usage of the IS in place, given that Hospital B was the only one that had an IS that covered the whole organization. This feeling of insecurity and threat was very noticeable in the first years, but as the advantages in obtaining equipment became more obvious, this has become less noticeable. Even so, the impact on the commitment to the PFSS, principally among professional workers, persists.

The accreditation of the hospital in October 2010 by the Joint Commission International (JCI), along with the whole of the HC, helped reinforce the self-esteem of the professionals in Hospital B in the common effort that had been made. “The JCI is a division of JCAHO (Joint Commission for Accreditation of Healthcare Organizations) which has as a stated mission the improvement of the quality of health on the international community, giving worldwide accreditation to healthcare provision services” (Int_Journal1_doc3).

Some professionals refer to this process, highlighting the positive aspects of

international recognition of the installed practices, but also lamenting somewhat the fact that it was a process conducted with the paper-based clinical records, when the hospital already had the electronic patient record system institutionalized.

“there was a decline in the involvement and commitment of people at the start of the integration, but (...) the majority of people think that they are [more compliant], they accept more and recognize the advantages of belonging to the HC, yes, I think that the accreditation project was a bonus as well” (P_N_I20.1).

“as regards the question of accreditation, where the auditing of the clinical records is carried out on paper forms, (...) the organization of the clinical records was shaken up, (...) because we had a historical archive (...) that was disorganized, and it was because of this that we invested in paper-free, to eliminate the paper” (E_Mg_I1.2).

This last observation, by the executive member of the Board, reflects the disillusion felt following the efforts made to organize the clinical archive and eliminate paper, and subsequently having to print the electronic records for the auditing purposes of accreditation.

b) The Political Context

The political context of Hospital B is, once again, dominated by the phenomenon of integration into the HC, by the resulting changes in the power structure of Hospital B and the loss of autonomy and identity compared with the central unit of the HC, which didn't possess the same IS. The following comments are illustrative:

“(...) it is a disorderly period for our hospital, in that the HC was created and as such our own hospital centre brought some resistance. Aside from this, as a central unit (...), it doesn't have the PFSS and there exists a disconnect in terms of the systems adopted” (E_Mg_I1).

“From the moment that the HC was created, there was a lot of instability (...). Some conflicts, (...) arise when people lack confidence, they do not know very well what will happen (...). These changes of management ... the directives are not sufficient; the information is not channelled in the most appropriate manner.” (T_N_I5).

“I think that it is that, a feeling of loss of identity, because we put forward our opinion, we decided, and now we are not heard or included” (T_N_I5).

Other aspects that characterize the political environment of the organization, but not in a much visible way, are, on the one hand, a certain division between the two dominant professional classes (doctors and nurses), and on the other hand, personal and

professional interests held by some professional groups.

. “(...) we were lucky to have a nurse as an executive member (...) but, this was not a respected decision by the doctors (G_N_I7).

5.3.4 Infrastructure and Strategy for the IS/IT

The story of Hospital B's usage of IT goes back to 1998, with the use of a computer in the Administrative Service of the ER, where a database application for identifying patients was developed by a doctor in the hospital.

Since 2001, all services of the hospital are equipped with a network access and computers. “At this point in time the development of the PFSS software for the ER took place, which was became live in 2003” (WW_Doc_2).

Due to budgetary difficulties for hardware funding, the hospital took advantage of public funding (25%) and Structural European Funds (75%), as described by the director of the IT department: “There was no budget available for the project, moreover, we did not have any real financing capabilities...” (A_Mg_I2).

Currently, and besides the PFSS, Hospital B has a number of IT applications available, some of which are common to the health sector and supplied by the CAHS. Of these it is worth highlighting: (1) SONHO, which is the base layer application, on top of which all other applications are built and which provides a fundamental role in the supply of information resulting from the different hospital units to the Ministry of Health; (2) MSS (Medical Support System), that grew in use after the integration into the HC, and (3) the Information System for Classifying Patients in Nursing (ISCPN),

Besides these systems referred above, other clinical IS are still functioning in the hospital (laboratory support, imaging and pharmacy) whose interfaces with the PFSS and SONHO are well secured.

The previous objective of management was to assure the existence of a unique electronic patient record and an integrated information system through the use of PFSS,

which, besides clinical information, would supply management indicators. This position is not shared with the current Board of the HC, according to information supplied by members of the current management team: “At this point, I think they have to optimize SONHO, (...) and this is a guerrilla war in Hospital B, because the others use MSS and are moving towards the Support System for Nursing Practice (SSNP). From the HC, only the Hospital B is not using SSNP because it uses PFSS” (E_Mg_I1.2).

The intention exists to implement a different electronic drug prescription system known as GAFE (associated with the pharmacy software), and whose functionality overlaps with the prescription module integrated into PFSS. This attempt to introduce a new system is not unanimously accepted by the professional workers who would be using multiple applications instead of only one. With regard to this point, the manager of the hospital explains:

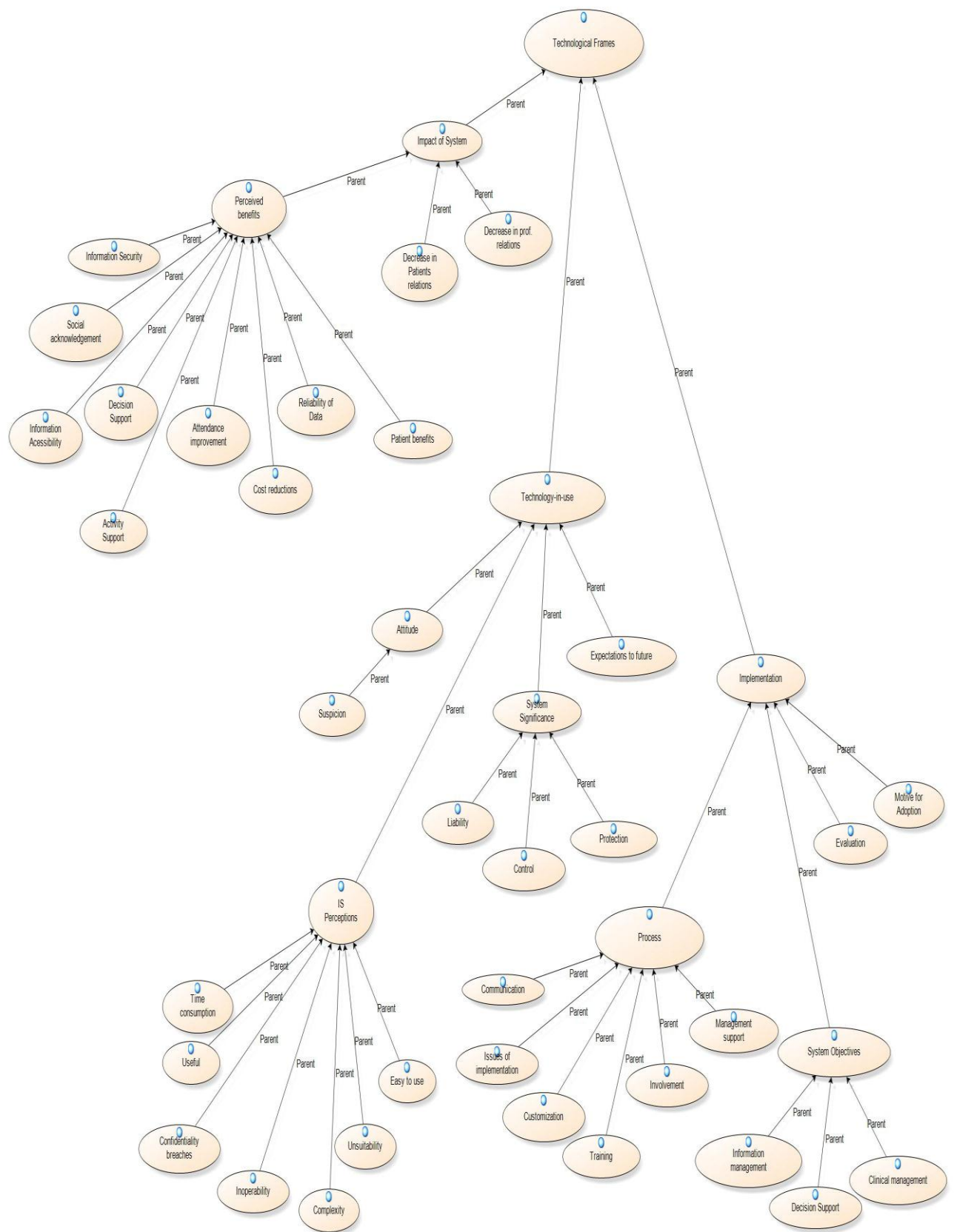
"GAFE is a pharmacy management program, we do use it in the ER, but we use the PFSS directly for prescription. And now, in the in-patient department, (...) they have to make a decision, do we prescribe from the PFSS or GAFE, knowing that the medical records contained in the GAFE have to be linked [to the PFSS] (...) "(E_Mg_I1.2).

5.3.5 Implementation of PFSS: Technological Frames of Users

As in Hospital A, the same group of themes emerged: Implementation, Technology-in-use and Impact of System, with little differences.

Figure 14 represents the frames that are most representative of the professional workers in Hospital B in function of the technology implemented.

Figure 14 Technological Frames for Hospital B Professionals



5.3.5.1 Implementation

The PFSS resulted from a partnership between the supplying firm and Hospital B, with the objective of creating a clinical software package and subsequent implementation. “This partnership began with a proposal that the firm [software supplier] made to the institution in which (...) the firm would supply the technical development and we would contribute with the ‘know-how’ of the health unit management. The ER module was the first phase, and it was from this that everything else took off”, stated de IT manager (A_Mg_I2). For this reason, some of the professional workers refer to the system as the product of their contributions and initial effort.

“the program was developed inside our own services, all the people involved were heard, and all suggestions were welcomed and in May 2003, the PFSS was launched. (...) We were a little bit like the guinea pigs for the program” (FQ_N_I1).

“All the errors that the system could have or all the different functionality that it possesses, it was all made by ourselves” (FL_P_I13).

The implementation process of the PFSS was executed in phases and the adoption of the software for the whole hospital was only carried out “when we had completed some three or four years of successful implementation in the ER” (T_P_I12), as explained by the previous Clinical Director.

After installing the PFSS in the ER on 5 May 2003, the Outpatient module followed on 1 March 2006. The Operating Rooms module went live on 15 December 2006 (Press_2006_Doc5), followed by the implementation of In-patient module which extended until 2010.

a) Motivation for the IS project adoption

The interest of the Board in the acquisition of the IS arose from a first formal presentation of the PFSS and the Manchester system for triage priority in the hospital in January 2002 (WW_Doc_2), as related by the chief Nurse of the ER:

I myself was present, the service director and all the members of the Board of Directors. It was then at that time that I thought the system was interesting, because there would be a link between the professional workers, and the fact that it would start off in the ER, and I found that attractive, (...) the Board was enthusiastic as well (...)" (FQ_N-I1).

Even so, and besides the fact that the Board immediately recognized the advantages for patient records of having a single IS, in the opinion of the Board's executive member there were other underlying factors involved in the decision to adopt the PFSS, including: 1) "the lack of credibility in the current information and the necessity to develop more effective management tools along with the knowledge that IGIF (that superseded CAHS) would stop development and updates of the existing packages (SSNP and MSS)", and 2) the possibility of computerizing the whole hospital with all the associated advantages of a paper-free hospital (e.g. environmental impact, improved information management and security, along with "an improvement in the patient care").

Maybe due to the hiatus between the time of that decision was made and the time of the start of the implementation process, the professional workers did not present a well defined idea of the motivation behind the purchase of the system and adopted a neutral position regarding the whole process.

"the exact motivation of those that decided that the system would be implemented, that it would be put in place here – that I do not know. Our opinion was never officially requested" (MC_P_I9).

"Maybe to make people's work easier and to avoid paperwork, isn't it?" (A_A_I4).

"I suppose that it was to make teamwork easier and for the patient data and knowledge in itself, in the patient record, (...) would be all recorded" (A_N_I13).

"Maybe it was really the idea of the paper-free hospital" (P_P_I2).

There is a belief that the introduction of the system was fundamentally for reasons to do with management:

"Singularly to do with financial management and control over workers (F_P_I3).

"the possibility that (...) the professional workers, (...) would have easier access to information and that the administrative services would be able to control the activities of the professional workers" (L_N_I8).

b) System Objectives

The objectives for adoption were: (1) the attainment of credible and reliable clinical information, accessible to professional workers through the unique electronic record that would enhance patient care; (2) attainment of management and output indicators, resulting from the records related to care provided; (3) an understanding in real-time of the processes that are being executed on the ground and decisions that are being made; (4) the computerization of all the records related to patient care provision (paper-free hospital), allowing automation and flexibility in the processes. All these objectives were grouped into three larger objectives: Clinical Management, Information Management and Decision Support. There now follows some excerpts that illustrate these objectives.

Clinical Management:

“Undoubtedly, the activities that the professional workers log on the system (...) are important as well for the organization to know what each person is doing” (FQ_N_I1).
 “I think that it is (...) more orientated towards health management than really to the clinical area” (MC_P_I9).
 “(...) it was created to follow all the different types of contact that happen with the patient” (T_P_I12).

Information Management:

“The vision of a computerized clinical record that allows the recording of all the information in one file” (WW_Doc_2).
 “The objectivity of the records (...) because it is so much easier to see a patient record with all the information, at what time, who was it, how was it, (...) than have to search in the paperwork and as such much less information is lost.” (A_N_I13).
 “The clinical computerization arises out of a basic necessity to standardize the different services (...) because it was the case that each service worked with specific programs” (T_P_I12).

Decision Support:

“to have better information, more reliable, (...) logically the best would be to take decisions based on the information that the system generates for us” (E_Mg_I1).

c) Process

The implementation of PFSS includes the following categories: (1) Project phases; (2) Communication; (3) Involvement; (4) Training; (5) Management Support; (6) Customization and (7) Implementation Issues.

Project Phases: Following the technical survey, functional requirements, information flow mapping, the communication and discussion meetings with the WG for planning and execution of the project implementation, then was “training for the product (...) for all the teams, from the assistants, to the doctors, administrators, nurses and other professional workers”, explains the project manager from the software company (R_Mg_I1). The usage and support of the system occurred in a time-frame as close as possible to the training and “the whole process was surveyed weekly by the directors or the working group nominated by the BOD for monitoring the implementation process” (R_Mg_I1).

The implementation process of the PFSS was formally launched with the first meeting of the WG in February 2002, that included the director of the hospital, the clinical director, the director of nursing, the head nurse from the ER, the chairman of the software supplier, the managing director (representing the interests of the Board), the manager of the IT department and the project manager (from the supplier firm) (W_meetingPFSS_1). This meeting was convened to collect material and forms used in the ER of the hospital, define the methodology and organize workgroup meetings (that included weekly meetings) (W_meetingsPFSS_1).

The PFSS went live in the ER on 5 May 2003 simultaneously with the Manchester system for triage priority, following an initial training period. Initially the paper and computer systems ran in parallel with the process of progressively removing paper forms lasting until 3 December 2003, when the ER became completely paper-free.

“in an initial phase, we had to use the paper and computer systems. And then, (...) we started using the triage files. After three or four days (...) the paper form was removed from our ER files and this continued successively” (FQ_N_I1).

There followed, still within the ER, the launch of the IS in the observation room, which was completed on 21 April 2004. It should be noted that this module is similar to the existing one used for the in-patient services, as the patients in that room already have an active in-patient file.

In a late phase, following successful implementation in the ER, the hospital advanced with the implementation of the PFSS in the whole hospital, first in the Out-patient department followed by the In-patient and Operation Room services.

Being at the same time a case of a software development and deployment, "there was a task of collecting of all the information recorded by us on paper, all the print-outs, all the information flows to be implemented. (...) we started by identifying and selecting the employees to be involved with the process. (...) There were doctors who took part from start to finish, and there were always nurses who participated in the developments (...) There was no survey of who could, exactly, raise questions looking at it from the other side", explained the director of the IT department.

With the exception of the medical services, where the medical teams refused to use the system, and some of the medical specialties (a very few) of the In-patient department that insisted on using paper forms, the introduction of the PFSS was a continual and participative process, albeit quite long (since 2003). Each service suggested improvements to the product which were incorporated with each update to the application.

With respect to the way that the implementation was carried out, some professional workers gave the following comments:

“First, there was the training done here on site (...) the technicians of the PFSS were with us for the time that was necessary (...) We passed through an adaptation phase (...) it was easy” (C_A_I1).

“The implementation of the IS was done in phases and it was a gradual process (...). They did two important things – one was to train people, and the other was to clearly define what the objectives were” (T_P_I12).

“We implemented things little by little. We took away the paperwork a little at a time” (A_N_I13).

As regards the introduction of the PFSS in the in-patient (with the exception of the Medicine services), the process was carried out in a gradual manner with a progressive removal of the paperwork:

“Gradually we eliminated the paper records... When we started with the PFSS we worked with all the system functionality (...) with all the patients and we progressed little by little trying to eliminate the manual records, until we finished up not using the paper records for the patients” (A_N_I13).

The frames ‘Implementation issues’ and ‘Evaluation’ present with greater detail the difficulties and barriers that occurred during the process and a global evaluation of the PFSS implementation process, following a viewpoint supplied by the healthcare professionals and implementers.

Communication: According to the executive member of the Board, the communication with the employees regarding the uptake of the PFSS system and its entry into use followed the usual procedures, or in other words, meetings were held with the representatives from each service areas and memos were circulated informing of the adoption of the system and the implementation procedure. Even so, some physicians expressed an opinion that the information from the Board, namely regarding the objectives for the system, was inexistent or insufficient:

“There was training on how it worked, but there was no justification as to why it was being implemented (...) They only said: ‘Doctor, please could you attend the IT class so we can show you how the system works’ (E_P_I14).

“(...) what they told us was: ‘We are going to implement this system, it is a system under development that will be developed here in our hospital’, but nobody ever asked us directly to collaborate” (MC_P_I19).

Involvement: The participation of the professional healthcare workers was most noted during the development stage of the software and subsequently, in the

suggestions presented to improve the system and better reflect the reality of each specialty and functions of each professional group. The perception of the users regarding their involvement in the process is now presented, drawing on some of their comments:

“as it happens, I got quite involved, because (...) they asked my opinion a lot (...) I really put in a lot on this (...)” (P_P_I2).

“They didn’t ask for any opinion or participation, it was only in terms of training, then we had the training” (J_A_I3).

“our involvement was only to say what we thought should function in a different way (...) what we thought should be altered (...)” (MC_P_I9).

“the clinicians were never heard or questioned!” (F_P_I3).

A large contingent of doctors thought that their involvement in the process should have been bigger, in the sense of helping create a more friendly application.

The necessity of having more extensive involvement by the medical team, particularly those elements more resistant to the project, was also defended by the head nurse of the ER service. The point made here was that the extra involvement could prevent resistance to implementation and increase the commitment of the doctors to the project:

“I think that there should have been more involvement of the doctors. Because the directors of the different services and one or other of the doctors were involved, and maybe those that (...), if it had been known from the outset that they would be more difficult, they should have been called, right at the beginning to give suggestions, and be involved (...)” (FQ_I_I1).

On the part of the nurses, the involvement showed a similar story, however, participation of the nurses in the various services was more frequently referred to by themselves in a generally positive light, as the following excerpts show. This could be true because in the groups of nurses the participation of the head nurse is more intensive than that of doctors, contributing to the development of a greater commitment to the project of their teams.

“Each service, each nursing team defined the development of the diagnostics for each type of medical procedure and then in general terms” (A_N_I15).

“As such, we made a survey of the most used diagnostics in nursing here, at each post and that

was it, it was the group that did it” (G_N_I6).

The PFSS team representative monitoring the installation explains the strategy followed by the company in involving the heads of department as relating to the fact that it is their job to motivate and involve the teams that they manage: “generally we always deal with the heads of department, who then relate the information to all their personnel” (R_MT_I1.1).

A head nurse of an in-patient service commented:

“In the In-patient department, (...) it was very easy because I was very motivated and very interested. I think I was able to motivate the team, for the time being, as head nurse this is part of my role, no?” (T_N_I15).

In some services, such as Paediatrics, the involvement of the nursing team worked as a driving factor for the commitment of the medical team, as the head nurse of the paediatrics service recalls:

“When we started in paediatrics, (...) it was just us... the nurses. The doctors afterwards were dragged into it and afterwards it was (...) with some work by them, together with them, that we managed it, and now practically all [the professional groups] use the PFSS” (A_N_I15).

Training: Training was guaranteed to all professional groups that had a functional profile in the PFSS, always at the stage before putting the system into the live environment, and was one of the aspects most referred to when questioning about the feeling of support realized by the users during implementation. However, the compliance with the training was different between the different user groups. “There were professional groups that complied 100%, there are other groups that didn’t do it”, commented a head nurse. As per this nurse, this is due to “a real lack of motivation and a lack of interest” because, in her opinion, “the correct procedure was carried out” (A_N_I5).

The head nurse of the ER, while also being an element of the working group, refers to this difference in the uptake of training by the different professional groups:

“While the nurses and the assistants complied cohesively with the training, this didn’t happen with the medical team in the beginning” (FQ_N_I1).

“Initially, the professional workers were not at all receptive, and it was very difficult (...) I remember having gone around the previous day alerting people to the fact that training would take place the following day, but, or they didn’t feel like going, or there was no reason to go” (RC_MT_I2).

To resolve this problem and not compromise the progress of the project, a strategy for training in the workplace was adopted in the ER, “it was necessary to create a strategy, that instead of them going to the training, it was the trainers that would go to them (...) and then after that they all did the training” (FQ_NI1).

Despite some users considering the training to be insufficient or too concentrated, probably because had more difficulties in using computer-based systems, the most part of professional workers found that the training process as well as, the subsequent on-site support, facilitated a smooth adoption of the system, as shown by the following comments:

“Maybe we could have had a bit more basic training, because (...) I know very little about IT (...) and maybe if we had had more training (...) it would be easier” (F_N_I10)

“There should be more training (...) Not like this, so much information in so little time (...)” (I_N_I16)

“(...) the training was sufficient, (...), Well, in the beginning it was a little difficult, (...) the PFSS technicians were with us for the time that was necessary to allow the people to learn (...) We adapted over time (...) I think it was quite easy” (C_A_I1).

Management Support: The measures adopted by the management group to stimulate or even enforce resistant elements to comply through necessary measures are also relevant in this research, and is valued by many users.

According to one of the members of the monitoring PFSS team, the “administration and the boards of directors have an important role. Some 60% of the success of the implementation is down to them. They are the dominant bodies, of leadership, (...) they hold the knowledge, (...) if people are not working for the system, the system by itself cannot win through. (...) The imposition and definition of rules has to happen, there has to be an authoritative figure, in whatever system, in whatever

organization (...)” (R_MT_I2.1).

The necessity to lay down rules of use and adopt measures to support the progress of the IS is shared by the various healthcare professionals:

“if there was more leadership and more commitment on the part of management, things, maybe, would have been done a long time ago” (MC_P_I9).

As referred to before, the process of integrating Hospital B in the HC, the departure of the Board, and the distancing of the management team from the project implementation, causing the project to diverge from its natural course, were all very influential factors in the commitment of the professional workers, who were confronted with a blockade with negative consequences for the expected benefits of the system. The statements made by various professional workers and members of the monitoring team reflect this feeling of a lack of support by the Board for the continued success of the IS.

“The Board became a great asset since the beginning, (...) since we moved to the hospital centre the things became different (...). And in terms of progress, (...) we haven’t had the support that we are used to have from the Board” (RC_MT_I2.1).

“I think that the involvement of the current Board has not been sufficient when it comes to the PFSS” (P_N_I20.1).

“The PFSS continues to work in all the hospital. The management of the hospital went away and after that it ran on autopilot [without guidance]. As there is no one to put pressure on, nothing happens” (T_P_I12.1).

The greatest support was provided by the supplying company, through the presence of a monitoring team that maintained support for a significant time, in some cases through a historical respect for the partnership that surrounded the development of the software and its implementation, as recounted by a member of the on-site MT:

“Just because Hospital B was a very special case, (...) it was here that all the demonstrations were made, or in other words, there are a series of factors that mean that this hospital continues to have members of the MT (...). However, this did not happen in any other site” (RC_MT_I2).

Some other professional workers also expressed their opinion by saying:

“we have a support team on site, always here, they are here 24 hours, providing help if someone

has some problem (...) In that respect, they are phenomenal” (A_Mg_I2).

“it was my trainers that gave all the support in this process, and they move around there helping out from the beginning ” (J_A_I3).

“When it was implemented, the system support people were here 24 hours” (S_N_I11).

“Of course, the fact that we had an on-site support team from the company means that they were able to carry out some of the development, communicate the difficulties and make contact with the relevant people” (E_Mg_I1).

One element of the WG when questioned about the strategy used to involve users in the project and influence their commitment explained that there was no organized way to involve users. However, “there was an effort made to give more on-site support to the more resistant people (...)” (A_Mg_I2).

According to the project manager, this involvement is carried out at the time of the presentation of the PFSS, “(...) at the time of forming (...) the working group and it is at this point that the teams are involved. It is obvious that we cannot involve (...) all the workers. There is a role for management here too, no? We try (...) to involve all the groups of the hospital, after which it is up to the groups to involve their own teams” (R_Mg_I1).

Customization: One of the characteristics of the PFSS is its capacity to be altered, customized to the specifics of each medical speciality and the demands of users, through personalized user profiles. This process was very evident in this hospital, in the sense that it was here that the initial development of the software by the supplier took place. All the teams took part and all the services submitted suggestions to customize the PFSS.

The level of participation from the various groups was different as well. It was notable, a greater contribution on the part of the nurses and assistants. The involvement of each leader in his team was crucial in this process. According to the head nurse of the ER, “the activities that each professional was responsible for, the nurses procedures were all incorporated (...). The medical procedures were still not part of the PFSS. It was constructed by all the professional workers” (FQ_N_I1). The following statements

given by a nurse and a doctor also show this customization:

“We made our own application, created our standards ... each service has its own documenting standards. We use the International Classification for Nursing Practice (ICNP) and each service organizes itself according to the most frequently used diagnostics in each service area”(A_N_I5).

“That program for emergency work, as small and simple as it is, it was us that made it, it was the doctors of this hospital. One said one thing, another said another, ‘look let’s do it like this, let’s so it like that’” (FÇ_P_I13).

Issues of Implementation: The main problems and difficulties of implementation are related on the one side to the lack of support for the project by the Board and on the other side to cases of resistance to the IS, most visible in the group of doctors from the medicine service, that interfered in the completion of the process and realization of the expected benefits. For the project manager, “the great difficulties reside in a change of mentality. It is having to deal with change, with the resistance of some groups and changing mentalities” (R_Mg_I1).

With reference to the existing difficulties in the process, an assistant nurse from the nursing management team explained:

“there are some professional groups, (...) that did not comply. Plainly and simply they did not want to do it, they did not want to use it. This afterwards created some insatisfaction and disorganization in terms of the day-to-day activities” (A_N_I5).

It should be noted in the case of the Medicine services that after a period of almost two years of not using the IS, by imposition of the service director, the nurses decided to go ahead by themselves after judging that the objections raised by the clinicians no longer existed. This was a concerted decision between the assistants of the nursing management and the head nurse against the director of the service. They thought that the physicians would gradually join them, but this did not happen as stated by this nurse: “there was an expectation that the doctors would be dragged into it gradually, having to use the application every time they needed to consult the nursing records, but it didn’t happen like that” (V_N_I21).

Following from the integration into the hospital centre, a blockade occurred and

a slowdown in the implementation effort occurred that in some cases influenced the commitment to the project, raising doubts about the survival of the project:

“if this paradigm would be implemented in most hospitals, I am sure that it would have great potential... and the problem is that it is not, and nothing is happening...” (E_Mg_I1.2).

“Up to now the integration into the hospital centre has not changed anything. I even thought it would change something... this system... it was one of our fears. But no, up to now I don't think so” (A_N_I13).

The project manager when questioned about the strategies adopted to deal with the resistant elements stated that identification is made during the training and the strategies run to “talking and noting the situation with the management (...) after which the information is used to decide how to manage this type of person (...). The approach is decided on an individual basis” (R_Mg_I1). The manager continues “(...) the resistive elements are normally obliged to comply. There are hospitals that use incentives as an approach (...) This work is done with us, we give feedback to the management on how things are evolving in the implementation process and they have to take the necessary measures” (R_Mg_I1).

Another difficulty that arose during the implementation hangs on the introduction of the information system for electronic prescriptions for the hospital pharmacy that raised resistance among the professional workers due to the necessity to jump from one system to another, when the PFSS also has a therapeutics module.

“Electronic prescription is possible with the PFSS, but the policy adopted by the Hospital Centre is to use GAFE” (E_Mg_I1.1).

“they were already confronted, the users, with prescriptions in this software (GAFE), (...) they then reacted and said: (...) if we have to use another system we will use the PFSS (...)” (E_Mg_I1.2).

“(...) it is not really viable to have to leave one application and enter another” (FQ_N_I1.2).

d) Evaluation

This category, in a similar vein to the previous case, includes the interpretations that the users make, in evaluating the way the whole process was executed, the scope, current state, level of usage and how the future expectations should be managed.

Perception of the Implementation Process: According to the assistant to the nursing director, during the last interview carried out in July 2011, the implementation was completed, “At this time we do not have on site support from the PFSS technicians and that area of responsibility has been passed on the IT services of the hospital” (A_N_I15.1).

When the professional workers are asked how the implementation of the PFSS went and how it was managed, they respond that it “went well”, “it was a gradual process” and “it was well structured”. In the opinion of an operational assistant: “I don’t think there could have been a better way to do the implementation” (J_A_I3).

“As it was, the process was gradual, (...). As it was, things were somewhat gradual, but the difficulties were always adding up” (G_P_I5).

Some of the contributing people showed opinions against the changes introduced by the HC and the necessity to use various IS, including paper.

The information system is now perfectly institutionalized, being used in the Outpatients department and the ER in a more or less exclusive capacity. In the ER the implementation is completed. “We have reached the predicted goal, working without paper, completely” states a head nurse from the service (FQ_N_I1.2).

The Outpatient department is fully computerized, although there are differing levels of support, with only a partial usage of the system by the doctors, as noted by a nurse: “There are paper records still arriving ... We do not use them, the nursing service does not use them, but paper records are always still coming from the consultations” (L_N_I8).

At the in-patient level, the process is not yet completed, where there are various levels of compliance and usage, both from the services and particular professional groups.

Regarding what the healthcare professionals of Hospital B generally thought of

the impact of the system on their day-to-day activities, a large part of the workers consider it as a work instrument, that supports their activity, and now cannot see themselves working without it. Even the most critical people respond with conviction that there is no going back, now. The following excerpts illustrate well this perspective:

“People that in the first stages, reacted very badly, saying that it wasn’t worth anything, and now say (...) ‘today in the ER, we wouldn’t know how to work without the information system’” (FQ_I_I1).

“In the beginning, it was very difficult (...). Today we realized, really, that (...) really, it helps a lot” (FL_P_I13).

“Look, here I have to say that this makes total sense. This is part of a modern country. (...) the problem is that at this point in time we still have more paper than we had some time ago” (G_P_I5).

“Look, the PFSS in the beginning was a stress (...) it was something complicated, because I don’t have a lot of experience”.

In relation to other more objective results obtained from the system, namely the impact on costs and waiting times, two elements of the WG (current manager of the unit and head nurse of the ER) replied, that they have difficulty in demonstrating the real impact of the IS in these matters as shown by their comments:

“Talking about costs, there is nothing concrete in terms of a real study, (...) because there have been no effective clinical audits to see clearly if the healthcare professionals are making use of the information that they have there and judging its merit, isn’t it?” (E_Mg_I1).

“Previous studies, with objective data, to identify the benefits achieved and the way to evaluate them – this hasn’t been done, (...) because previously there were no records in the admission records, with the admission time, time of consultation and time of release (although this field exists) (...) as such if we now wanted to compare with what happened previous to 2003, because the data was not recorded it is difficult to make that comparison” (FQ_I_I1).

Concerning the criteria used to define the success or completion of the process, the project manager affirmed that the use of the system is verified by removing paperwork, but in this process they need the cooperation of the management. He stated that “removing paper depends upon acceptance, (...) For us, with our methodology, we guarantee that if the management collaborates with us, or in other words, by obliging the rebels against the application to work with the system - we guarantee that in three months people will be autonomous”.

Expectations for the Future: The expectations of some participants relating to the PFSS are dominated, at the same time, by some uncertainty in relation to the continuity of the PFSS program and also by the necessity to encourage the use of the existing software and its integration with other existing systems:

“as regards nursing, we have a series of instruments which (...) would even be useful if they were used over a network with another hospital that would also have the PFSS” (E_N_I16).

“(...) From what the HC says, the PFSS will continue to be used. We thought initially that because the central unit didn’t use it (...) it would be dropped (...), I was sad because after so much effort, we would go back to making the records as we used to (...) it didn’t make any sense” (G_N_I17).

“To get the most out of the program, because I think that the program, from what was told to us in the training that we did in the area of management (...) it was exceptional!” (P_N_I20.1).

“it would be great if we were able to do it (...) make the link to the SCDE” (T_N_I5).

“(...) five years from now this has to be all computerized! Be it the PFSS or the [System ABC]” (P_P_I2).

IS usage level by Professionals: The level of use is very variable between the medical specialties and type of clinical activity (Out-patient, In-patient, Operating Room and ER) and varies as well between professional groups. It can said that the nurses and the operational assistants were almost 100% compliant in all areas and the few areas where this is not the case result from the in-patient services where nurses had to transcribe therapeutic prescriptions that the doctors had filled out on paper. There are services that use IS in almost its entirety and others where only two groups of professionals use it (nurses and assistants). The following excerpts exemplify this:

“In a general way, I think that the nurses almost in their entirety ... some of the doctors, some completely, others a little...and others not at all” (A_N_I15).

“us nurses, we do everything. Everything to do with making records in the PFSS, we do everything using the IS, (...) except the therapeutics records that should be done by online prescription and they continue to use the paper forms” (P_N_I20.1).

“In terms of the medical specialties, almost all the services, with the exception of the medicine specialty in the in-patient department, because in the out-patient department and the ER they use it” (E_Mg_I1.2).

The doctors as a group presented considerably different levels of compliance, including active resistance (e.g. refusal to use the system).

“the medical section does not prescribe medication in the PFSS” (E_P_I22).

“In a general manner, I think that the nurses are almost all in... the doctors, some do use it, some completely, others a little... and others not at all.” (A_N_I15).

In the ER, where the system was first installed, the usage level of the system is very high, and they do not use paper now, although even the doctors do not use all the functionality of the system.

In the in-patient services of Medicine and the Operation Room, the resident medical staff (permanent staff in the service area), show an almost total refusal to use the system. Usage is partial in the other services of the In-patient department and the Out-patient department.

“For consultations it works well, in the ER it works well. In the in-patient department and the operating rooms, they are more critical (A_Mg_I2).

“The medicine services are the only ones that do not use the PFSS, but just the medical part” (T_N_I15).

The paediatrics and orthopaedics services are those that have the best level of compliance from the medical teams. In paediatrics they even use the system for prescribing the therapeutics.

When inquired to give examples of resistance to the IS, and give their opinion regarding the best way to overcome such behaviour, some users showed marked support for the Board imposing compulsory use.

“The Board members have two powers. First, to try and convince and then use authority. If they do not try and convince, and they do not use their authority, each one does what he pleases.” (P_P_I2).

“While the hospital centre does not take a stand over this, it is not going ahead (...)” (P_P_I2).

“While there is no decision compelling the use of the PFSS as a work tool, it will always be very complicated” (RC_MT_I2).

5.3.5.2 Technology-in-Use

This domain includes all the perceptions and interpretations that the users hold of the technology, and collates perceptions, meanings attributed to the system and assumed attitudes.

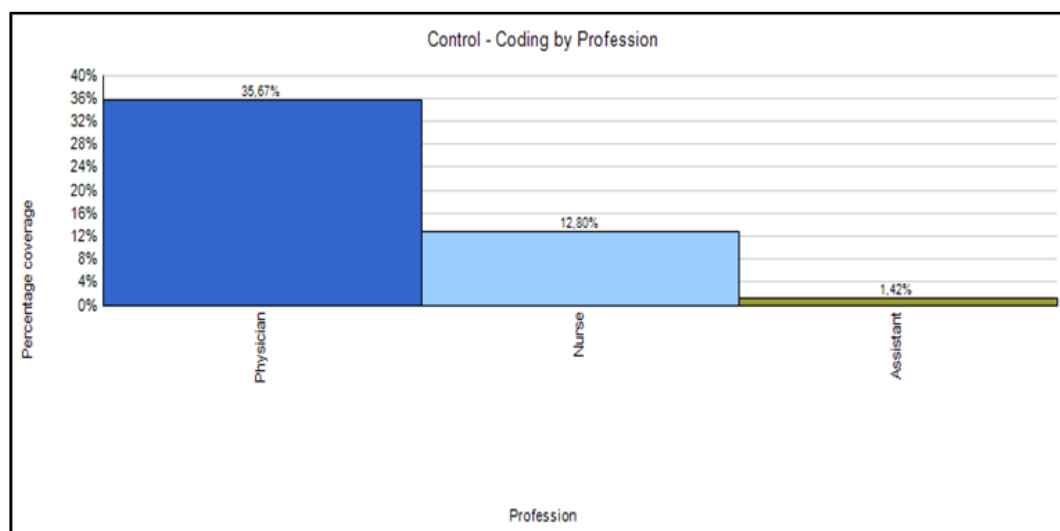
a) Significance of System

In the perceptions and assumptions referred to by the healthcare professionals, the following were found to have implicit meanings for the system; (1) control mechanism (Control), (2) a tool that makes activities visible and as such is susceptible to having consequences in terms of civil liability (Liability) and (3) an instrument of professional protection (Protection).

The last frame is associated to increased security of information, legibility and responsibility and is mentioned mostly by nurses and assistants. The first two are more associated with the medical group, essentially with those professionals that take a position against the system or of little commitment to the system.

Control: The assumption that the PFSS is put in place to control activities is often mentioned by the participants in the study or referred to by other professional groups. The Figure 15 illustrates the distribution of this frame by professional groups.

Figure 15 Distribution of the Frame ‘Control’ by Professional Groups



Some excerpts serve to illustrate this technological frame that accounted for 36 references from 21 sources. The following comments illustrate well this interpretation:

“who benefits most from the PFSS is the institution itself. In terms of records, it is everything, because it collects everything, isn’t it?” (C_A_I5).

“I think the PFSS was created as a management system, because of all the information of when the patient is admitted, the time you took, the tests you asked for, so, all of this is controlled,”(E_P_I4).

“Now the doctors are obliged to write and use the system, and because of that they can be controlled” (F_P_I3).

“it was designed for the managers to control everything. Isn’t it? But we have high hopes that they get a lot of benefits out of it” (P_P_I2).

The project manager tried to describe the conversations that were exchanged with some of these users in the following way:

“(…) ‘Ah, the system here is watching us. And we say: ‘No it isn’t’, and they retort: ‘Ah, because you know how it is that we get in and get out’” (R_Mg_I1)

Behind this fear of being controlled seems to be the fact that the IS makes the realised actions and timetables practiced visible. It should be noted that some doctors share their time between hospital and private clinic activities. The assistant to the Head of Nursing states:

“It was not just the PFSS, there were other aspects as well, namely, productivity, indicators, responsibility, and other aspects that must have influenced them... (...) they were used to do almost what they wanted” (A_N_I15).

Liability: This frame attributes to the system the capacity to serve as an instrument to be used against the professionals in cases of complaint regarding the treatment or the occurrence of medical error and in disciplinary procedures that follow, just as exemplified in the following statements:

“to reply, many times to the complaints of the users, or to make an exhaustive search of a particular process, it allows us to have a great deal of detail in looking up information.”

“(…) That IT system (...) it could violate some constitutional rights, in particular those that assure rights of liberty” (F_P_Letter2).

User Protection: This frame reflects an opposite view to the previous two frames. It is normally valued by the proponents of IS. The professionals see the system as an instrument that clarifies their activity and that of others and thereby of reliability and transparency of the processes. On the other hand, the information is not lost and can be used to clarify situations (e.g. complaints) that the professional was involved in, providing some protection. According to the professional users that share this frame, the

IS legitimizes more and helps to better show those workers that work best. It is clear that the IS will only show such things when it is correctly used. This frame is more characteristic of the professional groups of nurses and operational assistants, but it is also true for some doctors.

“Even for our own security (...)” (A_N_I15).

“In terms of our nursing records, it is a good system (...) there is nobody that can go and cross out the things that a person writes...this has happened to me (...) and there it is well kept, nobody goes there and alters it! And it is our defence later, it is there written, everything recorded and there is nothing to change” (I_N_I6).

“(...) for example, in terms of complaints, a situation which is more and more frequent (...) we have to reply to those complaints and we can do it using the PFSS (P_N_I20.1).

b) IS Perceptions

Various interpretations of the system, its flexibility and influence on the daily activities were ascertained. The IS perceptions most mentioned were ‘complexity’, with 31 references from 15 interviews, ‘time consumption’, with 35 references from 22 individuals and ‘inoperability’, that was referred to 15 times by 11 professionals. There were also 16 references to the system, made by 8 individuals, as being not well adapted to clinical practice (‘Unsuitability’).

The perception of the system as being useful and easy to use was referred to respectively by 10 and 7 interviewees.

Frames related to ‘confidentiality breaches’ and ‘imposition’ were identified as well, but were present in only very few references. Therefore they will not be presented.

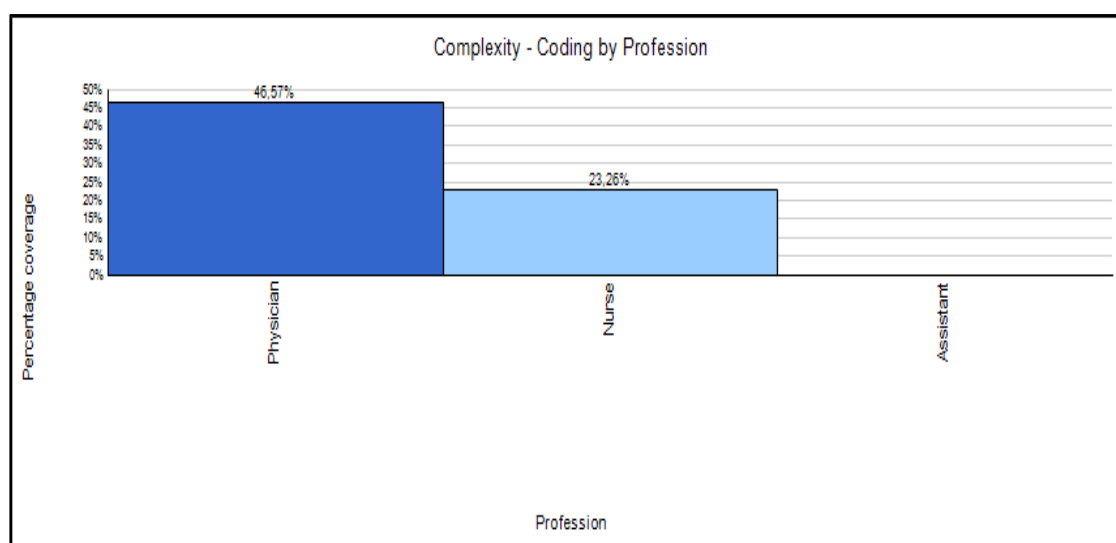
In this theme, only the frames that are most relevant and were subject to the most number of references by the interviewees will be discussed.

It is important to note that two of the visits carried out on site coincided with updates to the IS, in which alterations suggested by the professionals of Hospital B or other hospitals were introduced. These alterations always implied some adaptation of the professionals and support by the PFSS team, as such, some of the interpretations

related to operability and complexity of the system may be associated with this fact.

Complexity: a large part of the perceptions recorded in this frame translate into an image of the system as being complex, with record fields that are very specific and difficult to transcribe. This was very often referred to in the ER and the professionals identified a difference in usability between the first version of the system that was more simple and rapid to use than the current version. These perceptions are similar to those found in the other hospital that also used the previous version of the system. The complexity of the system was referred to most frequently by doctors (10), as can be seen by looking at Figure 16, although there were also significant responses by the class of nurses (referred to by 5 nurses).

Figure 16 Distribution of Frame 'Complexity' by Professionals



The following comments reflect the perceptions of the users:

“And if they wanted, (...) to have access to the nursing records they would find it difficult, because they have to go into the nursing information application, (...) afterwards (...) in the diagnostics, then they have to ... (...) click *OK* I don’t know how many times” (A_N_I15).

“this last update of the program made it much heavier and more complex, for example, to get into the medication section (...) it takes some time (...) Previously it was not like that” (E_N_I16).

“In the ER it really is complex (...) it takes a lot of time” (P_P_I11).

“It is very subdivided. It is very complex, not at all practical, it is very slow” (FL_P_I13).

“To help a patient (...) it is necessary to go through fields and fields of the application successively (...)” (F_P_Letter2).

Inoperability: This interpretation linked to the PFSS is, as can be seen, associated to the complexity of and time spent in using the application.

“Sometimes it is useful, others not - when it does not work as quickly as one would like (...) and deletes everything” (A_A_I4).

“It is obvious that there is a lot of information and I understand perfectly that this makes the program slow, but in terms of functionality, I don’t want to know. I want to press the button and the information appears straight away” (E_P_I4).

“It should have been more thought out and directed by the doctor-patient relationship, it should be a more functional thing” (G_P_I5).

Unsuitability: This frame results from the fact that the IS was not constructed from the point of view of the doctors, according to the doctors’ perspective.

“(…) This system from my point of view is impractical looking at the way it was planned, (...) it shows that there is a lack of knowledge of clinical practices in an ER service (...)”(F_P_Letter 1).

“There are lots of aspects to the PFSS; it shows that there was not one doctor, that there was not one clinician architecting the system” (E_P_I4).

“The program goes against all the things they taught us at university in terms of collecting the anamnesis and the doing a physical examination. It goes against the medical traditions (...)” (FL_P_I13).

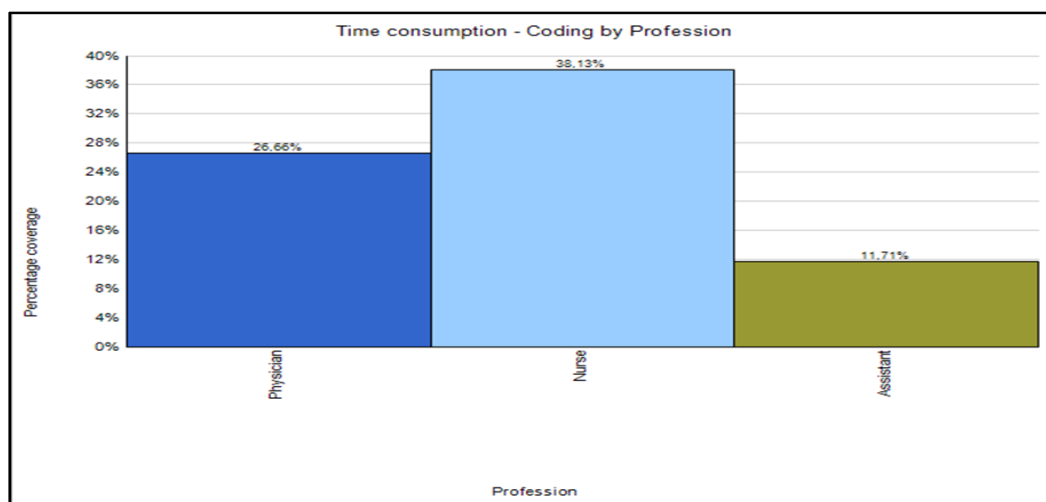
Various doctors referred to the need for IS to be kept simple, and sometimes “when trying to make a wide ranging thing, trying to include everything, makes it unnecessarily complicated” (MC_P_I9).

Time Consumption: The data effectively shows that the factor “time” (in recording information and data analysis) is highly valued by professionals influencing their commitment level towards the use of and compliance with technology. This interpretation of time consumption associated with the system was the most referenced (22 interviewees).

The 22 sources of information included, 9 nurses, 2 assistants, and 11 doctors. Figure 17 shows the distribution of this frame by professional groups, revealing a high percentage of nurses to be sharing this frame; even higher than that of the doctors, as can be seen in Figure, does not seem to influence their commitment to the use of the

system. Supporting this, the frame “Correct Use” is referred to by 42.49% of nurses, against 10.62% of doctors and 6.83% of assistants.

Figure 17 Distribution of the Frame ‘Time Consumption’ by Professional Groups



Some of the comments offered by the participants are very representative of this perception (frame):

“If we now went and tried to fill in all of the items that exist, for example in a consultation, there wouldn’t be time enough for everything” (MC_P_I9).

“In the beginning I think you lose a bit of time, because the person is not (...) and the patient gets left behind. But later no! The staff are now more knowledgeable and ready, and used to it, you get there quickly” (I_N_I6).

“(...) the risk of attending a tiny minority of patients (...) with the added time spent that the information system requires” (F_P_Letter2).

According to the data analysis, time consumption is important due to its relationship with commitment as it influences the interpretation of the system, compromising the relationship with the patients, in as much as it puts the doctor in a position of choosing between paying attention either to the system or to the patient.

c) Attitude

In this frame the category of ‘Suspicion’ was identified being referenced in 5 sources. Suspicion seems to be intimately related with the users’ perceptions of the

original intentions in adopting the system, which are not clear.

“It is a system that is ‘masked’, disguised” (E_P_I4).

“Sometimes there are alterations to the system that are not always clear” (F_P_I3).

“We always have to put up with the infamous “OK”... what excessive concerns could there be (...) behind those that planned the system?” (F_P_Letter1).

5.3.5.3 *Impact of the System*

This domain of TF includes the perceptions associated with the impact that the system has on the lives of professional workers. Although three individuals considered that there was a negative impact on the relations between professional workers, the strongest perception is related to the impact the system had on the relationship with the patients (‘Decrease Patient Relationship’). The positive perceptions were related to the perceived benefits (‘Perceived Benefits’).

a) Decrease Patient Relationship

The frame ‘Decrease Patient Relationship’ occurred in 16 references from 13 individuals. This frame is also associated with the frames of ‘Complexity’ and ‘Time consumption’, as can be seen from the following statements:

“The PFSS is a negative interference in carrying out clinical activities, dehumanizing the one-on-one relationship between patient and doctor” (F_P_Letter2).

“The fact that we spend more time in front of the computer impedes us from interacting more with the patients” (E_P_I4).

b) Perceived Benefits

Due to the fact that the PFSS is truly institutionalized in Hospital B, there seems to exist, within the users, a clearer and more encompassing view of the benefits that the system has brought, principally in terms of the patients and the professional workers themselves. In terms of other more objective benefits of the system, the professional workers did not show any knowledge. More specifically, this refers to the management

bodies being able to receive reports covering the impact on reduced waiting times or the number and value of tests requested for patients.

From the perceived benefits, those that were more often referred to by the users were: Attendance Improvement (74), Patient Benefits in General (64), Activity Support (48), Information Accessibility (43), Decision Support (28), Information Security (23), and Reliability of Data (14). The largest part of these perceptions (frames) covering the benefits achieved show a strong link between themselves, influencing one another. For example, a strong relationship seems to exist between the categories of Activity Support, Information Accessibility, Information Security and Reliability of Data, just as there is between the category of Attendance Improvement and Patient Benefits for the patients. In Table 10 all the categories of benefits and their respective description are presented, along with the verbatim text that illustrates the interpretations of the professional workers.

Table 10 List of Perceived Benefits

Perceived benefits	Evidences
<p><u>Attendance Improvement</u></p> <p>This is associated with a general improvement in treatment and service provision resulting from the benefits that the professional workers receive. It encompasses the benefits associated with the professionals due to automation (legibility and transparency of information), information security, responsibility, work organization and its impact of the relationship with patients and on their treatment.</p> <p>Sources: 30 References:74</p>	<p>“I am in favour because (...) the communication between doctors has become clearer” (P_P_I11)</p> <p>“the PFSS ... helps makes our life a little easier and avoids some of the communication errors, namely when handwriting is not very legible” (E_N_I22)</p> <p>“I think that now I am more secure in my work, because I get there and I know what there is. I will not forget anything, (...) I think I feel more secure with this system” (A_N_I13)</p> <p>“Even though it is slow, it allows us to save time in terms of having to go and talk to someone about the patient” (E_P_I4)</p> <p>“And it is all recorded and there are no gaps! (...) nobody can say: ‘It was not me that did this, I do not assume responsibility for this!’ because the name is there (...)” (G_N_I6)</p>

List of Perceived Benefits (continued)

<p><u>Patient benefits</u></p> <p>This frame includes the following perceptions associated to the IS: Better Clinical Decisions, Error Reduction, Patient Security (location, time savings)</p> <p>Sources:12 References:64</p>	<p>“The patient wins with more time, wins with better monitoring, wins with the quality of the service provided, wins with continuity, because all the information relating to the patient is available on the screen.” (T_P_I12)</p> <p>“sometimes, (...) we do not understand very well the writing of the doctors. Now there is less possibility of making a mistake” (A_A_I4)</p> <p>The advantage that it has for me, is that all my patients are registered and I can go back to previous records, quickly and easily” (MC_P_I9)</p> <p>“if we would want to know where a patient is, (...) it is very easy (FL_P_I13).</p>
<p><u>Activity Support</u></p> <p>Images of the system related to the positive impact of the system on users’ activities</p> <p>Sources: 23 References:48</p>	<p>“people reach the profile, see what is requested, it is easy” (C_A_E1)</p> <p>“it makes our work a lot easier. To know where the patient is located” (J_A_I3)</p> <p>“it facilitates our work, saves us time, records kept are more reliable and I think that there is less information lost and I think that this helps everybody” (A_N_I13)</p> <p>“I think that for the clinical activities it is very important” (E_P_I4)</p> <p>“without the PFSS we would not be able to look back (...) in a certain way it continues to be a great instrument, a work tool” (E_N_I16.1)</p>
<p><u>Information Accessibility</u></p> <p>Represents the way that users perceive the accessibility of information and its impact on patients.</p> <p>Sources: 25 References:43</p>	<p>“ we have access to all the files and we don’t have to do around looking to see where the patient is” (A_A_I4)</p> <p>“Information available at any time, organized, structured, ...I think it contributed to an improvement in care” (A_N_I15)</p> <p>“we can see the background, the medicine that was taken, the doctor that prescribed it, if he was operated on..., that is useful” (E_P_I4)</p> <p>“it allows us (...) access to the patient file from any place in the hospital” (MC_P_I9)</p>
<p><u>Decision Support</u></p> <p>The capacity that the system has to influence decision making.</p> <p>Sources: 22 References:28</p>	<p>“I suppose that they see a management tool and in the short run it constitutes a good instrument for human resources” (A_N_I12)</p> <p>“It is important in terms of management because it supplies a lot of information to the managers” (P_P_I11)</p> <p>“To take decisions based on the information that the system generates” (E_Mg_I1)</p>
<p><u>Information Security</u></p> <p>This frame is associated with the interpretation that information is not lost or susceptible to alteration</p> <p>Sources: 16 References: 23</p>	<p>“It is all recorded, anybody can access it, nobody can erase it, nobody can change it (...) I think that in terms of security it is much better” (S_N_I11)</p> <p>“If I make a record of a procedure, it stays recorded (...) for ever and it is no likelihood of it being deleted” (A_N_I13)</p> <p>“the advantage is that the data is inside, even in five years from now, you can still get it back” (P_P_I2)</p>

List of Perceived Benefits (continued)

<p><u>Reliability of Data</u></p> <p>This frame refers to the credibility and quality that the information should possess. It is associated with the image of reliable information.</p> <p>Sources: 10 References:14</p>	<p>“It is reliable information because (...), it stays recorded (...) who did what, the time that they did it (...) for always (...). I think that there is more truth in the information” (A_N_I13)</p> <p>“we move to having the best information, more reliable” (E_Mg_I1)</p> <p>“if the system was well implemented, it would bring many advantages (...) talking about prescriptions, there are no more problems with illegibility of the handwriting. There are (...) no doubts in relation to what is written” (T_N_I17)</p>
<p><u>Cost reductions</u></p> <p>Represents the images that the users have of the effect that the system generally has over costs.</p> <p>Sources: 7 References:7</p>	<p>“at this point it is not of great benefit because the two systems continue to exist in parallel, but at the level of paper costs, costs with radiography... there we have reduced a lot...” (A_Mg_I2)</p> <p>“with respect to costs, in terms of a real study, there is nothing concrete (...)” (E_Mg_I1)</p>
<p><u>Social Acknowledgment</u></p> <p>Refers to the capability of the system to impact the social acknowledgment of the profession, through the increased visibility of the work.</p> <p>Sources:5 References: 6</p>	<p>“it gives visibility to the work of the nurses... gives visibility to those things that the nurses do” (A_N_I15)</p> <p>“it gives visibility and shows, truly, those things that the professional workers do, because everything is recorded” (G_N_I7)</p> <p>“allows a record of those things that we do, doesn’t it?!” (MC_P_I9)</p> <p>“nursing these days has a much improved visibility, because with the (...) information systems, and in particular the PFSS, you really see the importance of nursing, at the level of out-patient consultations with the nursing consultations.” (A_N_I15)</p> <p>“we need something that would show what it is that the nurses do, because that is our greatest difficulty” (P_N_I20)</p>

5.3.6 Usage

In this research, the usage of IS emerged as a relevant category and a critical point in the context of PFSS implementation. As in hospital A, three levels of usage were found: (1) Correct usage of the system (‘Correct Use’), (2) Partial usage (‘Partial Use’) and a third case designated as (3) ‘Not use’.

Correct use: The correct use is associated with the full and adequate usage of IS. At this level of use, users enter in the "IS" the required and fundamental information in their respective fields.

Looking at the correct use of the system, the following excerpts reflect the way in which some professionals (assistants, doctors and nurses) use the PFSS in their work:

“Yes, we use the system in its totality (vital signs, positioning, everything!) (...), less for therapeutics, because the medical staff do not respond to requests” (I_N_I6).

“For the assistants as a group, (...) there are three or four basic tasks, but all the tasks that the orderlies have to do, they do them well” (A_N_I12).

“I use all the functionality of the system, with respect to my role as an orderly” (J_A_I3).

“I have not written on paper for a year and a half, except to sign things” (MC_P_I9).

“Everything (...) I use everything” (P_P_I2).

From the perspective of the interviewees, the correct use of the application relates to the acknowledgement that usage of the system provides benefits for the patient and the professionals.

“We have to use it for everything. Because they are our nursing records ... there is one or other sheet of paper that we have to fill in outside of the PFSS, but this is to do with the Joint Commission (...)” (V_N_I21.1).

“the people who worry about really filling out the records with correct information are those that understand that later on they will benefit from the input they have made” (A_Mg_I2).

“I am a little disorganized, and this taught me to organize myself better and I worry more about the record keeping as well (...)” (MC_P_I9).

“At the time of an emergency, I think that it is vital and because of this for clinical activities it is very important” (E_P_I4).

It is interesting to observe that the perception of benefits that are associated to the system (legibility, responsibility, reliability, information security, time savings for the patient and healthcare professionals as well as, professional security) for some users, mostly nurses, influences their commitment to the IS, encouraging an appropriate use.

“I think that now I cannot go back to paper, [because]: I think it helps our work, it saves time, the records are more reliable, and I think that there is less information lost and this benefits everybody. It benefits the patient principally, and above all, we benefit ourselves, that probably are less stressed in what we do.” (A_N_I13).

“I think it brings all the benefits for us, it helps a lot in our work. (...) For us it is so much easier to locate the patients’ data, or find out how he is doing” (J_A_I3).

“But I think it has been very beneficial ... in various ways; First, because I think it saves us time” (A_N_I13).

Partial Use: Some users admit to using the IS only partially:

“I end up just using two or three things and the rest is there, but people don’t use it” (MC_P_I9).

“I use it for consultations, in the ER, but in the in-patient services I use just half of it, because it is only half operational” (P_P_I2).

“I just use a bit. In the Out-patient department, I request the tests that I can and the imaging exams. The rest I use a manual process” (G_P_I5).

Not Use: Some of the following excerpts provide evidence of the refusal to use the system by the medical teams in Medicine and the Operating Rooms.

“The doctors do not comply because it is the service director that decides and he prohibits the use of the PFSS in Medicine” (RC_MT_I2).

“we only enter the nursing records, it is all that exists in PFSS. Nursing records, vital signs – the medical part – zero and the prescriptions – zero.” (V_N_I21.1).

“In the operating rooms, the anaesthetists do not use the application. It is only the nurses that use the application” (RC_MT_I2.1).

The biggest constraints which are behind the partial or not usage of the system are tied to the following aspects:

1) Greater or lesser difficulty in using IT

“I just use a part, There is a lot of the system – maybe it is somewhat through ignorance, and I talk for myself, because I do not know how to retrieve things – that I do not know how to use and benefit from the system” (G_P_I5).

2) The integration into the HC and the lack of involvement and decision making by the Board, leading to users creating the idea that the project could be scrapped:

“if this intervention had not happened (move to the Hospital Centre), I think that the direction would have been different, I think we would be on another level. (...) the fact that the other units did not use the PFSS was a complicating factor (...)” (A_N_I15).

3) The necessity to share the clinical records and formal documents between the four units in different formats (paper and other IS), that, even though they supported the activities of recording and sharing clinical information did not function as true electronic patient record systems, meaning that the professional workers of Hospital B started to duplicate procedures, increasing the feeling of discontent:

“in this phase of the transition with things as they are where there is duplication of papers, it is running the risk that certain situations will arise, sometimes from negligence. Previously, people had a record, a file, and there everything was kept, now we have things that are here in the PFSS and others that are there in the file [on paper]” (G_P_I5).

4) The lack of a strong leadership needed to oblige usage of the system by the different services, or more importantly, the professional groups that refused to use the IS. In this respect, a nurse from the operating rooms affirms: “it is really

necessary that the leaders or Board press them a bit harder to use it. Because, while they can use the paper system, they will use it” (S_N_I11). Other professional, this time a doctor, states: “There is nothing compelling doctors to make records! There is nobody to say: ‘so, you are admitting this patient and have not written anything, not done anything?!’” (MC_P_I9).

This situation aggravates information sharing and the continuity of care, in as much as a patient that has different pathologies will end up not having all his information in the HIS and another health professional that needs access to the information will have to consult various different IS, namely paper, with the related problems of legibility, accessibility and security. A nurse stated:

“Look, if the system was 100% used we would all win! The healthcare professionals and the patient. With 100% working both for the medical part and as well as our own. We cannot work 100% because we are missing the therapeutic part” (I_N_I16).

Even the benefits that management can expect (resulting production indicators) are compromised, as the manager of the hospital explains “At this point, the supplied data [by the PFSS-Data Warehouse management module], in terms of productivity, in terms of production indicators – these are not used” (E_Mg_I1.2).

- 5) The transition from a leadership that was engaged and participative to a management that was distant and authoritarian. For the project manager the relocation of the centre of decision making has a direct impact on the commitment of professional workers to the project and this turned out to be the case during the implementation process, following the integration into the HC.

In reference to his hierarchical superior in the Service Directorate (working in the central unit), one doctor interviewed exemplified the type of communication that exists. “Let’s see how we are going to resolve this.” (...) “It is a decision of the hospital”; “By decision, that is how it is, (...) that is how it is!”

- 6) Another aspect that seems to have influenced the commitment of the users and subsequent partial or complete lack of use of the system is the fact that the administrative directives oblige, in some circumstances, the use of paperwork, as is the case of clinical coding and the accreditation process of the hospital by the Joint Commission, as previously referred to. The executive member as such expresses his preoccupation and indignation:

“In terms of the guidelines (...) in terms of us adopting management measures that try to reduce paper, (...) optimize human resources (...) avoid using up resources in terms of the environment (...) and then we have guidelines that go against all this, isn't it? (...), As such, my doubts are about evaluating and determining the relative future of a system like this” (E_Mg_I1.2).

5.3.7 Commitment

Regarding commitment, the following categories were identified: (1) Commitment Dimensions; (2) Commitment Antecedents, and (3) Project Commitment, as in organization A.

5.3.7.1 *Commitment dimensions*

It was possible to identify the three dimensions of commitment referred to in the literature in the users of Hospital B (Affective, Continuance and Normative Commitment). However, it can be seen that the last two dimensions are found to be poorly represented in the data, contrary to the first, where there were codified 53 references out of 24 interviewees. Five people who contributed proffered declarations that were associated with the Normative Commitment dimension and only one in the category of Continuance Commitment. Given the weak incidence of Continuance Commitment, discussion is presented for only Affective Commitment and Normative Commitment.

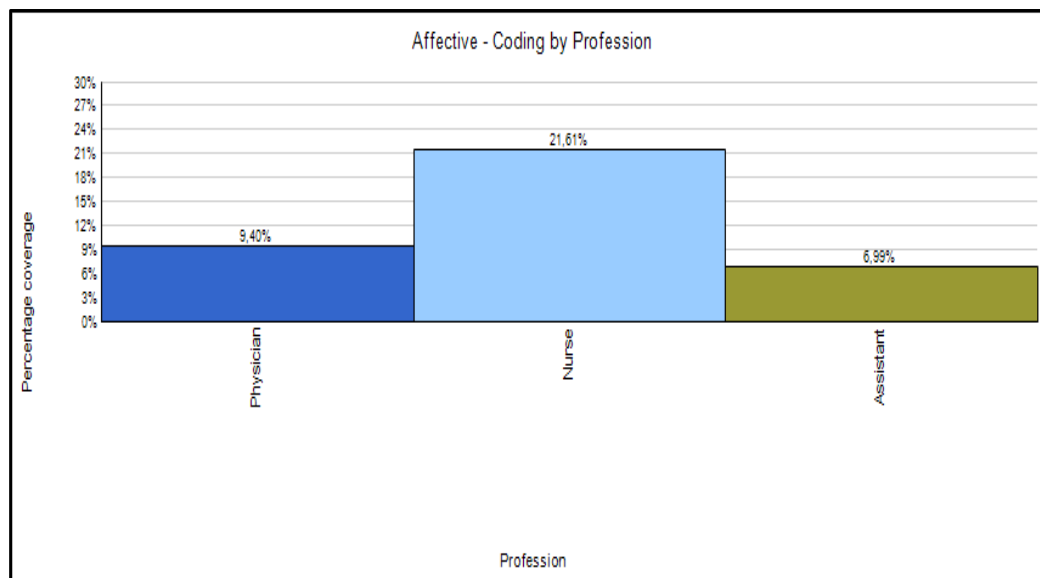
a) Affective Commitment

This dimension of affective commitment was strongly in evidence in this research site, both to the organization and to the PFSS implementation project.

The data related to this dimension were extracted from 24 interviews of which, 13 are from nurses, 8 from doctors and 3 from assistants.

In Figure 18 the difference between the three professional groups can be seen, in terms of the references codified for this category.

Figure 18 Distribution of Affective Commitment by Profession



The history of innovation in Hospital B, an attitude already demonstrated in relation to the various projects that the organization has developed over the years, and a continual search for treatment quality, reflected in the effort for accreditation of the unit by the Joint Commission, seem to be reflected here in this category, even though the organizational climate associated with the integration into the hospital centre was not favourable.

The following excerpts are quite representative of this dimension:

“My link is that of a marriage to the hospital. (...) I work in the hospital exclusively. (...) I am more time in the hospital than with my family” (T_P_I12.1).

“It is an airy hospital, it is a hospital full of light, and it was full of people (...) and with a lot of motivation. (...) We had prizes for the provision of quality, (...)” (T_P_I12).

“I like to be here, I have family here, (...) and I don’t see myself leaving here unless it would be for something better or if I had to” (FL_P_I13.1).

“I am here for 21 years. I adopted this hospital as a home, despite all the alterations that we have had and also I am not from this region (...) the integration into the hospital centre mixed us up a bit, but that was not a reason to demotivate us” (E_N_I16.1).

“We felt that the hospital... was like our own (...)” (A_N_15).

“I like to work in this hospital and I think that we should be enthused by what we have. If someone carries out a task with eagerness then things are going to work a lot better.” (J_A_I3).

Affective commitment influenced many things as for example, the way the nurses embraced the PFSS implementation project.

“Any change that would be implemented, I would embrace it from start to finish” (A_N_I15.1).

“It was an investment on the part of the whole team, of all the hospital” (A_N_I13).

“I am conscious of what changes from one day to the next, and we have to be open to change and follow it up.” (A_N_I15.1).

b) Normative Commitment

This dimension of commitment was noted to be more associated with some head nurses, as can be seen by the statements and can be also associated to the affective commitment of some situations.

“Motivation was necessary on my part, encouragement and presence and a lot of persistence! I thought ‘I cannot take this’ because I was against it in the beginning. But I could not show that side, as head nurse, could I!” (G_N_I7)

“Here in the service, my strategy was one of involvement (the nurses), it was to be with them, it was to accompany them and it was at the time the records were there. To teach them, to tell them how they had to do it” (T_N_I5)

“We felt, as workers of the hospital, that we had to collaborate, isn’t it?” (MC_P_I9)

5.3.7.2 *Commitment Antecedents*

From an analysis of the data, the existence of close and distant antecedents of commitment can be seen. The first is constituted of the experiences linked to work (Work Experiences) and the second includes personal characteristics (Personal Characteristics). In each of these categories aspects are raised that, according to the information collected from the interviewees, most contributed to helping to understand how commitment developed among the professional workers relating to the implementation of the PFSS project.

a) Close Antecedents

Work Experiences: for this antecedent, situations of conflict and role ambiguity, organizational support, autonomy and authority, and the social representation of professional workers, are all included. The relative representation of each group interviewed is shown in Table 11.

Table 11 Relative Representation of Work Experiences' antecedents

Name	Sources	References
Autonomy and Authority	13	28
Conflict and Role ambiguity	7	11
Organizational Support	10	19
Social Representation	7	16

Autonomy and Authority: Autonomy and authority are critical factors linked to the work of professionals (Wallace, 1995) and in the class of professional health workers it is very notable, particularly for the class of doctors. It is associated to the immense power that this professional group holds over the hospital (supported much of the time by their social standing) in terms of autonomy of decision making and compliance with directives, particularly when those directives do not come from their equals.

The introduction of a system that introduces controls on their activity and productivity and increases the responsibility associated with the tasks they carry out created a series of factors that conditioned their commitment to the IS and the way in which it was used, "Because the PFSS obliges an increased organization in the way the work is done, (...) and produces indicators" making the work more visible.

One nurse from the Out-patient department explains why it is that doctors have difficulty in complying with the PFSS, arguing that "the doctors were always used to being the ones saying what had to be done, no (...) receiving information on what they should do or could do (...). We always complied with everything and (...) accepted the information that the (...) managers would try to give us, (...) we always followed... we questioned it sometimes, but without much protest, whereas the doctors, no"(L_N_I8). From what this professional said, this attitude of the doctors represents a form of contesting the introduction of the IS.

As can be seen from the last testimony, IS is associated to the loss of autonomy

and the power which is associated with it. “The fact that they were obliged to write in a predetermined way in a system, where everything is registered,” reduced their commitment, leading only to partial use or a complete boycott of the system.

Still, with the same idea of illustrating the strong sense of autonomy and authority, there follows some comments from various professionals including doctors:

It was always them deciding and coordinating and they would never accept anything you told them really. ‘Now you will start doing this’. They are able to say this: ‘Look, this is not good for me and as such, I don’t want it’ (...)” (L_N_I8).

“the group of doctors is very difficult to deal with and has a lot of strength, a lot of power and the people are scared of challenging...” (MC_P_I9).

“I have an independent spirit and I do not like to be manipulated” (F_P_I3).

“The nurses are completely gagged and stripped of autonomy by the nursing managers (...) and it is this that they want to do with the doctors” (F_P_I3).

These opinions are well recognized by the project manager, which considers ‘power’ to be the most correct word to explain the reasons for the resistance of some clinicians. “They are scared to lose autonomy, they are scared to lose power, they are scared of being controlled” (R_Mg_I1).

In the medical class, formal authority is recognized between colleagues and is associated to position in one’s career, from which arises the importance of leaders (service directors or clinical directors). This authority in Hospital B was, as well, not very evident from the beginning, as a unit manager explains:

“the clinical director of the time was maybe the person that was most absent from the development of the project, and it was the Managing Director (Head of the Board) that is also a doctor, that took on the role” (E_Mg_I1).

The Conflict and Role Ambiguity: This precursor of commitment is particularly evident in the group of professionals that present less commitment, or even resistance, towards the project of implementing the PFSS.

This role conflict relates to the duality that the professional workers feel between the ‘obligation’ to use the IS to fill out prescriptions and records about the patients and preserving the relationship with the patients and their care. As such, this antecedent is

strongly linked with the interpretation of the system as being prejudicial to the relationship between healthcare professionals and patients (frame ‘Decrease Patient Relationship’). As such, whenever this ambivalence is present, the commitment with the IS and its use is reduced (‘partial use’) or inexistent (‘not use’) (in the cases of greatest resistance).

This antecedent is also associated with the negative characteristics attributed to the system, such as complexity, time consumption and inoperability, which consequently are influenced by the competencies in dealing with the technology. In some professional groups, such as nurses, this conflict exists but is a lot less intense when compared to the group of doctors and is supplanted by the perception of the benefits associated to the correct use of the application.

“(...) we are here to respond to the patient and what is easier for the patient is what is easier for us in our working environment” (FL_P_I13).

“we spend a lot of time recording our activities. This time, sometimes, could be made available for talking to patients” (T_N_I17).

“it is (...) the time that it consumes (...) there is no way to get around it. The solution is for the patient to wait (...). The difficulty is that a person has to write, (...) write with two fingers, isn’t it?!” (P_P_I_11).

“I, really, am a fan of PFSS and become revolted when the system is slow and does not give the response that we want (...), then we have to stop and think and we can’t under any circumstances let the patient be prejudiced because of a system failure, isn’t it?” (E_N_I6).

“(...) sometimes the time is lacking, with this system, to observe and treat the patient!” (F_P_Letter1).

Organizational Support: The organizational support given by the management is referenced here in terms of proximity, the support of the Board relating to the professional workers, a concern for their well-being and motivation, transparency and assertive communication, recognition of the professional work done, etc. This antecedent is habitually seen by the literature as a variable with strong influence on the commitment of workers and here as well it was identified as being important.

This antecedent was the second most referenced in the category of work experiences. Links were identified between this precursor of commitment and the way

in which stakeholders saw the integration process of Hospital B into the HC. Notably the previous Board was quite close and well committed to the projects that involved the hospital, namely the PFSS, as a head nurse of the ER describes: “there was a close-nit relationship between the members of the Board (...) They were open, they listened to us, they were open to change - note that these programs that we have..., we needed, on the part of the Board, involvement, they were the ones that had to create the conditions such that the programs could be implemented” (FQ_N_I1).

With the creation of the HC and the constitution of a new BOD outside the unit, the biggest support that the healthcare professionals felt was given by the unit manager that was part of the previous Board as the nursing director. This element tried to maintain proximity with the workers through frequent visits to the services and giving continuity to the projects, as referred to by two nurses:

“here in the hospital it is normal that the ex-nursing director (...) visits the services (...) and wants to know about the PFSS as well as the progress of the other projects, how they are going, if everything is OK” (A_N_I13).

“I think it is has been maintained (the mobilization of resources for change), given that the member of the Board [previously the director of nursing] now has significant responsibility for all the projects, yes – these projects continue and aside from that they are growing more and more” (E_N_I16.1).

When questioning the executive member about the impasse that occurred in the implementation of the PFSS, particularly in the medicine services, she responded by stating that she could not interfere in the decisions of other members of the Board, namely at the clinical level.

“in the different areas that I can possibly intervene, OK, but the rest I have to respect, otherwise, it would be (...) in some way interference in an unproductive way for the whole chain of middle management (...)” (E_Mg_I1.2).

The role of the line managers also takes on an important role in determining the results obtained from the implementation process, which is more favourable in the case of the nurses than in the one of the doctors. The following excerpts demonstrate the role of involvement played by these nursing managers and what some healthcare

professionals think about the involvement of the hierarchy in the medical class.

“(...) here it was the manager and the PFSS team. Because the manager was always on top of the matter. ‘Hey, come here now, we have to see this, because I think that this is not right and now you have to put it like that!’” (I_N_I6).

“I have a service director that never came here to a meeting with us, not even if it was once a month, or two months, to come and ask if we needed anything” (FL_P_I13.1).

Referring to this distance and lack of involvement by the directors of the medical departments, a head nurse said: “according to my understanding (...) the directors of the department should come more times, should meet with the service members... with the objective of communicating a feeling of union and belonging” (A_N_I15). Another healthcare professional, this time a doctor, referred to the central unit of the HC in the following way: “there is a lack of recognition of the doctors of the Hospital B, we are doing a bad job and we don’t know anything, they don’t recognize our work” (FL_P_I13.1).

Social Representation: The way in which some professionals (e.g. nurses) have been seen over time in relation to other dominant groups of professionals (e.g. doctors), seems to exercise a significant degree of influence over the commitment of the former group to the implementation project. The visibility and security supplied by the IS allows this image to be broken down, sometimes viewed as one of ‘dependence’ or even ‘subservience’ to the medical class, as it makes their activity more evident.

The nursing class carries out interdependent functions and others that are completely autonomous of the medical class and of great impact to health. The possibility of showing these competencies and of being noted as an independent professional class makes nurses exemplary users and committed to IS in general, and this one in particular.

The same is true of the assistants that also had a spectacular compliance, demonstrating enthusiasm throughout the process, independent of the difficulties related to the use of technology and the advanced age of some.

The role carried out by this professional group is often viewed as being of minor importance, as a mere support role for other professionals, as it is that their tasks are based essentially on carrying out tasks related to patient transport, hygiene or errands. The information system permits them to organize their work, gives them visibility in their job and essentially made them feel like they were included in a multidisciplinary team that carries out, as with other professionals, an important role in the process of patient care.

The text from some of the interviews shown below gives some evidence of this relationship between social and professional image and the IS for these two groups:

“The assistants were the professional group that was most compliant. I think that it has to do with the question of visibility, because they, as a team were (...) the least valued, and they realized that ‘we can do it too, we can show that we are able to do it’” (FQ_N_I1.2).

“(...) the self-confidence of the assistants, became different (...) because (...) in the PFSS their tasks had visibility. I think that it was because of this that the assistants are 100% compliant” (R_Mg_I1).

“us as nurses, we joined in most enthusiastically because we saw (...) that the new technologies really helped us and that the PFSS was really a system made for us, to help us, and as such we benefitted with its use and we can only win and each time we get the most benefit out of it”(A_N_I13).

b) Distant Antecedents

The personal characteristics: In the interviews carried out, the interviewees were questioned about what, in their opinion, were the principal causes of a lack of commitment to the system and the difficulties in using the application. The responses essentially pointed to personal characteristics, with most weight on experience and computer usage skills (IT experience, with 30 references from 22 participants) and the social status and power (18 references from 11 individuals). Age was referenced by 6 interviewees as having influence over computer skills, particularly for the group of doctors. Motivation of professionals was also referred to by some interviewees as a conditioning factor on commitment (5 references).

The IT experience, sometimes associated with Age, was pointed out as a

difficulty which exists for the process of PFSS adoption, being more evident in the teams of doctors and assistants (the initial phase). This situation was overcome in some cases by using training and on-site support targeted at the individuals with difficulty.

The firm “(...) offered one month of training for using the keyboard, because the professionals complained that they did not know how to use the keyboard” commented one member of the support team (RC_MT_I2).

The following extracts from interviews clarify the importance of this factor for the adoption and use of the PFSS:

“We are used to working on paper, and we never had to look at a computer, in my case and many others” (J_A_I3).

“with the doctors, I think it is just the physical barrier of the computer” (A_N_I11).

“in the beginning it was very complicated because there doctors that while in front of the patient didn’t even know how to use the keyboard, and that caused a certain complication (...)” (RC_MT_I2).

“For the doctors, resistance could be due to (...) the past (...) for the most of them, in university they never used a computer and they had to start to work with a computer now, at 40 or 50 years old” (R_Mg_I1).

“In the out-patients department, there was a little difficulty initially for those nurses that were a bit older and without computer experience (...) and there was a lot of ... support (...). And afterwards the PFSS team also responded to questions” (G_N_I7).

“I deal very badly with IT systems, I probably reject them” (FL_P_I13).

“The class that adopted it most easily was the nurses (...) Also in terms of age (...) they are much younger and (...) they are more on the ball with it” (S_N_I11).

The Social Status and Power that some individuals have (be it through the job they have or by the class they belong to) is another factor indicated as being relevant in the way that some individuals adapt to technology and adopt it. In this hospital, the behaviour of the medicine service director is a good example of this antecedent in as much as he prohibited his team from using the IS, using his power over his colleagues. It should be noted that this doctor was the only professional that, in the course of this study, pointedly refused to submit to an interview, despite all the effort expended to this end. He alleged that he “would be available to discuss any matter other than the PFSS”.

This antecedent of “social status and power” also shows relationships with the

antecedent of ‘Autonomy and Authority’. There now follows some statements that illustrate this antecedent and its relationships, on behalf of a doctor and two nurses:

“It is about what happened in the past. I think that the doctors always had a large amount of power and a great ability to contradict (...) and now we see! This whole story of waiting lists! It is something shocking, isn’t it? The patients are not operated on; we have a waiting list of three years! Then the doctors themselves, that decide the waiting lists, are operating privately and earning more, to reduce the waiting lists” (MC_P_I9).

“I think that the doctors are more conservative, more resistant... it is also cultural I think... they are a professional group that has a lot of important power and they make use of it, isn’t it? (...)” (T_N_I5).

“The medical class has always been privileged and everybody bows to them, don’t they? It is Doctor Sir... (...) they had a different status ... almost nobody goes up against the medical class, those who do, do it for litigious reasons (G_N_I7).

One of the doctors interviewed argued that “the objective is to control and reduce the image of the power of the doctor (...) ‘take away the spell’ (in the sense of status) that historically has been an attribute of the profession” (F_P_I3).

The motivation is also a factor that influences the commitment of some of the doctors and their willingness to learn as referred to by a head nurse:

“The doctors, some of them don’t want to learn... they say that they don’t understand computers and they don’t want to learn and they don’t want to have anything to do with it” (A_N_I5).

5.3.7.3 *Project Commitment*

The commitment to the project was the subject of 112 references from 33 sources of information as codified by NVivo. In this category can be found two other categories also related to each other in a negative way, as we can see from what follows (Lack of commitment and Top Management Commitment).

This category of ‘Project Commitment’ is basically a grouped category and represents all the evidence showing commitment that the professional workers present related to the project as well as the factors (antecedents or frames technology) that are behind them. The level of commitment to the project is variable between the medical services, between medical specialties and between different professional groups.

Some observations found during the interviews that show the different levels of commitment and the principle driving factors are now shown:

“I think that (...) as regards the IS, people have to evolve with the passage of time. I think that we are at a point when, we should update ourselves and to move on with the times” (J_A_I3).

“From the two professional groups, those that adopted it better were without doubt, the nurses and the assistants. The doctors were a diverse group, as there are doctors that are extremely compliant and fill in all the records and others that have more difficulty.” (A_Mg_I2).

“I try to contribute in some ways so that things work” (E_N_I16.1).

“As regards the commitment to the goals and objectives of the hospital, there is always total availability to collaborate with what is necessary to achieve those goals” (FQ_N_I1.2).

“The PFSS is the information system, as I said, that I use most. And, as it happens, I was one of the people that always collaborated most” (MC_P_I9).

“I was always a supporter and user of the information system” (P_P_I2).

“I am talking about the idea of the hospital being perfectly controlled in all aspects and structured in its IT. In the twenty-first century we can't ask for more” (P_P_I2).

“(...) I think I am the only one against not using the system in the medicine services of the in-patient department. I am the only one; I think out of the others, nobody wants it.” (P_P_I11).

a) Lack of Commitment

In this category all the quoted text from the interviewees was included that indicated any type of less than positive reaction, adverse attitudes or behaviours towards the information system and that could in any way negatively influence the achievement of benefits.

The IS department manager referred to the impact that the refusal to use, or inappropriate use of, the system, by a particular group, has on reaching the expected benefits:

“The most complete records would have to forcibly be those of the doctors, because from there it is waterfall effect, if a doctor makes an entry, a nurse has to make an entry, the assistants have to make an entry – if the doctor doesn't make an entry, it compels the others to not use it (...) as such it depends on the will to use it, they can block up the system” (A_Mg_I2).

The situation described above is extremely relevant when it comes to the act of prescribing therapy and treatment that are independent activities which implies the interactive participation of various professionals in the care process. Besides compromising the continuity of care, not using the IS or an incomplete usage opens a

precedent for the possibility of medical error and the disadvantages associated with the paper clinical records (legibility, risk of loss or adulteration, problems of management of space and increased resources).

The unit manager gives an example of the impact of not using the IS: “imagine the patient is admitted using the PFSS in the ER. The record then goes to a consultation and the patient is admitted to the medicine services. As the doctors of the medicine services do not process these records, the patients wait there and as such the database (data warehouse) is not going to give true data. The information is not credible, and why? Because it is capable of mixing up patients that are admitted with those that have been discharged, do you see?” (E_Mg_I1.2)

In this way, the information no longer becomes credible, that is, it is not reliable and is not capable of being used:

“In the services where there are incoherent doctors, the information is no longer reliable” (A_Mg_I2).

“there are particular professional groups, [doctors] that do not comply, simply they do not want to do it, they don’t want to use it. So this then creates some dissatisfaction and some disorganization (...) in terms of the day to day activities.” (A_N_I15).

“I believe that they fill out the records, but they do not do it in a way that we can work with the information. (...) We have to have our own fields such that we could get the benefit of continuity of care and for taking decisions” (E_Mg_I1.1).

The lack of commitment is particularly attributed to the medical group, in a global way, and especially to the doctors of the in-patient medicine services, as can be seen from the following comments from the project manager and a team member from the on-site PFSS support.

“The impression that I have of medicine [as a medical specialty] is always that of a group that needs constant vigilance. They are people that have a lot of requirements compared to the others. If we look at in-patient medicine, a doctor of in-patient medicine works a lot harder than an orthopaedist [with irony]” (R_Mg_I1).

“(...) The specialty of medicine is undoubtedly the toughest. In the medical services, there is almost zero information in the system (A_Mg_I2).

Some of these doctors clearly admit that they only record partial information in the system, and even in the ER they use only one or two fields where they can write free

text:

“Because we can only work like this. The program is against everything that they taught us at the university in terms of obtaining the patient history and physical examination. It goes against medical tradition, against the basic teachings of medicine” (FL_P_I13).

“I reject the PFSS. I contest its use, but I adapt myself to the system, It is just that I do not always record everything. I don’t fill in all the windows. And when I am obliged to write something, I write what I want and what is not susceptible to being manipulated or used”(F_P_I3).

Some doctors who adopted the system referred to resistant colleagues in the following way:

“Have you heard about our colleagues in medicine? They do not use the PFSS. They may have many reasons, but I think the main one is that they are not used to recording information on a computer (...) and they have a certain reluctance (...)” (MC_P_I9).

“Only now do I need to start writing! This was in the group of those that never wrote and now are obliged to write. For many things, because previously paperwork was a mess and now it starts to be all visible, and you cannot open a file and have nothing written there.!! It is annoying. Then there are those that feed the campaigns, (...). If this is illegal, if it is legal... They are campaigns of two or three that shout a lot and talk...” (P_P_I2).

"Why are not interested because they do not want because it is best to always be against" (P_P_I2).

b) Top Management Commitment

The commitment of top management to the progress of the project exerted a marked influence on the way that the implementation was carried out, firstly in the ER (with a lot of enthusiasm and close contact with the Board) and latterly in the Operating Rooms and In-patient department (with very little commitment), with weak involvement from the Board, in the sense of supporting the implementation and the removal of paper.

As the project manager notes “The leadership has a direct impact. Leadership at the moment is neither direct nor present. It is a leadership that is distant, because they (the leaders) are most of the time in the central unit (...). In the previous case there was a leadership that was physically present, we had the manager present in the hospital every day, we had continual meetings with professionals of the hospital. Now it is different. There is no hands-on leadership...” (R_Mg_I1.1).

According to this leader the process should have already been completed, “it reached an impasse because there was a change in management and all the support that existed with the previous management was not carried over the present management” (R_Mg_I1).

In this process, the role of the clinical management was crucial, but the current clinical director, in the opinion of a doctor from the medicine service, “does not like the PFSS”.

This lack of commitment on the part of top management was often referred to by diverse groups of users. Also the manager responsible for the unit admitted that while being part of the Board, saw her power weakened when compared to the other members when it came to defending the continuity and development of the project. The following comments are illustrative:

There is no one who overtly assumes responsibility for the paper-free project (...) in internal terms, at this moment the management of the project has some flaws” (E_Mg_I1).

“it is very difficult to take decisions trying to defend software when it is not something which runs across the hospital centre” (E_Mg_I1.2).

“it is evident that if this goes to the general council I will maintain my position (...) I defend it. Now I am almost certain that those who do not defend it think that it (...) is not of any interest, that the PFSS is like any other system (...) now I cannot see any system being any better than this one” (E_Mg_I1.2).

“I am absolutely sure that the impasse that occurred in advancing with and improving on the PFSS has to do with the integration into the hospital centre.” (P_P_I2).

“[The HC does not want the PFSS] (...) and, logically, there is no Board here, we have a member that does what he has to do (...) If it (...) if it was not part of the Operational Programme for Health - Health XXI (...) it would already have disappeared.” (P_P_I2).

5.3.8 Discussion of the Case

The objective of this chapter is to present in a summary form the probable causes or factors that influenced, in an interpretivist perspective, the implementation of a clinical information system and its development, with particular reference to the commitment of the users in relation to the application and their impact on the use and reach of the benefits.

TF were identified related to the perception that the users have of the IS (Significance, Perceptions and Attitude), the impact on their daily activity and the way that the implementation process was conducted. Based on this, it was possible to join together the frames of the healthcare professionals into three large interdependent domains (Technology-in-use, Impact and Implementation). Different dimensions and antecedents of commitment relating to the project were also found for the different professionals that act in the sense of reinforcing or reducing the commitment to the project, revealing the fact that some of these relationships are susceptible to enhancing or reducing the commitment, interfering with the desired results (benefits).

Of the frames that were identified, the negative perceptions relating to the functionality of the system are highlighted (complexity, time-consumption and inoperability) as having significant impact on commitment to the project and in the use of the application due to its influence on the antecedent of 'Conflict and Role Ambiguity', which favours the image of the system as prejudicial to the relationship with the patients.

It became obvious here the importance that the frames 'Protection' and 'Control' exert over commitment, acting in an opposite direction, the first driving commitment and correct use of the system and the second reducing the commitment and relegating the users to a partial use of the system and sometimes to not using the system at all.

The correct use of the information system is of critical importance for achieving the expected benefits from the system, particularly in the overriding objective of hospital organizations, that of benefitting the patient. Throughout this description numerous statements and opinions from healthcare professionals and managers were presented that provide evidence of the consequences of a poor usage or incorrect usage of the application in terms of information credibility, and its capacity to assist the patient in terms of a decision support tool.

With reference to the dimensions of commitment and their antecedents, the marked influence of the affective component of commitment from the professional workers was evident, helping to beat the challenges of change (notably in the Assistants and nursing groups) as well as the impact that the antecedent of ‘organizational support’ had during the implementation process, always accompanying the doubt that the project would be continued.

When it came to implementation, sufficient support and communication measures were missing, that could contribute to minimizing uncertainty linked to the continuity of the project and would propel the use of the system for a particular professional group. According to the perceptions of various professional workers, the project was not completely abandoned because it was a project co-financed by the European Union.

Even though the executive member manifestly supported the project, her actions turned out to be ineffective faced with a professional group that held so much power, and that seemed to be supported by the lack of interest by the Clinical Director, who, in the view of that manager should take control of the process.

For the category of the close antecedents of commitment (work experiences) another factor arose, designated ‘social representation’, that revealed itself as being of great importance for commitment and the relationship between the users of the project and its implementation. This antecedent was also referenced in the other case, but was less evident.

The antecedent of ‘social representation’ that sometimes appears associated with the frame of ‘protection’, works by driving the commitment with the project and the correct use of the system, in as much as it uses the visibility supplied by the system to promote the profession, making its role in hospital organization and society clearer. This antecedent was found predominantly in the nursing and operational assistant class.

In an opposite way, and predominantly for the class of doctors, the antecedents 'autonomy and authority' and 'social status and power' were present.

What has just been revealed here is the fact that, in a certain way, the nurses and assistants adopted the IS with great ease, seeing it as a work instrument which facilitated their activities, having shown themselves to be completely committed. This also results from the role that the nursing managers have in their teams (that also includes the operational assistants), as was seen in various statements supplied by the interviewees. Meanwhile, the doctors showed different levels of compliance, and were always seen as more resistant. Also, some doctors here stated that there existed a lack of support by their hierarchical superiors.

The type of use (Correct use) influenced the perception of benefits achieved, and this perception acts to reinforce the commitment towards the project as well as, the correct use of the IS. In the act of healthcare provision where the roles of professionals, especially doctors and nurses, are to a large extent interdependent, the lack of commitment of one of the parts of the project leading a lack of use or partial use of the IS, can seriously compromise the achievement of expected benefits. This is particularly visible for the benefits related to the patient. All the relationships that are considered to be most relevant and were detailed up to now are presented in Figure 19. In Appendix F all the relationships identified between the various categories are presented.

This case shows, in a marked way, the effect that internal organizational context, and particularly the alteration of organizational structure resulting from a process of integration, can have on the successful conclusion of the implementation of a software project. The integration into a hospital centre the distance and lack of commitment shown by the new management team were always present, and were reflected in the refusal to use the IS by two services of the in-patient department, compromising the reach of a number of benefits associated with the system use, namely, accessibility and

The diagram illustrates a conceptual model with the following components and relationships:

- Central Node:** Project Commitment (light blue oval).
- Factors Influencing Project Commitment (orange ovals):**
 - IT Experience (Influences)
 - Organizational climate (Influences)
 - Protection (Influences)
 - Top Manag commit (Influences)
 - Affective (Increases)
 - Social representation (Influences)
 - Management support (Influences)
 - Organizational Support (Increases)
 - Integration (Affects)
 - Activity Support (Increases)
 - Training (Influences)
- Outcomes of Project Commitment (light blue ovals):**
 - Correct Use (Leads)
 - Perceived benefits (Leads)
- Factors Influencing Partial use (light blue oval):**
 - Lack commitment (Associated)
 - Unsuitability (Associated)
 - Social Status & power (Associated)
 - Time consumption (Influences)
 - Decrease in Patients relations (Associated)
 - Complexity (Influences)
 - Conflict & role ambiguity (Contributes)
 - Inoperability (Associated)
 - Control (Associated)
 - Autonomy_authority (Associated)
- Outcomes of Partial use (light blue ovals):**
 - Reliability of Data (Affects)
 - Information Security (Affects)
- Intermediate Relationships (orange diamonds):**
 - Correct Use leads to Perceived benefits.
 - Perceived benefits leads to Partial use.
 - Partial use affects Reliability of Data and Information Security.

Chapter VI Case Study Analysis – The Research Contribution

6.1 Introduction

The purpose of this chapter is to examine how the relationships found between the identified themes and categories in the case studies establish a thread that allows us to understand the most influential factors in the development of commitment to the project and address the research questions posed at beginning.

This chapter discusses and interprets the data collected in the case studies using a phenomenological and interpretive approach. Comparisons between the two cases are made, and offer research contributions that emerge from the case studies and literature.

All elements proposed here are founded on the case studies carried out.

6.2 General Description

The analysis of the two cases provides similar patterns, with respect to the themes found, as well as the respective categories. In the two cases the same domains were found in the TF of healthcare professionals, in their commitment to the project and in the way they utilize the software.

The principal differences related to the impact that the organizational context, particularly the organizational structure and organizational climate, had on commitment to the project. Another difference verified was that of the commitment of top management to the project. These differences were connected principally to the shift in leadership of Hospital B, which lost its identity and autonomy as a result of being integrated into a Hospital Centre with another three hospitals. Whereas in Hospital A the management team (members of the Board) continued unchanged since adoption of the PFSS, and remained in close contact with professionals, providing a supportive

leadership as well as, the necessary encouragement to progress implementation, in Hospital B, the members of the Board that were involved in the acquisition and implementation of the application changed during the course of integration, reducing their support for the implementation of the PFSS project.

So, whereas the implementation in Hospital A follows what can be termed a 'normal' course, the implementation in Hospital B passed through two phases: one phase marked by a receptive environment, with supportive management in close contact; and a second phase characterised by an ambiguous and unstable environment, without sufficient support from the new management team necessary to advance with the project and overcome existing issues (as verified by resistance in the two services of medicine, which refuse to use the IS). The committed professionals in Hospital B manifested their distrust, revolt and insecurity concerning the project continuity on many occasions, while the people most resistant to the project were satisfied and saw their position strengthened for continued use of paper as information support.

Concomitantly, as a result of integration, the previous service directors of Hospital B lost their management position, moving to a secondary tier in the service management hierarchy, constituting a loss of power. However this aspect (loss of power) referenced in literature by many authors (Lapointe and Rivard, 2005; Dhillon, 2004; Markus, 1983) was not verified at least in a manifest way. On the contrary, it was found some professionals who have lost their initial management position very committed with project.

The impact of organizational context occurred more in the sense of increase demotivation, feelings of abandon, loss of autonomy and identity as autonomous organization. While the organizational climate and changes of organizational structure in Hospital B acted to reduce the commitment to the project, in Hospital A the calm climate and continual change (alongside the existence of many other innovation

projects) and the fact that the management team were well accepted, contributed to an increase in the commitment of users. However, in the two organizations phenomena were found expressing a lack of commitment and even active resistance to the system that propagated a partial use of the system, with consequent impacts for the system benefits, specifically relating to the patients.

Also in the two cases similar interpretations and understandings of technology (frames) and related actions were found. Next the two organizations are compared with respect to the particular TF related to implementation, system impact, categories of commitment, and level of use (usage), linking the data analysed and research questions.

6.3 Discussion of Case Studies and Contributions

Here, each category is analysed comparing the two case studies with the existent theory. The purpose here is to provide answers to the research questions and the formulation of a framework that provides a useful contribution to academic knowledge and a starting point for future research and practice by management.

6.3.1 Usage

In the literature related to HIS, the success of implementing IS/IT has been studied with relation to the intention that users have to adopt and comply with the system, being formally addressed by the Technology Acceptance Model (Venkatesh *et al.*, 2003; Venkatesh and Davis, 2000; Davis *et al.*, 1989) and more recently in an attempt to understand why physicians resist implementation of HIT applications (Bhattacharjee and Hikmet, 2007, 2008; Lapointe and Rivard, 2005). The intention to use IS/IT is seen as being associated with such factors as ‘perceived usefulness’ and ‘ease of use’ (Bhattacharjee and Hikmet, 2007, 2008).

In this study, the usage level of IS/IT emerged as a relevant category and a critical point of consideration within the context of a HIS implementation, and is analysed as a direct or indirect consequence of commitment to a project and its resulting relevant role in benefits achievement.

In this research, partial use of the system ('partial use' category) consists of an incomplete use of the application's functions, or the record fields which cannot be treated statistically.

In the perspective used to examine data, the correct use ('Correct use') of the system consists of using of all fields of the IS application to introduce all pertinent information about the patient, as well as the prescription order, that is, to introduce all necessary information so that it can be reliable, shared for the continuity of care, and analysed to produce management indicators.

Analysis of information collected at the two research sites from the two professional groups with the highest weighting in terms of computer application usage (doctors and nurses), stressed the importance of a correct usage of HIS in achieving the desired benefits. In fact, without an appropriate and correct use of the HIS, particularly those with features of CPOE and EMR the scope of benefits can be significantly reduced. To produce all expected benefits, principally those related to the patients, it is important that the information introduced in the system is reliable, is of good quality and can be shared with all stakeholders in the care process. To this end, it must be registered in the respective fields and at appropriate times.

To demonstrate the significance of the 'Correct use' of an electronic medical application, consider the following example: if doctors introduce all patient information into a single field, and subsequently prescribe medication in the same field, a risk exists that other professionals responsible for the administration of the therapy will not have access to the required information and the patient will simply not be treated because

treatment was not prescribed in the right field (prescription). This brief example demonstrates that the way people use any HIS with the characteristics of an Electronic Medical Record (EMR) is not without risks for the patient and potentially reduces the available information to management. If alternatively, the healthcare professional is from the out-patient department, and uses paper to take down patient records, while entering only the diagnosis or other limited information into the IS, information has become dispersed, unsafe and difficult to access. This may adversely affect the continuity of care by other professionals involved in the process because the information on paper is difficult to read, more subject to errors of transcription and interpretation.

These aspects associated with use of application had similarities in the two research sites, particularly linked to electronic prescriptions.

So, based on the findings of the two cases, we can say that there is a connection between a correct use ('Correct use') of a HIS and benefits as they are perceived by users.

6.3.2 Technology-in-Use

Orlikowski and Gash (1994, p.184) identified three domains of TF in the participants of their study, (that included users, managers and technologists): (1) Nature of Technology - refers to people's images of the technology and their understanding of its capabilities and functionality, (2) Technology Strategy - refers to people's views of why their organization acquired and implemented the technology. It includes their understanding of the motivation or vision behind the adoption decision and its likely value to the organization, (3) Technology-in-Use - refers to people's understanding of how the technology will be used on a day-to-day basis and the likely or actual conditions and consequences associated with such use.

In this research the third domain (Technology-in-Use) was adopted, but characteristics of the “Nature of Technology” are also evident, existing to characterize the perceptions that people have about IT, its attributes, capabilities and functionality; the understanding that people have of how technology is used in their day-to-day activities and its meaning from the point of view of whoever implements it.

In the Technology-in-Use domain three categories were found: System Significance IS Perceptions and Attitude. Only those categories that showed greater impact on commitment to the IS and consequently, in the answer to research questions, will be discussed.

System Significance

As regards the significance given to the system in the two hospitals, two types of interpretation of technology have been identified which impact the user's commitment (by influencing some of the precursors of commitment, as later mentioned), as well as in the manner they use the application: the perception of the system as a factor that protects and promotes work activity (e.g. ‘Protection’) and the perception of technology as a menacing instrument (e.g. ‘Control’ and ‘Liability’).

While the perception that professionals have that the IS system provides a protective mechanism for their job (‘Protection’) seems to be a great enabler of commitment and a strong incentive to the appropriate use of the system, therefore contributing to the rapid achievement of benefits, the other two frames (‘Control’ and ‘Liability’) act to reduce commitment. The fear of being controlled, or that the use of the IS can bring future adverse consequences, prevents the use of the system whenever possible or, at least promotes a minimal introduction of information, contrary to what occurs for the ‘Protection’ frame. Therefore, the perception of control or liability associated with the system reduces the likelihood of achieving the benefits.

It was interesting to observe that in the two hospitals, the frame 'protection', was found in to be more prevalent in the nurses and assistants groups, while the other two groups are more closely associated with medical professionals who are essentially against the system or little committed to the project.

IS perceptions

This frame reflects the images that users associate with the system (IS perceptions). Although images were found associated with the IS as being "useful", in Hospital B and "easy to use" in the two hospitals, most of them were of negative character, such as inoperability, complexity, unsuitability, and time consumption. These perceptions associated with the HIS have been reported in the literature, in the sense of usefulness or ease to use being factors influencing the resistance of physicians, particularly those associated with time wasting (Poon et al., 2004; Slack, 2001). However, these perceptions were neither treated in the literature as TF nor have they been studied for their capacity to influence commitment to a project and benefits achievement.

The above referenced perceptions are interrelated and influence the level of commitment to the system and its use, being the subject of a large number of contributions made by the respondents of the two organizations. Although they are frames related to the technological features, they are important because they also contribute to the appearance of another frame related to system impact, that of 'workload'. The perception that some users have that the IS increases workload limits use and exploration of the system.

The above referenced images associated with IS are also associated with a close antecedent of commitment (conflict and role ambiguity), which links the IS to a reduction or deterioration in the relationship with patients. As such, those perceptions of

the system are highly influential in reducing the commitment to the project and can lead to a partial use of the system.

Time Consumption

The frame 'time consumption' negatively influences the commitment in that it leads to the system as being interpreted as detrimental to the relationship with patients and increases the role conflict and ambiguity.

Time is highly valued by physicians, such that life itself can be at stake when it comes to providing emergency care, and in this case they do not want to occupy their time complying with the system when it is hampering their primary function of patient caring.

The data show that the 'time' used to create records and in the analysis of patient information, seems to be an important factor in the clinicians work and, as such this frame (time consumption) and the others before referenced (complexity, inoperability) influences their level of commitment to use and the compliance with the technology.

Unsuitability

This frame refers to the perceptions that the professionals have about the suitability of the IS to their professional practice. For some professionals, with higher prevalence in the medical profession, the system "has little correlation with what they use on a daily basis" and believe that it does not respect their usual way of assessing the patients until they reach a diagnosis (the structure of medical thinking). This perception was often referred to by specialists of in-patient medicine (the medical group that presented more resistance in the sites researched).

6.3.3 Implementation

This core domain of TFR is a wide domain considering the content that it includes. Here, this domain refers to the evaluation of the whole implementation process by users, including categories such as: Motivation for IS adoption, System objectives and Process. This last category (Process) is equivalent in significance to what Orlikowski and Gash (1991) called ‘Issues around implementation’. Included in the category of ‘process’ here are aspects of: phases of project, communication, customization, involvement, issues of implementation, training and management support, which corresponding to their domain (‘Issues around implementation’).

Other authors use similar domains to gather the perceptions of stakeholders about implementation, as in for example, “images of implementation” (Lin and Cornford, 2000); “understanding of the project” (Lin and Silva, 2005) and “Technology Strategy” (Orlikowski and Gash, 1994). In this frame domain we analysed the perceptions of users concerning the implementation process in the two organizations which help us to understand the knowledge, perceptions, that healthcare professionals have about how IT was introduced in organization. Only the more significant categories which represent users’ frames are discussed.

Management Support and Training

The users’ vision of implementation is formed largely by the training given on the system and the support provided by management (management support) and was found to be relevant in the two implementation processes, influencing directly or indirectly the level of commitment and the use of the IS.

It was evident in the two cases that management support is seen as an important factor in maintaining commitment. In Hospital A, some incongruence was verified between users’ frames and frames of the WG elements. For the latter, the support of the

Board has been exemplary and a facilitator, either in terms of support, or in terms of resource allocation and involvement of the professionals through meetings. For the former, this support was insufficient, particularly because they felt that they were not involved, except the nurses who relied on the involvement of the nurse director. However, in Hospital B, the users mentioned that the management support for the system has changed during implementation with the integration in the HC. They have seen a continuous decrease of administration support. In the two hospitals the form of management support most valued was the presence of the PFSS monitoring team, which proved to be crucial to overcome the initial difficulties in using the system, as an assistant explains: "They spent about two years with us every day, (...) so you do not felt a great degree of difficulty".

Such monitoring is an indirect support of management. It increased the skills of users and has given more confidence and promoted the professionals commitment to the project and consequently its use. This monitoring role of PFSS team proved to be extremely important for professionals of Hospitals A and B.

In the two cases, commitment and support of management, particularly of the clinical member of the BOD was pointed out by the on-site MT (as technologists) and some members of WG as a critical point to contribute to a faster and more comprehensive implementation of the system. In the hospital B this support was almost inexistent. The results obtained from data analysis allow conclusions to be drawn regarding the relevance that management support has in the maintaining the professionals involved and committed towards a course of action with relevance to an entity, as it is the implementation of an IS.

The findings here are consistent with those of Lau and Herbert (2001) which revealed that the need to have organizational commitment and training/resource support were the two most cited lessons learned over the years from implementing projects (Lau

and Herbert, 2001). As they stated, “organizational commitment is needed to provide the leadership, resources and support necessary to implement the systems” (2001, p. 22).

Customization

Research in the area of HIS points to the customization of the system to fit physician’s workflow as a strategy to overcome resistance (Poon *et al.*, 2004).

The adaptation of the system to the specificities of each site and to professional work is a factor referenced by participants of the two sites as a positive aspect, although this was more evident in Hospital B where the professionals participated actively in software development. This involvement facilitated the increase in professionals’ commitment to a project, which they see as their own product. This affective commitment was reduced in a certain way after the integration, due to fear that the project could be abandoned by the Administration Team.

Despite the positive opinion regarding the customization process, some professionals considered that it increases the complexity of application.

Communication

According to various authors an effective communication approach towards stakeholders has been identified as a significant factor in increasing their collaboration and reducing resistance to change (McGrath, 2002; Akkermans and Van Helden, 2002; Sumner, 2000). The way the investment objectives and the extent with which organizational vision are communicated, can also influence the planning and execution of IS/IT implementations, as well as the management of organizational change inherent to IS/IT (Markus *et al.*, 2000; Swanson and Ramiller, 1997). As a consequence, a lack

of an effective communication approach can reduce the commitment to the project and compromise the achievement of benefits from IS/IT implementation.

In the two sites studied, the communication of the objectives of the IS and its organizational importance were revealed as being of extreme significance in strengthening the commitment to the project, insofar as it allows greater identification with the organizational goals and objectives. This frame was referenced by the professionals of two hospitals. For professionals of Hospital B there were no communication problems at the start of implementation. But after the integration in HC the communication decreased and was related to the silence of the administration regarding the continuity of the project and support of it.

In Hospital A, was found incongruence between users' frames and frames of members of WG, in respect to objectives communication. Poor communication not only allows the spread of misleading images regarding the motivation behind the purchase of information system, but can also put into question the involvement and commitment of the Board in adopting the system as occurred in Hospital A.

"The communication should start at management level, so they can share and engage the rest of the team they manage, "(...) I often feel (...), both here and in other hospitals that this is not done (...)", said a member of MT of hospital A.

Evaluation

This frame allowed the identification of perceptions users developed from evaluating the implementation process, how professionals were involved, as well as understanding their future expectations related to IS and obtaining lessons for the future.

The results of implementation were inconclusive at the two sites at the time that the field work was completed. In organization B the system is seen as useful and constitutes a productive work tool for the nurses and assistants, but many doctors only

partially use the IS and in the two medicine services it is not used at all. In the Hospital A, the implementation is still running; as of July 2011 it was not finished, in particular the operating room and in-patient services were not completed. There are also many gaps with regard to electronic prescriptions.

However we observed that the overall perceptions of users about methodology followed in the implementation were positive.

6.3.4 Impact of System

As in the same category presented by Orlikowski and Gash (1991), this domain has the components, related to ‘individuals effects’, ‘task level effects’ and ‘organization effects’, although these last were more limited in this study. Effects on structure, culture and strategy as well as on costs for example, were not expressed or interpreted from observations and participants’ affirmations, due to the IS in Hospital B being primarily used for clinical support and, in Hospital A, the implementation was not finished at the end of empirical work.

This domain of TF in the two hospitals includes negative and positive perceptions about the consequences of the system. The negative frames (*disbenefits*) were: (1) the decrease in quality of the relationship between professionals and patients, (2) the decline in the relationship between healthcare professionals, and (3) the increase of the workload. This last interpretation of the system was found only in Hospital A. However, it is the opinion expressed here that, those that have more impact in commitment with the IS are the first and last listed. The positive perceptions of the consequences of the system were denoted as perceived benefits.

Perceived benefits

As has been shown in the beginning, some studies demonstrated the importance of organizational commitment in realizing IT benefits in organizations (Shum *et al.*, 2008; Swailes, 2004; Benjamin and Levinson, 1993).

The benefits that can result from implementation of HIS/HIT are reported in the literature by many authors who pointed out the benefits as: improvement of patient safety and organizational efficiency (Bhattacharjee and Hikmet, 2008; Davidson and Chismar, 2007) or effects on the healthcare professionals' performance (Bhattacharjee *et al.*, 2007; Menachemi and Brooks, 2006).

Most of the benefits resulting from the use of HIT/HIS are shown by the literature as having been related with: (1) quality of care (Leapfrog, 2006; Dexter *et al.*, 2004); (2) effect on efficiency (Wong *et al.*, 2003); (3) reduction on costs (Caldeira *et al.*, 2010; Menachemi and Brooks, 2006).

In the two organizations studied, all benefits referenced above were in some way perceived by users. However they were more recognizable and identifiable by professionals in Organization B, where the use of the system was institutionalized for some years.

The benefits most valued by users of the three professional groups that seem to have impact on their commitment to the project implementation were: increased safety, reliability and accessibility to information, because "(...) everything is recorded in legible writing, the information is accessible, reliable and archived (...). Processes are not lost, they do not disappear".

Note that the frames related to the benefits (Perceived Benefits), especially the frames of safety, reliability and accessibility of information, legibility of the records and activity support are shared between users, managers and implementers (congruence between frames).

Other benefits were also referred to by many users as well as by administrators and members of WG. They are: decision support, patient benefits, activity support, and attendance improvement.

Decision Support

This benefit is mostly noted by managers, either at the top or operational level: "The major benefit of PFSS (...) is that it gives us really valuable information, (...) that allows us to make decisions (...)".

The decision support was also observed in clinical terms particularly with regard to diagnosis and treatment of patients, providing to healthcare professionals a greater security in their decision making and consequently better patient care.

Activity Support

Slack (2001) stated that providers will use computer based IS and HIS if they see reasonable benefits to their practice resulting from time savings, increased ease in finding specific patient data, and faster analysis of it.

The view of the system as a work instrument, which helps in daily activities that professionals perform, is seen as a perceived usefulness of the system in light of the technology acceptance model (Venkatesh *et al.*, 2003) and a factor that influences intention of use.

A good proportion of users in the two hospitals, particularly nurses and assistants see the system as a useful working tool in their activity, showing their interpretations in many varied forms.

Here, this frame represents more than just a benefit to the professionals through the correct use of the system. It also represents benefits to other stakeholders (given the possibility of sharing information), for the organization, that has more reliable

information, and especially for the patient who benefits from the work done by the healthcare provider.

Patient Benefits

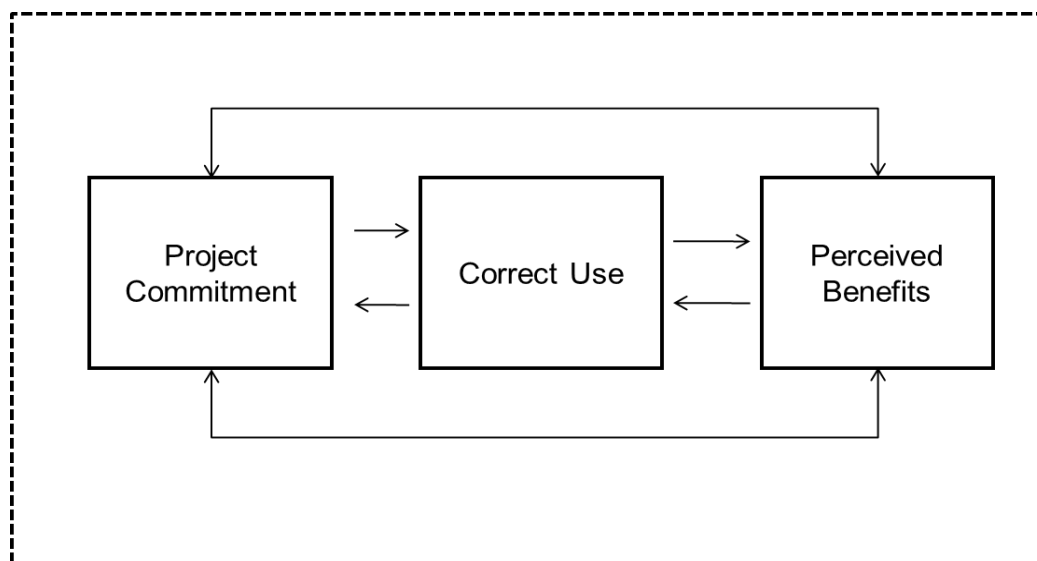
The major concern of healthcare professionals is the patients, their well-being, the attainment of a diagnosis and effective treatment, in essence, the provision of quality care, which is in line with the mission of the organization.

The resulting benefits of the PFSS to patients were recognized by professionals particularly by those who are supporters of the information system.

As we have seen, the perceived benefits influence, and are influenced by, the commitment. Note that these benefits are associated with a greater safety in the activities undertaken, improvement of medical decisions and improvement in the delivery of care, promoting the feeling of safety both for the patient and the professional who wants to feel supported and protected. All these perceptions of benefits were collated within the frame 'Attendance Improvement'.

The perception of benefits related to the use of the system is itself a great stimulus to commitment to the project that in turn acts to increase the correct usage of system. Therefore the perceived benefits and a 'Correct use' act reinforcing each other, by the influence of commitment, constituting a virtuous cycle, represented by Figure 20.

Figure 20 Virtuous Cycle of Commitment and Perceived Benefits



6.3.5 Commitment

In this research the definition of commitment stated by Meyer and Herscovitch (2001, p.299) was adopted.

The same dimensions of commitment (affective, normative and continuance) were found to exist, along with the two types of antecedents, (work experiences and personal characteristics). The work experiences and personal characteristics were the antecedents of commitment that emerged with greatest relevance in this investigation, having an important role in the development of commitment and in the use of the IS.

With respect to the dimensions of commitment we found evidence from participants' perspectives, that affective commitment is present in the most professionals (more so in the nurse and assistant groups) in the two hospitals and it represented a strong influence on commitment to the project implementation and use, even in the absence of administration commitment and in an instable and ambiguous environment (as occurred in the hospital B). In this way, this finding is supported by the

theory on commitment (Meyer *et al.*, 2002; Meyer and Herscovitch, 2001; Meyer and Allen, 1991, 1997) relating to commitment dimensions and change initiatives.

Next the most relevance antecedents to commitment are presented, as found in the two case studies along with their relations with TFR.

1) Work Experiences

Meyer and Allen (1991, 1997) argue that commitment develops as a consequence of experiences compatible with the values of employees and/ or satisfaction of their needs. They divided the experiences of work into two categories: comfort and competence related experiences.

From the data analysed these two types of categories were found. Here, the first category includes, ‘organizational support’, ‘conflict and role ambiguity’ and ‘pressure and stress’, while the second category is composed of ‘autonomy and authority’ and another new category, considered to be an antecedent linked to work experiences: the ‘Social representation’ of profession.

The ‘Pressure and Stress’ coupled to the profession was referenced in the hospital A and the ‘Social Representation’ was more manifest in Hospital B.

Organizational Support

The organizational support is considered a variable with a strong positive correlation with affective commitment of employees (Meyer *et al.*, 2002), that is, in the opinion of the authors consistent with the argument that, to have committed employees, organizations must demonstrate their own commitment by providing a supportive work environment.

It is posited here that among the aspects that favour this antecedent are the fair treatment of employees, the creation of a supportive environment and the exercise of strong leadership.

As referred to earlier in this chapter (see section 6.2), and demonstrated within the cases, the existence of a supportive environment (organizational support) and of a strong leadership, have great impact on commitment to the project.

This precursor of commitment was found in the two organizations studied as well as its relation with commitment to a project. The two cases provided different forms of organizational support with different results from the point of view of commitment.

As with conflict and role ambiguity, and autonomy and authority, this antecedent helps us to answer the research question concerning the relationship between commitment and benefits.

Conflict and Role Ambiguity

Conflict and role ambiguity is another very important close antecedent related with work experiences as described in the commitment literature (Meyer *et al.*, 2002; Meyer and Allen, 1991, 1997).

According to Igbaria and Siegel (1992) role ambiguity is the difference between what is expected of an individual at work and what he/she feels he/she should do. Here it was considered as being related to the duality that professionals have between the “obligation” to use the system and the preservation of the relationship with patients and their care. This feeling leads to opposition to the use of the system by users, compromising the performance of healthcare professionals.

Analyses conducted by Meyer *et al.* (2002) for the work experience variables revealed that role ambiguity and role conflict correlated strongly with affective commitment, and this correlation is negative.

The main conflict noticed and manifested by the interviewees is the existing duality between the use of the information system (fulfilment of an obligation) and the preservation of the relationship with patients and their care, which they consider to be their true role, according to their job.

This antecedent was found in the two hospitals in the sense that the professionals (more so in the case of resistant users) mentioned the fact that they feel divided between paying attention to their patients and filing records in the system, an IS which reflects in detail the work performed, by whom, how and when, which some users have difficulties in handling.

In the two organizations this antecedent was associated with negative images of system (complexity, time consumption, and inoperability) and the negative impacts (a decrease in the quality of the relationship with the patient and increased workload). It was also associated with ‘pressure and stress (another antecedent) in Hospital A. So, this antecedent of conflict and role ambiguity is a critical factor in understanding how the TFR and commitment antecedents (precursors of commitment) interact to influence the use of, and therefore the benefits induced by, the system.

Autonomy and Authority

Hospitals have characteristics of professional bureaucracies, where the power resides in knowledge (of a professional nature). Mintzberg (1981) stated that in organizations like professional bureaucracies, the professional groups take their “directions for performance” primarily from their profession rather than their organization.

The autonomy and authority are critical factors related to the work of professionals (Wallace, 1995) particularly so in healthcare professionals (especially doctors). Here there is an association with the great power that this professional group has always held in hospitals (often supported by their social status) in terms of autonomy of their decisions and compliance with directives particularly when guidelines do not come from their peers.

The frame 'autonomy and authority' was found in this research to influence the commitment to the project, and consequently the use of IS, since it highlights the work done by professionals, makes them liable for their clinical decisions, and exposes their skills in working with IS/IT. Therefore it can call into question their power and their image. This antecedent seems to be linked to the other antecedent, of 'status and power' which mutually reinforce each other. In turn, they are also associated with the image of the system as a control mechanism and unfit for purpose, reducing commitment, promoting a boycott, or partial use of system and thus, decreasing the benefits.

This antecedent was present in the two organizations and its impact on commitment with a project was more manifest in hospital B, culminating with the refusal to use the system by a medical team from two services. This resistance phenomenon seems to be related with this antecedent, because it originated with the service director, who obliged his colleagues to not use the system. Whereas in Hospital A the situations of opposition (e.g. from doctors of medicine services) were confronted with a strong leadership from the Board, in Hospital B, the lack of commitment demonstrated by new management contributed to increase the resistance.

The professional autonomy and role assigned to their social and professional status, influences how some doctors see, for example, the work done by nurses in applying the Manchester triage. In the opinion of some nurses of Hospital A, "they do not like to be ordered about!".

2) Personal Characteristics

The demographic characteristics such as age, tenure, sex and education, as well as personal dispositions such as need for realization, affiliation and others have been found to correlate with commitment but their relations are neither strong nor consistent (Meyer *et al.*, 2002; Meyer and Allen, 1991). For example, Meyer *et al.* (2002) consider that correlations involving the work experience variables were generally much stronger than those involving personal characteristics. However, in this research personal characteristics were referenced as having influence on some behaviours related to the lack of commitment.

Among the distant antecedents of commitment, some specific personal characteristics can be identified. It should be noted that in the opinion of those interviewed in the two research sites, the lack of commitment of professionals, i.e., the development of resistance to the information system, seems to be closely related to personal characteristics in general [e.g., motivation and personality] and in particular to: lack of experience and knowledge of dealing with computers; social status and power; and age (often associated with the IT experience).

IT Experience

The difficulty in use HIS/HIT due to its complexity has been reported by the literature as a barrier to implementation. Such systems need time and training for healthcare professionals to adequately learn how to use the new system (Davidson and Chismar, 2007; Jung, 2006; Baus, 2004).

This difficulty of learning and using the system were found in this investigation to sometimes be associated with cultural barriers, and were overcome with training and close monitoring by staff of the supplier's company.

Some interpretations related to the commitment of users with the IS reflect the experience accumulated by some professional groups in the use of IS, as is the case of nurses who have already “become more accustomed to the computer”.

A large part of the participants stated that the appropriate or inappropriate use of the system is due to the perceived difficulty in using the information system, more frequently attributing this difficulty to the group of doctors. The lack of experience with IS/IT augments the perception of difficulty, complexity and consumption of time associated with the system implemented, influencing the commitment to the project. This antecedent is also coupled with the habit of filing patient records using paper over a period of decades.

Age

The age of professionals was also interpreted in the two research sites as a likely reason for the difficulty and lack of commitment to the project, contributing to a partial use of the system. This perception was sometimes associated with seniority in career. Young teams (in which nurses are in greater number) generally find technology easier to use and therefore show a greater acceptance of the system with consequently higher levels of utilization. However, difficulty in using the system was not found to be caused by advanced age. On the contrary, in the two sites many older assistants and nurses after learning to use the application became excellent users.

Social Status and Power versus Social Representation

Despite these two antecedents being associated with different sets of antecedents, as is the case of social representation that pertains in this research to close antecedents, particularly to work experiences, they are treated together because they are considered to be opposite poles.

Social status and power and the social representation that some individuals or groups have either in organization or in society were also recognized by some participants in the two hospitals as an important factor having impact on the commitment to the project and use of the system.

In relation to these two antecedents found in our research, two perspectives were found: on the one hand, a perspective of improving their image of class and social representation of the profession (attributed to the nurses and operational assistants), and on the other hand, an attempt to maintain their importance and status already acquired over many years (attributed to more senior clinicians in age and career). For example, for the medical class, the need to recognize that they have difficulties in handling the system, sometimes in front of the patient, causes constraints, which can jeopardize their social image, according to informants. Yet in some professional groups who have over years had their image associated with a role of dependency on the medical class or whose professional role has not been sufficiently acknowledged by others, the usage of the system is seen as a means to gain relevance through more visibility.

Therefore, while the first perspective (of strengthen social representation) acts positively, reinforcing the commitment and the correct use of the system, the second perspective in some cases reduces the commitment as well as voluntary and appropriate use of the system.

6.3.6 Relationship between TFR, Commitment and Benefits

Up to now the findings obtained in the case studies have been compared with the existing theory. In an attempt to gain more consistency between findings, a summary of their principal relationships is made in this section, with the purpose of providing a useful framework that opens the way to future academic research and provides guidance to practitioners.

Using as a starting point the research questions posed in the beginning, it was found that:

(1) The way the professionals use the system can increase the potential for benefits achievement. For example, a partial use of the system can seriously compromise the achievement of all possible benefits.

(2) Three main domains of TF characterize the perceptions of professionals related with the IS/IT (technology–in-use, impact of system and implementation). Some of the frames identified by participants have close relationships between them and with some antecedents of commitment with a great impact on the use of the system and consequently on its impact for benefits achievement. Here, reference is made to the relationships between negative images of the system as ‘time consumption’, ‘complexity’, ‘inoperability’ and ‘unsuitability’ with ‘workload’ and ‘conflict and role ambiguity’ on one hand, and on the other hand, the relationships between ‘control’ and ‘autonomy and authority’. These relationships revealed a capability to potentiate the lack of commitment and a partial use of system. On the contrary, the frame ‘protection’ acts as a driver to commitment to the project and therefore the correct use of the system, as is the case with the commitment antecedent of ‘social representation’.

(3) The negative frames (or images) of the system impact such as, workload and compromised relationships between professionals and patients originated from images of system and antecedents of commitment above referenced, are associated to a lack of commitment, leading to a partial use, that in turn reduces the perception of benefits.

(4) In the professionals of the two hospitals a set of antecedents of commitment was found with significant influence on commitment to the project. Some of them act in a positive way (e.g. organizational support and social representation), and others act in a negative way (e.g. conflict and role ambiguity, autonomy and authority, pressure and stress). Other antecedents associated with personal characteristics seem to influence

the project commitment either positively or negatively (e.g., Age, IT experience, Social Status and Power, Motivation and Personality).

(5) An intensive program of training, particularly in the work context, facilitates the capacity of professionals to adhere to the training program and learn more quickly how to manage the system. Usually doctors are reluctant to waste their time in learning an application that they distrust or, that can make their difficulty with technology more visible. As a consequence of a good training program it is more likely the doctors use the IS correctly.

(6) The customization of the system to the specificities of each site and to professional work also has a positive impact on commitment as referenced by participants of the two sites because it increases users' feelings that they are involved. Hence, it increases the professionals' commitment to a project, which is seen as their own product. Nevertheless, some professionals see customization as a factor that increases the complexity of application.

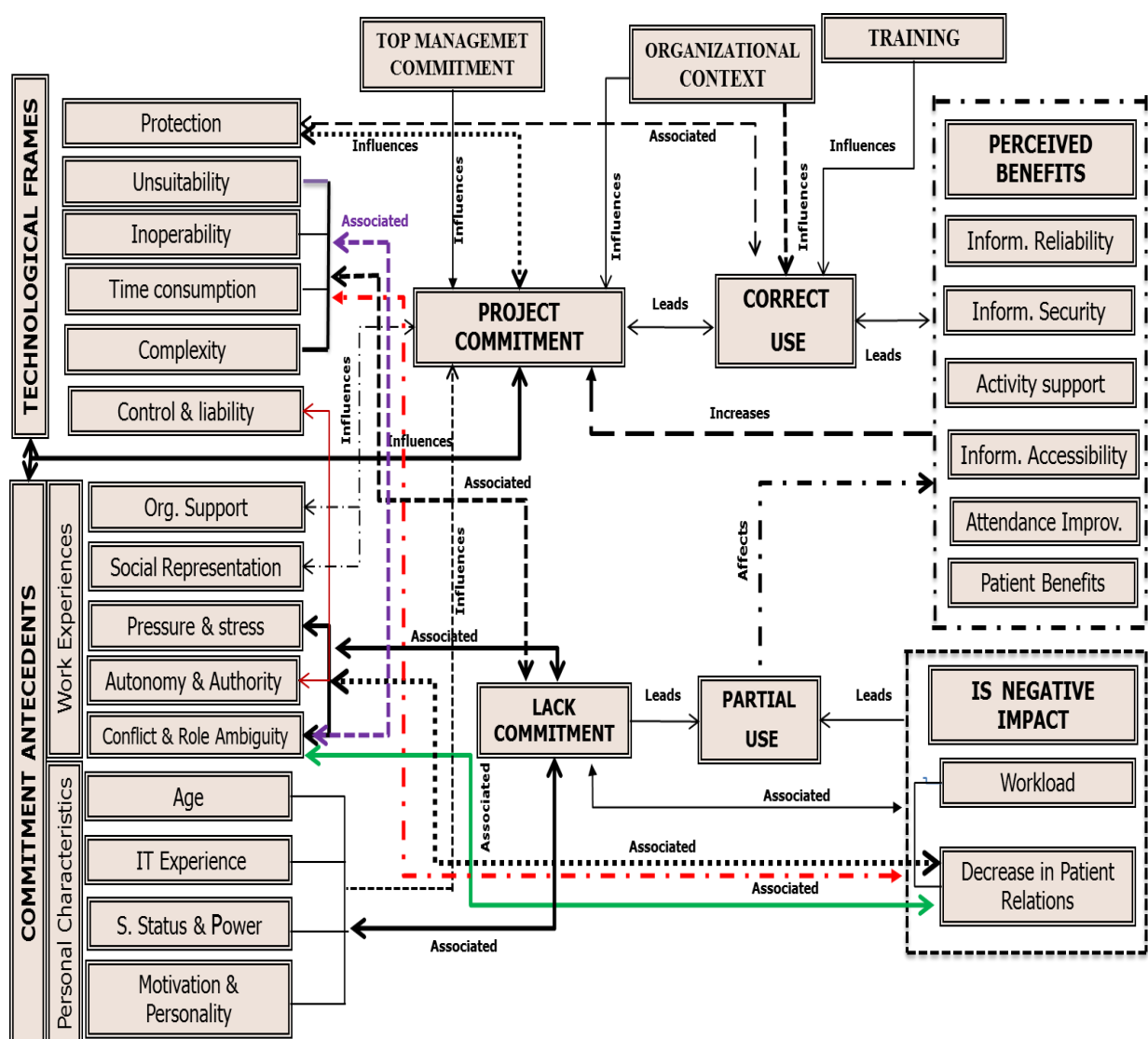
(7) Top management commitment has been demonstrated to be extremely relevant to the commitment of users in the two research sites. Associated with top management commitment, it is worth highlighting the role of management support (from the frame of 'implementation') and a strong leadership. In the case of Hospital A, a strong leadership showed to be very important in overcoming resistance phenomena.

(8) The organizational context showed itself to be of particular importance in influencing commitment, in particular with respect to organizational climate, and political context. In terms of the implementation of a HIS, a quiet atmosphere, transparent and open to change, and a stable management team proved to be extremely important in organization A, and in an initial stage in organization B. On the other hand, the identification of political aspects such as personal and group interests and partisan politics can contribute to reducing the incidence of resistance phenomena (lack of

commitment) that undermine the scope of benefits through the partial or inadequate use of the system.

All these relevant relationships found in the research undertaken and based on the multiple case studies, are represented in detail in the Figure 21, which also represents the Conceptual Model of Commitment to a HIS, as a principal contribution of the thesis.

Figure 21 Conceptual Model of Commitment to a HIS



The Figure 22 representing a simplified conceptual model of commitment is based on a specific IS in the healthcare sector. This model aims to represent the

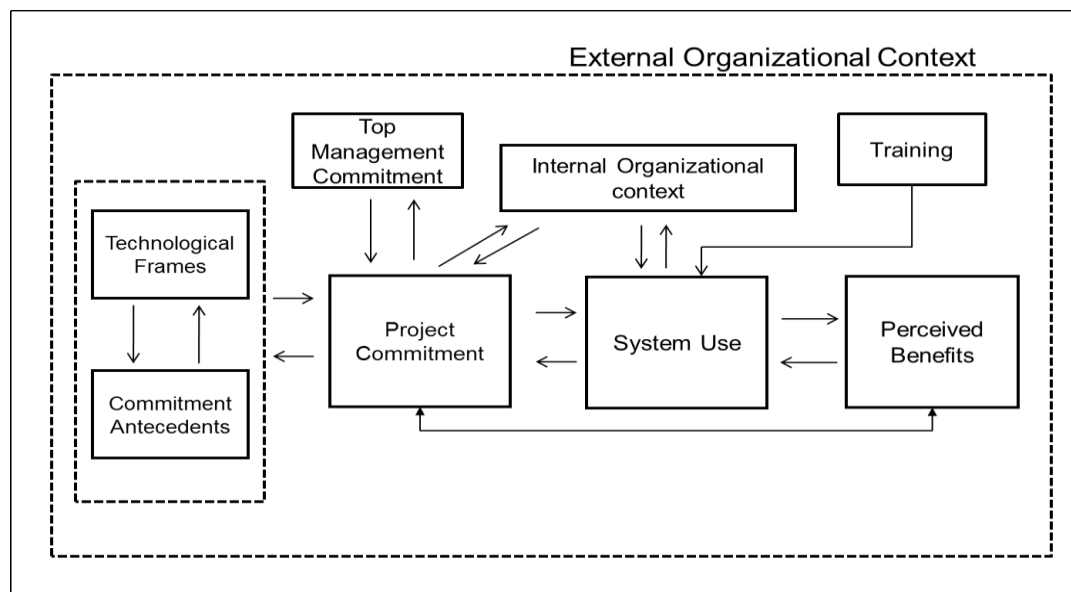
commitment towards the development of an information system and its influence in achieving the benefits perceived by stakeholders. On the one hand there is the interaction between the TFR and the antecedents of commitment that, together with the support of the project by management (top management commitment) and the internal organizational context, influence the commitment to the project implementation, which in turn leads to the effective use of the system and the consequent range of benefits. Note, that in this model, the relationships established are bi-directional (association), that is, each variable influences and is influenced by the other.

In this conceptual model the correct and efficient use of the system is a prerequisite for the achievement of all the benefits and the perception of these benefits in itself constitutes an inducement of commitment establishing a virtuous circle of interaction (Project commitment- system use - perceived benefits).

User training for the system influences the range of benefits, by improving skills and the use of the IS.

During the course of process, and since hospitals do not work separately from their external environment, influence is exerted. This influence is exercised through: (1) health policies emanating from the Ministry of Health with direct impact on the organization's internal context (e.g., in work contexts and available resources); (2) strategies for IS in the health sector (or lack of them, as was observed in this research); and (3) the operating guidelines for healthcare organizations that sometimes interfere with already existing dynamics for the process of computerization.

Figure 22 Simplified Conceptual Model of Commitment to a HIS



6.3.7 Other Research Contributions

The conceptual model shown in the Figures 21 and 22 represents the main contribution of the thesis, in the sense that it explains how commitment influences the realization of benefits expected for implementing HIS. However, it is possible to extract other contributions from the research which can themselves, raise other subjects of investigation or generate hypotheses to validate:

1. Differences in the Commitment of Professional Groups and the Use of IS

An understanding of the level of commitment of the three professional groups was possible, both, in terms of their dimensions and in terms of commitment antecedents as referenced in the literature by Meyer and Allen (1991, 1997) and followers. There was for example a higher prevalence of the component of affective commitment than the other components (normative and continuance). From the three professional groups, affective commitment was more evident for nurses and assistants,

that goes some way to explaining why even in the presence of resistance from physicians they advance with the use of system to make their own records.

2. Identification of the Various Precursors of Commitment for Health Professionals

In addition to the identification of some of the antecedents of commitment reported in the literature, two aspects associated to work experiences and personal characteristics as antecedents of commitment to a HIS implementation project were found (Social representation and Social status and power). These antecedents function in different ways to influence the commitment towards project implementation and IS.

The 'social representation' of profession was considered as an important antecedent of commitment that is more characteristic of the nursing class and, to a lesser degree, assistants. The need for more acknowledgement of their professional role within healthcare and by society compared to other classes is a strong motivation factor to increasing the commitment to an IS implementation project and its subsequent use. On the contrary, the 'status and power' functions as an inhibitor to commitment and use, particularly when is associated with some negative perceptions about the significance of the system (as control and liability), or a weak IT experience. This last antecedent is more characteristic of the medical class.

3. Leadership Role in Overcoming Issues of Implementation in HIS

In this research the role that leadership has in overcoming some issues related to HIS implementation, such as resistance, is also highlighted. In the two case studies the commitment of top management and management support was highly valued by participants, particularly with respect to the capability of the management team to make decisions to support the implementation progress and increase the use of the system, probably because in organizations with characteristics of professional bureaucracy most

professional groups take their “directions for performance” (Mintzberg, 1981) and are reluctant to subordinate themselves to others, or to support organizational goals not completely in line with their particular viewpoint (Quinn *et al.*, (1996).

4. Identification of the Structure of Technological Frames for Health Professionals

Up to now the research on TF has been more associated with study of technological change, resistance phenomena or limited to applications of IT in organizations (Davidson, 2002; Orlikowski, 2000; Orlikowski and Gash, 1991, 1994). The principal concern of researchers was to understand how an organization’s members make sense of technologies and how their interpretations affect the actions relating to IT. The principal concern of researchers was to understand how organizational members make sense of technologies and how their interpretations affect the actions related with IT. Here a study was made of how these interpretations are shaped and influence the commitment to IS projects and consequently their usage and benefits associated to it, in a specific and complex context of a healthcare organization.

In this sense, the data collected and analysed from an interpretive view, provided a structure of the TF found in the healthcare professionals relating to the implementation of an HIS, in the two hospitals. This structure includes three core domains (Implementation, Technology-in-Use and Impact of System), which share some common ground with the TRF domains found in literature [e.g., by Orlikowski and Gash (1991, 1994)], but go beyond it, when in each domain a structure of frames is presented as found in the three professionals groups in the healthcare organizations (presented in Figure 14 and in the Appendices C and E with more detail).

Some of these core domains, such as Technology-in-Use and Impact as well as their components (the frame’s categories), were revealed as having marked significance in influencing commitment with HIS implementation, the use of the IS and hence, the

benefits obtained with the system. The importance of these frames resides in their capability to influence and to be influenced by commitment antecedents.

In addition to identifying a structure of frames for healthcare professionals some incongruence was observed in TF in the different professional groups as was the case for the frames of “Protection” and “Control”. The first is more evident for nurses and assistants and the second is more characteristic of physicians.

Finally it is argued that the findings here constitute a contribution to TFR theory, in the sense that they seem to relate to the concerns of Davidson (2006) for research in TFR. She pointed out that to promote TFR theory development more attention must be paid to frame structure at the analysis stage, on framing as a dynamic process and on the characteristics of this process as well as expanding the context of TFR research into the organizational field including cultural assumptions and institutional logics.

6.4 Summary

This chapter discusses and interprets the data collected in the two case studies using a phenomenological and interpretive approach. Comparisons between the two cases are made.

The analysis of the two cases provides similar patterns, with respect to the themes found, as well as the respective categories. In the two cases the same domains were found in the TF for healthcare professionals, in their commitment to the project and in the way the professionals utilize the software.

A conceptual model of commitment to HIS implementation is also presented as the principal contribution of thesis, with answers to the research questions and other relevant contributions to theory of frames and commitment.

Chapter VII Conclusions

7.1. Background and Summary of Research Undertaken

The management of patient information is a particular concern for healthcare organizations because it partly reflects their activity as healthcare providers (Baus, 2004). The healthcare organizations, particularly public ones, are evaluated more and more on their performance according to the quality of the services they provide, and are financed accordingly. The quality of information that they produce allows better access to financing from government budgets, as well as improving their performance in relation to other similar organizations and improved management of their resources.

The quality of clinical information and the benefits associated with it depend increasingly on reliability, accessibility and security of information, which also allows better quality of patient care. High costs, medical errors, low quality, administrative inefficiencies and poor management are often mentioned as principal problems within most healthcare systems (Leapfrog, 2006; Wong *et al.*, 2003).

Some advantages of HIS are improvements in various metrics of efficiency. Therefore, the healthcare sector sees technology adoption as a way to improve organizational performance and quality of patient care. This reflects the way IT investments in the health sector have increased dramatically (Carpenter, 2005).

Quality of care is the major concern and driving force in the use of HIS whose use has been advocated by various healthcare bodies as a strategy for improving the quality of patient records (Ball *et al.*, 1999). However, in many cases, attempts of HIS implementation have failed.

HIS, in particular EMR and CPOE (as the case of PFSS) are expensive, and a highly complex applications. They are mentioned by the literature as difficult to

implement, and frequently resisted by professionals that are expected to benefit from its use (Bhattacharjee *et al.*, 2007; Lapointe and Rivard 2005). Their introduction in an organization implies the involvement of various professional groups (physicians, nurses, and other healthcare professionals), some of them with greater power and autonomy in the hospital settings.

The institutionalized and complex environment of hospitals and the influence of external factors such as economic constraints or regulatory issues provide a rich context to examine the interplay of technology and institutional change, as is the case with related aspects such as commitment. For that reason IT use in healthcare is increasingly of interest to IS researchers.

As with any IS/IT, introducing HIS into a clinical setting involves a certain degree of change in the way work is done. Some studies have advocated the need to attain greater commitment from all levels throughout the implementation of an IS project and other studies have demonstrated that organizational commitment could be an important issue for realizing IT benefits in organizations (Swailes, 2004; Shoemaker, 2001; Benjamin and Levinson, 1993).

Considering the critical role that stakeholders' commitment has for IT implementation, research is undertaken based on multiple case studies in two public Portuguese hospitals. The objective was to use an interpretivist perspective to analyze and accompany the implementation of a clinical information system and its development, with particular interest in understanding how the commitment of the users to the implementation of HIS influences the use of the system and the achievement of the benefits. The data was coded and analyzed by the use of a software package for qualitative data analysis - NVivo. In the Appendix G we can observe some data display, as well as the sources of data.

The perceptions, understandings and knowledge that users have toward technology (TF) influence the actions they have around it. Thus, understanding how an organization's members make sense of technology is critical to influencing their actions and to achieving planned outcomes. For that, some research questions were laid down as a starting point for the research.

Looking at data through the theoretical lens of TRF of Orlikowski and Gash (1991, 1994) and Three-Component Model of Commitment of Meyer and Allen (1991, 1997), similar patterns were found in the two case studies, both with respect to the themes, and their respective categories. In the two cases, the same domains of TF were found for the healthcare professionals, as well as the three dimensions of commitment (affective, continuance and normative) and the principal antecedents of affective commitment.

7.2 Key Research Findings

Over the last chapter the findings resulting from analysis of data have been presented, pointing to answers to research questions posed at the beginning of the thesis, and culminating with the presentation of a conceptual model of commitment to an HIS in the detailed model of Figure 21, simplified in Figure 22.

This conceptual model represents the central contribution of the thesis, and in a certain way it answers all of the research questions, in the sense that it explains “how commitment of stakeholders affects the realization of expected benefits for the implementation of clinical information systems”, “what is the role of technological frames of users in the development of commitment towards a project”, and “how TFR and commitment interact to influence the achievement of benefits”.

In order to answer each question or set of questions (because the answer of one can also be the answer of another) a starting point is taken from the findings of the

research, from the themes and categories that emerged from data analysis and their relationships.

As has been said the domains and categories of frames and commitment are related and interdependent. Therefore, it is difficult to present answers which reply to only one question, although examples can be found that are more characteristic of one or other question in particular.

Due to the difficulty in associating responses to each research question in a separate way some evidence found in the data will be presented at the end of which will make reference to the corresponding research questions:

1. One particular finding that is important in responding to all research questions hangs on the use of systems by professionals. As has been revealed before, the correct use of an information system is critical in achieving the expected benefits from the system, particularly in the principal objective of hospital organizations, that of benefiting the patient.
2. Throughout participants' perspectives it was effectively found that the commitment that stakeholders have towards to the project implementation and IS influence benefits achievement (in this research described as perceived benefits [also a TF], particularly by the way the users utilize the IS. For example, the antecedents of commitment as 'autonomy and authority' and 'status and power' that reinforce each other, influence the commitment to the project in a negative way, and consequently the partial use of IS, as well as the likelihood of achieving the benefits. This antecedent of commitment and its relationship with other antecedents as well as, with the technological frame of 'control' points to the connection between commitment and benefits, which helps answer the first and third research questions posed.
3. The interaction and mutual influence between other antecedents of commitment such as "conflict and role ambiguity" and some negative perceptions of system (e.g., complexity, time consumption and unsuitability) influence the interpretation of the system as detrimental to the relation with patients and workload, because professionals consider that the use of the system takes time away from useful care to patients. This antecedent when associated to this negative impact of system

contributes to the lack of commitment and partial use of system, influencing in this way benefits achievement. These relationships between antecedents and TF provide responses to the first, second and third research questions. Here the mechanisms are explained behind the behaviour “use”, that result from a close interaction between the perceptions users have about IT/IS and consequent acceptance (commitment) and cooperation to the system project, as well as describing how the interaction between these categories (commitment and frames) occurred. On the other hand, the role of TF of users in the development of commitment towards a project is highlighted by these interactions and the outcomes caused by them (as is the case with the example of “perceived benefits” that are also TFR).

4. While in the situation described in [2] the impact on commitment is negative, favouring the lack of commitment, other interpretations for the significance of the system as a protective mechanism, here denoted ‘protection’, act in the opposite way, increasing the commitment to the project and its correct use. This perception of the system is closely linked to the perception of the benefits that users obtain from the system (e.g., legibility of records, greater accountability of professionals, recognition and visibility of work done, accessibility and security of information). Here, an increased importance of the TFR in influencing commitment was observed, making the role of TFR more visible, in answering the second question.
5. The relationship between some of TF (e.g., ‘Control’, ‘Decrease in patient relationship’ and ‘workload’) and commitment antecedents (e.g., ‘autonomy and authority’ and ‘Conflict and role ambiguity’) was evident in the domains of Technology-in-use and Impact of System. Following from this the necessary information can be collated to respond the third research question, also answering the other questions.

7.3 Knowledge Contribution

The study of how commitment to a project influences benefits achievement through the theoretical lens of TFR is in itself an important contribution to knowledge, because the study of users’ commitment to IS projects is insufficiently explored in the IS area. The association of TFR and commitment antecedents to constitute a conceptual

framework of commitment to HIS project resulted from a profound understanding of the context of healthcare organizations and the actions the users take around IT.

To relate the contribution of this research to the body of knowledge, a Conceptual Model of Commitment to a HIS is proposed as the main contribution to the thesis, which is explained in detail in chapter 6. It represents the outcomes produced by an interpretive research within the IS field looking for a depth understanding of human thought and action in organizational contexts of hospitals; it has the potential to produce deep insights related to the influence of TFR and commitment on the achievement of benefits.

In this conceptual model all principal categories extracted from data are presented. They include TF pertaining to the three core domains identified in the research (Technology-in-use, Impact and Implementation), from which only those that were revealed as having more impact on influencing project commitment are represented.

This conceptual model also shows the antecedents that were found as exerting more effect on development of commitment (both close and distant antecedents). Here the organizational support and social representation is highlighted as having positive influence on project commitment. The other antecedents (e.g., 'status and power') were revealed as having marked influence on a lack of commitment that is, acting in the sense to reduce commitment.

In the two research sites two themes were revealed as having had greater influence on the commitment process and the results obtained (benefits): the top management commitment and organizational context, which are also represented in the model. These two components of the model demonstrated themselves to be extremely relevant in the commitment of users at the two research sites.

In this way, the Conceptual Model of Commitment to a HIS seems to be a significant contribution to the knowledge in the area of IS. Although some TF and

antecedents found in the users of HIS are quite specific to the context of healthcare organizations, some of them can be explored in other contexts. What is relevant to highlight is that people in organizations when faced with an IS/IT develop interpretations, understandings, knowledge and perceptions of IS/IT that can influence and be influenced the/by antecedents of commitment to a project. So identifying the primary TFR the staff have concerning the IS/IT and their antecedents of commitment can contribute to the adoption of measures to improve commitment and a correct use of the system, overcoming or avoiding lack of commitment reactions which compromise benefits achievement.

In this research, other contributions to knowledge were identified, which were presented in detail in Chapter 6. They are: 1) Differences in the commitment of professional groups, 2) Identification of various antecedents of commitment for healthcare professionals, 3) Leadership role in overcoming issues of HIS implementation, and 4) Identification of the structure of Technological Frames for Health Professionals.

7.4 Implications for Practice

Considering that this implementation project constitutes a learning process, some ideas resulting from the statements of users and implementers in the two research sites as well as from research findings are presented:

1. The clinical elements of the Board are central in the involvement and improvement of professionals' commitment, so a strong leadership is expected from them in situations that require authority. In the two cases, commitment and support of management, particularly of the clinical member of the BOD was pointed out as critical to a faster and more comprehensive implementation of the system.
2. Early interpretations of a technology are particularly influential because they are established rapidly as the technology is assimilated into work practices and becomes

built into organizational routines. Such embedded understandings and assessments of a technology are particularly difficult to change later. Therefore an understanding of users' perceptions about technology should be a key factor in managing the adoption of IS and will be decisive in understanding how they interact with the antecedents of commitment to enable changes and improve the use of IS to produce benefits.

3. The perception that professionals have that the IS system provides a protective mechanism for their job seems to be a great enabler of commitment and a strong incentive to an appropriate use of the system, therefore contributing to the rapid achievement of benefits. Thus, any measure to be taken by management to foster the development of that frame (e.g. protection in our research) or other with positive influence on commitment, either through communication strategies, an early and comprehensive disclosure of objectives and benefits of the system or through the demonstration of these benefits from the early stages of use (through activity reports and positive reinforcement), will help increase commitment to the project and its use.
4. An implementation which extends over a long period of time can be an added difficulty permitting resistance to arise beyond the normal time frame of implementation with extra investment costs. On the other hand, an implementation which occurs at various times causes situations of inequity between services and constraints in their relationships. Therefore, the implementation should be executed quickly with as few stages as possible.
5. Doctors prefer simple and objective systems, with few fields, whose use does not reduce the time available for clinical care.
6. Excessive customization makes the system more complex and increases the implementation time.
7. The existence of multiple healthcare information systems with similar functions must be avoided and it is important to realize the full integration of all applications.
8. The use of all features of the system must be mandatory and more restrictive measures in terms of paper use should be implemented right from the beginning.
9. Usability criteria for the various application modules should be established with the supplier firm, based on identified errors and suggestions for improvement.

7.5 Study Limitations and Opportunities for Further Research

7.5.1 Limitations

This document resulted from a long research process, in which many issues and difficulties occurred. An analysis of these issues provides opportunities for improvement.

While initially the objective was to explore four case studies, only two cases have been finished (the most important and largest). The reasons behind this option relate to divergent and contradictory decisions from the BOD of one healthcare organization, where an initial decision to approve the research within the organization was retracted, even after data collection had begun. The reasons for this decision do not relate in any way with the researcher or the procedures performed to gain access.

With regard to another case study, which paradoxically would have been developed near the residence of the researcher, this could not be completed for reasons related to available resources. The scientific community is well aware of the amount and mobilization of resources (financial, time and materials) that an interpretative phenomenological inquiry entails. However, there was a large part of the data collection which will constitute an important database for future research.

Despite having visited the organizations around 10 times during five years, with each visit lasting one week, it was not possible to explore in greater detail the existing power relationships between users at the two sites, which is believed to be relevant to understanding the subject under investigation.

Another question refers to the very complexity of the context where the professionals work, as is the example of the ER. Some interviews were limited in time because the professionals accepted to participate in places very close to their activity, and sometimes the interview was interrupted. The characteristics of context for some

interviews obliged the researcher to have objectivity in asking questions and to centre on what was essential. However, these limitations were in a certain way overcome by the contributions of interviewees and the possibility of a repeat interview at another time.

One other limitation in access to information from participants occurred with the refusal of the director of the medicine service to be interviewed. His contributions could be certainly increase the understanding of commitment phenomena and their influence for benefits achievement, given that that individual was the principal resistor to the implemented IS in organization B.

A number of situations are also highlighted as constituting limitations to the research: time spent in transcription and processing of large amounts of data; difficulty in contact with some stakeholders, particularly in the final phase of the investigation, and obtaining objective information about the benefits achieved from managers.

Two kinds of prejudices are associated to the case study research: (i) the effects of the researcher on events and the behaviour of participants at the case study site, and (ii) the researcher's own beliefs, values and prior assumptions (Darke *et al.*, 1998). Thus, it is essential to clarify that this phenomenological approach is related to an interpretive research paradigm, which makes this study not free of 'biases' in the sense that the previous personal experiences of the author, which includes a set of values and beliefs, have conditioned the choice of the subject of study and its analysis. Although Walsham (1995a) highlights that biases arising from researcher effects at the site are in one sense mandatory, this has to be considered as a limitation.

Another important aspect is to argue that statistical generalization is not an objective of interpretative research. The purpose of this research is to offer a deeper understanding of the TF and antecedents of commitment of healthcare professionals and how they interact to develop commitment to the project implementation influencing the

benefits achievement from IS in healthcare organizations. The research findings may be valuable to other settings and organizations as interpretations of phenomena but which are not wholly predictive for future situations. These research findings must be read in order to gain new rich insights into the existing theory and as a contribution to future research.

7.5.2 Further Research

The qualitative and exploratory nature of this research is very appropriate in the sense that it provides new insights for further research topics. This research process provided some interesting ideas for future research

An interesting research project could be undertaken to validate some of the results found in this work, comparing private and public organizations, with the same information system and or different systems, considering that factors such as financing and government regulation do not exist in private organizations.

In future research, an important issue is understanding how culture influences the technological framing process as a way of developing commitment and its impact on benefits achievement from implementation of IS in the healthcare organizations. This should be considered with reference to the influence that the internal context, particularly the organizational climate, had on commitment to the project in the two research sites.

It would also be interesting to explore the antecedent related to work experiences, here denoted as ‘social representation’, and the significance given to the system as a protective work instrument (the frame ‘protection’) in isolation, due to the strong influence they exert on commitment to the project, as presented by some professional groups.

In the two research sites, the antecedent of conflict and role ambiguity is present in all individuals with a lack of commitment to the project, but it is acknowledged by some committed users, that try to adopt strategies to minimize the impact on the time available for the patient. Therefore it is a relevant issue to investigate in future research.

As the objectives and goals of healthcare organizations are interconnected with the goals and objectives of each of the healthcare professional groups, for some participants (doctors) the question must be raised as to whether they are more committed to their profession or to the organization/ project. This also, can be an interesting topic to investigate with the same theoretical lens of TRF.

Considering the previously recognized limitation in exploring aspects of power relationships between users, and since the ‘autonomy and authority’ and ‘status and power’ were revealed in this research to be critical factors in influencing commitment to the project, a more extensive analysis could be attained by, for example a longer stay at the research sites, or, by employing another research methodology such as action research.

Appendices

Appendix A - Formal request for case studies

To President of the Board of Directors

7, October 2007

Subject: Request for permission for the development of research under the PhD Program in Management at ISEG - Technical University of Lisbon

I, Irene Rebelo Cardoso, ID 9055058, student in the 2nd year of the PhD program in Management at ISEG, do hereby request approval to develop a Research project (whose summary is attached) in your hospital. The area of research is "Implementation of Information Systems" and the research topic is "The Management of Benefits and resistance to change with the implementation of Information Systems in the health sector".

The main objective of this research is to examine the users' perceptions leading to the behaviours of resistance to changes due to the implementation of a clinical information system as well as the potential role of Benefits Management in reducing resistance to change. The featured information system for this research is the [PFSS] system.

The strategy for research is the Case Study, more specifically four case studies that will focus on 4 Hospitals. Data collection will be made through semi-structured interviews, direct observation and documentary analysis.

The research will focus on managers, members of the Board of Directors, IS' managers and users of the System (physicians, nurses and diagnosis technicians).

The anonymity of respondents and the organization will be guaranteed (if it is established), since the information regarding the participants will remain in possession of the Investigator and will not be used for any other purpose other than the implementation of this project.

The gathering of information will take place only after the informed consent of those interviewed has been given.

All data will be processed in order to protect the confidentiality and anonymity of those involved in the study. Data collection will occur as soon as possible after the approval of this request, until the first semester of 2009.

I am also a healthcare professional, and I shall respect all constraints at the location of the observation.

I am available for any further clarification.

Yours sincerely,

Irene Cardoso

Phone: 962001402 / 936257921

E-mail: irene_cardoso@yahoo.com; irenecardo@gmail.com

Appendix - B Interviews guidelines

I

Interview with the project manager

1. What benefits do you attribute to the PFSS system, considering the hospitals and ERs' mission?
2. In your view, what changes do the "PFSS for ERs" introduce into the professionals' ways of doing things? What do we need to change when ALERT is implemented?
3. Can you describe how you implemented PFSS (phases, procedures, timings, difficulties, and solutions adopted)?
4. Before implementation was there some kind of stakeholder analysis in order to identify possible facilitators or resistant elements to the IS?
5. Was there any prior identification of the benefits associated with PFSS in combination with the Board of Directors (BOD)?
6. In your opinion, which processes will the benefit most from the system be observed and what will those main benefits (or beneficiaries) be? How will the achievement of these benefits be evaluated?
7. How have users been involved in the process?
8. How important is the role of the BOD in the process of implementing the PFSS (urgency or PFH) in hospitals? What can you tell me about the role of the Board in this hospital?
9. How would you describe the role and involvement of the hospital's 'IT services' in the implementation process?
10. What were, if any, the main difficulties (or ease of use) encountered during implementation of PFSS in the Hospital or units? What do you see as the main reasons for these difficulties? How were they overcome?
11. What reactions did you get from the different occupational groups of users (doctors, nurses, technicians)?
12. In your opinion, what are the main reasons behind the feedback obtained?
13. Can you indicate some professionals who were outspoken in their reaction to the system (positive or negative) and its use?
14. How did the process evolve in the offices that work with ERs from each hospital?
15. What criteria exist for establishing that the process has been completed successfully?
16. What kind of support is provided to hospitals by the company after the completion of the projects?
17. Who are those mainly responsible for the implementation of PFSS on the ground?
18. How is the link between those responsible for the enterprise and the organization made?

II

Interview with members of Board of Directors and IS Managers

1. When was it decided to adopt PFSS and what factors/motivations influenced that decision? How long did the implementation of this Information System take (from start to end)?
2. What degree of importance do you attach to the PFSS system in terms of organizational objectives? How does this investment fit within the objectives of the Ministry of Health?
3. In your opinion, what are the main benefits of PFSS?
4. What were the main benefits achieved (quantity and quality) and which do you still hope to achieve with the adoption of PFSS (where)? Do you consider that the various users share this perspective? If not, can you give me your opinion as to why not?
5. Who are, if any, the main beneficiaries of this Information System and why?
6. Was there a prior identification of the benefits and the necessary changes to be made before implementation of the system, as well as the measures to assess its achievement? Was there any plan to implement the changes required?
7. Was there some kind of stakeholder analysis in order to identify possible facilitators or resistant elements?
8. Were any organizational members appointed to collaborate or participate in the Information System implementation? If there were, can you identify them and tell me about the criteria that were used to select those individuals? Did you participate in this group?
9. How did the implementation of the PFSS go? What were the main problems encountered and the reasons behind them?
10. How do you evaluate the professionals' participation in the implementation of PFSS?
11. Which professional groups (doctors, nurses, and technicians) were most compliant with the information system and its use and which ones have shown more difficulty? In the latter case, what reasons might explain this attitude?
12. After the implementation process, do you consider that some of the expected benefits were achieved? Can you describe them?
13. How do you characterize the users' utilization of the information system at the present time? Do you believe that all users make full use of all the features of the system and produce the required information? If there are some professionals who do not, can you indicate the possible reasons for that?
14. How is PFSS seen by the professionals involved (physicians, nurses, technicians)?
15. What kind of difficulties do you expect in the implementation process for the remaining applications and how will they be managed?
16. If it were possible to go back and start the whole process again, what do you think should be done differently?

17. Can you indicate some professionals who were more outspoken in their reaction to the system (positive or negative) and its use?
18. Can you characterize the organizational culture of the hospital in terms of: commitment to organizational goals, the relationship with formal authority, openness to change, and interpersonal relationships?

III

Interview with Head Nurse and Service Director

1. When was it decided to adopt PFSS and, which factors/motivations influenced that decision? How long did it take from start to finish for this IS to be implemented?
2. What degree of importance do you attach to the PFSS system in terms of organizational objectives? What do you consider are its main benefits?
3. In which areas was the IS installed?
4. Were any organizational members appointed to collaborate or participate in the Information System implementation? If there were, can you identify them and tell me about any criteria that were used to select those individuals? Did you make up part of this group?
5. Was there a prior identification of the benefits and the necessary changes to be made before implementation of the system, as well as a measuring system to assess its achievement? Was there a plan to implement the changes required?
6. Who are (if any) the main beneficiaries of this information system and why?
7. How did users participate or get involved in the overall process?
8. Was there some kind of stakeholder analysis in order to identify possible facilitators or resistant elements?
9. Tell me about your feelings regarding PFSS, in terms of its importance both to your job and the organization.
10. Were there any changes in the way you carry out your activities? If yes, what were they and what is your perception of the importance of these changes?
11. What were the main benefits achieved (quantity and quality) and what do you still hope to achieve with the adoption of PFSS (where)? Do you think that the various users share those (your) opinions? If not, can you suggest any reasons why not?
12. How did the implementation of PFSS take place? What were the main problems encountered and what reasons led to them?
13. How would you qualify the participation of professionals involved in the implementation of PFSS?
14. Who were the professional groups (doctors, nurses, and technicians) who were most compliant with the information system and its use and which ones had more difficulty? In the latter case, what reasons could explain this fact?
15. How would you currently characterize the users' utilization of the Information System? Do you consider that all users take advantage of all the features of the system and produce the required information? If there are some professionals who do not, can you indicate possible reasons for this?

16. How is the PFSS seen by professionals involved (physicians, nurses and technicians)?
17. After the implementation process, do you believe that some of the expected benefits were achieved? Can you describe them?
18. If it were possible to go back and start the whole process again, what you think should be done differently?
19. Can you indicate some professionals who were outspoken in their reactions to the system (positive or negative) and its use?
20. Can you characterize the organizational culture of hospital in terms of: commitment to the organizational goals, the relationship with formal authority, openness to innovation and interpersonal relationships?

IV Users' interview

1. What do you think about information systems in healthcare? And in your job?
2. Do you normally use computer-based IS?
3. Tell me your opinion about PFSS, in terms of its importance to your work and to the organization.
4. Do you make full use of PFSS?
5. Which factors / motivations seem to have been the basis for the adoption of PFSS?
6. What changes were made in order to for you to carry out your duties? What is your perception regarding the importance of these changes?
7. How have these changes been implemented? Do you agree with their implementation?
8. Do you know if there was a prior identification of the benefits and the necessary changes to be made before implementation of the system, as well as a measuring system to assess its achievement? Was there any plan to implement the changes required?
9. What are the main benefits that you hope to achieve with the adoption of PFSS? Do you consider that these benefits have been achieved in any way?
10. How have you benefited or think that will benefit in the future from PFSS and what importance do you attribute to this? Do you also recognize the benefits for the organization? In what way?
11. In your opinion, who are the main beneficiaries of PFSS?
12. In what way did the users participate or get involved in the process?
13. Did you feel supported (and by whom) in the implementation process? What aspects did you consider important in the implementation process so that the system could bring the expected benefits?
14. How do you think PFSS is regarded by the various professionals (physicians, nurses and technicians)? What reasons, if any, are the bases for these differences?
15. Can you describe some of the reactions observed in the professional groups? How do you explain them?

16. How did the implementation of PFSS take place? What were the main problems encountered and the reasons behind them?
17. How were these difficulties dealt with?
18. In your opinion what are the main factors that facilitate the participation in and implementation of PFSS?
19. What is your overall opinion of PFSS?
20. Can you indicate some professionals who were outspoken in their reaction to the system (positive or negative) and its use?
21. Can you describe the organizational culture at hospital in terms of: commitment to the organizational goals, the relationship with formal authority, openness to innovation, and interpersonal relationships?

V

2nd Interview Guideline

Objectives:

1. Re-evaluate and validate some information;
2. Obtain a new assessment of the implementation;
3. Formulate three/ four questions
4. Ensure the privacy and anonymity of the statements

Questions

1. What do you think now of the information system PFSS, since the last time we talked? The way it works, benefits, and advantages?
2. What are the difficulties that still exist in the process?
3. How is the paper-free project going, and what results were achieved in other departments of the Hospital (Outpatient, Inpatient and the Operating Room)?
4. Please tell me what, at this moment, are the difficulties and achievements of the project?
5. What is your level of usage of the PFSS?

Considering the organizational commitment as:

- a) the psychological state/ force that binds the employee to the organization (hospital), the way you identify with the values and goals and get involved in realizing its mission, goals / objectives; or
- b) the psychological state/ strength that contributes to following a certain course of action (goal or behaviour) of relevance to the organization (hospital / profession)

1. How do you characterize the connection that you have with the hospital?
2. How do you describe your commitment to the goals and objectives of the Hospital in relation to specific changes? (in this case, the PFSS system implementation)

Thank You

Appendix C – List of Categories of Case A

Name/Sources /References

292

List of Categories of Case A (Continue)

Tree Node	Organizational context	Inner context			
Tree Node	Tree Node				
Tree Node	Tree Node				
		Lack HR	12	14	
		Organizational climate	9	19	
		Tree Node		7	12
		Opening to change			
		Political Context	13	43	
		Tree Node		5	13
		Group Interests		10	20
		Personal Interests		6	11
		Status Power		4	7
		Size & complexity workload	7	10	
			18	26	
	Tree Node	Outer context			
	Tree Node				
	Tree Node	Inefficacy of NHS	5	6	
	Tree Node	NHS IS Strategy	2	2	
	Tree Node	Political Ext Context	1	1	
			4		
		Decrease Pat.relationship	12	20	
		Decrease prof. relations	7	12	
		Perceived benefits			
		Tree Node		22	60
		Attendance Improvement		26	71
		Cost reductions		7	7
		Decision Support		6	9
		Information Accessibility		25	56
		Information Security		13	17
		Patient benefits		24	38
		Reliability of Data		4	6
		Workload	16	24	
	Tree Node				
		Implementation	30	212	
		Evaluation	43	281	
		Motive for adoption	12	18	
		Process	16	37	

List of Categories of Case A (Continue)

	Tree Node	Communication	14	29
	Tree Node	Customization	2	2
	Tree Node	Implementation Issues	32	109
	Tree Node	Management support	26	68
	Tree Node	Training	23	49
	System Objectives			
	Tree Node			
	Tree Node	Clinical management	8	21
	Tree Node	Inform. management	7	17
	Tree Node	Paper free Hospital	4	4
	Technology-in-use			
Tree Node				
	Tree Node	Attitude	1	
	Tree Node	skepticism	5	8
	Tree Node	Suspicion	8	9
	IS Perceptions			
	Tree Node			
	Tree Node	Complexity	21	52
	Tree Node	Confidentiality breaches	3	9
	Tree Node	Easy to use	7	11
	Tree Node	Imposition	10	17
	Tree Node	Inoperability	25	53
	Tree Node	Time consumption	18	38
	Tree Node	Unsuitability	15	49
	System Significance			
	Tree Node			
	Tree Node	Control	10	21
	Tree Node	Liability	10	18
	Tree Node	Protection	12	20
	Use			
Tree Node				
	Tree Node	Partial use	64	
	Tree Node	Correct Use	23	60
			15	27

Appendix D – List of Relationships between Categories of Case A

Appendix E – List of Categories of Case B

Appendix E - List of Categories of Case B

		Name/Sources /References	
Tree Node	Commitment	8	10
Tree Node	Commit. Antecedents Tree Node	Close Tree Node	
Tree Node	Work experiences Tree Node	Work experiences Tree Node	
Tree Node	Prof. work's dimensions Tree Node	Prof. work's dimensions Tree Node	
Tree Node	Autonomy Tree Node	Autonomy Tree Node	
Tree Node	Social representation Tree Node	Social representation Tree Node	
Tree Node	Personal characteristics Tree Node	Personal characteristics Tree Node	
Tree Node	Demographics Tree Node	Demographics Tree Node	
Tree Node	Individual differences Tree Node	Individual differences Tree Node	
Tree Node	IT Experience Tree Node	IT Experience Tree Node	
Tree Node	Motivation Tree Node	Motivation Tree Node	
Tree Node	Personality Tree Node	Personality Tree Node	
Tree Node	Social Status & power Tree Node	Social Status & power Tree Node	
Tree Node	Commitment Dimensions Tree Node	Commitment Dimensions Tree Node	
Tree Node	Affective Tree Node	Affective Tree Node	
Tree Node	Continuance Tree Node	Continuance Tree Node	
Tree Node	Normative commitment Tree Node	Normative commitment Tree Node	
Tree Node	Project Commitment Tree Node	Project Commitment Tree Node	
Tree Node	Lack commitment Tree Node	Lack commitment Tree Node	
Tree Node	Top Manag commit. Tree Node	Top Manag commit. Tree Node	
Tree Node	Organizational context Tree Node	Organizational context Tree Node	
Tree Node	Inner context Tree Node	Inner context Tree Node	
Tree Node	Organizational climate Tree Node	Organizational climate Tree Node	
Tree Node	Dissatisfaction Tree Node	Dissatisfaction Tree Node	
Tree Node	Uncertainty & ambiguity Tree Node	Uncertainty & ambiguity Tree Node	
Tree Node	Opening to change Tree Node	Opening to change Tree Node	
Tree Node	Quality Tree Node	Quality Tree Node	
Tree Node	Organizational Structure Tree Node	Organizational Structure Tree Node	
Tree Node	Integration Tree Node	Integration Tree Node	

List of Categories of Case B (Continue)

Tree Node	Political Context	13	18	
	Tree Node		4	
	Tree Node		8	
	Tree Node		3	
	Tree Node		6	
	Stress_workload	5	7	
Tree Node	Outer context			
	Tree Node		3	
	Tree Node		11	
	Tree Node		5	
Tree Node	Impact of System			
	Tree Node		16	
	Tree Node		5	
	Tree Node		10	
	Decrease in Patients relations	13		48
	Decrease_prof. relations	3		74
	Perceived benefits	8		7
	Tree Node		23	
	Tree Node		30	
	Tree Node		7	
	Tree Node		22	
	Tree Node		25	
	Tree Node		16	
	Tree Node		30	
	Tree Node		10	
	Tree Node		5	
	Activity Support			
	Attendance improvement			
	Cost reductions			
	Decision Support			
	Information Accessibility			
	Information Security			
	Patient benefits			
	Reliability of Data			
	Social acknowledgement			
Tree Node	Implementation			
	Tree Node			
	Tree Node			
	Tree Node			
	Evaluation	9		
	Motive to Adoption	18	151	
	Process	17	29	
	Tree Node	27	105	
	Tree Node		16	29
	Tree Node		12	28
	Tree Node		14	21
	Tree Node		31	78
	Tree Node		30	81
	Tree Node		20	30

List of Categories of Case B (Continue)

Tree Node	System Objectives				
	Tree Node	Clinical management	9	14	
	Tree Node	Decision Support	7	10	
	Tree Node	Information management	17	24	
Tree Node	Technology-in-use				
	Tree Node				
	Tree Node	Suspicion	5	5	
	Tree Node	Expectations to future	11		
	Tree Node	IS Perceptions			
	Tree Node	Complexity	15	29	
	Tree Node	Confidentiality breaches	4	11	
	Tree Node	Easy to use	7	11	
	Tree Node	Inoperability	11	15	
	Tree Node	Time consumption	22	35	
	Tree Node	Unsuitability	8	16	
	Tree Node	Useful	10	12	
Tree Node	System Significance				
	Tree Node	Control	21	36	
	Tree Node	Liability	4	5	
	Tree Node	Protection	4	9	
Tree Node	Usage				
	Tree Node	23			
	Tree Node	8			
	Tree Node	25	11		
	Tree Node	21	51		
	Tree Node		33		
	Not Use				
	Partial use				
	Correct Use				

Appendix F – List of Relationships between Categories of Case B

List of Relationships between Categories of Case B (continue)

From / Name	Type	To / Name	Direction
Hospital B\Technological Frames\Technology-in-use\IS Perceptions\Inoperability	Associated	Hospital B\Commitment\Commitment Antecedents\Close\Work experiences\Conflict & role ambiguity	Associative
Hospital B\Technological Frames\Technology-in-use\IS Perceptions\Time consumption	Influences	Hospital B\Commitment\Commitment Antecedents\Close\Work experiences\Conflict & role ambiguity	One Way
Hospital B\Technological Frames\Technology-in-use\IS Perceptions\Time consumption	Influences	Hospital B\Technological Frames\Impact of System\Decrease Patients relation	One Way
Hospital B\Technological Frames\Technology-in-use\IS Perceptions\Time consumption	Associated	Hospital B\Commitment\Project Commitment\Lack commitment	Associative
Hospital B\Technological Frames\Technology-in-use\IS Perceptions\Unsuitability	Associated	Hospital B\Commitment\Project Commitment\Lack commitment	Associative
Hospital B\Technological Frames\Technology-in-use\System Significance\Control	Associated	Hospital B\Commitment\Project Commitment\Lack commitment	Associative
Hospital B\Technological Frames\Technology-in-use\System Significance\Control	Associated	Hospital B\Commitment\Commitment Antecedents\Close\Work experiences\Autonomy_authority	Associative
Hospital B\Technological Frames\Technology-in-use\System Significance\Protection	Influences	Hospital B\Commitment\Project Commitment	One Way
Hospital B\Usage\Partial use	Associated	Hospital B\Technological Frames\Impact of System\Perceived benefits\Information Security	Associative
Hospital B\Usage\Partial use	Affects	Hospital B\Technological Frames\Impact of System\Perceived benefits\Reliability of Data	One Way
Hospital B\Usage\Partial use	Affects	Hospital B\Technological Frames\Impact of System\Perceived benefits\Information Accessibility	One Way
Hospital B\Usage\Partial use	Leads	Hospital B\Technological Frames\Impact of System\Perceived benefits\Patient benefits	One Way
Hospital B\Usage\Correct Use	Leads	Hospital B\Technological Frames\Impact of System\Perceived benefits	One Way
Imposition Rules	Increases	Hospital B\Usage	One Way

Appendix G - Presentation of data included in NVivo Software

Organizational commitment and IT Benefits6- Évora.nvp - NVivo

File Edit View Go Project Tools Window Help

Look for: Search In Internals Find Now Clear Options X

All Sources Not Embedded

Name	In Folder	Filename	Size (MB)	Available	Created On	Created By	Modified On	Modified By
DIV_B0360_Dr Godinho	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	21.59		09-03-2011 12:27	IRC	09-03-2011 12:27	IRC
Adelaide_CH_Ped_DIV_B	Internals/Hospital de Chaves	C:\Users\Rui Branco\Desko	31.4		27-05-2010 20:06	IRC	02-06-2010 20:29	IRC
Almeida_Cirurg_Ce_DIV_	Internals/Hospital de Chaves	C:\Users\Rui Branco\Desko	27.99		27-05-2010 20:37	IRC	02-06-2010 20:48	IRC
Ana Guerreiro_Su1_DIV_A	Internals/Hospital Évora/Entr	C:\Users\Rui Branco\Desko	22.45		02-06-2010 18:03	IRC	02-06-2010 18:36	IRC
Artur_Cirurgal_DIV_A022	Internals/Hospital Évora/Entr	C:\Users\Rui Branco\Desko	25.33		02-06-2010 19:31	IRC	02-06-2010 19:31	IRC
Augusta_DIV_A0106	Internals/Hospital de Chaves	C:\Users\Rui Branco\Desko	20.17		27-05-2010 19:43	IRC	02-06-2010 20:40	IRC
CardosoOliveira1_UruL_D	Internals/Hospital Évora/Entr	C:\Users\Irene\Documents\T	27.41		02-06-2010 19:32	IRC	20-04-2011 17:33	IRC
Cbarata_Cv2_DIV_A0193	Internals/Hospital Évora/Entr	C:\Users\Irene\Documents\T	36.7		02-06-2010 19:38	IRC	13-05-2011 20:32	IRC
Celeste-anest_DIV_B0144	Internals/Hospital de Chaves	C:\Users\Rui Branco\Desko	22.94		27-05-2010 19:58	IRC	02-06-2010 20:50	IRC
Conceição BarataSU_DIV_	Internals/Hospital Évora/Entr	C:\Users\Irene\Documents\T	41.56		02-06-2010 19:36	IRC	19-04-2011 22:03	IRC
Direct_Ortopedia_DIV_800	Internals/Hospital de Chaves	C:\Users\Rui Branco\Desko	25.83		27-05-2010 19:53	IRC	02-06-2010 20:48	IRC
DirectSU_DIV_A0095	Internals/Hospital de Chaves	C:\Users\Rui Branco\Desko	26.07		27-05-2010 19:50	IRC	02-06-2010 20:44	IRC
DIV_A0055_HCF Serra	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	46.27		02-06-2010 22:19	IRC	17-01-2011 17:11	IRC
DIV_A0120_GodinhoHCF2	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	33.01		02-06-2010 22:16	IRC	17-01-2011 17:14	IRC
DIV_A0212_Faro_Margari	Internals/Hospital Faro/Entre	C:\Users\Rui Branco\Desko	20.74		02-06-2010 22:06	IRC	02-06-2010 22:06	IRC
DIV_A0213_Faro_Margari	Internals/Hospital Faro/Entre	C:\Users\Rui Branco\Desko	48.96		02-06-2010 22:06	IRC	02-06-2010 22:06	IRC
DIV_A0353_Dra gabriela	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	34.75		25-02-2011 20:40	IRC	25-02-2011 20:40	IRC
DIV_A0365_Parreira_P_2	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	22.26		29-03-2011 16:56	IRC	29-03-2011 16:56	IRC
DIV_B0096_DR HELDER	Internals/Hospital de Chaves	C:\Users\Irene\Documents\T	25.83		20-07-2011 11:54	IRC	20-07-2011 11:55	IRC
DIV_B0144_draCelestean	Internals/Hospital de Chaves	C:\Users\Irene\Documents\T	22.94		20-07-2011 16:20	IRC	20-07-2011 16:20	IRC
DIV_B0164_ENFCH3_22_	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	40.85		09-03-2011 12:41	IRC	09-03-2011 12:41	IRC
DIV_B0214_Engº Marco_	Internals/Hospital Faro/Entre	C:\Users\Rui Branco\Desko	40.96		02-06-2010 22:06	IRC	02-06-2010 22:06	IRC
DIV_B0316_FerGuer_Faro	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	25.15		14-02-2011 12:03	IRC	14-02-2011 12:03	IRC
DIV_B0316_Fernanda Gue	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	25.15		25-02-2011 20:22	IRC	25-02-2011 20:22	IRC
DIV_B0363_28_3_11_naul	Internals/Hospital Faro/Entre	C:\Users\Irene\Documents\T	33.63		29-03-2011 16:51	IRC	29-03-2011 16:51	IRC

81 76 Items

18:31 30-01-2012

Organizational commitment and IT Benefits6- Évora.nvp - NVivo

File Edit View Go Project Links Code Tools Window Help

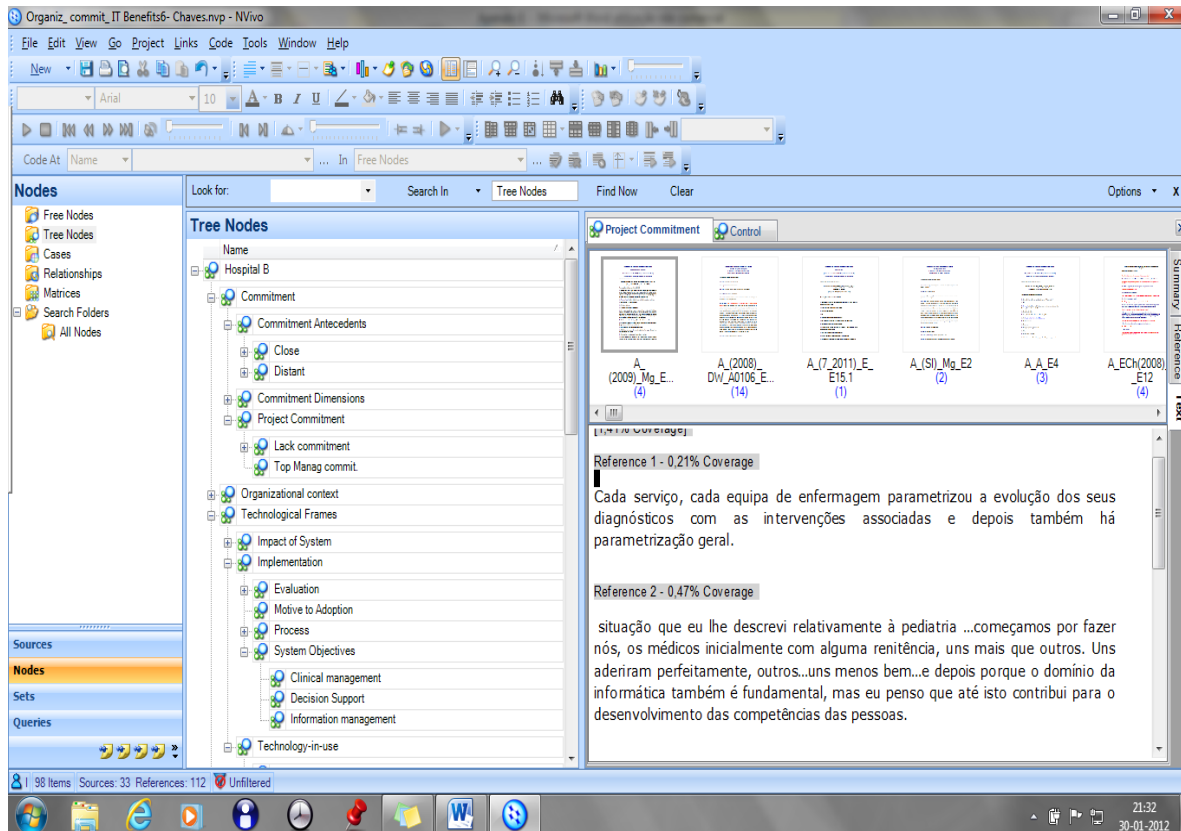
Look for: Search In Médicos Find Now Clear Options X

Médicos

Name	Nodes	References	Created O	Created By	Modified O	Modified By
Artur_Cir_6_7_11DIV_B0	0	0	20-07-2011	IRC	20-07-2011	IRC
CB_1_7_11(1)_DIV_A03	0	0	20-07-2011	IRC	20-07-2011	IRC
CB_1_7_11(2)_DIV_A03	0	0	20-07-2011	IRC	20-07-2011	IRC
JM_6_7_11DIV_B0386	0	0	20-07-2011	IRC	20-07-2011	IRC
SergioBarroso_Oncol_1_	0	0	02-06-2011	IRC	02-06-2011	IRC
SergioBarroso_Oncol2_	0	0	02-06-2011	IRC	09-05-2011	IRC
AnaDamásio_Med_DIV_	0	0	02-06-2011	IRC	02-06-2011	IRC
Artur_Cirurgal_DIV_A02	0	0	02-06-2011	IRC	02-06-2011	IRC
CardosoOliveira1_UruL_	0	0	02-06-2011	IRC	20-04-2011	IRC
CardosoOliveira_urul_2_	0	0	02-06-2011	IRC	02-06-2011	IRC
AndréSU_	0	0	02-06-2011	IRC	02-06-2011	IRC
Conceição BarataSU_D	0	0	02-06-2011	IRC	19-04-2011	IRC
Cbarata_Cv1-DIV_A019	0	0	02-06-2011	IRC	02-06-2011	IRC
Cbarata_Cv2_DIV_A019	0	0	02-06-2011	IRC	13-05-2011	IRC
Cbarata_Conv3_DIV_A0	0	0	02-06-2011	IRC	02-06-2011	IRC
Cbarata_Conv4_DIV_A0	0	0	02-06-2011	IRC	02-06-2011	IRC
Cbarata_Conv5_DIV_A0	0	0	02-06-2011	IRC	02-06-2011	IRC
Cbarata_Conv6_DIV_A0	0	0	02-06-2011	IRC	02-06-2011	IRC
Cbarata_Conv7-DIV_A0	0	0	02-06-2011	IRC	02-06-2011	IRC
Cbarata_Conv8-DIV_A0	0	0	02-06-2011	IRC	02-06-2011	IRC
Cbarata_Conv9-DIV_A0	0	0	02-06-2011	IRC	02-06-2011	IRC
Cbarata_Conv10-DIV_A	0	0	02-06-2011	IRC	02-06-2011	IRC
Helenafalcão-DIV_C006	0	0	02-06-2011	IRC	02-06-2011	IRC
Ireneia_1ª_Med_1_DIV_A	0	0	02-06-2011	IRC	02-06-2011	IRC
Ireneia_Med_1_28-DIV_A	0	0	02-06-2011	IRC	02-06-2011	IRC

81 28 Items

18:35 30-01-2012



References

- Agrawal, A., (2002). Return on investment analysis for a computerized-based patient record in the outpatient clinic settings. *Journal of Association for Academic Minority Physicians*, 13(3), 61-65.
- Aguilar-Zambrano, J. J. and Gardoni, M. (2012). An Information System to Support Problems Definition Based on Technological Frames and Organizational Routines. *International Journal of Manufacturing Technology and Management*, 22(3), 219-232.
- Akkermans, H. and Van Helden, K. (2002). Vicious and virtuous cycles in ERP implementation: a case study of interrelations between critical success factors. *European Journal of Information Systems*, 11, 35-46.
- Attewell, P. (1992). Technology diffusion and organizational learning: the case of business computing. *Organization Science*, 3 (1), 1-19.
- Bagraim, J. (2010). Multiple affective commitments and salient outcomes: The improbable case of information technology knowledge workers. *The Electronic Journal Information Systems Evaluation*, 13(2), 97-106. Available online at: www.ejise.com.
- Ball, M., Peterson, H. and Douglas J. (1999). The computerized patient record: A global view. *MD Computing*, 16(5), 40-46.
- Bartlett, K. (2001). The Relationship between training and Organizational Commitment: A study in the Health Care field. *Human Resource Development Quarterly*, 12(4), 335-352.
- Baskerville, R.L. and Myers, M.D. (2002). Information systems as a Reference Discipline. *MIS Quarterly*, 26(1), 1-14.
- Basu, V., Hartono, E., Lederer, A. and Sethi, V. (2002, May). The impact of organizational commitment, senior management involvement, and team involvement on strategic information systems planning. *Information and Management*, 39(6), 513-524.
- Bate, P., (2000). Changing the culture of a hospital: from hierarchy to networked community. *Public Administration*, 78 (3), 485- 512.
- Bates, D W., Cohen, M., Leape, L., Overhage, J., Shabot, M., and Sheridan, T. (2001). Reducing the frequency of errors in Medicine using Information Technology. *Journal of American Medical Informatics Association*, 8 (4), 229-308.
- Bates, D., Leape, L., Cullen, D., Laird, N., Petersen, L., Teich, J., Burdick, E., Hickey, M., Kleeefield, S., Shea, B., Vander, V., and Seger, D., (1998). Effect of Computerized Physician Order Entry and a team intervention on prevention of serious medication errors. *The Journal of American Medical Association*, 280(15), 1311-1316.
- Bates, D.W., (2000). Using information technology to reduce rates of medication errors in hospitals. *BMJ*, 320 (7237), 788-791.
- Baus, A., (2004, November). *Literature Review: barriers to the successful implementation of healthcare information systems*. West Virginia University Department of Community Medicine Office of Health Services Research. Available at: <http://www.hsc.wvu.edu/som/cmed/ohsr/presentations.htm>, July 2010.

- Benjamin, R., I. and Levinson Eliot (1993). A framework for managing IT-enabled change. *Sloan Management Review*, 34 (4), 23-33.
- Berg, M. (1999). Patient Care Information Systems and Health Care Work: A Sociotechnical Approach. *International Journal of Medical Informatics*, 55(2), 87-101.
- Bhaskar, R.(1989). *Reclaiming Reality*. London: Verso.
- Bhattacharjee, A. and Hikmet, N. (2007). Physicians' resistance toward healthcare information technology: a theoretical model and empirical test. *European Journal of Information Systems*, 16(6), 725–737.
- Bhattacharjee, A. and Hikmet, N. (2008). Reconceptualising organizational support and its effect on information technology usage: evidence from the health care sector. *The Journal of Computer Information Systems*, 48(4), 69-76.
- Bhattacharjee, A., Hikmet, N., Menachemi, N., Kayhan, V. and Brooks, R. (2007). The differential performance effects of Healthcare Information technology adoption. *Information Systems Management*, 24 (1), 5-14.
- Bijker W. (1995). *Of Bicycles, Bakelites, and Bulbs: Towards a Theory of Sociotechnical Change*. Cambridge, MA: The MIT Press.
- Bishop, J., Scott, K., Goldsby, M., and Cropanzano, R. (2005). A construct validity study of commitment and perceived support variables: A Multifoci Approach across Different Team Environments. *Group Organization Management*, 30(2), 153-180.
- Blakie, N. (1993). *Approaches to Social Enquiry*. Cambridge: Polity Press.
- Boland, R. J. (1991). Information System Use as a Hermeneutic Process, In Nissen, Klein, and R. A. Hirschheim (eds.), *Information Systems Research: Contemporary Approaches and Emergent Traditions*, H-E. Amsterdam, 439–464.
- Brailer, D. (2004). Translating Ideals for HIT into Practice. *Health Affairs*, 4, 318-320.
- Brockner, J., Spreitzer, G., Mishra, A., Hochwarter, W., Pepper, L., Weinberg, J. (2004, March). Perceived control as an Antidote to the negative effects of layoffs on survivors' Organizational Commitment and job performance. *Administrative Science Quarterly*, 49 (1), 76-100.
- Bryant, S., Moshavi, D. and Nguyen, T. (2007). A field study on organizational commitment, professional commitment and peer mentoring. *Database for Advances in Information Systems*, 38 (2), 61-74.
- Burrell, G. and Morgan, G. (1979). *Sociological Paradigms and Organizational Analysis*. London: Heinemann.
- Burton, L., Anderson G., Kues I. (2004). Using health records to help coordinate care. *The Milbank Quarterly*, 82(3), 457-481.
- Caldeira, M. (2000). Critical realism: A philosophical perspective for case study research in management studies. *Episteme*, Ano II (5-6), 73-88.
- Caldeira, M. and Ward, J. (2003). Using resource-based theory to interpret the successful adoption and use of information systems and technology in manufacturing small and medium-sized enterprises. *European Journal of Information Systems*, 12(2), 127–141.
- Caldeira, M., and Romão, M. (2002). Estratégias de investigação em Sistemas de Informação organizacionais: A utilização de métodos qualitativos. *Estudos de Gestão - Portuguese Journal of Management Studies*, 7(1), 77-97.

- Caldeira, M., Quaresma, R. Quintela, H. and Serrano, A. (2010). Avaliação de benefícios com a implementação de um sistema de informação *paper-free* no Hospital do Espírito Santo. CAPSI - 10ª Conferência da Associação Portuguesa de Sistemas de Informação.
- Carapinheiro, G., (1998). *Saberes e poderes no hospital: Uma sociologia dos serviços hospitalares*. 3ª Ed. Porto: Edições Afrontamento.
- Carpenter, D. (2005). Spending spree. Big HIT: Health information technology enjoys a growth spurt; still coming up short. *Hospitals & Health Networks*. Accessed July 25, 2007
at:http://www.hhnmag.com/hhnmag_app/jsp/articledisplay.jsp?dcrpath=HHNMAG/NewsArticle/data/0505HHN_FEA_Finance_Supplement_Story1&domain=HHNMAG.
- Casedesus, M., and Karapetrovic, S. (2005). *The erosion of ISO 9000 benefits: a temporal study*. *International Journal of Quality and Reliability Management*, 22(2), 120-136.
- Cavaye, A. and Cragg, P.(1995). Factors contributing to the success of customer-oriented interorganizational systems. *Journal of Strategic Information systems*, 4, 13-30.
- Chen, WenShin and Hirschheim Rudy (2004). A paradigmatic and methodological examination of information systems research from 1991 to 2001. *Information Systems Journal*, 14(3), 197–235.
- Chertow, G., Lee, J., Kuperman, G., Burdick, E., Horsky, J., Seger, D., Lee, R., Mekala, A., Song, J., Komaroff, A. and Bates, D. (2001). *Guided medication dosing for inpatients with renal insufficiency*. *The Journal of American Medical Association*, 286 (22), 2839-2844.
- Chiasson, M. and Davidson, E. (2004). Pushing the contextual envelope: developing and diffusing the theory for health information systems research. *Information and Organization*, 14(3), 155–183.
- Cho S. (2007). *A contextualist approach to telehealth innovations*. Unpublished Ph.D Thesis. Georgia State University.
- CHTMAD (2009, July). O chtmad em revista. *Journal of CHTMAD*, 2, 1-214.
- Chwelos, P. Benbasat, I., and Dexter, A., (2001). Research Report: Empirical test of an EDI Adoption Model. *Information System Research*, 12(3), 304-321.
- Coetsee, L. (1999). From resistance to commitment. *Public Administration Quarterly*, 23(2), 204-222.
- Coleman, D., Irving, G., and Cooper, C., (1999). Another look at the Locus of control-organizational commitment relationship: It depends on the form of commitment. *Journal of Organizational Behavior*, 20(6), 995-1001.
- Darke, P., Shanks, G., and Broadbent, M. (1998). Successfully completing case study research: combining rigour, relevance and pragmatism. *Information Systems Journal*, 8(4), 273-289.
- Davidson, E. (2002). Technology frames and framing: A socio-cognitive investigation of requirements determination. *MIS Quarterly*, 26(4), 329-358.
- Davidson, E. (2006, Mar). A Technological frames perspective on Information Technology and organizational change. *The Journal of Applied Behavioral Science*, 42(1), 23-39.

- Davidson, E. and Chiasson, M. (2005). Contextual influences on technology use mediation: a comparative analysis of electronic medical record systems. *European Journal of Information Systems*, 1(14), 6–18.
- Davidson, E. and Chismar, W. (2007, *December*). The interaction of institutionally triggered and technology-triggered social structure change: an investigation of computerized physician order entry. *MIS Quarterly*, 31 (4), 739-758.
- Davis, F.D., Bagozzi, R.P. and Warshaw, P.R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science* 35(8), 982-1003
- Dearing, B., (1990, Jan/Feb). The strategic benefits of EDI. *The Journal of Business Strategy*, 11(1), 4-6.
- Dent, E. and Goldberg, S. (1999). Challenging resistance to change. *The Journal of Applied Behavioral Science*, 35(1), 25-42.
- Denzin, Norman K. and Lincoln Yvonna, S. (2011). The discipline and practice of Qualitative Research. In N. Denzin and Y. Lincoln, S. (Eds.), *The Sage Handbook of Qualitative Research*. 4th Edition. Thousand Oaks, California: Sage Publications, Inc., 1-32.
- Dexter, P., Perkins, S., Maharry, K., Jones, K., McDonald, C., (2004). Inpatient computer based standing orders vs. physician reminders to increase influenza and pneumococcal vaccination rates: a randomized trial. *The Journal of American Medical Association*, 292 (23), 66-71.
- Dhillon, G. (2004). Dimensions of power and IS implementation. *Information and Management*, 41(5), 635-644.
- Dhillon, G. (2005). Gaining benefits from IS/IT implementation: interpretations from case studies. *International Journal of Information Management*, 25(6), 502-515.
- Doherty, Neil F. and King, Malcolm (2005). From technical to socio-technical change: tackling the human and organizational aspects of systems development projects. *European Journal of Information Systems*, 14(1), 1–5.
- Doolin, B. (1996). Alternative views of case research in information systems. *Australian Journal of Information systems*, 3(2), 21-29.
- Doolin, B. (2004). Power and resistance in the implementation of a medical management information system. *Information Systems Journal*, 14(4), 343-362.
- Dubé, L., and Paré, G., (2003). Rigor in information Systems positivist case research: current practices, trends, and recommendations. *MS Quarterly*, 27 (4), 597-636.
- Eisenhardt, K., (1989). Building Theories from Case Study Research. *Academy of Management Review*, 14 (4), 532-550.
- Engel, Gloria V. (1970). Professional autonomy and bureaucratic organization. *Administrative Science Quarterly*, 15(1), 12-21.
- Erstad, T. (2003). Analysing computer based patient records: a review of literature. *Journal of Healthcare Information Management*, 17(4), 51-57.
- Etzione, A. (1961). *A comparative analysis of complex organizations*, New York, Free Press.
- Evans, R., Pestotnik, S., Classen, D., and Burke, J. (1999). Evaluation of a computer assisted antibiotic-dose monitor. *Ann Pharmacother*, 33, 1026-1031.

- Fedor, D.B. and Herold, D.M. (2004). Effects of change and change management on employee responses: an overview of results from multiple studies, In *Proceedings of the PATPI 2004 Fall Technical Conference: Engineering, Pulping and PCE&I*, Atlanta, GA.
- Felt-Lisk, Suzanne (2006, May). Trends IN HEALTH CARE QUALITY: New Hospital Information Technology: Is It Helping to Improve Quality? *Mathematica Policy Research, Inc*, 3, 1- 4. Available in: <http://www.mathematica-mpr.com/publications/PDFs/newhospinfo.pdf>.
- Feng Li (2007). Editorial:E-Business and Information Systems Research - Towards a common research agenda. *Int. Journal of Business Science and Applied Management*, 2(3), 1-3.
- First Consulting Group, (2001). E-prescribing. *California Healthcare Foundation*, 1-44
- Fitzgerald, G. and Russo, N. (2005). The turnaround of the London Ambulance Service Computer- Aided Despatch System. *European Journal of Information Systems*, 14(3), 244-257.
- Flick, U. (2002). “An introduction to qualitative research”. 2nd ed. London: Sage.
- Fowler, J., and Horan, P. (2007). Are Information Systems’ success and failure factors related? An exploratory study. *Journal of Organizational and End User Computing*, 19(2), 1-22.
- Freidson, E. (1984).The changing nature of professional control. In Ralph H. Turner and James F. Short, Jr. (Eds.), *Annual Review of Sociology*, 10, 1-20, Palo Alto, CA: Annual Reviews.
- Galliers, R.D. (1991) Choosing appropriate information systems research approaches: A revised taxonomy. In: H-E, Nissen, H. Klein and R. Hirschheim, (Eds), (1991)..*Information Systems Research: Contemporary Approaches and Emergent Traditions*, 327–345.Elsevier Science Publishers, North Holland.
- Gans, D., Kralewski, J., Hammons, T. and Dowd, B. (2005) Medical groups’ adoption of electronic health records and information systems. *Health Affairs*, 24(5), 1323–1333.
- Gasson, S. (2004). *Rigor in Grounded Theory Research: An Interpretive Perspective on Generating Theory from Qualitative Field Studies*. In M. Whitman and A. Woszczyński (2004). *The Handbook of Information Systems Research*. Hershey PA.USA: Idea Group Publishing, 349 pp.
- Gellatly, I., Meyer, J., and Luchak, A. (2006). Combined effects of the three components of commitment on focal and discretionary behavior: A test of Meyer and Herscovitch’s propositions. *Journal of Vocational Behavior*, 69(2), 331–345.
- Glanz, K. and Rimer, B. (2005) *Theory at a Glance: A Guide for Health Promotion Practice*. 2nd Edition. U.S. Department of health and human services. National Institutes of Health. Available at: <http://www.cancer.gov/cancertopics/cancerlibrary/theory.pdf>.
- Glaser, B.G. (1992). *Basics of Grounded Theory Analysis, Emergence vs. Forcing*. Mill Valley, CA: Sociology Press.
- Gregor, Shirley (2006). The Nature of Theory in Information Systems. *MIS Quarterly*, 30 (3), 611-642.
- Guba, E., and Lincoln, Y. (1994). Competing Paradigms in Qualitative Research. In N.K. Denzin, and. Y.S. Lincoln (Eds.) (1994). *Handbook of Qualitative Research*, Thousand Oaks, CA: Sage, 105-117.

- Guba, E.G., and Lincoln, Y.S. (1998). Competing Paradigms in Qualitative Research. In N.K. Denzin, and Y.S. Lincoln (eds.), (1998). *Handbook of Qualitative Research*. 2ed., Thousand Oaks, CA: Sage, 195-220.
- Hackman, J. Richard, and Oldham, Greg R. (1980). *Work Redesign*. Reading, MA: Addison-Wesley.
- Hall, R. H. (1999). *Organizations: Structures, Processes, and Outcomes* (7th ed.), Upper Saddle River, NJ: Prentice Hall.
- Harris, S.E., and Katz, J.L. (1991). Organizational performance and information technology investment intensity in the insurance industry. *Organization Science*, 2 (3), 263-296.
- Herscovitch, L., and Meyer, J. P. (2002). Commitment to organizational change: Extension of a three component model. *Journal of Applied Psychology*, 87, 474-487.
- Hersh, WR (2002). Medical Informatics: Improving Healthcare through Information. *The Journal of American Medical Association*, 288 (16), 1955-1958.
- Highsmith, J. (2006). The Chaos Report- Reality Challenged. Guest Articles. Available at: http://www.maxwideman.com/guests/chaos_report/intro.htm.
- Hikmet, N., Bhattacharjee, A., Menachemi, N., Kayhan, V., and Brooks, R. (2008). "The role of organizational factors in the adoption of healthcare information technology in Florida hospitals". *Health Care Management Science*, 11(1), 1-9.
- Hillestad, R., Bigelow, J., Bower, A., Girosi, F., Meili, R., Scoville, R. and Taylor, R. (2005). Can Electronic Medical Record systems transform health care? Potential health benefits, savings, and costs. *Health Affairs*, 24(5), 1103- 1117.
- HIMSS ANALYTICS (2007) Essentials of the US hospital IT market: Introduction HIMSS Analytics Report, Chicago, IL. Available at: http://www.himssanalytics.org/docs/e07_chapterintro.pdf.
- Hofer, Timothy P., Kerr, Eve A., Hayward, Rodney A. (2000, Nov./Dec.). What is an Error? *Effective Clinical Practice*. Available at: http://www.acponline.org/clinical_information/journals_publications/ecp/novdec00/hofer.html
- Holstein, J.A. and Gubrium, J.F. (2004). The active interview. In David Silverman (2004). (Eds). *Qualitative Research: Theory, Method and Practice*. London: Sage.
- Huberman, A. M. and Miles, M.B. (1994). Data management and analysis methods. In N. Denzin and Y. Lincoln (Eds.), *Handbook of qualitative research*. Thousand Oaks: Sage Publications Ltd.
- Igbaria, M. and Guimarães, T. (1993). Antecedents and consequences of job satisfaction among Information Center employees. *Journal of Management Information Systems*, 9 (4), 321-330.
- Igbaria, M. and Siegel, S. (1992). An Examination of the Antecedents of Turnover Propensity of Engineers: An Integrated Model, *Journal of Engineering and Technology Management*, 9, 101-126.
- Iivari, J., Hirschheim, R., and Klein, H. (1998). A Paradigmatic Analysis Contrasting Information Systems Development Approaches and Methodologies. *Information Systems Research*, 9 (2), 164-193.
- Institute of Medicine (IOM) (2001), *Crossing the Quality Chasm: The IOM Health Care Quality Initiative*. The National Academies Press.

Jacobs, A., Kelly, K., Valenziano, C., Chevinsky, A. H., Pawar, J. and Jones, C. (2000). Cost saving associated with changes in routine laboratory tests ordered for victims of trauma. *The American Surgeon*, 66 (6), 579-585.

James, A. (1994). *Managing to care*. London: Longman.

Jarvenpaa, S.L. and Ives, B. (1991, June). Executive involvement and participation in the management of Information Technology. *MIS Quarterly*, 15(2), 205-227.

Jaspersen, J., Carte, T., Saunders, C., Butler, B., Croes, H., and Zheng, W. (2002). Review: power and information technology research: A metatriangulation review. *MIS Quarterly*, 26(4), 397-459.

Jensen, T. B. and Aanestad, M. (2007). Hospitality and hostility in hospitals: a case study of an EPR adoption among surgeons. *European Journal of Information Systems*, 16(6), 672-680.

Jiang, J.J. and Klein, G. (1999). Risks to different aspects of system success. *Information & Management*, 36 (5) 263-272.

Jiménez-Martínez, J., Polo-Redondo, Y., (2004). *The influence of EDI adoption over its perceived benefits*. *Technovation*, 24(1), 73-79.

Johnston, D., Pan, E., Middleton, B., Walker, J. and Bates, D.W., (2003). *The value of computerized provider order entry in ambulatory settings*. Center for Information Technology Leadership (CITL).

Johnston, D., Pan, E. and Middleton, B. (2002). Finding the value in healthcare information technologies. In *Center for IT Leadership. Partners HealthCare*. Boston, MA, <http://www.citl.org/findingTheValue.pdf>, Retrieved January 6, 2007.

Joshi, K. (1991, June). A model of Users' perspective on change: the case of Information Systems Technology implementation. *MIS Quarterly*, 15(2), 229-242.

Jung, So-Ra (2006). *The perceived benefits of Healthcare information technology adoption: Construct and Survey Development*. Thesis, Louisiana State University and Agricultural and Mechanical College, B.S. Dankook University, 2003, 1-73.

Jurison, J. (1996). Toward more effective management of information technology benefits. *Journal of Strategic Information Systems*, 5(4), 263-274.

Kaihara S. (1998). Realization of the Computerized Patient Record: Relevance and Unsolved Problems. *International Journal of Medical Informatics*, 49(1), 1-8.

Keen, Peter G. W. (1981). Information Systems and Organizational Change. *Communications of the ACM*, 24 (1), 24-33.

Klein, H. and Myers, M. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly*, 23(1), 67-94.

Klein, H., Hirschheim, R. and Nissen, H-E. (1991) 'A Pluralist Perspective of the Information Systems Research Arena' In H-E. Nissen *et al.*, (eds.) *Information Systems Research: Contemporary Approaches and Emergent Traditions*, Proceedings of IFIP TC8/WG 8.2 Conference, Denmark 1990, Elsevier, North Holland, 1-26.

Kling R. (1980). Social analyses of computing: theoretical perspectives in recent empirical research. *ACM Computing Surveys*. 12 (1), 61-110.

Kohn, L.T., Corrigan, J.M. and Donaldson, M.S. (Eds) (1999). *To Err is Human Building a Safer Health System*. Committee on Quality of Health Care in America. Institute of Medicine, Washington, DC: National Academy Press.

- Kuhn, T. (1970) *The Structure of Scientific Revolution*, 2nd ed., Chicago: University of Chicago Press.
- Kumar, K., van Dissel, H., Bielli, P., (1998, June). The merchant of Prato—Revisited: toward a third rationality of information systems. *MIS Quarterly*, 22(2), 199–226.
- Kuperman, G., Teich J., Tanasijevic M., Ma'Luf, N., Rittenberg, E., Jha. *et al.*, (1999, Nov–Dec). Improving *response to critical laboratory results with automation: results of a randomized controlled trial*. *Journal of American Medical Informatics Association*, 6(6): 512–522.
- Lacity, M., Iyer, V. and Rudramuniyaiah, P. (2008). Turnover intentions of Indian IS professionals. *Information Systems Frontiers*, 10 (2), 225-241.
- Lapointe, L. and Rivard, S. (2005, September). A multilevel model of resistance to information technology implementation. *MIS Quarterly*, 29(3), 461-491.
- Lapointe, L. and Rivard, S. (2006, May). Getting physicians to accept new information technology: insights from case studies. *Canadian Medical Association Journal (CMAJ)*, 174(11), 1573-1578.
- Lau, F. and Herbert, M. (2001). Experiences from health information system implementation projects reported in Canada between 1991 and 1997. *Journal of End User Computing*, 13, (4), 17-25.
- Lauer, Thomas and Rajagopalan, Balaji (2003, November). Conceptualization of user acceptance and resistance in system implementation research: A re-examination of Constructs, *Working Paper*, 1-31.
- Leana, C. and Barry, B., (2000). Stability and change as simultaneous experiences in organizational life. *Academy of Management Review*, 25 (4), 753-59.
- Leapfrog Group (2006). *The Leapfrog Group Hospital Quality and Safety Survey What's New in the 2006 Survey*. Available at: <https://leapfrog.medstat.com/pdf/final.pdf>.
- Lee, A. (1991). Integrating positivist and interpretive approaches to organizational research. *Organization Science*, 2(4), 342-365
- Lee, A. (2001). Editorial *MIS Quarterly*, 25(1), iii-vii.
- Lee, A. S. (1989, Mar). A Scientific Methodology for MIS Case Studies. *MIS Quarterly*, 13 (1), 33-50.
- Lee, A. S., and Baskerville, R. L. (2003). Generalizing Generalizability in Information Systems Research. *Information Systems Research*, 14 (3), 221-243.
- Lee, T., Ashford, S., Walsh, J. and Mowday, R. (1992). Commitment propensity, organizational commitment and voluntary turnover: A longitudinal study of organizational entry processes. *Journal of Management*, 18 (1), 15-32.
- LeRouge, Cynthia, Mantzana, Vasiliki and Wilson, E. Vance (2007). Healthcare information systems research, revelations and visions. *European Journal of Information Systems*, 16(6), 669–671.
- Lin, A. and Cornford, T. (2000). Framing implementation management. Proceedings: ICIS '00 of the twenty first international conference on Information systems, Association for Information Systems Atlanta, 197–205.
- Lin, A. and Silva, L. (2005). The social and political construction of technological frames. *European Journal of Information Systems*, 14(, 49–59.

- Lin, C. and Pervan, G. (2003). The practice of IS/IT benefits management in large Australian organizations. *Information and Management*, 41(1), 13–24.
- Linberg, K. R. (1999). Software developer perceptions about software project failure: a case study. *The Journal of Systems and Software*, 49 (2-3), 177-192.
- Lorenzi, N., Riley, R., Blyth, A., Southon, G. and Dixon, B. (1997). Antecedents of the people and organizational aspects of medical informatics. *Journal of American Medical Informatics Association*, 4(2), 79-93.
- Lum, L., Kervin, J., Clark, K., Reid, F. and Sirola, W. (1998, May). Explaining Nursing turnover intent: job satisfaction, pay satisfaction, or Organizational Commitment? *Journal of Organizational Behavior*, 19(3), 305-320.
- Mahesh S., Tan, E-Lin, Untama, J., Weiershaus, H., Levermann, T. and Verdeflor, N. (2005). CRM Systems in German Hospitals: illustrations of issues & trends. *Journal of Cases on Information Technology*, 7 (4), 1-26.
- Mantzana V, Temistocleous M, Irani Z and Morabito V (2007). Identifying healthcare actors involved in the adoption of information systems. *European Journal of Information Systems*, 16(01), 91–102.
- Marakas, G. M., and Hornik, S. (1996). Passive resistance misuse: overt support and covert recalcitrance in IS implementation. *European Journal of Information Systems*, 5(3), 208-220.
- Marchal, B., Dedzo M. and Kegels, G.(2010). A realist evaluation of the management of a well-performing regional hospital in Ghana. *BMC Health Services Research*, 10(24), 1-14
- Marietti C. (1998, May). Will the Real CPR/EMR/HER Please Stand Up. *Health Informatics Online* [serial online]. Available at: http://www.healthcareinformatics.com/issues/1998/05_98/cover.htm. Accessed October 2006.
- Markus, M. (1983, June). Power, politics, and MIS implementation. *Communications of the ACM*, 26(6), 430-444.
- Markus, M. (2004). Technochange management: using IT to drive organizational change. *Journal of Information Technology*, 19(1), 4-20.
- Markus, M., Axline, S., Petrie, D., Tanis, C., (2000). Learning from adopters' experiences with ERP: problems encountered and success achieved. *Journal of Information Technology*, 15 (4), 245–265.
- Martin, J., Avant, R., Bowman, M., Bucholtz, J., Dickinson, J., Evans, K., Green, L., Henley, D., Jones, W. *et al.*, (2004) .The Future of Family Medicine: A Collaborative Project of the Family Medicine Community. *Annals of Family Medicine*, 2(1), S3–S32.
- Martinko, M., Henry, J. and Zmud, R. (1996). An attributional explanation of individual resistance to the introduction of Information Technologies in the workplace. *Behaviour & Information Technology*, 15(5), 313-330.
- McElroy, J. (2001). Managing Workplace Commitment by putting the people first. *Human Resource Management Review*, 11, 327-335.
- McGrath, K. (2002). The Golden Circle: a way of arguing and acting about technology in the London Ambulance Service. *European Journal of Information Systems*, 11(4), 251-266.

- Mckee, M. and Healy J., (2000). The Role of the hospital in a changing environment. *Bulletin of the World Health Organization (WHO)*, 78(6), 803-810.
- Mckee, M. and Healy J., (2002). The significance of hospitals: an introduction. In Martin M. and Healy J. (Eds.), *Hospitals in a Changing Europe*, eds. Copenhagen: European Observatory on Health Care Systems, WHO Regional Office for Europe, 3-13.
- Mehrtens, J., Cragg, P. and Mills, A. (2001). A Model of Internet adoption by SME's. *Information and Management*, 39(3), 165-176.
- Menachemi, N., and Brooks, R., (2006). Reviewing the benefits and costs of electronic health records and associated patient safety technologies. *Journal of Medical Systems*, 30(3), 159-168.
- Menon, N. M., B. Lee, and Eldenburg, L. (2000). Productivity of information systems in the healthcare industry. *Information Systems Research*, 11(1) 83-92.
- Mertens, D.M. 1998. *Research Methods in Education and Psychology: Integrating Diversity with Quantitative and Qualitative Approaches*. Thousand Oaks: Sage Publications.
- Meyer, J. P., and Allen, N. J. (1997). *Commitment in the Workplace: Theory, Research, and Application*. Thousand Oaks, CA: Sage Publications.
- Meyer, J., Stanley, D., Herscovitch, L., and Topolnytsky, L. (2002). Affective, Continuance, and Normative Commitment to the Organization: A Meta-analysis of antecedents, correlates, and consequences. *Journal of Vocational Behavior*, 61(1), 20-52.
- Meyer, J.P. and Allen, N.J. (1991). A three-component conceptualization of organizational commitment. *Human Resource Management Review*, 1 (1), 61-89.
- Meyer, J.P. and Herscovitch, L. (2001). Commitment in the workplace: toward a general model. *Human Resource Management Review*, 11(3), 299-326.
- Meyer, J., Srinivas, E., Lal, J. and Topolnytsky, L. (2007). Employee commitment and support for an organizational change: Test of the three-component model in two cultures. *Journal of Occupational and Organizational Psychology*, 80(2), 185-211
- Miles, M.B. and Huberman, A.M. (1994) *Qualitative Data Analysis: An Expanded Sourcebook*, (2nd. Edition), Thousand Oaks, CA: Sage Publications.
- Miller, R., Sim, I. and Newman, J. (2003). *Electronic medical records: lessons from small physician practices*. California Healthcare Foundation. Available at: <http://www.chcf.org/documents/ihealth/EMRLessonsSmallPhysicianPractices.pdf>.
- Milliken, J. (2001). Qualitative research and marketing management. *Management Decision*, 39(1), 71-77.
- Mingers, J. (2001). Combining IS Research Methods: Towards a Pluralist Methodology. *Information Systems Research*, 12(3), 240-259.
- Mingers, J. (2003) The paucity of multimethod research: a review of the information systems literature. *Information Systems Journal*, 13(3), 233-249.
- Mingers, J. (2004). Realizing information systems: critical realism as an underpinning philosophy for information systems. *Information and Organizational*, 14 (2), 87-103.
- Ministério da Saúde (2003). Decreto-lei n.º 188/2003 de 20 de Agosto. Lisboa: Diário da República, 191, 5219-5230.

Mintzberg, H. (1981). *The structuring of organizations. A synthesis of the research*. Englewood Cliffs: Prentice-Hall.

Myers, M. D. (1994). A Disaster for everyone to see. An interpretive analysis of a failed IS project. *Accounting Management and Information Technology*, 4(4), 185-201.

Myers, M. D. (1995) Dialectical hermeneutics: A theoretical framework for the implementation of Information Systems. *Information Systems Journal*, 5(1), 51-70.

Myers, M. D. (1997) Qualitative Research in Information Systems, *Management Information Systems Quarterly*, 21(2), 221-242.

NCDP (National Commission for data Protection). (2011). Attributions and competences. Available at: <http://www.cnpd.pt/bin/cnpd/acnpd.htm>.

Nelson, R.L., and Trubek, D.M. (1992) Arenas of professionalism: The professional ideologies of lawyers in context. In Robert L. Nelson, David M. Trubek, and Rayman L. Solomon (eds.), *Lawyers' Ideals/Lawyers' Practices: Transformations in the American Legal Profession*: 177-214. Ithaca, NY: Cornell University Press.

Newman, M. and Sabherwal, R. (1996, March). Determinants of Commitment to Information Systems development: A longitudinal investigation, *MIS Quarterly*, 20(1), 23-54.

OCDE (2007). *Health at a Glance 2007: OECD indicators*. Available at: <http://puck.sourceoecd.org/vl=6176871/cl=13/nw=1/rpsv/health2007/index.htm>.

OECD (2011), *Health at a Glance 2011: OECD Indicators*, OECD Publishing. http://dx.doi.org/10.1787/health_glance-2011-en.

Orlikowski W.J. and Robey, D. (1991). Information Technology and the structuring of organizations. *Information Systems Research*, 2(2), 143-169.

Orlikowski, W. and Gash, D.C (1991). Changing frames: understanding technological changes in organizations. *Working Paper*, 236, Cambridge, MA: Massachusetts Institute of Technology.

Orlikowski, W. J., and Baroudi, J. J. (1991). Studying Information Technology in organizations: Research Approaches and Assumptions. *Information Systems Research*, 2 (1), 1-28.

Orlikowski, W.J (1993). CASE tools as organizational change: Investigating incremental and radical changes in systems development. *MIS Quarterly*, 17(3), 309–340.

Orlikowski, W.J and Gash, DC (1994). Technological frames: making sense of information technology in organizations. *ACM Transactions on Information Systems*, 12(2), 174–207.

Orlikowski, W.J. (2000). Using technology and constituting structures: A practice lens for studying technology in organizations. *Organization Science*, 11(4), 404-428.

Ovaska, P., Rossi, M., and Smolander, K. (2005). Filtering, negotiating and shifting in the understanding of information system requirements. *Scandinavian Journal of Information Systems*, 17(1), 31-66.

Overhage, J. M., Tierney, W. M., McDonald, C. J., (1996). Computer reminders to implement preventive care guidelines for hospitalized patients. *Archives of Internal Medicine*, 156 (15), 51-56.

- Paré, G., Tremblay, M., Lalonde, P. (2000). The impact of Human Resources Practices on IT personnel commitment: Citizenship Behaviors and Turnover Intentions. *Proceedings of the ICIS Conference*, Brisbane, Austrália, 461-466.
- Paré, G., Tremblay, M., Lalonde, P. (2001). Workforce retention: what do IT employees really want? In *Proceedings of the ACM Special Interest Group on Computer Personnel Research*. New York. ACM Press, 1-10.
- Patton, M. Q. (2002). *Qualitative research and evaluation methods*. (3rd ed.), Thousand Oaks, CA: Sage Publications.
- Peppard, J., Ward, J. and Daniel, E. (2007). Managing the Realization of Business Benefits from IT investments. *MIS Quarterly Executive*, 6(1), 1-10.
- Pettigrew, A. M. (1985). *The awakening giant: continuity and change in ICI*. Oxford: Blackwell.
- Polit, D., Hungler, B. (1995). *Fundamentos de Pesquisa em Enfermagem*. 3ª Ed. Porto Alegre: Artes Médicas.
- Poon, E.G., Blumenthal, D., Jaggi, T., Honour M.M., Bates, D.W. and Kaushal, R. (2004). Overcoming barriers to adopting and implementing computerized physician order entry systems in U.S. hospitals. *Health Affairs*, 24(4), 184–190.
- Porter, M. and Teisberg, O. (2004). Redefining competition in health care. *Harvard Business Review* 82(6), 65–76.
- Punch, K. F. (2000). *Developing Effective Research Proposals*. London: Sage Publications.
- Quinn, J. B., Anderson, P. and Finkelstein, S. (1996). Leveraging intellect. *Academy of Management Executive*, 10(3), 7-27.
- RAND Health (2005). “*Extrapolating evidence of health information technology savings and costs*”. RAND Corporation, US.
- Rashbass J. (2001). The Patient-owned, Population-Based Electronic Medical Record: A revolutionary resource for Clinical Medicine. *The Journal of American Medical Association*, 285(13), 1769.
- Reardon, J. and Davidson, E. (2007). An organizational learning perspective on the assimilation of electronic medical records among small physician practice. *European Journal of Information Systems*, 16(6), 681–694.
- Riemenschneider, C., Hardgrave, B., Davis, F. (2002, Dec.). Explaining software developer acceptance of methodologies: a comparison of five theoretical models. *IEEE Transactions on Software Engineering*, 28(12), 1135-1145.
- Robey, D., Ross, J., Boudreau, M. (2002). Learning to implement enterprise systems: an exploratory study of the dialectics of change. *Journal of Management Information Systems*, 19(1), 17–46.
- Sabherwal R., Sein M., Marakas G. (2003). Escalating commitment to information system projects: findings from two simulated experiments. *Information and Management*, 40(8), 781–798.
- Salami, S. O. (2008). Demographic and psychological factors predicting organizational commitment among Industrial workers. *Anthropologist*, 10(1), 31-38.

Schriger, D., Baraff, L., Buller, K., *et al.*, (2000). Implementation of clinical guidelines via computer charting system: effect on the care of febrile children less than three years of age. *Journal of American Medical Informatics Association*, 7(2), 186-195.

Schwandt, I. A. (1994). "Constructivist, Interpretivist Approaches to Human Inquiry," In N. Denzin and Y. Lincoln (1994) (Eds.). *Handbook of Qualitative Enquiry*, Thousand Oaks, CA: Sage, 118-137.

Sedera, D., Rosemann, M., and Gable, G. (June, 2001). Using performance measurement models for benefit realization with enterprise systems -The Queensland government approach [case study]. In proceedings of *The 9th European Conference on Information Systems*, Bled, Slovenia, 837-847.

Seidman, Irving (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. 3rd edition, New York, NY: Teachers College Press, Columbia University.

Shang, S. and Seddon, P. (2002). Assessing and managing the benefits of enterprise systems: the business manager's perspective. *Information System Journal*, 12(4), 271-299.

Shoemaker, M. (2001). A framework for examining IT-enabled market relationships. *Journal of Personal Selling and Sales Management*, 21 (2), 77-85.

Shum, P., Bove, L. and Auh, S. (2008). Employees' affective commitment to change. The key to successful CRM implementation. *European Journal of Marketing*, 42 (11/12), 1346-1371.

Silverman, D. (1998). Harvey Sacks: Social science and conversation analysis. Cambridge: Polity

Silverman, D., (2006). *Interpreting Qualitative Data*. Third Edition. London: Sage Publications, Ltd

Silverman, D., (2009). *Doing Qualitative Research* . Third Edition. London: Sage Publications, Ltd.

Simões, Jorge (2004). *Retrato Político da Saúde. Dependência do percurso e Inovação em Saúde: Da Ideologia ao Desempenho*. Coimbra: Almedina.

Slack, W.V. (2001). *Cybermedicine: How Computing Empowers Doctors and Patients for Better Health Care*. New York: John Wiley & Sons, Inc.

Smith, J. A., Flowers, P. and Larkin, M. (2009). *Interpretive Phenomenological Analysis: Theory, Method and Research*. 1st Edition. London: Sage Publications.

Staples, D., Wong, I., and Seddon, P. B., (2002). Having expectations of information systems benefits that match received benefits: does it really matter? *Information and Management*, 40(2), 115-131.

Staw, B.M. and Ross, J. (1987). Understanding Escalation Situations: Antecedents, Prototypes, and Solutions", In B. Staw and L. Cummings (eds.) (1987). *Research in Organizational Behavior*, Greenwich, CT: JAI Press, 39-78.

Stone, R. and Henry, J. (2003, Jan-Mar). The roles of computer self-efficacy and outcome expectancy in influencing the computer and user's organizational commitment. *Journal of End User Computing*, 15(1), 38-53.

Strauss, A. L., and Corbin, J. (1998) *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. 2nd. Edition, Newbury Park, CA: Sage Publications.

- Sumner, M., (2000). Risk factors in enterprise-wide/ERP projects. *Journal of Information Technology*, 15(4) 317–327.
- Swales, S. (2004). Commitment to change: Profiles of commitment and in-role performance. *Personnel Review*, 33 (2), 187-204.
- Swanson, E. and Ramiller, N. (1997). The organizing vision in information systems innovation. *Organization Science*, 8(5), 458-474.
- Symons, V. J. (1991). A Review information systems evaluation: content, context and process, *European Journal of Information Systems*, 1 (3), 205-212.
- Thatcher, Jason B., Stepina, Lee P., Boyle, Randall J. (2002 / 03). Turnover of Information Technology Workers: Examining Empirically the Influence of Attitudes, Job Characteristics, and External Markets. *Journal of Management Information Systems*, 19, (3), 231 – 261.
- The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) (2005). NCCMERP: *The First Ten years. Defining the Problem and Developing Solutions*. Available at: <http://www.nccmerp.org/pdf/reportFinal2005-11-29.pdf>.
- The Standish Group International (1994). The Chaos report. Available at: <https://www.ibv.liu.se/content/1/c6/04/12/28/The%20CHAOS%20Report.pdf>.
- The Standish Group International (1995). The Chaos Report. The Standish Group Report Chaos. Available at: <http://www.projectsmart.co.uk/docs/chaos-report.pdf>.
- Tolbert, P.S., and Stern, R.N. (1991). Organizations of professionals: Governance structures in large law firms. In Pamela Tolbert, and Stephen, Barley, R. (eds.), *Research in the Sociology of Organizations*, 8, 97-117. Greenwich, CT: JAI Press.
- Trauth, E. and Jessup, L. (2000). Understanding computer- mediated discussions: positivist and interpretive analyses of group support system use. *MIS Quarterly*, 24(1), 43–79.
- Tu, Q., Ragunathan, B. and Ragunathan, T. (2001, Jul-Sep). A path analytic study of the antecedents of organizational commitment of IS managers. *Information Resources Management Journal*, 14(3), 27-36.
- Tyre, M.J. and Orlikowski, W.J. (1994, February). Windows of Opportunity: Temporal Patterns of Technological Adaptation in Organizations. *Organization Science*, 5(1), 98-118
- Ury, W., Brett, J. and Goldberg, S. (1993). *Getting disputes resolved*. San Francisco: Jossey – Bass.
- Valéau, P., Mignonac, K., Vandenberghe, C., Gatignon, A.L (2012). A Study of the Relationships Between Volunteers' Commitments to Organizations and Beneficiaries and Turnover Intentions. *Canadian Journal of Behavioural Science*, 16. Abstract available in <http://psycnet.apa.org/psycinfo/2012-10002-001/>.
- Venkatesh V., Morris M., Davis G. and Davis, F.D. (2003). User acceptance of information technology: Toward a unifying view. *MIS Quarterly*, 27(3), 425–478.
- Venkatesh, V. and Davis, F.D. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. *Management Science*, 46(2), 186-204.

- Villiers, M. R. (2005). Three approaches as pillars for interpretive Information Systems research: development research, action research and grounded theory. In *Proceedings of SAICSIT 2005*
- Wager K., Lee F., White A., Ward D. and Ornstein S. (2000). Impact of an Electronic Medical Record System on Community-Based Primary Care Clinics. The *Journal of the American Board of Family Practice*, 13(5), 338-348.
- Wallace, J. E. (1995). Organizational and Professional commitment in Professional and Nonprofessional Organizations. *Administrative Science Quarterly*, 40(2), 228-255.
- Walsham, G. (1993). *Interpreting Information Systems in Organizations*. Chichester, UK: John Wiley & Sons,
- Walsham, G. (1995a) Interpretive case studies in IS research: nature and method. *European Journal of Information Systems*, 4, 74–81.
- Walsham, G. (2006). Doing interpretive research. *European Journal of Information Systems*, 15 (3), 320-330.
- Walsham, G., (1995b). The emergence of interpretivism in IS research. *Information Systems Research*, 6 (4), 376–394.
- Walton, R.E. (1989). *Up and running integrating information technology and the organization*. Boston: Harvard Business School Press.
- Wanberg, C. and Banas, J. (2000). Predictors and outcomes of openness to changes in a reorganizing workplace. *Journal of Applied Psychology*, 85 (1), 132-42.
- Ward, J. and Daniel, E. (2006). *Benefits Management: delivering value from IS and Investments*. Chichester: John Wiley & Sons Ltd.
- Ward, J. and Peppard, J. (2002). *Strategic planning for Information Systems*. 3rd Edition. Chichester: John Wiley & Sons Ltd.
- Ward, J., Hemingway, C. and Daniel, E. (2005). A framework for addressing the organizational issues of enterprise systems implementation. *Journal of Strategic Information Systems*, 14(2), 97–119.
- Ward, J., Taylor, P. and Bond, P. (1996). Evaluation and realization of IS/IT benefits: an Empirical study of current Practice. *European Information Systems*, 4, 214-225.
- Weill, P. and Olson, M. (1989, March). Managing Investments in IT: Mini Case Examples and Implications. *MIS Quarterly*, 13(1), 3-17.
- Wheeler, P., (2002). *The changing nature of work*. Available at: http://www.occupier.org/papers/working_paper4.pdf.
- Williams, Eric, (1998, March). *Research and paradigms*. Retrieved in 21th November, 2011, from: www.umdj.edu/idsweb/idst6000/williams_research+paradigms.htm#Paradigm.
- Wilson, M. and Howcroft, D. (2000). The politics of is evaluation: A social shaping perspective. *International Conference on Information systems*. Proceedings of the twenty first International Conference on Information Systems. *Association for Information Systems*, 94-103.
- Wong, D., Gallegos, Y., Weiger, M., Clack, S., Slagle, J., and Anderson, C. (2003). Changes in intensive care unit nurse task activity after installation of a third generation intensive care unit information system. *Critical Care Medicine*, 31(24), 88-94.

Yin, R. K. (1994). *Case Study Research, Design and Methods*. (2nd ed.), Newbury Park, CA: Sage Publications.

Yin, R. K. (2003). *Case Study Research, Design and Methods*. (3rd ed.), Thousand Oaks: Sage Publications, Inc.