HOW THE ROLE OF
THE CHIEF INFORMATION OFFICER
CONTRIBUTES TO THE ORGANISATION

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Abstract

Since, the available informational and technological resources constitute a source of prosperity and differentiation for the organisations, the role of the Chief Information Officer (CIO) is becoming more crucial and vital. The thirty years of the CIO's existence have shown a path of changes and difficulties on defining and establishing the particular role within the organisational context.

The present study examines the CIO role evolution over the last thirty years, analyses the CIO role at the present time and discusses the CIO role in the future. The examination of the evolution of the CIO role identifies four main areas of interest that are used as the conceptual framework of the study. These areas relate to business strategy, innovation and competitive advantage, relationships building and external environment. Based on a qualitative research approach, nine case studies of existing CIOs are conducted and analysed from the private and the public sector. The analysis provides insights about the responsibilities of the CIOs, currently, regarding each one of the role aspects and the furthermore, particular responsibilities for these aspects. The results of the analysis demonstrate that within the CIO role responsibilities there are activities such as active participation in the strategic planning, exploitation of information management as an enabler of innovation, active facilitation of consultation processes with the stakeholders and finally, networking with outside organisations such as suppliers and customers but also networking with peers to share best practices.

Regarding the future of the CIO role, it is argued that the CIO role includes responsibilities relating to technology management and it is counterproductive to separate these responsibilities to another C-level executive such as a CTO. Finally, it is argued that the CIO role enhances the dynamic capabilities of the organisation by helping it to improve its learning processes and the way it transforms its information resources.

The results of the study have implications to both industry and academia. The proposed CIO role model could be used by industry as a guideline for the job description of the role in question, as well as an evaluation scheme for the post holders. With respect to academia, the proposed role model could be used to identify the skills necessary for a CIO and thus, to help inform areas in which university educational programmes should focus on.

Declaration

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To Eleni and Artemis,
who did not have enough time
to see the completion of this effort

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Abbreviations

CEO   = Chief Executive Officer
CIO   = Chief Information Officer
CSF   = Critical Success Factor
CTO   = Chief Technology Officer
EDI   = Electronic Data Interchange
ERP   = Enterprise Resource Planning
ESTeMA = Evaluation Scheme for Text Mining Application
ICT   = Information and Communication Technologies
ICT   = Information and Communication Technology
IM   = Information Management
IS   = Information Systems
ISS   = Information Systems Services
IT   = Information Technology
KPI   = Key Performance Indicator
MRP II = Manufacturing Resource Planning
MRP   = Material Requirements Planning
NGE   = Next Generation Enterprise
NPfIT   = National Programme for IT
PACs   = Pictures Archiving and Communications
PC   = Personal Computer
ROI   = Return On Investment
SMIS   = Society for Management Information Systems
UIM   = Unstructured Information Management
VoIP   = Voice over Internet Protocol

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Stephanos A. Strickland was born in Athens, Greece in 1978. He holds a BSc in Business Administration (87%) from the Technological Institute of Western Macedonia, Greece (2001). His first written work was the BSc Dissertation on "*Linear Programming on Decision Making using Microsoft® Excel*". He continued his studies in Athens University of Economics and Business where he obtained the BSc in Business Administration with specialisation in Information Systems Management (85%). In 2005, he decided to broaden his knowledge and travelled to United Kingdom, where he obtained his MSc in Business Information Technology from the University of Manchester, U.K.

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Publications

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Chapter 1:
Introduction

1.1 Motivation

It is widely accepted that the role of *information* in organisations is of great importance and it is considered as important, if not more, than the technologies that are used to manage information. Along with land, people and capital, information represents a resource that is able to provide differentiation in a competitive environment and there are many studies in the literature that suggest approaches and provide examples of how information can be used efficiently and effectively.

Technological developments have a significant effect on the way information is managed. From the early days of automation and digitisation of structured data, technologies now focus on collection, manipulation, integration and distribution of information coming from different sources and in various formats and media. Artificial intelligence, natural language processing, semantic web and knowledge management are only few of the fields that have contributed to these technological developments.

One can argue that the informational and technological resources available to the organisations nowadays are playing now an active role and are driving business strategy in many areas. The existence of the Chief Information Officer (CIO) as a c-level executive provides an indication to the attention that is paid to those resources by the organisations.

1.1.1 The CIO as an evolving role

The Chief Information Officer (CIO) role has changed substantially since it was first introduced in 1981 (Benjamin et al., 1985; Passino & Severance, 1988; Applegate & Elam, 1992; Earl, 1996; Ross & Feeny, 1999; Enns et al., 2003; Hunter, 2007; Maes & De Vries, 2008; Chun & Mooney, 2009). A number of factors contributed to this evolution and some of them still in existence and can be argued that they still drive the evolving nature of the CIO role. Some of these factors relate to the internal and external environment as well as the nature and characteristics of the CIO's role and responsibiltities.

The role of Information Management (IM) and Information Systems (IS) within the organisations has become increasingly important for their development and empowerment (Bharadwaj et al., 1999; Sher & Lee, 2004; Roberts & Stephenson, 2008). The main operations in the business environment are based on the informational resources that are collected and distributed based on the technological infrastructure. The automation of the business processes and the digitisation of the information that flows between systems, employees, departments and third parties have influenced the ways that IM and IS are

approached. Furthermore, new capabilities are available to the directors and the decision makers through technologies that support advanced analytics. All these corroborate to the fact that the CIO role has evolved into a crucial and strategic post within the organisation.

Similarly, the external environment forces have had an impact upon the role of the CIO. The new competitive forces, the challenges and the opportunities of the global environment motivate organisations to exploit their informational and technological resources in order to survive, differentiate and innovate (Chun & Mooney, 2009). In addition, those informational resources are managed within an integrated environment in which suppliers, organisations and consumers share the same infrastructure. As a result, the CIO role skills have been enhanced with communicational attributes on top of the managerial and leadership ones.

1.1.2 The CIO as an unclear role

Unlike other c-level executives, the Chief Information Officer still does not have a widely accepted and well defined job description (Lohmeyer et al., 2002; Karahanna & Watson, 2006). Several CIOs are members of the board of directors while others report to the Chief Operations Officer or the Chief Finance Officer. Furthermore, some CIOs have the role to promote strategic initiatives, while others in the same post are more focusing on the operations' side of the IT function. So, it can be argued that the main CIOs duty is to equilibrate between strategic decisions and technical implementation. However, the main role aspects of the CIO and the expectation of the particular post remain unclear.

This context, in addition to the previous analysis about the evolving characteristic of the CIO, illustrates the varied and unclear role in question. In an attempt to tackle this phenomenon, previous research has shown that there are different role models for CIOs according to the IS function in the

organisations or the perception of the CEO about the benefits of the IT (De Barbuat & Labaye, 2008; Yan & Chuan Hoo, 2009). This implies that the role still remains unclear in terms of the main aspects that it includes and the responsibilities that each aspect incorporates.

There are two possible reasons for this: the few years of existence of the role and the strong relationship of the role with Information Technology. Regarding the first reason, although the term appeared in the literature in 1981 for the first time, organisations did not establish the particular post until the 1990s. On the other hand, the role is associated with two field areas (IM and IS), which are pretty much technology related and they evolve in a rapid pace.

Additional evidence of the unclear CIO role is demonstrated by the continuous change of the knowledge, skills and abilities of IS professionals (Cheney et al., 1990; Yan & Chuan Hoo, 2009). While the candidates and the successful post holders were supposed to have more technical skills a couple of decades ago, currently they appear to concentrate on managerial skills and interpersonal abilities such as leadership. Furthermore, proactive CIOs possess higher levels of openness and extraversion (Yan & Chuan Hoo, 2009). As a result, the skills portfolio for the CIO position requires a mix of business, organisational and technical skills (Nakayama & Sutcliffe, 2001). However, the role that university IS programmes can play in meeting the organisations' changing skills needs to be assessed (Nakayama & Sutcliffe, 2001). Under this concept, the present work can provide useful insight on the actual CIO role and suggest the areas of focus for the university courses that will educate the CIOs of tomorrow.

Based on the above, the present study's motivation is to develop a CIO role model that will illustrate the main aspects of the role and the responsibilities the CIOs have. The development of that model is based on the examination of the CIO evolution until now and the analysis of the CIO role currently. This analysis provides the input to examine the drivers that will influence the CIO role in the future.

1.2   Aims and objectives of the study

The overall aim of the thesis is to examine the evolution of the CIO role over the last thirty years, examine the role as it currently stands and identify the factors that will influence the role in the future. The examination of the role evolution takes under consideration the actual role aspects and responsibilities of the CIO post as well as the technology and its influence on the CIO role. There are plenty of examples of technological developments that affected the ways the organisations manage their informational resources and there is a need to examine how those changes have affected the organisations themselves and as a consequence, the CIO role.

The examination of the role as it currently stands targets the development of a CIO role model and the corresponding responsibilities. The proposed role model is based on the output of the examination of the role evolution and includes four areas of concern, namely: 1) business strategy, 2) innovation and competitive advantage, 3) relationships building and 4) external environment.

To summarise, the objectives of the study are:

1. to examine the CIO role evolution until now

2. to analyse the CIO role at the present stage

3. to discuss the CIO role aspects of the future

1.3   Research Questions

The objectives of the study are tackled with three respective research questions. More specifically:

RQ1:   How the CIO role has evolved over the last thirty years in relation to its main role aspects and in relation to technology factors affecting the internal and external organisational environment?

RQ2:   How the CIO role currently contributes to the organisation in relation to the business strategy, innovation and competitive advantage, relationships building and external environment?

RQ3:   How the CIO role is likely to evolve in the future? What are the important factors that will affect the role in the future?

The methodology adopted to address these research questions is to explore the unit of analysis (the CIO role), rather than examine a particular theory or a model for that unit. As such, the methodology focuses on the CIO role and those individuals who hold that post in organisations and leads to exploring CIOs responsibilities and perceptions.

The first research question is addressed by a comprehensive review of the literature regarding the CIO role. The main role aspects and responsibilities are identified and their evolution is examined. Disruptive technologies that affected the internal and external organisational environment are related with the respective aspects. The outcome of this analysis is a conceptual framework that is used to examine the CIO currently.

Regarding the second research question, a qualitative case study is conducted. More specifically, data from nine case studies are examined that correspond to interviews with CIOs from a wide range of organisations. These were analysed in order to examine how CIOs currently contribute to their organisations in relation to the conceptual framework and the outcome of this analysis is the proposed CIO role model.

In order to address the third research question, the proposed CIO role model is examined in relation to the latest technological developments and studies and a number of issues are highlighted as important for the CIO role in the future. In particular, the CIO role in relation to the Chief Technology Officer, in relation to the innovation mechanisms of the organisation and in relation to the dynamic capabilities of the organisation are identified and examined.

1.4   Key findings

The analysis of the CIO role evolution the last thirty years offers not only a view of how the CIO evolved until now, but also an informed indication of how the CIO role will be in the future. By examining the history of the main role aspects and the responsibilities of the CIO role, we are able to argue about the key drivers and challenges that will influence and shape the CIO role in the future.

The second key finding of the study is the proposed CIO role model. This could provide the basis for a detailed description and examination of existing roles and the ways these roles are carried out on a daily basis. In other words, the proposed CIO role model provides a useful tool for evaluation and assessment purposes and can be applied as a set of key performance indicators for the post.

1.5   Structure of the thesis

The structure of the thesis is as follows. Chapter 2 reviews the literature and the previous research in terms of the CIO role aspects, their responsibilities and the technologies that affected the role in question. The review is structured in a chronological order that helps the reader to understand the evolution and the transformation of the CIO role. The conceptual framework used for addressing the second research question is explained at the end of this chapter.

Chapter 3 explains the research design regarding the second research question. Based on the qualitative design, the followed case study methodology is justified. In addition, the data collection and analysis phases are described in detail.

The analysis chapter 4 gives a description of the nine cases analysed, in terms of organisational characteristics and the CIO position in the hierarchy, followed by the analysis of the CIO role. The analysis in chapter 4 is based on the conceptual framework as it has been extracted from the literature review.

Chapter 5 discusses the results of the CIO role analysis in an attempt to identify the key challenges of the CIO role in the future. In particular, the CIO role is examined in specific contexts. These are its position within the organisation and its co-existence with the Chief Technology Officer, the drivers of innovation through the CIO lens and the CIO role as an enabler of dynamic capabilities.

The last chapter 6 summarises the present study. The contribution of this research project is stated in comparison with the previous research on the topic of the Chief Information Officer. Finally, the limitations and the directions for future work are discussed in chapter 6.

Chapter 2:
Literature Review

2.1   Introduction

This chapter mainly addresses the first research question of the present study, regarding the CIO role evolution in the last thirty years in relation to its main role aspects and to the technology in the internal and external organisational environment. The aim of this chapter is to review the evolution of the CIO role the first thirty years of its existence.

The CIO aspects and responsibilities documented in the literature since 1981, when the term of the Chief Information Officer (CIO) first appeared, are reviewed and presented for each decade in chronological order. These main

CIO role aspects and responsibilities are also related to the key drivers of the evolution, the major changes in the industrial landscape and the major disruptive technologies. As a result, the main key themes and challenges the CIOs have faced since 1980s are grouped into seven areas of concern. In addition, two current CIO role models are validated. The outcome of the present chapter is the CIO conceptual framework, which will motivate the research design to answer the next research question.

The structure of this chapter is as follows. At first, the CIO role aspects and responsibilities are reviewed for each decade and related to the current technological landscape. Section 2.3 describes the seven key themes and challenges as they have been extracted from the previous analysis. The current CIO role models are reviewed in section 2.4. Finally, the conceptual framework that will drive the following research design chapter is discussed in section 2.5. The framework suggests the four main role aspects through which the CIO role currently contributes to the organisation.

2.2   The Chief Information Officer role

The term of the Chief Information Officer (CIO) appeared in the early 1980s. The first reference to this position appeared in the book "*Information Resource Management: opportunities and strategies for the 1980s*" (Synnott & Gruber, 1981). Until then, Information Management needs of the organisations were limited to data processing and hardware maintenance. These tasks were the responsibility of the Data Processing Manager who was positioned to the third or fourth level of the organisation chart. Following the spread of computers and internet, the information needs of enterprises increased. So, the Data Processing Managers had to be engaged with more responsibilities and broaden their duties across the organisation, taking a place in the executive level of the hierarchy. As a result, the Chief Information Officer position was established in more and more organisations.

The first definition of the Chief Information Officer refers to the role as "*the senior executive responsible for establishing corporate information policy, standards and management control over all corporate information resources*" (Synnott & Gruber, 1981, p.66). The main focus of that definition is on the operational function of the information resources leaving aside the relationship of those resources with the business processes. The prediction about the CIO participation to the board of directors came some years later. In particular, this participation was predicted based on the CIO role as "*the corporate officer who truly understands the interconnection of the information flow to the business*" (Benjamin et al., 1985). Later, the CIO role becomes more active in the strategic planning of the information resources of the organisations (Stephens et al., 1992). Yet, the link of the role to the business strategy is not well defined in the literature. Years later, the term CIO is used for "*the most senior executive responsible for identifying information and technology needs and then delivering services to meet those needs*" (Broadbent & Kitzis, 2005, p.6). Up to that point, the CIO role is defined according to a vague combination of both technical and managerial expertise in which the CIO is called upon to effectively understand and integrate business processes, technologies and data (Beatty et al., 2005). A more recent definition quotes that the role of the CIO is "*to manage information technology for the benefit of the firm and, ensure that the use of information technology is aligned with the business goals and objectives of the firm*" (Hunter, 2007, p.224). According to the above definitions, it is becoming clear that the role of the CIO has been sufficiently changed. It is still related with the corporate information resources; however the role has gained a strategic position within the organisation. The responsible manager for information resources, systems and technology acquires a more active role in the business processes and infrastructure of the organisation. In the following paragraphs, this evolution will become more obvious.

The Chief Information Officer title is not the unique one used for the modern Data Processing manager. Research has shown that various titles have been used in organisations charts to identify this position. During 1980s the most

common titles that appeared were Manager of Information Systems or Information Systems Manager. Depending on the sector, the organisation and the job description titles also include Systems Administrator, Director of Communications etc. Moving higher to the hierarchy, the titles appeared are: Information Systems Executive or Senior Information Systems Executive as well as Chief Technology Officer.

The following sections demonstrate the aspects of the CIO role that have been investigated in the literature the last thirty years. The identified aspects are presented in chronological order as this helps in understanding the evolving role of the CIO. In addition to the CIO role aspects that have been investigated each decade, the contemporary technology areas are also presented and related with the relative responsibilities. This insight and comparison of the CIO role aspects with the key technological areas provides an understanding of the context in which the CIO evolved those thirty years and the characteristics of this evolution.

2.2.1 The Chief Information Officer of the 1980s

The antecedent of the Chief Information Officer was the Information Systems Manager. There is evidence that this role began to change in the working environment. It became *more of a manager than a technician*. The Information Systems Managers left their technical responsibilities to technical experts, from both internal and external environment (Ives & Olson, 1981). The new activities of their role were *coordination, motivation* and *planning*. Information Systems Managers begun to spend more of their time to plan the overall strategy of the Information Systems function. This change of activities had an equivalent transformation of the Critical Success Factors (CSFs) of their position. The new priorities of the role were the *communication*, the *IS human resources*, the *reposition of the IS function* and the *delivered service of the IS department* (Rockart, 1982). The IS executives were required to understand the users' needs and explain to them the IS functions. They had to appoint personnel who are managerially competent and able to assist top management team by

interpreting their requirements in terms of Information Technology. As the IS function has changed and has been involved in all aspects of the business, the IS managers had to introduce new techniques that allow top management team to use information more effectively than back office systems did so far. In addition, IS managers perceived Information Systems as a service which implied that they had to consider not only operational but also user's aspects. From the above, it becomes clear that Information Systems Managers' activities were more user-oriented and their responsibility was to transform IS function from data processing to information delivery.

The first attempt to define the main aspects of the Chief Information Officer role was made by the Society for Management Information Systems (SMIS) (Rockart et al., 1982). The members of the society argued that the executive's future role would be influenced by the required attributes of the role and these will be defined by the relevant trends of the business environment. The work concludes that the main aspects of the CIO role would be the *diminishing of direct line responsibilities*, the *increasing staff orientation* and the *corporate responsibility for information resource policy and strategy* (Rockart et al., 1982). The researchers anticipated that the CIOs would be focused on their staff, leaving technical details to departments, of which they would keep the overall control, and they would be strategically involved in the top management team. Those aspects were validated through an exploratory survey of twenty CIOs. It was also found that the CIOs responsibility was rapidly distributed (*distribution of IS executive responsibility*), their primary goals were accomplished through *staff activities* and they were aligned to the strategic and operational elements of the business (*strategic and operational alignment of IS*) (Benjamin et al., 1985). By that time, it was a fact that CIOs have a more strategic role within the organisation.

Apart from the strategic aspect of the CIO role, another issue emerged during the 1980s. The technology evolution combined with the continuous growth of corporate data made available information an asset. In particular, information resources were seen as a source for competitive advantage. As a result, the

new issue of concern for the CIOs was to *translate IT into competitive advantage* (Passino & Severance, 1988). In broad terms, the CIO role seemed to be moving beyond technology toward business concerns, such as *productivity of IS* and *communication with top management and end users*. In Table 1, it is shown that only one out of the top four CIO's concerns is related directly to technology. In contrast, the IS department focus is on communication, training and education of non-IT people within the organisation. Through their concerns, CIOs were also aware of the necessity to quickly *respond and handle sudden changes in the business environment*.

CIO's issues of concern	
1986 ranking	**1988 ranking**
1. Facilitating/managing end-user computing.	1. Communication with top management, functional managers and end users.
2. Translating IT into competitive advantage.	2. Improving the productivity of application system development.
3. Having top management understands needs and perspective of IS.	3. Translating information technology into a competitive advantage.
4. Measuring and improving IS/DP effectiveness/productivity.	4. Developing a quick response capability to handle sudden changes in the business and shorter system life cycles.

Table 1: CIO's issues of concern in 1986 and 1988 (Passino & Severance, 1988)

The technology evolution in terms of information processes automation was expected to affect the role of the CIO in the next decade. The characteristics of the technology evolution would lead to new IT management paradigms which would be based on partnership and cooperation (Dixon & John, 1989). As a result, CIO role should be a *partner consultant*, a *strategy planner* and a *manager of technology infrastructure in a hybrid structure*. His responsibilities would be concentrated on the business use of technology, the delivery of macro financial and competitive benefits as well as on the maintenance of a constructive leadership position in the organisational revolution (Dixon & John, 1989).

A summary of the key characteristics identified in the literature during the 1980s are shown in Table 2.

Author	Year	Aspects investigated	Group
Ives and Olson	1981	more of a manager than a technician	[1]
		coordinator	[1]
		motivator	[2]
		planner	[1]
Rockart	1982	communication	[2]
		IS human resources	[1]
		IS function reposition	[3]
		IS as service	[2]
Rockart et al.	1982	diminishing direct line responsibilities	[1]
		increasing staff orientation	[1]
		corporate responsibility for information resource policy and strategy	[1]
Benjamin et al.	1985	distribution of IS executive responsibility	[1]
		staff activities	[2]
		strategic and operational alignment of IS	[1]
Passino and Severance	1988	communication with top management, functional managers and end users	[2]
		productivity improvement of application system development	[3]
		translation of IT into a competitive advantage	[3]
		development of a quick response capability to handle sudden changes	[3]
Dixon and John	1989	partner consultant	[2]
		strategy planner	[1]
		manager of technology infrastructure in a hybrid structure	[1]

Table 2: The CIO role aspects of the 1980s

Looking at the evolution of the CIO role during the 1980s, we can identify three main characteristics that are essentially groupings of the aspects shown in Table 2 (indicated as [1], [2] and [3]). Firstly, it can be argued that CIOs leave aside the technical focus of their role and concentrate more on the strategic aspect of the IS function through long-term planning. As a result, they obtain a more strategic position within the organisation hierarchy and develop their managerial responsibilities (group [1]). Furthermore, one can suggest that the CIOs focus on the internal communication (group [2]) with the other parts of the organisation and they have to educate the top management team and other departmental managers about the IS function capabilities. A final argument can be that the CIOs start paying attention on finding the appropriate technologies and systems that will bring competitive advantage for their organisations (group [3]).

In addition to the role aspects identified from the literature, it is useful to discuss the major changes in the technological landscape during the 1980s and reflect on the possible effects of major disruptive technologies on the CIO role aspects.

From the literature, we can identify three major technologies that were the highlight during the 1980s, namely, PCs, mainframes and the Windows Operating System as shown in Figure 1 (Carlson et al., 1996). During the early years of the 80s, PCs became widely available and affordable and as a result, started penetrating the business world. At the same time, mainframes were expanding as more and more organisations could afford their development. On the basis of this, the CIO role increased in visibility within the organisation and had to justify investments in IT to senior management, often on the basis of savings in personnel costs but also on the broader and longer term competitive advantages that technology brings with it. Finally, usability of the technology increased substantially through the wider availability of the Windows operating system and related applications. This meant that PCs were increasingly used within the various parts of the organisation to support automation of the office tasks such as word-processing and one can argue that as a result of this CIOs had to develop their communication channels with larger parts of the organisation and at the same time, develop the appropriate infrastructure for the support of users (larger IT department and managerial responsibilities).
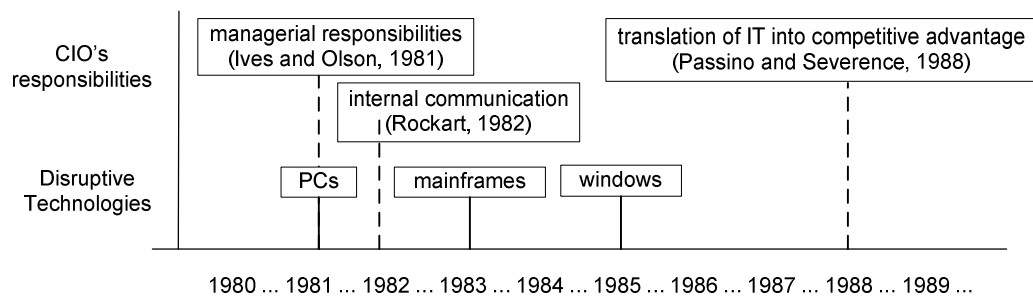
Figure 1: Disruptive technologies and CIO role aspects during 1980s

2.2.2 The Chief Information Officer of the 1990s

A first point that can be made by reviewing the literature about the CIO role in the 1990s is that there is an increasing amount of research about CIOs in different sectors. Until now, researchers were mainly interested in private

companies and the role of their CIOs (Lawry & Waddell, 2008). But once information resources became crucial for all the types of organisations, the CIO was an integral part of their structure. As a result, research began to examine the aspects of the CIO role in other sectors such as education and, in particular, higher education.

Higher education is an information intensive sector. Its main "product" is knowledge while the majority of internal functions deal with sensitive information. Conducted research examined the relationship between the enterprise CIO and that of the higher education in United States. The results were consistent with previous research. Higher education CIO role aspects were *leadership*, *planning* and *communication/liaison* (Penrod et al., 1990). Three aspects that can be interpreted to similar activities their colleagues in business and industry had.

A new dimension of the CIO role was cited by a study of Australian CIOs. Their inward behaviour in seeking information resources prevented their ability to get ahead of competitors (Watson, 1990). IS executives who wish to bring competitive advantage to their organisations should be innovative and find new ideas. In order to succeed on that, they must *scan the environment* in a more extended way than their peers (Watson, 1990). They should be able to view opportunities that IT can bring into their organisations, inspired by other fields such as marketing, and they should not focus only on their field area.

The evolving characteristic of the CIO role was demonstrated by a comparison study between newly appointed IS executives and established IS executives (Applegate & Elam, 1992). The study confirmed the trends about the CIO role discussed in the previous decade. Both categories of the IS executives spent sufficient time in *IT strategic planning and control* (Applegate & Elam, 1992). Nevertheless, newly appointed IS executives dedicate rather less of their time into technical IT issues (see Table 3). According to the authors, the agenda of new generation of CIOs is focused on the link between business and IT

strategy. In addition, they are more likely to quickly develop relationships with colleagues across all the levels of the organisation.

| IS executives' activities ||
established	newly appointed
1. Architecture	1. IT Strategy
2. HR Management	2. Architecture
3. IT Strategy	3. HR Management
4. Operations	4. Operations
5. Systems development	5. Systems development

Table 3: The IS executives' activities (Applegate & Elam, 1992)

Ten years after the "*more of a manager than a technician*" (Ives & Olson, 1981), a study concluded that CIO is an "*executive rather than a functional manager*" (Stephens et al., 1992). The new aspect found in the CIO role is the active *participation in the strategic planning of the organisation*. Despite the planning of the IT department and its functions, CIOs have an active role in the overall organisation strategy. Their concern is to plan long-term projects and not only day-to-day functioning of the Information Technology unit. CIO is the executive who can *bridge the IT group, the functional areas and external entities* of the organisation.

A study, based on Mintzberg's classic managerial role model (Mintzberg, 1971), investigated the aspects of the IS manager and how they were related to those of other executives (Grover et al., 1993). In more detail, CIOs see their role as more structured and support-oriented in comparison with the role of finance executives (Grover et al., 1993). They also have informational responsibilities while they need to be alert to technical developments. The aspects of *spokesman* and *liaison* role were also identified from the same study. CIOs should develop communication capabilities and talk with people from other departments of the organisation as well. Ultimately, they should collaboratively *be part of the external environment* in order to update their knowledge and create a wide network. Surprisingly, this study is the first that argues that the strategic aspect of the role is not so important. However, the authors conclude that the role is still not established and needs to be further investigated.

The aspects gaining space in the 1990s decade are the *communication* and *networking skills*. With the main objective to be the bridge of the two worlds – IT and the rest of the business – the CIOs spent a lot of their time to inform and convince colleagues about the role of IT in the business (Stephens & Loughman, 1994). At the same time, they have to understand what their colleagues' technology needs are and support them with suitable Information Technology solutions.

In the middle of the nineties, the issue that concerns the managerial world is the performance of the IS and their ability to create business value. The latter emerge attention to research the efficiency aspects of the IS function, the respective department and ultimately the role of the CIO as the leader of the IS projects. A number of IT projects were unsuccessful and if they were not so, they did not meet the time and budget plan specifications most of the times. The result was quite often the CIO role to be under attack. Therefore, research on different sectors indicated a number of CIO role aspects that would improve IS performance (Earl & Feeny, 1995). These aspects are:

- ✓ focus on business imperatives
- ✓ interpret external IT success stories
- ✓ establish and maintain executive relationships
- ✓ establish and communicate IS performance record
- ✓ concentrate on IS development effort
- ✓ achieve shared vision of IT and,
- ✓ make business contribution.

Some of these aspects overlap with each other. The main point that can be argued is that CIOs should be integral part of the top management team and should contribute in effective relationships. They should demonstrate business contribution and their department's efficient performance. Through the above role aspects for improvement of IS performance, it becomes clear that only if

CIOs follow a shared vision with business objectives, they will be able to add value to the organisation.

Similar results were discussed about the structure of the IT department or an IT organisation. A set of eight imperatives was proposed as guidelines to adjust the IT structure according to the business, environment and technological changes (Rockart et al., 1996). The areas on which IT organisations should excel are:

- ✓ achieve two-way strategic alignment

- ✓ develop effective relationships with line management

- ✓ deliver and implement new systems

- ✓ build and manage infrastructure

- ✓ re-skill the IT organisation

- ✓ manage vendor partnerships

- ✓ build high performance and,

- ✓ redesign and manage the federal IT organisation.

Those IT imperatives could be considered as the responsibilities of the IT leader, or the Chief Information Officer of an organisation. To summarise, the IT executive should first restructure the IT organisation according to the new business challenges, deliver results that offer business solutions and all these through developing relationships within and outside the organisation.

Similarly to the research on the differences between established and newly appointed CIOs (Applegate & Elam, 1992), another study investigated the factors which could be critical for the CIOs to maintain their position. Ten factors were identified and classified into four categories: personal attributes, organisational context, IS management processes and performance (Earl, 1996). For the purposes of this study, we are interested in the four imperative roles extracted from this work. CIOs were presented as *visionaries* as they need to proactively plan the IT structure and as *deliverers* since they still need to

deliver the IT solutions. Their strategic position at the top management team is depicted in the *tactician* role which would be enforced if the CIOs develop the skills to *build effective relationships*. Based on this research and the evolution of Information Technology, Earl (1996) extended the initial four roles according to future trends. Based on this view, CIOs would need to expand their views outside the IT field and their organisation as *systems thinkers*. They should not just deliver effective IS but also introduce new technologies and implement new ideas like *architects*. CIOs active participation in the business strategy would be a necessity and their role will be to suggest change for the organisation's directions (*reformer*). Therefore, they would be reformers. Finally, as IT developing and outsourcing expands outside the organisation's boundaries, CIOs would need to be *alliance managers* with third parties, vendors and users. The existing four roles and the new ones are shown in Table 4.

CIO roles	
current	**new**
Visionary	Systems thinker
Deliverer	Architect
Tactician	Reformer
Relationship builder	Alliance manager

Table 4: The CIO roles (Earl, 1996)

The work of Earl (1996) identified eight imperative roles for the CIO position based on critical survival factors. An interesting point is to examine if those roles depict activities that CIOs have identified as the main activities of their day-to-day work. Fifteen activities were sent to CIOs to be assessed and ranked in priority order (Gilbert et al., 1999). The top five activities ranked by CIOs were:

1. align the IS organisation with the enterprise

2. competitive advantage

3. data resources

4. end user computing and,

5. strategic planning.

The highest ranked activity by the CIOs was the alignment of IS organisation with the enterprise. The ability to transform IT capabilities to solve business problems is a job for the tactician and systems thinker CIO. The more technical activities of data resources and end user computing are related to the deliverer and architect role, while strategic planning is clearly a visionary and systems thinker responsibility. However, the creation of competitive advantage is an activity that is difficult to be assigned to one of the above roles. In addition, "relationships building" was an activity that was not under CIOs ranking exercise. Therefore, it could be argued that there is a gap between the proposed CIO role models and the day-to-day tasks that CIOs rank as their activities.

One reason that could explain this discrepancy is the constantly evolving nature of Information Technology. As technology evolved from the mainframe to the web-based era, a specific CIO role model that would last in time and include all the current and potential aspects of the role was difficult to be captured (Ross & Feeny, 1999). The direct relation of the CIO role to the Information Technology made its identification a hard task for the researchers of IT leadership.

A summary of the key characteristics identified in the literature during the 1990s are shown in Table 5.

Author	Year	Aspects investigated	Group
Penrod et al.	1990	leadership	[1]
		planning	[1]
		communication/liaison	[2]
Watson	1990	wide environment scanning	[5]
		communication/relationship with CEO	[2]
Applegate and Elam	1992	IT strategic planning and control	[1]
		IT architecture management and standards development	[3]
		human resource management	[1]
Stephens et al.	1992	executive rather than a functional manager	[1]
		active participant in business strategy planning	[4]
		bridge between the IT group, the functional areas and external entities	[4],[5]
Grover	1993	spokesman	[2]
		liaison	[5]
		part of the external environment	[5]
Stephens and Loughman	1994	networking	[5]
		communication skills	[2]
Earl and Feeny	1995	focus on business imperatives	[4]
		interpret external IT success stories	[3]
		establish and maintain executive relationships	[2]
		establish and communicate IS performance record	[3]
		concentrate on IS development effort	[3]
		achieve shared vision of IT	[4]
		make business contribution	[4]
Rockart et al.	1996	achieve two-way strategic alignment	[4]
		develop effective relationships with line management	[2]
		deliver and implement new systems	[3]
		build and manage infrastructure	[1]
		reskill the IT organisation	[3]
		manage vendor partnerships	[5]
		build high performance	[3]
		redesign and manage the federal IT organisation	[1]
Earl	1996	visionary and systems thinker	[5]
		deliverer and architect	[3]
		tactician and reformer	[4]
		relationship builder and alliance manager	[2],[5]
Gilbert et al.	1999	aligning the IS organisation with the enterprise	[4]
		competitive advantage	[3]
		data resources	[3]
		end user computing	[4]
		strategic planning	[1]

Table 5: The CIO role aspects of the 1990s

Looking at the evolution of the CIO role aspects during the 1990s, we can examine how the previous aspects evolved and what are the new aspects that appeared during this decade. Regarding the managerial responsibilities (group [1]), the CIO develops leadership skills in order to manage the IS department and the responsibilities that he or she diminishes the previous decade. Also, the strategic planning and control of the IS function is now clear that it is one of the

top priorities for the CIOs. The internal communication (group [2]) as a CIO role aspect has evolved to relationships building. CIOs need not only to establish but also to maintain relationships with other executives and for that reason they have to develop communication channels that are not based on IT terminology. In respect to that aspect, relationships with particular roles within the organisation, such as the CEO, are of high importance. Furthermore, regarding the role aspect of bringing competitive advantage through the IS function (group [3]), more emphasis has been given to the IS performance and the new systems that the CIO is responsible to deliver.

During the 1990s, the CIO role evolution is also characterised by a couple of new aspects that appeared those ten years. At first, it can be argued that a new group of responsibilities regards the two-way alignment that is expected between the business and the IT function (group [4]). CIOs are concerned about the business outcome of their IT products/services and to some extent the business impact of their work. Finally, the significant change of the CIO position is the expansion to the external environment (group [5]). In order to succeed at their post, CIOs need to develop networks and alliances with external entities (i.e. suppliers) and adopt successful IT solutions from the wider external environment.

In addition to the role aspects and their evolution identified from the literature, it is useful to discuss the major changes in the technological landscape during the 1990s and reflect on the possible effects of major disruptive technologies on the CIO role aspects.

From the literature, we can identify four major technologies that were introduced during the 1990s, namely, client-server architectures, email and web communications and Electronic Data Interchange (EDI) applications, as shown in Figure 2 (Carlson et al., 1996). During the early 90s, IT architectures were redesigned as client-server in order to meet the needs of organisations from the expanding use of IT. In addition, this decade was characterised by the

increased availability of email communications and more importantly, the introduction of the first generation of web technologies (HTML, web browser) in organisations. Finally, organisations were linked more directly with other parts of their supply chain through EDI technologies so that they could optimise performance and minimise resource requirements.

On the basis of these technologies, CIOs were asked to develop further their links with other parts of the organisation and in many cases, to initiate communication by explaining the benefits of the new trends in IT to their colleagues and ways that the organisation could take advantage of. This in essence, could be seen as the basis of the two-way communication that not only recognises the requirement for the CIO to satisfy the needs identified but also to point to possible areas for improvement and expansion that the new trends in IT provide. Furthermore, the increased availability of EDI technologies and the web meant that CIOs became more aware of the external environment of the organisation and had to work alongside its suppliers and customers. In order to be able to catch up with the rapid expansion of these technologies and especially, the web, CIOs had to develop better relationships with their peers to be able to understand better what are the possible implications, avoid pitfalls and more importantly, take advantage of possible opportunities that otherwise would be more difficult to identify.
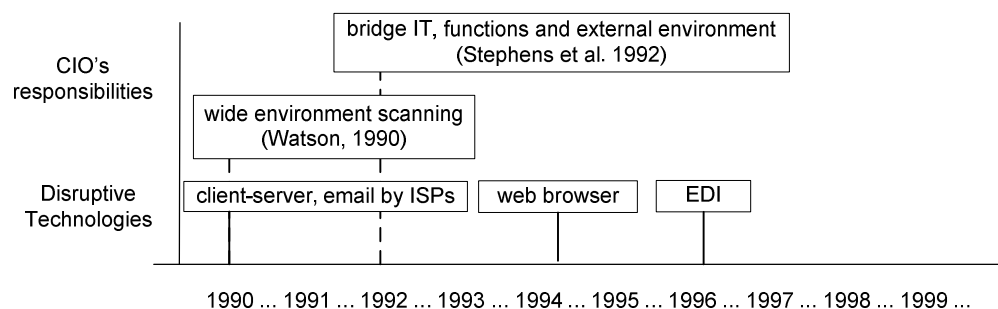
Figure 2: Disruptive technologies and CIO role aspects during 1990s

2.2.3 The Chief Information Officer of the 2000s

Entering the new millennium, the CIO position became more prominent in both the private and public sectors. It was exceptional for an organisation not to have to deal with information technologies and therefore, an executive, who is responsible for the management of the informational and technological resources, was somewhere at the organisational chart. This expansion is demonstrated by the increasing number of business reports and studies regarding the public sector and government agencies. Organisations like Gartner, McKinsey, IBM and others carried out studies and published reports about the role of the CIO. At the same time, government bodies realised the necessity to standardise the CIO role through various initiatives such as the Clinger-Cohen Information Technology Management Reform Act and the Sarbones-Oxley Act.

The Clinger-Cohen Act was the US government attempt to examine how private sector and pioneering public sector organisations assured customer services through effective management of Information Technology resources. A qualitative study about the implementation of the Clinger-Cohen Act in four US federal agencies reveals very useful insights (Buehler, 2000). Although there were dissimilarities between the public agent CIOs, a few common aspects were identified about their roles. At first, government CIOs stressed the implementation of effective and efficient IT solutions, essentially a technical-deliverer role. Also, they argued about their strategic role through the importance of *leadership*. Finally, the majority agreed that IT was pivotal in supporting the overall mission of their agencies (*support organisation's mission statement*). These aspects are similar to the ones that have been identified so far in the literature. However, the government CIOs highlighted another issue of concern namely, the realisation of *cost avoidance or resource saving*.

As the CIO role went through the third decade of its existence, more quantitative and qualitative studies appeared that in addition, addressed deeper levels of analysis. Researchers assume that CIOs role include one or two of the

previous stated aspects, and they attempt to investigate how this aspect is achieved. One example of such research study was how CIOs effectively influence their peers (Enns et al., 2000). The results indicated that *personal appeal* brings a positive outcome whereas the use of pressure led to resistance (Enns et al., 2000). This level of investigation and analysis reveals the importance of communication and relationship building in the strategic role of the CIO.

Ten years after the study which revealed that the strategic role of the CIO was not so important (Grover et al., 1993), another study contradicted this result. It was found that the activities of initiating and designing change (*entrepreneur as plan and implement change*) in the organisation were number one priorities for the CIOs (Gottschalk, 2002). Those activities are described by the entrepreneur role of Mintzberg's managerial model. Another study, investigates further the role of CIO in relation to the generic managerial model of Mintzberg and it assumes that the generic roles included in the Mintzberg model can be used to define the CIO roles identified in the literature (Sojer et al., 2006). This study proposes a CIO role model that consists of four roles in relation to the strategic impact of current and future information systems on the organisation. This study is based on secondary data and the role aspects are not explained in terms of responsibilities. With respect to Mintzberg's generic managerial role model, it would be interesting to investigate in more detail and in addition to the three previous studies, its relationship with the CIO role models discussed in the literature. This is considered to be a possible future work and outside the scope of this study that focuses on the CIO role and its evolution over the last thirty years.

Until now, not much discussion has been put in place about the technical aspect of the CIO role in this decade. For that reason it is important to quote the outcome of a CIO panel that analysed the Next Generation Enterprise (NGE) (Kishore & McLean, 2002). During the discussions about the shaping of the NGE and the role the technology will play on that, it was argued that *leadership capabilities* are indispensable in every level of management and mobile

technologies will play a crucial role in the future (Kishore & McLean, 2002). However, CIOs made clear that the technology itself is not the only ingredient that will offer the fruition and the value of information in the organisation. It is cleared by now that technical aspects of the CIO role are not in the highest level of ranking or prioritisation for the CIOs in the next generation. In contradiction, the vital role of Information and Communication Technologies (ICT) assign to the CIO role the responsibility of *technical communication* (Haselkorn, 2003). Of course, the skills of team-building and the central leadership role *focused on strategic goals* are still required in order to *creatively use information tools*.

Since contradictive results were found in the literature about the priorities of the CIO role, researchers quite often began their analysis from the drivers that cause the changes to organisational structures and the CIO role in particular. The rapid strategic business change, the pervasive IT with an experienced user community and the e-business and technology complexity were the identified drivers that make the CIO role to change (Reich & Nelson, 2003). The role of *business consultant* has expanded to IT people taking more of a leadership role and aiming to identify and quantify opportunities to create business value through IT. The ability of *interacting, influencing and negotiating* with diverse teams and stakeholders is also indicated for the CIO role. According to the authors, these aspects should be a part of the curriculum not only for management and MIS courses but also for computer science ones.

Emphasis is given during the 2000s to the relationship between the CIO role and the external environment. CIOs need to be cultural and political savvy whilst they need to act collaboratively to *understand and communicate with their customers* (Weiss & Anderson Jr., 2003). It has been recognised that the nature of the competitive and technological environment forces CIOs to perform within *a complex environment by reacting fast and effectively*. Finally, CIOs need to act as *change agents* and more importantly, act collaboratively with internal and external stakeholders.

There are three interdependent, interrelated and universally applicable principles for managing IT effectively. Those principles are undoubtedly top management's responsibility to understand and apply (Feld & Stoddard, 2004). These are:

- ✓ a long-term IT renewal plan linked to corporate strategy

- ✓ a simplified, unifying corporate technology platform and,

- ✓ a highly functional, performance-oriented IT organisation.

The three suggested aspects are also applicable during the high level of IT outsourcing trend. There is a lot of argument about the obsolete role of the CIO because of the increasing outsourcing development. However, as the outsourcing transforms the IT space to a more complex environment, the suggested issues need consideration.

An interesting study conducted by MIT Sloan School of Management (Westerman & Weill, 2004) in which non-IT executives were asked to list the four most important tasks for the CIOs. The study shows the perception of CIOs' colleagues about their role in the organisation. The first four key capabilities that emerged were:

- ✓ operations

- ✓ application development

- ✓ IT strategy

- ✓ infrastructure and architecture

while relationship management was the last one. Despite the fact that CIOs rank the relationships building activity higher among their priorities, their colleagues did not seem to receive this communication effort by the IT executives. In addition, the above ranking shows that the colleagues of CIOs still believe that CIO's responsibility is restricted to the IT department function. Apart from the operations capability, the other three are limited to the IT department function and they are not directly related to the business objectives.

A different view is stated by a study that shows that the IT managerial challenges remain fairly constant over the years (Luftman, 2005). The IT and business alignment aspect as well as the IT strategic planning remain in the top ten concerns of the CIOs and the IT executives in a period over twenty years (Rockart et al., 1982; Luftman, 2005). Some can argue that this consistency of results contradicts the evolving characteristic of the CIO role. Nevertheless, the fact that CIOs are still concerned with the same issues illustrates that those issues are not resolved. CIOs have not found the patterns to overcome them. In addition, the dynamic and competitive business environment, together with the technological development, requires a continuous alert and monitoring facility from the CIO point of view in order to face the business needs.

A set of six roles emerged by a study about the CIO role effectiveness (Smaltz et al., 2006). Although the study focused on the healthcare sector, the aspects emerged were similar to the ones that have been identified in the literature up to now. According to an exploratory factor analysis (Smaltz et al., 2006) the six salient roles of the CIO were:

- ✓ business strategist
- ✓ relationship architect
- ✓ integrator
- ✓ IT educator
- ✓ utility provider and,
- ✓ information steward

More recently, an exploratory study revealed aspects of the CIO role and in addition how these aspects are institutionalised (Watts & Henderson, 2006). The aspects emerged in this study were: *peer relation and networking*, *support*, *motivation to achieve*, *innovation*, *reality checking* and *promoting credibility*. This study also quotes CIOs activities that institutionalise the aforementioned role aspects. For example, interviewed CIOs have created or altered job positions to those that require networking behaviour, in order to achieve peer relations and networking. In addition, they demonstrate technological research

and environmental scanning to introduce innovation within their organisations. However, those activities are not in their majority referring to the CIO role itself but, in many cases, to the way CIOs manage the IT department and their subordinates.

A concluding remark that can be made for the last ten years of the CIO role is that more qualitative studies attempted to investigate not only what the aspects of the CIO role are, but also how these aspects are instantiated within an organisational context. In other words, researchers were interested in how CIOs contribute to their organisations. A summary of the key characteristics identified in the literature during 2000s are shown in Table 6.

Author	Year	Aspects investigated	Group
Buehler	2000	executive leadership and personnel supporting	[1]
		implement an efficient and effective IT-paradigm	[3]
		support organisation's mission statement	[4]
		realise cost avoidance or resource saving	[6]
Enns et al.	2000	use of personal appeal	[2]
Gottschalk	2002	entrepreneur (plan and implement change)	[1]
Kishore	2002	leadership in every level as more important than technology	[1]
Haselkorn	2003	technical communication	[4]
		team-building	[2]
		focus on strategic goals	[4]
		creative use of information tools	[6]
Reich and Nelson	2003	move even closer towards the strategic centre of the company	[4]
		require increased business knowledge	[1]
		improve ability to influence and negotiate	[2]
		renew focus on standardised architectures, metrics and value creation	[3]
Weiss and Anderson	2003	risks managers who must understand, communicate and share risks	[1],[2]
		quickly read complex environments	[5]
		change agents who must act collaboratively	[1]
Feld and Stoddard	2004	a long-term IT renewal plan linked to corporate strategy	[4]
		a simplified, unifying corporate technology platform	[6]
		a highly functional, performance-oriented IT organisation	[1]
Westerman and Weill	2004	operations	[1]
		application development	[3]
		IT strategy	[1]
		infrastructure and architecture	[3]
Smaltz et al.	2006	business strategist	[4]
		relationship architect	[2],[5]
		integrator	[6]
		IT educator	[2]
		utility provider	[3]
		information steward	[7]
Watts and Henderson	2006	peer relations and networking	[2],[5]
		support	[6]
		motivation to achieve	[4]
		innovation	[6]
		reality-checking	[5]
		promoting credibility	[3]

Table 6: The CIO role aspects of the 2000s

Looking at the evolution of the CIO role the last ten years, we can examine in what extent the previous role aspects have changed and what the newly appeared characteristics are during this decade. Regarding the managerial responsibilities (group [1]), it can be argued that business knowledge is required more than before by the CIOs to accomplish their role as managers. Also, they extend their abilities to issues such as change management and they try to perform business change. The internal communication role aspect (group [2]) requires team building and collaboration, while influencing and negotiating are

skills that CIOs begin to have. The importance of competitive advantage through IS systems (group [3]) is shown through the development of an IT architecture covering the entire organisation and the focus on metrics and standards that measure its effectiveness. Regarding the CIO role aspect of two-way alignment (group [4]), the linkage between IT function and corporate strategy is getting stronger. The CIOs participate in the business strategy and support the organisation's mission statement. The last role aspect from the previous decades, the external environment (group [5]), is still related to the partnership and networking skills. However, as a role aspect is not limited on scanning, it also involves the complex competitive environment and the quick responses by the CIOs to check the opportunities for the organisation.

It can be argued that during the last decade, the CIO role also includes two new aspects. The first one is innovation (group [6]) and the second is information management (group [7]). Innovation as a CIO role aspect is expressed through cost reduction and innovative use of the information resources. At the same time, emphasis is given on the management of the information as a strategic resource and the CIO role to integrate and use those resources for value creation.

In addition to the role aspects identified from the literature, it is useful to discuss the major changes in the technological landscape during the 2000s and reflect on the possible effects of major disruptive technologies on the CIO role aspects.

From the literature, we can identify three major technologies that were the highlight during the 2000s, namely, Enterprise Resource Planning technologies, the evolution of web 2.0 applications and the rapid expansion of mobile technologies as shown in Figure 3 (Carlson et al., 1996). During the early years of 2000s, ERP technologies became the de-facto standard for enterprise IT architectures and a large number of organisations went through the sometimes painful, route of redesigning business structures and processes to accommodate these technologies. Despite the often high costs, these

technologies are capable of delivering high return values. At the same time, the web revolution continued with the appearance of semantic web technologies and applications (collectively called web 2.0) that gave rise to areas such as social networking and collaboration tools as well as a wealth of other applications that demonstrate the increased value of the rich interaction with the web content. Finally, mobile technologies including smart phones, laptops, tablets and other net-aware devices gave rise to the need for richer mobile content that moves beyond the "textual" content of the previous decade but also opportunities for increased interaction with users.

On the basis of these technologies, CIOs were asked but also had the opportunity to contribute further to the innovation processes of their organisation which were "IT-enabled". This related both to the internal environment of the organisation, primarily through the use of ERP technologies but also increasingly through the use of web and mobile technologies. The use of ERP technologies gave organisations the opportunity to reconsider the way processes were carried out and structures were defined and to take advantage of the restructuring opportunities to improve performance and minimise costs. At the same time, the semantic web and mobile technologies gave CIOs the opportunity to further innovate by bringing the customer closer to the organisation and often, including him/her as part of the actual process in a co-creation/co-production context. The same applied to the suppliers and other external entities that organisations interact with. Furthermore, on the basis of all these, the information management requirements became more visible and thus more important, for organisations to address. The role of the CIO in managing information flows from source to destination and transforming the information in ways that its value can be immediate acted up on, became the subject matter and focus of many of the studies found in the literature. This is probably the single most important issue that all these technologies imposed on the CIO role and it is the main subject of two of the latest studies on the CIO role that are discussed in detail in the next section.
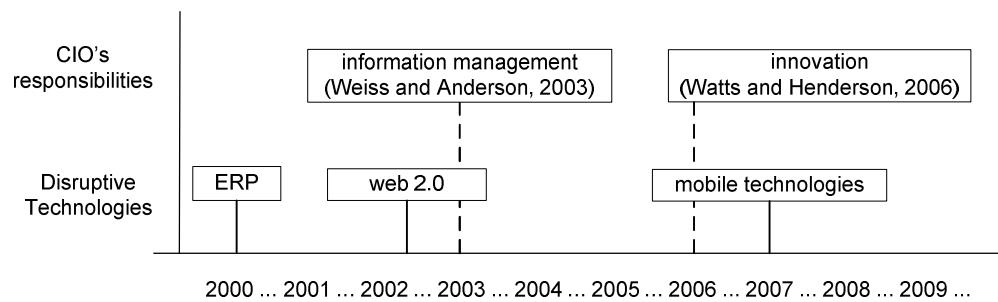
Figure 3: Disruptive technologies and CIO role aspects during 2000s

2.3 The CIO key themes and challenges

The previous analysis shows how the Chief Information Officer role evolved the last thirty years in relation to its responsibilities and to the technology in the internal and external environment of the organisations. In this context, we grouped those responsibilities in order to identify the key themes and challenges of the CIO and examine how the evolution affected particular aspects of the role. Those challenges are described in the following paragraphs.

✓ Managerial responsibilities: The managerial responsibilities of the CIO role are the first challenge that needs attention. The transformation of the role from a technician to a manager and then to an executive shows the shift of the role from functional responsibilities to more strategic ones.

✓ Two-way alignment: This aspect refers to the CIO responsibility to align the business operations and the IT function. The two-way alignment appeared in the second decade and it relates to the strategic position of the CIO role within the organisation.

✓ Internal communication: It could be argued that the internal communication aspect is overlapped or is part of the managerial responsibilities of the CIO role. However, internal communication is examined as a separate aspect based on its importance to the CIO role. The internal communication

responsibilities involved into relationships building within the organisation and as a result, CIOs need to develop this aspect of their role in order to communicate and in some cases educate their colleagues on the IT function. In addition, internal communication is a twofold aspect. On the one hand, it relates to the aforementioned skills and capabilities of the CIO as a person and, on the other hand, it refers to the IT-enabled communication and collaboration environment that the CIO is called to design, develop and maintain within the organisation.

✓ External environment: The more the IT function is expanded in the businesses and through outsourcing, the role of the CIO also expands to the external environment. CIOs have to be aware of what the competition is doing in terms of IT, best practices in business processes and how technology helped organisation to develop. These responsibilities enhance the CIOs with a more complete picture of the marketplace and as such they help CIOs to educate and influence the other executives. In that context, the external environment aspect of the CIO role is an essential part of the role.

✓ Bring competitive advantage: The CIOs role aspect of bringing competitive advantage to the organisation evolved the last thirty years. Initially, the source for competitive advantage was the technology. Later, the focus was on the ISs that support the business processes. In addition, emphasis was given to the performance of those systems and how they could bring competitive advantage through efficient use. At last, great importance was given to the IT architecture and infrastructure and thus, the source for competitive advantage was the development of enterprise applications with cross-functional implementation.

✓ Innovation: A CIO role aspect that emerged the last ten years was that of innovation. CIOs need to be innovative and at the same time to reduce costs where is possible. They also need to integrate business processes

and applications in order to help their organisation to differentiate from the competitors.

✓ Information management: Although it can be argued that Information management is the overall CIO goal, it appears as separate role aspect. This aspect perceives information as a strategic resource for the organisation. It involves operations such as collection, manipulation and distribution of information among the organisation.

2.4   Current Chief Information Officer role models

This section reviews current CIO role models and examines in what extent those models are adequate and well defined in describing the CIO post and encapsulate the CIO role aspects and responsibilities that appeared the last thirty years. Two CIO role models are selected for that purpose. The first CIO role model by Maes and De Vries (Maes & De Vries, 2008) is chosen as it covers the theoretical perspective of the role. It defines the CIO based on the Information Management theory, and in that sense, it is scientifically complete and valid. The second role model proposed by IBM (IBM, 2009) is based on a study about the role aspects and activities of CIOs worldwide. The value of this model lies on its large sample covering a wide range of countries and sectors.

Apart from the following representative CIO role models, there is a number of similar studies that attempt to define a model based on similar research on specific sectors or geographical areas. For example, studies were based on healthcare sector (Smaltz et al., 2006) or on a particular country (Gottschalk, 2002) and for this reason they were excluded as representative models. In addition, the purpose of the present study was not to test the validity of current models.

Previous research aimed to model the CIO role aspects in a conceptual framework that contains the salient aspects of the IT executive. Educational experience exposed that practitioners require a holistic framework that demonstrates the various aspects of the position in an understandable way to the CIOs (Maes & De Vries, 2008). The majority of the CIO role activities deal with issues that are rarely IS oriented, thus the conceptual framework needs to take under consideration a multi-disciplinary approach and integrate various aspects that non-IT people would comprehend. In this vain, the proposed model was based on the integrative framework for Information Management (Maes, 2007). As shown in Figure 4, the framework demonstrates the Information Management within the organisation as an integrative and balanced operation that considers two dimensions. The first dimension (vertical) concerns the strategic, the structural and the operational level of information related issues, whilst the second (horizontal dimension) demonstrates the issues related to business, information/communication and technology.

In this context, the areas of concern and responsibility of the CIO are spread to these three levels of hierarchy and to the whole spectrum of Information Management. In other words, the CIO role includes strategic, structural and operational information-related issues (vertical dimension) and relates the external and internal information and communication processes and their supporting technology to general business aspects (horizontal dimension).
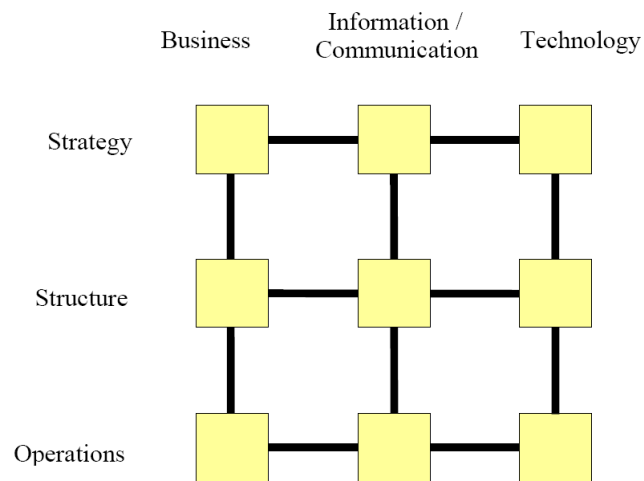
Figure 4: The IM integrative framework (Maes, 2007)

According to the above framework, the CIO operates as an orchestrator of the informational activities that take place within the organisation boundaries and as an equilibrist between information and inspiration (Maes & De Vries, 2008). In particular, the CIO post includes the following roles:

- ✓ information strategist

- ✓ co-creator/advisor business strategy

- ✓ IT portfolio manager

- ✓ enterprise architect

- ✓ business advisor and,

- ✓ trend watcher.

The previous conceptual framework is well defined for the Information Management concept in the organisational context. However, its implementation as a role model for the CIO post is open to various interpretations. The first point that can be made is that, as the framework is based on the internal Information Management function of the organisation, the relationship of the CIO with the external environment is overlooked. There are some CIO roles that imply the external environment awareness (such as the trend watcher), yet the importance of the changing environment is not clearly depicted. Examining in more detail the roles of the CIO as they are explained in

the role model, it can be argued that they are abstracted in a level that they are easily overlapped. For example, the co-creator/advisor business strategy role represents the co-creative role of the CIO to the business strategy along with the other members of the board (Maes, 2007). At the same time, the business advisor role refers to the peer relationships of the CIO with the business unit managers (Maes, 2007). These two roles do not explicitly describe the position of the CIO in an understandable way as the authors suggested. Perhaps the misleading concept begins from the distinction between business and business strategy. With the assumption that the former concept is related with the operations while the second with the long term planning of the organisation, the problem of understanding is resolved partially. This interpretation leads to the confusion between the business advisor and the enterprise architect one. As a result, the proposed framework is based on a well defined Information Management context within the organisation, yet it is limited in terms of the wide range of the CIO role aspects while it is not clear in defining the different role aspects.

A global Chief Information Officer study by IBM was conducted during 2009 and gave insights about the aspects and the activities of CIOs worldwide (IBM, 2009). The sample of the study was adequate enough, with more than 2,500 CIOs participated from 78 different countries and 19 industries. The outcome of this study was three pairs of roles or aspects as they are shown in Figure 5. These twofold aspects are innovation, Return on Investment (ROI) and business impact. The aspects are characterised as twofold because they are spread between two opposed sub-roles. So, innovation for the CIOs means to be insightful visionaries but also capable pragmatists. In other words, CIOs have to be creative thinkers and introduce cutting-edge technology initiatives, yet they have to face reality, advance the productivity of current IT solutions and build a vigorous innovation foundation (IBM, 2009).
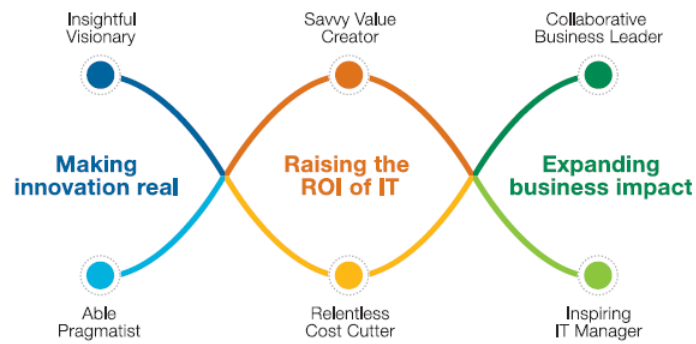
Figure 5: The CIOs' three primary goals (IBM, 2009)

The second twofold CIO role aspect is about ROI. According to the outcome of this IBM study, CIOs both create value and cut costs. They create value through better customer services and understanding of their needs. At the same time, CIOs are seeking ways and transform procedures in order to reduce costs through automation, centralisation and standardisation (IBM, 2009).

Similarly, in their role to expand the business impact, CIOs have to balance between collaboration and inspiration (IBM, 2009). Collaboration helps partnership with other executives. CIOs are called to build better business models and perform cultural shift with their colleagues. This part of the role entails that the business impact of the IT is not only a job for the IT department and its leader. It is an issue for all the CxOs and the CIOs as such, that collaboration will assist them in the process of business impact expansion. On the other hand, CIOs relationship with the IT managers and subordinates is still important and vital. Hence, within the IT department CIO's ability to motivate and inspire IT managers force excellent IT centres and foster IT expertise to extract and preserve critical business data.

The previously described role model of the CIOs gives useful insights from the industrial perspective. In addition, the sample size and the variation of the countries involved in this study add value to it. Nevertheless, a more detailed view of the framework is conflicting in terms of activities and tasks CIOs perform to achieve the highest level roles. According to the framework, one of the key

initiatives to make innovation real is to extend CIO influence. That can be achieved, from the CIO perspective, through helping to define the overall business vision and strategy and take on other non-technology leadership roles (IBM, 2009). Those activities are more related with the business impact expansion and the participation of the CIO with the development of the business strategy. In addition, according to the role model, making innovation real is achieved through better partnering and collaboration technologies activities, that are mentioned again as the means to inspire the IT managers and ultimately expand the business impact. This inconsistent structure does not help in formalising a well defined CIO role model that could be easily understood by CIOs and other executives.

2.5   A conceptual framework for the CIO role

Based on the evolution of the CIO role the last thirty years and the CIO role models of the previous section, we propose a conceptual framework as an approach for researching the CIO role. This conceptual framework will also motivate the research design for the second research question of the study. The proposed framework is based on four main CIO role aspects that cover the salient roles and responsibilities analysed in the previous sections. Those four main role aspects constitute a comprehensive and complete in terms of aspects CIO conceptual framework. Those main role aspects represent the areas of concern for the CIOs that have been evolved over time and the ways through which their contribution is shown in their organisations. In particular, CIOs' concern includes the business strategy, the innovation and the competitive advantage, the relationships building and the external environment. The following paragraphs explain each area of CIO concern and propose those areas as the conceptual framework for researching the CIOs contribution currently and in the future.

2.5.1 Business strategy

The CIO's role is directly related with the business strategy of the organisation and one aspect of this role is to participate in the development and implementation of it (Rockart et al., 1982; Benjamin et al., 1985; Dixon & John, 1989; Stephens et al., 1992; Earl, 1996; Karimi et al., 1996; Rockart et al., 1996; Buehler, 2000; Gottschalk, 2002; Reich & Nelson, 2003; Smaltz et al., 2006). The future objectives of the organisation cannot be independent from the information and technology infrastructure of the organisation. Informational resources and technology evolution affect the long-term planning of the organisation. The data an organisation keeps and the available technologies to manage those data influence the strategic planning of the organisation in terms of opportunities, threats and competition. Since information and technology are crucial for the continuity of every organisation, CIOs need to assist the way firms assess their position and draw their future. On the other hand, the CIO from NetApp declares that "*anything that we do in IT has to be driven by business strategy*" (Roberts & Stephenson, 2008). This means that in spite of inspiring the business strategy, the IT function is also guided by the overall business objectives.

This interaction between the business and the IT is part of the CIO's job. It is this role's responsibility to merge the two forces for the sake of business continuity. The business strategy aspect of the CIO role includes the alignment of IT and business objectives (Westerman & Weill, 2004), the strategic development of the IT function itself (Stephens et al., 1992) and the investment plan of the IT initiatives (Penrod et al., 1990). The available technologies and techniques could add no value to the firm robustness if they are implemented without any long-term planning and assessment of implications. Therefore, the initiatives and implementations of IT projects should be in line with the future goal of the organisation and should be evaluated in terms of feasibility and appropriateness of the given business problem. In this context, the first area of concern for the CIOs is how they contribute to the organisation in relation to the business strategy.

2.5.2 Innovation and competitive advantage

Innovation and competitive advantage are two concepts that permeate the entire organisation. There are both based on the employees' knowledge, how this knowledge is articulated in all the levels of management and how it can be applied to new products, services and processes that will differentiate the organisation from the market. IT function is now driving innovation and competitive advantage leaving behind the supporting aspect to business needs (Polansky et al., 2004). IT is an enabler of innovation and competitive advantage in two ways: a direct and an indirect. At first, new technology achievements can be directly applied in the organisation in order to improve products, services and processes. Examples are the online booking system of American Airlines, the parcel tracking system of UPS and so on. Those were innovative ideas that were implemented with the appropriate technology and brought competitive advantage to the organisations. On the other hand, IT and, in particular, how information and knowledge is managed within the organisation also enforce the quick and accurate information and knowledge exchange. Employees are able to exchange ideas in a faster and more accurate way and achieve innovative solutions that could bring competitive advantage. According to these two paths, the executive who is responsible for the Information Technology and knowledge transfer within the organisation is an enabler of innovation and competitive advantage. In particular, the CIO role is an enabler of innovation (Rockart et al., 1996; Watts & Henderson, 2006) and competitive advantage (Passino & Severance, 1988; Gilbert et al., 1999).

There is a number of ways through which the CIO role could work as an enabler of innovation and competitive advantage. IT-enabled innovation is able to enhance the financial performance through reducing costs (Bakos & Treacy, 1985; Buehler, 2000; IBM, 2007) or deliver and implement new systems (Rockart et al., 1996). Similarly, there are responsibilities, under the CIO role, that are related to market differentiation and competitiveness such as translation of IT into a competitive advantage (Passino & Severance, 1988) or build high performance systems (Rockart et al., 1996). As a result, the second

area of concern for the CIO role is how he or she contributes to the organisation in relation to innovation and competitive advantage.

2.5.3 Relationships building

The significance of the relationships building aspect of the CIO role has been raised at previous studies. From the early steps of the CIO career (Ives & Olson, 1981; Rockart, 1982; Passino & Severance, 1988; Penrod et al., 1990; Earl & Feeny, 1995; Earl, 1996) until the recent studies (Buehler, 2000; Reich & Nelson, 2003; Weiss & Anderson Jr., 2003; Smaltz et al., 2006; Watts & Henderson, 2006) the communication skills of the IT executive are essential for the CIO role. Research reveals that as the IS management matures, the spokesman and liaison role of the CIO becomes more important (Grover et al., 1993). Also, newly appointed CIOs build faster relationships within their organisations in comparison with the established executives (Applegate & Elam, 1992). In addition, the CIO is part of the top executive team and reports directly to the Chief Executive Officer (CEO) in the majority of the organisations (Polansky et al., 2004). In addition, a lot of attention has been paid in this CIO/CEO relationship and how it constitutes an ideal role model for the CIO (Watson, 1990; Feeny et al., 1992). After this analysis, it is clear that the third CIOs' area of concern is how their building relationships capabilities affect their organisations.

2.5.4 External environment

The development of Information Systems and technology in general, assist the capability of organisations to interact with the environment and be able to adapt environmental changes (Pavlou et al., 2004; Sher & Lee, 2004). Information and Knowledge Management systems capture information from outside of the organisation and distribute it to employees and decision makers. The organisation's top management team is equipped with technologies, which bring real-time information about market behaviour and competitors' moves, and as a result they enrich managers' decision making capabilities. For those reasons, a

role aspect of the executive responsible for the information resources (data, technology, systems) of the organisation is the external environment. It is crucial for the CIOs to be aware of what is going on in the outside world and find ways to bring this knowledge into their organisations. Hence, part of the CIO role is to scan the external environment (Watson, 1990; Grover et al., 1993; Earl & Feeny, 1995; Earl, 1996).

In terms of Information Management, scanning external environment includes a number of responsibilities that enhance organisations to acknowledge opportunities and threats from it. Being part of the CIO role, those responsibilities are structured, standardised and managed so they enhance organisation's performance. In more detail, CIOs, initially, are continuously informed on developments in IT and they are able to interpret their significance to their business (Feeny et al., 1992). They also use monitoring procedures to be alert to changes in the hardware and software market (Grover et al., 1993). In relation to the relationships building role aspect, CIOs need to build effective relationships with IT external vendors and suppliers. Since outsourcing is getting more expanded in the IT function, CIOs have to compare and evaluate alternative solutions and sometimes shape vendors' offerings (Ross & Feeny, 1999), in order to decide the best offering for their organisation. Therefore, the last area of concern for the CIO role is how it contributes to the organisation in relation to the external environment.

The Figure 6 below demonstrates the four areas of concern for the CIOs as they incorporated into the proposed conceptual framework. That approach suggests how to examine the CIO post at present and in the future. This conceptual framework will also motivate the research design of this study and will form the base for answering the second research question that is how the CIO role currently contributes to the organisation.
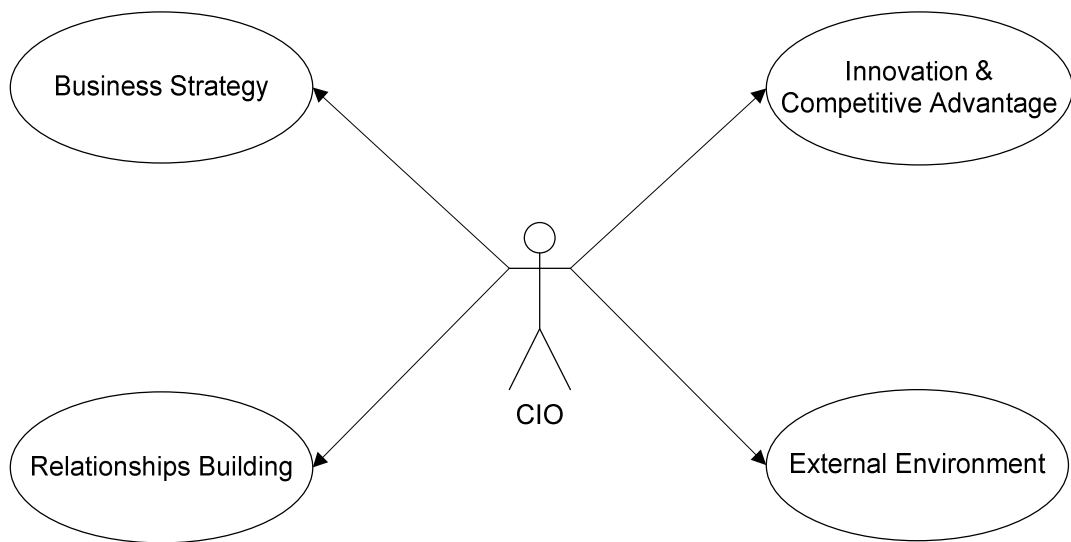
Figure 6: The CIO conceptual framework

2.6   Summary

This chapter investigated the Chief Information Officer role the three decades of its existence. The CIO role evolution in relation to the disruptive technologies that changed the industrial landscape reviewed in the previous pages. Starting with a technical orientation, the executive responsible for the information resources of the organisation changed to a more manager-oriented director (Rockart, 1982). Further than that, as information and technology became vital resources in the business environment, CIO gained a strategic position within the organisations. Not only in industry, but also in public sector and non-profit institutions, the CIO role is indispensable and a number of operational and strategic moves rely upon its contribution to the organisation growth. The review of role aspects and responsibilities indicated the CIO key themes and challenges, which include managerial responsibilities, two-way alignment, internal communication, external environment, bring competitive advantage, innovation and information management.

In addition, two current CIO role models by Maes and De Vries (2008) and IBM (2009) reviewed. It is argued that those CIO role models are not adequate for specific reasons and there is a gap of knowledge that the present study fits in.

Despite the thirty years life of the CIO, the role of this senior executive is not well defined and research is needed to investigate its responsibilities and activities (Karahanna & Watson, 2006). For that reason, a conceptual framework is proposed for researching the CIO role. This conceptual framework is based on the literature review, the current models and the key themes and challenges the CIOs have faced the last thirty years. It consists of four salient role aspects: business strategy, innovation and competitive advantage, relationships building and external environment. The proposed conceptual framework will motivate the research design of the next chapter that describes the research design for addressing the second research question.

Chapter 3:
Research Design

3.1   Introduction

This chapter describes the research design followed for answering the second research question of the current study. Following the analysis of the CIO evolution the last thirty years (see previous chapter), the next research question refers to the contribution of the CIO role at present. That research question is addressed by exploring the CIO role in current organisations. The explorative research is based on the conceptual framework as it is described in the previous chapter. It is explained why the qualitative design is used and why the case study approach is selected. It is also described how the analysis is conducted in terms of data collection and analysis steps. Finally, the analysed cases are described in this chapter.

The structure of the chapter begins with the second research question and its associated propositions. The justification for following the qualitative design and case study methodology is covered in sections 3.3 and 3.4 respectively. In particular, the case study design is explained in section 3.5 and the cases examined for the purposes of the present study are presented in section 3.6. Finally, how the case studies analysis is conducted is described in section 3.7.

3.2   Second research question and propositions

The second research question "How the CIO role currently contributes to the organisation" aims at exploring the CIO role currently in the organisations and explain their responsibilities in relation to that contribution. That form of generic research question is not able to drive a specific direction for investigation and as such a number of propositions should be stated to guide the research design (Yin, 2009). For that reason, the four areas of concern for the CIOs, described in the previous chapter (section 2.5), they are used as propositions for the second research question. In that sense, the propositions are:

P1: The Chief Information Officer role currently contributes to the organisation through the business strategy.

P2: The Chief Information Officer role currently contributes to the organisation through enabling innovation and competitive advantage.

P3: The Chief Information Officer role currently contributes to the organisation through relationships building.

P4: The Chief Information Officer role currently contributes to the organisation through its interaction with external environment.

The aforementioned propositions form the conceptual framework for the study as it is shown in Figure 7 below.
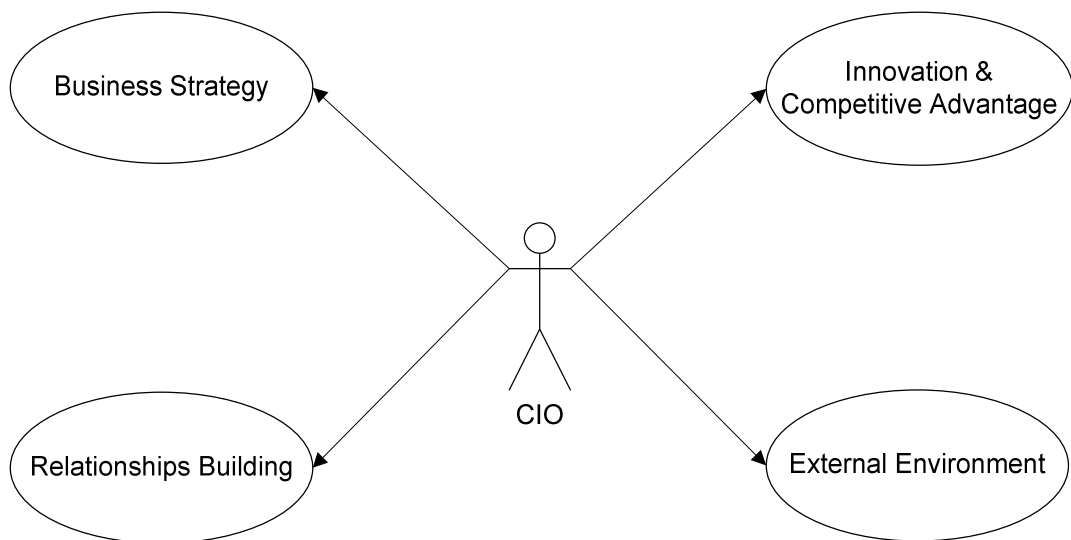
Figure 7: The CIO role conceptual framework

3.3   Qualitative design

The importance of the research design for every study or research project comes out from its definition. The research design is the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions (Yin, 2009, p.26). The research design should also guide the investigator in the process of collecting, analysing and interpreting observations (Frankfort-Nachmias & Nachmias, 2008). Therefore, the research question(s), the used method and the concluded findings must follow a consistent rationale that is self evident and easy to understand. This section describes the logic behind the chosen qualitative design.

The present study is based on one main assumption, which constitutes the base of the study. The assumption arises from the importance of the

informational and the technological resources of an organisation. As the services dominate the market more and more against the traditional products and additionally the products are technologically advanced, the economy is more dependent on the informational and technological resources than the natural ones. The responsibility of those resources lays on the role of the Chief Information Officer, the senior executive who manages information and technology for the benefit of the firm. However, that role of the CIO is not clearly defined in the first thirty years of its existence. The literature review (previous chapter) showed that the CIO is a position that has evolved the last decades and even today there is not a widely accepted role model that includes all the responsibilities the CIOs have in the organisations. In this context, the main research question of the present study is "How the Chief Information Officer role contributes to the organisation".

Initially, the nature of our research question implies the structure of a qualitative research design. The research question seeks to explain some present social phenomenon. There is no concrete and established theory on the particular subject and more investigation is required (Karahanna & Watson, 2006). The qualitative research design produces an extensive and an in-depth description of the situation. The present project is not testing a particular theory or a set of predefined constructs for the CIO role thus, the quantitative design is not suitable.

On the other hand, the study analyses the way information is managed within the organisation and the aspects of the CIO role that contribute to the organisation. In order to discover and untangle this particular concept, CIO post holders need to be investigated in order to explore their responsibilities in the organisational environment. That can be done by using a research design that guides to rich and descriptive qualitative data. This kind of fieldwork-based research can uncover precisely how as well as what is done within the organisational context (Rouse & Daellenbach, 2002).

3.4   Case study methodology

The qualitative research design includes various strategies for handling the research questions. Examples are the case study approach, the action research, the ethnography and so on. Typically one research question has one research strategy (Oates, 2006, p.35) and this work is not an exception. As the research aim is to obtain a rich and detailed insight into the 'life' of the CIO, the case study strategy is followed to tackle the research question. A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2009, p.13). According to this definition the case study approach is the most appropriate to investigate the CIOs role and how they affect their organisations.

The qualitative design, as it is mentioned above, is chosen because of the lack of an established theory and the need for investigation of the role of the CIO in its real-life context. Nevertheless and without going against that rationale, case study design differs from ethnography and grounded theory in terms of the theory development. Ethnography (Van Maanen, 1988, p.127) and grounded theory (Strauss & Corbin, 1990, p.23) deliberately avoid to develop any theory prior to the data collection phase. Yet, in the present study although there is no concrete theory about the CIO contribution to the organisation, the literature provides the areas of responsibility or the role aspects of the CIOs the last thirty years. Those aspects and responsibilities provide the areas of investigation as the main CIO role aspects that contribute to the organisation. These key role aspects constitute the theoretical framework the present study is based on and designed accordingly.

Researchers have identified different types of case studies. Robert E. Stake in the Handbook of Qualitative Research (Denzin & Lincoln, 2000, p.447-450) classified case studies into: intrinsic, instrumental and collective. Through an intrinsic case study, the researcher gains insight into a particular phenomenon without generalising beyond the case study and trying to build a theory.

Through an instrumental case study, the researcher explores a particular phenomenon, contributes to theory creation or revises a generalisation. Finally, in the collective type of case study, a number of cases are studied so as to investigate the issue of the research, conducting a general inquiry into a phenomenon. According to this typology, the cases of the present study are collective in the sense that we investigate the particular phenomenon of the CIO role through different case studies.

However, a totally different typology is proposed in accordance with the design of the case studies. Yin (2009, p.39) suggests that there are single-case and multiple case designs each of which can have a holistic or an embedded design. These four types of case study designs shape a 2 x 2 matrix. According to this alternative typology, the cases of our study follow the multiple-case (holistic) design. We investigate the particular phenomenon in a holistic view collecting data from multiple organisations.

3.5   Case study design

The present study follows a qualitative design and holistic multiple case studies through semi-structured interviews with CIOs from different organisations. The case study design includes: the study's question, its propositions, its unit of analysis, the logic linking the data to the propositions and the criteria for interpreting the findings (Yin, 2009, p.21).

The underlined question of the present study is: "How the Chief Information Officer role contributes to the organisation". This overall research question is further instantiated into four main propositions. These propositions are helpful in understanding the direction that our case study design should follow. They suggest the aspects of CIOs' role that contribute to the organisation business functions and performance. Hence, the CIO contributes to the organisation through:

- ✓ business strategy

✓ innovation and competitive advantage

✓ relationships building and

✓ external environment.

The third component of the case study design is the unit of analysis. Although it should be clear by now, the unit of analysis for our research is the Chief Information Officer. As such, we are interested in a wide area of organisations and we do not narrow our sampling to a specific geographical or sector area. We want to investigate the role of the post in question in its wide spectrum. As a result, our cases represent small, medium and large companies from the private and the public sector, including the higher education.

Sampling is a major problem for both quantitative and qualitative research (Becker, 1998, p.67). Researchers often face the problem of insufficient breadth of sampling or vast amount of unanalysed data. This shortcoming can be resolved with a concrete and well defined case study design established before the data collection process. Eisenhardt (1989) suggested that the cases should be minimum four and maximum ten, so as to generate theory, but also avoid following highly complicated procedures of data analysis. In more complex multi-case approach the sample should not be more than 15 cases, otherwise the study will become 'unwieldy' (Miles & Huberman, 1994, p.30). Hedges in 'Group Interviewing' (Walker, 1985, p.71) argues that in practise, four to six groups probably form a reasonable minimum for a serious project and twelve cases can be the maximum. The total number of cases required is dependent on the project itself and the research questions. It is probably difficult if not incorrect to apply a rule for every research project. However, the cases are enough when theoretical saturation is reached (Glaser & Strauss, 1967, p.61). Theoretical saturation is the point at which incremental learning is minimal because the researcher is observing phenomena already seen before.

3.6   Case studies

This section describes the cases of the present study. In order to understand the analysis chapter that follows, it is helpful to depict the main characteristics of the organisations, the CIO profiles and role descriptions of each case. According to the previous design issues, the present study includes nine cases. Organisations from the private and the public sector were contacted and asked to provide information about Information Management issues such as who is responsible for this area and in particular who has the responsibility for the informational and technological resources and holds the higher position at the organisational hierarchy. The responses of nine cases, four from the private sector, three from public sector and two from the higher education sector, indicate the senior executives that were contacted for the interviews. Nine interviews were conducted for the purposes of this study. The cases are summarised in the Table 7 below.

Case	Sector	Revenue	Employees	IT Budget	IT employees
Alpha	University	£450	8,000	£17	400
Lima	Local government	£1,764	23,500	£10.9	170
Golf	Airline	£1,045.9	4,300	£15-25	32
Oscar	University	£521,787	7,691	£27	600
Romeo	Software development	£1	19	N/A	N/A
India	Consultancy	£615.9	300	N/A	N/A
Tango	Local government	£261.8	2,893	£8.5	72
Hotel	Health	£364	200	N/A	18
Mike	Software development	£1	9	N/A	N/A

Numbers of 2007

* Revenue in million sterling pounds per year

Table 7: The sample cases of the study

3.6.1   Alpha case

Alpha is a University in central United Kingdom. The Alpha University is divided into nine faculties and each faculty is subdivided into schools, institutes and centres. Alpha University has 27,726 registered students and around 8,000 staff members including academics, researchers and administration, its annual turnover is 450 million of sterling pounds (~500 million euros). In Alpha, there is a central IT department, the Information Systems Services (ISS), but there is

also local support and service provision within the nine faculties. Within the Alpha ISS department there are 210 full time employees and besides that there are another 200 full time employees for IT. The ISS budget comes from two sources. The one is centrally from the University and the other source of funding is from the faculties, the schools and the research centres. The annual budget from both sources reaches the 11 million sterling pounds (~12 million euros).

For the purposes of the present study, the CIO of Alpha University was interviewed. According to the organisational structure, the Alpha CIO reports to the deputy Vice Chancellor of Alpha University. The required IT related projects are introduced from either the University steering committee or the Alpha ISS department through IT proposals. The latter occurs when the projects are technology focused such as upgrade, maintenance and so on and they are initiated and implemented internally. On the other hand, the business problem projects that are related to the corporate Information Systems are introduced to the ISS department by a group of the senior executives and academics. The Alpha CIO leads the ISS department which provides core IT infrastructure, applications and software support as well as IT user support. According to the Alpha ISS strategy plan, the Alpha CIO job description includes the following responsibilities:

- ✓ Enable and manage innovation to increase academic and service contribution
- ✓ Increase impact through aligned prioritisation and planning of resources (IT&S Governance)
- ✓ Improve communication and collaboration internally and externally
- ✓ Manage suppliers and develop partnerships

The Alpha CIO has been employed for the last 11 years in higher education as an IT director. At the same time, he is providing business consultancy services and his focus is to develop IT to become a valued part of organisations.

3.6.2 Lima case

Lima is a city council in central United Kingdom. The Lima city council is made of 96 councillors and 10 members who form the Executive committee. The Executive committee is the main decision making body of the council responsible for implementing the budgetary and policy framework of the council. The Lima city's population is around 470,000 people who live in an area of 11,500 hectares (~110,000 square meters). The city council employs around 23,500 workers while its annual turnover is 1,764 million sterling pounds (~2 billion euros). The IT department of the Lima city council has 170 members of staff and an annual budget of 10.9 million sterling pounds (~12 million euros).

The Lima city council CIO gave an interview about how her role and responsibilities contribute to the council's growth and citizens' life. According to the organisational structure, the Lima CIO reports to the Executive member for finance and human resources. The IT projects mainly are initiated by the CIO team through business plans, which are submitted to the Executive committee for approval. The Lima CIO is responsible for the development and delivery of the Lima city council's ICT strategy including the implementation of the organisation's eGoverment agenda.

The Lima CIO educational background includes a BA in Administrative studies and an MBA.

3.6.3 Golf case

Golf is an airline company based on United Kingdom that serves in the UK, Europe, Middle East, Central Asia and Africa. In 2007, Golf airlines served 10 million passengers and had a turnover of around 1,050 million sterling pounds (~1,160 million euros). Owning 49 aircrafts of various types, the Golf airline employs 4,300 employees. Compared to the size of the company, the IT department is considered as a small department with 32 members of staff. This

is explained by the fact that the IT function of Golf airlines is outsourced to an external partner. The IT department though has an annual budget between 15 and 25 million sterling pounds (~16-28 million euros).

For the purposes of the current study, the Golf CIO was interviewed. The Golf CIO reports to the Deputy Chief Executive Officer according to the organisational structure. The projects initiated in Golf company are business triggered in terms of how they are raised. In other words, the CIO participates in the board and jointly they indicate possible solutions to the business problems. Then, the board, including the CIO, tries to find what role technology plays on the particular problem and how it can help for its solution.

Golf CIO's career path includes the post of Process Change Director and IT Director, both in private sector. He has studied Computer Science and he also holds an MBA.

3.6.4 Oscar case

Oscar is a University in north United Kingdom. In terms of structure, the Oscar University is divided to six major blocks. There are three academic colleges that contain all the academic business such as the faculties and there are three supporting groups, one of which is the Information Services. Oscar University has 22,812 registered students and employs more than 7,500 members of staff and its annual turnover is 521 million of sterling pounds (~570 million euros). Compared to Alpha University, Oscar has a bigger Information Services department with 600 employees and its turnover is 27 million sterling pounds (~29 million euros) a year.

Oscar University CIO was interviewed for the purposes of the current study. Oscar CIO is the head of the Information Services department and according to the organisational structure he reports directly to principal vice chancellor. The IT related projects at Oscar University are initiated in a similar way to Alpha

University. A top-down approach is followed for major projects by a project governance team that is responsible for the formal budgets and reporting. On the other hand, smaller projects are decided and developed by the Information Services department. However, according to the Oscar CIO those small projects are still driven by the strategic planning.

The Oscar CIO is also Professor of Education and Technology and his research interests are in the development of strategies for effective use of ICT in education at institutional, national and international levels with a particular emphasis on understanding learner experiences.

3.6.5 Romeo case

Romeo is a small software development company that is specialised in web content management systems development. Romeo company has a turnover of 1 million sterling pounds (~1.1 million euros) and 19 employees. Software developed by Romeo has been applied to more than 300 organisations in the United Kingdom in health care, technology, public, media, enterprise, travel and finance sector. Romeo company has four business functions that are directed respectively by the Chief Financial Officer, the Chief Operations Officer, the Chief Technology Officer and the Sales Marketing Director. These are the four members of the board who report to the Chief Executive Officer.

The Chief Technology Officer of Romeo company participated in this study about his role aspects and the responsibilities. As a member of the board of directors, the CTO reports directly to the CEO of Romeo. The IT projects initiation goes to both directions for Romeo. The top-down approach occurs when there are business problems on sales, marketing or financial functions and solutions are expected to be proposed by the CTO. Yet, there are occasions where improvements in technology or new developments are proposed from the CTO to the board of directors.

The Romeo CIO has been previously employed as Administration manager, Computer specialist, Technical Author and Translator, and Business Development Manager.

3.6.6 India case

India is a global leadership advisory firm providing executive search and leadership consulting services. The company's mission is to help its clients to build leadership governance. The United Kingdom office of the company was approached and an interview was conducted with the consultant specialised in CIO appointments. In the last decade, India has appointed more than 500 CIOs and partnered with some of the best-known, and most demanding, companies in the world.

Although this interview was not with an actual CIO of an organisation, useful insights were raised about the CIOs. The India CIO consultant interview raised issues about the role aspects of the CIO, the main characteristics of the CIOs, what companies are looking for when they appoint a CIO candidate and some of the skills CIOs should have.

3.6.7 Tango case

Tango is the borough of a city in south United Kingdom. The Tango borough serves the population of around 270,000 people who live in an area of 1.67 hectares (~16,700 squared meters). The Tango borough has around 2,900 employees and the annual budget is 260 million sterling pounds (~ 290 million euros). The Tango borough is organised into eight departments and has nine Councillors who form the Executive committee. As committee leaders they put forward proposals to improve the borough. The Information Technology service is under the Business Transformation department. The former employs 72 members of staff and its annual budget is 8.5 million sterling pounds (~ 9.3 million euros).

The CIO of Tango borough gave an interview for the purposes of the current study. According to the borough's structure the Tango CIO reports to the director of finance, although he mentioned that this is going to change after a reconstruction of borough's transformation. In terms of project initiation, it is mainly the CIO's team responsibility to provide information up to the board about what is feasible and what can be done.

The Tango CIO's primary focus is the need for councils to improve the quality of their customer information. During his career path, he was responsible for the building and implementation of two council wide master customer databases. He is also leading a group whose purpose is the exchange of best CDI practice for UK local government.

3.6.8 Hotel case

The Hotel is one of the Strategic Health Authorities of United Kingdom. Hotel authority serves a population of 2.5 million patients and there are 77,000 NHS staff members under its responsibility. The Hotel area has eight hospital trusts, twelve primary care trusts, one ambulance trust and two specialist trusts providing mental health and learning disabilities services. The Tango healthcare authority is managed by six board members and five executive directors. In total, 200 employees work for Tango authority and its annual budget is around 364 million of sterling pounds (~ 400 million euros). The IT department occupies 18 employees.

The CIO of Hotel healthcare authority gave an interview for the purposes of the present study. The Tango CIO reports to the director of nursing and patient safety. In terms of projects, these are coming either as proposals they need acceptance by the management team or as directives from the National policy.

The Hotel CIO's career path includes the posts of Human resources and information director as well as Information Management and technology director. He holds a bachelor degree in Information Technology, a master degree in organisational change and management development, and a professional doctorate.

3.6.9 Mike case

Mike is a small software development company that offers business intelligence products and services to the life sciences industry. Mike has three main business activities: Repositioning Programmes, Pharma Services and Solutions. Mike's repositioning programmes leverage the company's technology platform to identify suitable drugs and to reposition them in isolation or in combination with other drugs to therapeutic areas that are currently not covered by existing products. The Pharma Services combine the best of opinion-based medicine with evidence-based intelligent automation. The services offer state-of-the-art predictive modelling and link identification capabilities for adverse event profiling and drug repositioning in a translational medicine context. Supported by one of the world's largest databases with over 4 billion biological correlations, they exploit seemingly disparate biological correlations to deliver novel insights and recommendations that are immediately actionable by the client. Finally, Mike leverages its technology platform to offer solutions in application areas where the ability to analyze and correlate very large data sets generates significant value-added.

Mike company has a turnover of around one million sterling pounds (~ 1.1 million euros) and 9 employees. The structure of the Mike company includes the President, the CEO/CIO, the Chief Financial Officer, two bioinformaticians, three IT employees and one web-designer. The Mike CEO/CIO gave an interview for the purposes of the research study.

The Mike CEO/CIO holds a bachelor degree in Naval Architecture and a Ph.D. in Advanced Applications of IT. Prior to co-founding Mike, he was a Research Fellow at the University of Strathclyde and project manager in EU projects.

3.7   Case study analysis

The case study analysis, see the following chapter, is based on the cross-case synthesis technique and includes five stages: collect supporting evidence of the cases (interviews, job descriptions, organisations' web sites and other relevant documents), transcribe the interviews, extract the relevant data from the transcriptions, classify the latter to each one of the four aspects-propositions and explore the output of the data to determine if meaningful patterns emerge. Since the qualitative data is interrogated according to the conceptual framework of the study, which is developed in advance, the content analysis is used for the collected data (Easterby-Smith et al., 2008, p.173).

3.7.1   Data collection

The collected data of the nine cases of this study consist of various sources. The main source is the interviews conducted with the senior executives responsible for the Information Management at their organisations. Of the nine cases, five interviewees hold the CIO position, one is the CEO/CIO, one is director of ISS (Information Systems Services) and one is CIO consultant. In addition, the job description of the contacted and interviewed executives was provided where available and it is used for cross referencing while clarification was required when needed. Finally, the organisations web site was useful for description of Information Systems and Technology related projects, which the interviewees propose, run and monitor.

The semi-structured interviews are the main source of data for the present study. As such, the agenda of the interview was examined thoroughly and

predefined in order to be able to provide the most insightful information of the interviewee role. The interview agenda (please see Appendix I), without being restricted, consists of three main areas of discussion: the firm profile, the CIO's profile and the relationship between business and Information Management. The first topic, the firm profile, aims at the collection of supporting evidence for descriptive and categorisation purposes. This evidence includes the size of the organisation, in terms of annual revenue and number of employees and the size of the department the interviewee is head of. Also, information was gathered about the reporting level of the CIO and about the ways the IT projects are proposed or introduced in the board of directors for examination and approval. The second topic of discussion is the actual exploration of the CIO role. The main activities of the role were asked, examples of projects that represent some of the role aspects and the Key Performance Indicators that monitor the interviewees' performance. Finally, the third topic of the agenda aims at the exploration of the relationship between business and informational and technological resources. This discussion area is structured in order to extract the examples of projects that informational and technological resources contribute to the organisational processes.

The first stage of the case analysis consists of the interviews transcription. The transcriptions were imported into the qualitative data analysis software package NVivo version 8 by QSR International[1]. The first discussion area of the agenda was used for the description of each case study. Details about the size of the organisations and their respective IT departments provide useful insights for their structure. The next stages of the case analysis are described in the following sections.

3.7.2 Data extraction

The next stage of the case study analysis was to extract the relevant information from the qualitative data. Each case was examined at a time and the extracted information was listed accordingly. In more detail, we search for

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[1] http://www.qsrinternational.com/products_nvivo.aspx

themes that occur in the textual data in relation to the role of the CIO and the four propositions of the research study. Apart from the respective question of the interview agenda asking the main aspects and activities of the CIOs role, useful information emerged from the discussion about the relationship between business and Information Management. The interviewees referred to examples of projects and business problems that were solved by particular projects with their guidance.

After the extraction step, the themes were classified according to the four propositions of the study. Each responsibility and activity was grouped to one of the four CIO roles of the conceptual framework: business strategy, innovation and competitive advantage, relationships building and external environment. A cross checking phase was performed to ensure that each linking of the CIO activities to the respective role was unbiased. For the same purposes, every new activity was compared with the previous ones before it was grouped to the CIO role. In that sense, the lack of consistency is limited.

3.7.3 Data analysis

The data analysis of the case studies constitutes the following analysis chapter. First, a brief description of each case was done based on the organisation and IT department size, the CIO reporting level and the way the projects are proposed to the board of directors. Those descriptions provide an insight of the organisation in terms of the CIO role, the function of the IT department and the Information Management approach of the cases. Then, the analysis stage includes further examination of the activities that were grouped in the four main CIO role aspects.

Initially, the clear quotations reflecting each role aspect were discussed. In all the examined cases, the four propositions of the study were reflected. The next stage was to group the quotations, regarding each proposition, in second level responsibilities. Those responsibilities represent the ways the examined CIOs

approach and implement the main role aspects. In other words, those responsibilities illustrate how the CIO contributes to the organisation in terms of business strategy, innovation and competitive advantage, relationships building and external environment.

3.8 Summary

This chapter described the research design followed for addressing the second research question of the present study. The second research question and the associated propositions focus on how the CIOs currently contribute to their organisations. It was justified why the qualitative design and case study methodology is followed. The case study design and the details about the cases examined also presented. Finally, the last section described how the case studies analysis is conducted (following chapter).

Chapter 4:
Analysis

4.1   Introduction

This chapter analyses the case studies examined in the present study. The aim of this chapter is to address the second research question that relates to how the CIOs currently contribute to their organisations with respect to the four main role aspects that are proposed in the conceptual framework (see Chapter 2:).

The chapter begins (section 4.2) with the preliminary analysis of the cases examined for the purposes of the study. This analysis includes the CIOs reporting level, their background in terms of qualifications and their career path. Comparisons have been made regarding the CIO reporting level in the private

and public sector, the CIOs first degree and expertise, as well as their professional trajectory in respect with their qualifications.

The following sections (4.3 to 4.6) explore the ways the CIOs contribute to their organisation with respect to business strategy, innovation and competitive advantage, relationships building and external environment. In total, fourteen responsibilities are indicated by CIO post holders, who described their role and projects they run, through interviews.

As a result, the proposed CIO role model is presented at the end of the chapter (section 4.7). A detailed description of the model elements illustrates how the CIO role currently contributes to the organisation. In addition, the model is validated by according to the evolving characteristics identified in the literature review and the current CIO role frameworks (Maes' and IBM's). Finally, an application of the proposed CIO role model is examined using the CIO job description in the healthcare sector.

4.2   Preliminary analysis

The cases described in the previous chapter are the sample of the present study. There are nine cases of organisations from the public and the private sector. The organisations were contacted and their chief-level executive responsible for the IM and IS was indicated as the appropriate person to answer the questions related to the CIO role and its responsibilities. Table 8 below summarises the characteristics of the interviewed CIOs and gives their position in their organisation. Apart from their Job title, an interesting point is to whom they report to. The Level column shows their reporting level. It indicates how many levels the CIO role is under the CEO of the organisation in terms of organisational structure. It is shown that CIO position is high up in the hierarchy as three CIOs report directly to the CEO of their organisation and one has actually both roles CEO and CIO. However, this is not reality in all the cases.

Four CIOs report to a senior executive who represents the IT function to the board of directors. This means that IT proposals are placed for discussion and eventually approval without the respective executive being in place. Those examples are based on the organisational structure and chart diagrams that are published by the organisations investigated. The analysis of the cases though, quite often shows that in reality the CIOs have an active role at the top management team within their organisations.

Case	Sector	Job Title	Reports to	Level
Alpha	University	Director of ISS	Deputy Vice Chancellor	3
Lima	Local government	CIO	Executive Member for Finance and Human Resources	3
Golf	Airline	CIO	Deputy CEO	3
Oscar	University	CIO	Vice Chancellor	2
Romeo	Software development	CTO	CEO	2
India	Consultancy	CIO consultant	N/A	N/A
Tango	Local government	CIO	Director of Finance	3
Hotel	Health	CIO	Director of Nursing and Patient Safety	2
Mike	Software development	CEO/CIO	N/A	0

Table 8: The CIOs of the cases

The educational background of the CIOs examined, shows particular interest. As such, a comparison of their first degree and their expertise (MSc or PhD) has been made. In a first level of analysis, the examined CIOs come from a broader spectrum of initial studies (i.e. Lima CIO: Business Administration, Golf CIO: Computer Science, Hotel CIO: Information Technology, Mike CIO: Naval Architecture). Regarding their expertise though, the majority of the CIOs continued their studies within the management science area, in particular Lima CIO: MBA, Golf CIO: MBA, Hotel CIO: MSc Organisational change, with the exception of Mike CIO who is a Dr. in Advanced Applications of IT.

Regarding the CIOs career path, today's executives have a variety in professional experience. For Golf CIO the previous experience is closer to the current post as he has previously worked as Process Change Director and IT Director. That is highly related to his qualifications in terms of the computer science background. Romeo CIO's trajectory includes posts such as

Administration Manager, Computer Specialist and Business Developer Manager. The trajectory of Hotel CIO shows particular interest as he has been involved with Human Resources apart from IM and IT responsibilities. Considering that aspect with his qualifications, it can be argued that beginning with computer science studies and then focus on managerial skills, gives prospective CIOs a wider range of competences.

4.3 Business strategy

The first proposition of the conceptual framework of the present study is that the CIOs contribute to the organisation through their involvement in the business strategy. The following analysis provides the ways the CIOs are involved, contribute and improve the performance of their organisation by participating in the formulation of the business strategy. In other words, the following paragraphs expose the CIOs role aspects in the strategic planning of their organisation.

All CIOs that participated in the present study, stated that they are involved in the long-term planning of their organisations. More specifically, they claimed that they are involved in the business strategy as their role responsibilities are *"more on the strategic part of it"* (Alpha CIO, Hotel CIO). CIOs see their role *"more steering and strategic rather than operational"* (Alpha CIO, Oscar CIO) and *"they have an overview of everything that is going on"* (India CIO consultant). This overview responsibility *"helps them to build the effective infrastructure the company needs and let it grow"* (India CIO consultant). In terms of operational activities, the same CIO stated that *"they do not know in great detail how the distribution processes are set up and the requirements for the systems are"* (India CIO consultant). In contrast, they *"have a contribution to the development and the enabling of the business strategy"* (Golf CIO). This CIO contribution to the business strategy of the organisation includes *"the design towards the future as much as the design for the present"* (Oscar CIO). CIOs are able to assess the current position of their organisation, and at the same time, propose the directions that will be discussed at the board of

directors and improve business performance. Furthermore, *"CIOs have the assistance of Information Technology that contributes to the development of the business strategy"* (Golf CIO). IT enables Information Management, sharing and distribution aspects that enhance decision making in the strategic level. Finally, Golf CIO said in a practical way that *"the big thing is that you have to contribute to that strategy, if you aren't doing that, quite frankly, it's very difficult to justify having a senior person on the board doing that"* (Golf CIO).

The CIO involvement in the business strategy is facilitated by the organisational structure. At this point, it can be argued that the CIO by definition, as a chief-level executive is a member of the board of directors. However, this argument should not be taken for granted as there is evidence that CIOs report to other members of the board such as the Chief Financial Officer or the Chief Operations Officer, without having a seat at the board. The interesting point though from our analysis is that CIOs that hold a position in the board have a clearer view of their responsibility in terms of the strategic planning. They referred to *"joint decisions about priorities and where their company wants to be"* (Golf CIO). Otherwise, the CIOs involvement with the business strategy is limited to the implementation level. They are receiving the overall strategy and they have to implement the parts that are related to the IT function.

The importance of the CIO appointment as a board member is also shown by the fact that organisations that proceed to structural change they include CIO into the board. The new strategic and executive management scheme followed by Alpha organisation *"allowed Alpha CIO to have those proper discussions to make the right decisions"* (Alpha CIO). As he said, *"I will be looking at more of the Alpha strategy"* (Alpha CIO). In a similar structural reorganisation that is planned for Tango organisation the CIO will report to the director. As a result, the organisation structure that gives the CIO post the ability to directly report to the director or the CEO recognises the strategic position of the CIO and the department he or she is responsible for.

Business strategy quotations	Sector
"we have an overview of everything that is going on"	private
"helps me to build the effective infrastructure the company needs and let it grow"	
"they do not know in great detail how the distribution processes are set up and the requirements for the systems are"	
"have a contribution to the development and the enabling of the business strategy"	
"we have the assistance of Information Technology that contributes to the development of the business strategy"	
"the big thing is that you have to contribute to that strategy, if you don't doing that, quite frankly, it's very difficult to justify having a senior person on the board doing that"	
"joint decisions about priorities and where our company wants to be"	
"more on the strategic part of it"	public
"more steering and strategic rather than operational"	
"allowed me to have those proper discussions to make the right decisions"	
"I will be looking at more of the Alpha strategy"	
"the design towards the future as much as the design for the present"	

Table 9: Business strategy quotations

The business strategy aspect of the CIO role includes two responsibilities for the executive level director of information resources. The first one is the alignment of IT and business objectives (Westerman & Weill, 2004). The CIO role does not interfere with the development of the business strategy, but endorses that the agreed business objectives are going to be implemented through the IT resources of the organisation. Simultaneously, this alignment implies that the business objectives are defined according to all the business resources, including the IT ones.

The second responsibility, which is related to the business strategy (Stephens et al., 1992) is the actual development and implementation of the IT strategy. The followed analysis shows how those two CIO responsibilities are related to the business strategy.

4.3.1 Align IT and business objectives

The IT alignment with business objectives literally means two parallel actions or responsibilities. The first one is that IT department or organisational function is in agreement with the business strategy and objectives. The second action implies that IT resources and functions support the business objectives of the organisation. This section exposes the aspects of the CIO role that demonstrate

the IT alignment with the business objectives as they were defined in the interviewees' roles.

The above two-way relationship between IT and business objectives is clearly supported by the CIOs that participated in this study. In particular, Lima CIO, referring to the other business executives and her position, pointed out that both sides understand what is in prioritisation for the business as well as for IT function. In the context of the agreement between the IT and business objectives, the same CIO reported that the business executives come to her when there is a need to identify the business requirements so the IT perspective is also under consideration. In addition, *"CIO's responsibility is to ensure how the IT initiatives fit strategically for the organisation as a whole"* (Lima CIO). IT services have the remit to consolidate and start to focus on the organisation as a whole. There is a necessity *"to locate what is the benefit for the organisation and if IT services can drive up value for money"* (Lima CIO). Furthermore, CIO leads a department that has its own strategic plan. The IT strategy is analysed in the next session, yet in accordance to the IT alignment with the business objectives Oscar CIO stated that the information service has its own strategic plan, which fits within the organisation's strategy.

On the other hand, a CIO responsibility is still to ensure that IT resources support the business strategy and are in line of implementing the business objectives. For example in Golf company, after the business objectives are defined, the CIO team *"looks to see what role the technology plays on those objectives and to contribute to that particular business issue or business endeavour, business project or business aspiration"* (Golf CIO). The support of IT to the business strategy and objectives is established through the allocation of the IT resources to business plans and activities. Oscar CIO, referring to IT initiatives, argued that those have not been driven by technology per se. They are strategic business decisions that they can be delivered through the use of technology and this is how they see them (Oscar CIO). In the same context, Hotel CIO's main responsibility is to use information and its associated systems

to transform the very critical business processes, to demonstrate efficiency, effectiveness and customer advantage.

Align IT and business objectives quotations	Sector
"looks to see what role the technology plays on those objectives and to contribute to that particular business issue or business endeavour, business project or business aspiration"	private
"that both sides understand what is in prioritisation for the business as well as for IT function"	public
"the business executives come to me when there is a need to identify the business requirements so the IT perspective is also under consideration"	
"our responsibility is to ensure how the IT initiatives fit strategically for the organisation as a whole"	
"to locate what is the benefit for the organisation and if IT services can drive up value for money"	
"the information service has its own strategic plan, which fits within the organisation's strategy"	
"they are strategic business decisions that they be can be delivered through the use of technology and this is how we see them"	
"my main responsibility is to use information and its associated systems to transform the very critical business processes, to really demonstrate efficiency, effectiveness and customer advantage"	

Table 10: Align IT and business objectives quotations

4.3.2 IT strategy

It was previously said that IT strategy, as a responsibility of the CIO role, represents the role involvement to the overall business strategy. The IT strategy consists of the informational and technological resources and how these support the business processes. IT strategy also includes the infrastructure and the architecture of the systems and the applications that are in place and used by the organisation. Decisions about which kind of technology will be used in the long-term, and if the required systems are going to be built in-house or outsourced are included in the IT strategy. The impact that those decisions have to the business, in relation to the fact that IT strategy is a CIO responsibility, renders the IT strategy as an additional "medium" of the CIO's involvement to business strategy.

The IT strategy, alike business one, implies the evaluation of the current situation, in terms of Information Management, technologies, systems and infrastructure that are used at present, indicates problems and opportunities and identifies a clear set of objectives to secure business robustness in the future. Besides those, Information Management and technology play a crucial role in the modern organisation. Information is a major resource during the

internet era, and additionally the systems and the infrastructure for collecting, analysing and distributing this information within the organisation are indispensable. As a result, the IT strategy affects the business present state and the design for the future.

The interviewed CIOs clearly stated that one of their responsibilities is the long-term planning and formulation of the informational and technological resources of their organisations (Alpha CIO, Lima CIO, Oscar CIO, Hotel CIO). In particular, Oscar CIO mentioned that *"part of his role is to lead essentially the strategic development of the support services"* (Oscar CIO). According to Oscar case plan, *"they decide that over the next five years they want to do the following sort of things"* (Oscar CIO). Another participant of the study pointed out that *"a key element of my role is around developing the regional informatics strategy"* (Hotel CIO). Romeo CTO identified the importance of his role as a visionary (Romeo case). The ability to imagine how IT will develop in the future and how these developments could affect the organisation's strategic moves, lies on the CIO role. By predicting where things can go technologically, CIOs can propose better and more accurate solutions and plans to implement the business strategy.

The IT strategy, as a CIO responsibility, includes not only the development of the informational and technological resources, but also the monitoring procedures the IT strategy requires. According to the long-term planning, Oscar CIO team *"have milestones, objectives and targets within the IT strategy"* (Oscar CIO). In Lima organisation, the CIO has to make sure that the IT programme is following the right strategic direction of travel for IT and that is entirely her responsibility. In more detail, part of the CIO's day-to-day responsibility is to monitor the resource level and the programmes they have and how they are progressing with them (Tango CIO). Therefore, the CIO's responsibility is not only to develop the IT strategy but also to monitor the implementation of it and ensure that it is applied according to the overall business goals.

In more detail, Golf CIO explained the characteristics of the IT strategy. The following statement offers useful insights in the elements that CIOs envisage about the IT strategy and the IT function in the organisation. According to the Golf CIO *"the IT strategy is very much around putting in place flexibility, agility, scalability and extendibility"* (Golf CIO). Considering the outsourcing policy that the Golf company follows, the characteristics that CIO sees for the IT strategy are clear. The CIO's long-term priority is to have a flexible infrastructure that is able to change easily and quickly and move, if needed, from one technology to the other or from one supplier to another. The vision about the IT function is obviously the changing and continuous evolving nature of the Information Technology. Therefore, the requirements and the strategic focus for the IT need to be agile and extensible, in order to adapt to the upcoming changes.

IT strategy quotations	Sector
"the importance of my role as a visionary"	private
"the IT strategy is very much around putting in place flexibility, agility, scalability and extendibility"	
"the long-term planning and formulation of the informational and technological resources of their organisations"	public
"part of my role is to lead essentially the strategic development of the support services"	
"we decide that over the next five years we want to do the following sort of things"	
"a key element of my role is around developing the regional informatics strategy"	
"we have milestones, objectives and targets within the IT strategy"	
"to make sure that the IT programme is following the right strategic direction of travel for IT"	
"to monitor the resource level and the programmes they have and how they are progressing with them"	

Table 11: IT strategy quotations

4.3.3 Change management

An aspect that was reported by the interviewed CIOs of this study, and it is grouped under the business strategy aspect, is the responsibility of change management. In a general sense, change management is a structured approach of transitioning individuals, teams and organisations from a current state to a desired future state. The importance of organisational change is associated with new developments in Information Technology area and it has been identified by research in Information Systems implementation (Irani & Love, 2000; Ryan & Harrison, 2000). CIOs' activities enhance business

processes improvement, which occurs through new initiatives and transformations or upgrades. These transformations result changes to the ways employees use information resources, capture them and share them within the organisation. Individuals often react to those changes if they are not updated, trained or even informed about the changes. At the organisations, there is a need to make changes in a structured manner and communicate the benefits of them for the organisation and the individuals' work. CIOs are aware of the change management skills they need to have in order to smoothly introduce new technologies or systems.

In this context, change management is an aspect of the CIO role as the analysis of cases shows. Lima and Hotel CIOs stated that part of their role is to demonstrate that informatics enables organisational change. Their focus is on the culture, the culture change and the members of the staff, when their organisation is in a transformation phase. Comparing the strategic aspect of his role to the operational one, Alpha CIO mentioned: *"they are change projects that I get involved in rather than delivery projects"* (Alpha CIO). In addition, *"CIOs role is a combination of the technology, the infrastructure and looking how you can actually deploy the significant change using those resources"* (Hotel CIO). Therefore, a key responsibility for the CIOs is to ensure that changes enabled by Information Technology will not only improve business processes but also they are going to be sufficiently accepted and deployed.

Change management quotations	Sector
"part of my role is to demonstrate that informatics enables organisational change"	public
"they are change projects that I get involved in rather than delivery projects"	
"our role is a combination of the technology, the infrastructure and looking how you can actually deploy the significant change using those resources"	

Table 12: Change management quotations

Summarising the findings regarding the first proposition of the current study, it is argued that the involvement of the CIO to the business strategy is an integral part of that role. All the participants of the current study validated this aspect of their role in various ways. Their experience offers useful insights into how the

chief executive level responsible for the IT within the organisation contributes to the organisation through the participation to business strategy. Table 13 below summarises the contribution of the CIO to the business objectives as it is depicted in the previous sections, through the participation in the strategic planning of the organisation, the alignment of IT with the business objectives, the development and implementation of the IT strategy and the participation in the change management procedures of the organisation.

P1: The Chief Information Officer role contributes to the organisation through the business strategy
- participate in the strategic planning of the organisation
- align IT and business objectives
- develop and implement the IT strategy
- participate in change management

Table 13: The CIO business strategy role aspect responsibilities

4.4 Innovation and competitive advantage

The second proposition of the present study suggests that the CIO role contributes to the organisation as an enabler of innovation and competitive advantage. From the following analysis, the ways that Information Technology enhances innovation and enables competitive advantage are extracted. As it is previously mentioned, the terms of innovation and competitive advantage are not clearly distinguished in terms of IT. Although this is not always the case, an innovative IT project, a new or improved information communication channel, can also bring competitive advantage to the organisation till competitors apply something similar. Therefore, the following analysis does not explicitly distinguish CIO responsibilities to each one of those categories. Our attempt is to elicit the role of the IT in innovation and competitive advantage and the aspects of the CIO role in terms of both innovation and competitive advantage.

The majority of the CIOs interviewed for the purposes of this study mentioned that part of their role is innovation. Golf CIO stated that he has a duty to bring innovation to his organisation. Organisations, that are seeking to appoint a new

employee for the post of CIO, place innovation in the top of required capabilities of the candidates (India CIO consultant). Even CIOs from the public sector place innovation among their priorities. Oscar CIO admitted that *"if you don't innovate you die"* and a future challenge for the CIO role is to balance innovation against the current services. So, from one hand CIO's role incorporates the improvement of products, services and business processes and, at the same time, it involves outside-of-the-box thinking about new products, services and business processes that other managers can not sense as they lack the knowledge and potential of the IT capabilities. Particularly, Hotel CIO said that he needs to demonstrate that new IT projects are not just doing the same things better but also that they offer better things.

At this point, an interesting finding of our analysis is the different perception of innovation that the interviewed CIOs have. They perceive innovation in various ways and as such they perform innovation through IT with various ways. In Lima organisation, the CIO sees innovation as customer focused. Their primary focus when talking about innovation is *"to support the customer in more innovative things"* (Lima CIO). In more detail, new communication channels and customer support through web-based technologies are some examples of innovative projects they are planning. This perception is related to the next one that is explicitly focused on new technologies. In particular, the India CIO consultant said that one CIO's responsibility is to bring fresh view on new technology challenges. In other words, CIO's responsibility is to bring new technologies in the organisation and replace or improve previous processes with new automated procedures that will enhance business processes efficiency. For example, the CIO at Alpha University referred to the Voice-over-Internet Protocol (VoIP) as a representative example of a new technology that can improve communications' efficiency and effectiveness within an organisation. A practical perception of innovation was given by Golf CIO. Although Golf is an airline company and the competition in the sector reaches high levels, the Golf CIO has a more practical view of innovation. He stated that *"if there is any innovation it is not about deployment of technology, it is more about bringing some discipline thinking to a problem and helping to shape the*

problem" (Golf CIO). Therefore, for that CIO the sense of innovation is not hidden behind the technology per se. The innovation the CIO can bring is based on the overall and *"outside-the-box"* thinking that should be inspired to the other executives. Going a step further, he declared that innovation does not have to be revolutionary. His responsibility, in terms of innovation, is to follow quickly what has been done by competitors and bring it into the Golf airline rather than introduce some rocket science with probably high cost and untested results.

Competitive advantage as an aspect of the CIO role was mentioned by rather few interviewees. A possible reason for this is the fact that a substantial part of the interviewed CIOs are coming from the public sector. Therefore, the competitive advantage per se is not identified as a goal or a target for the IT function in those organisations. On the other hand, a representative from the private sector mentioned that *"there is not anything unique that stops customers from switching anymore"* (Golf CIO). According to this view, competitive advantage is difficult to be achieved by a company in terms of products and services. However, Information Technologies are able to assist, transform and enable business processes that will benefit the organisation against competition. For example, Customer Relationship Management can be enhanced through Data Mining techniques and Business Intelligence so that it can transform organisations to outperform their competitors.

On the other hand, there is evidence that part of the CIO's role is to create competitive advantage. India CIO consultant agreed that *"the easiest way to get the advantage in the market is to have systems that support the business processes and use the work of the employees"* (India CIO consultant). During the previous decades, the sources that offered competitive advantage were those of land, capital and workforce. According to the India CIO consultant, nowadays the systems that support the collaboration and the exploitation of those resources are considered as sources of competitive advantage. In this context, Hotel CIO argues that *"the real advantage is where you can demonstrate as an organisation that you are efficient and effective"* (Hotel CIO). Hence, the competitive advantage comes from the management of the

resources rather than the exclusive possession of the resource itself. An additional perception about the creation of competitiveness is related to the quick response to market changes. Golf CIO mentioned that part of his company's strategic and competitive advantage is the ability to respond and do something quickly about market opportunities. This case shows that competitive advantage is perceived as the response to a competitor's movement or new technological challenge. In other words, there is a reactive position to competitive advantage and not a proactive in terms of development and introducing a new product or service. A key factor to achieve quick response to market opportunities according to Golf CIO is the adoption of flexible, extensible IT infrastructure that is not committed to one particular technology or supplier.

Innovation and competitive advantage quotations	Sector
"I have a duty to bring innovation to my organisation"	private
"organisations, that are seeking to appoint a new employee for the post of CIO, place innovation in the top of required capabilities of the candidates"	
"one CIO's responsibility is to bring fresh view on new technology challenges"	
"if there is any innovation it is not about deployment of technology, it is more about bringing some discipline thinking to a problem and helping to shape the problem"	
"is to follow quickly what has been done by competitors and bring it into the Golf airline rather than introduce some rocket science with probably high cost and untested results"	
"there is not anything unique that stops customers from switching anymore"	
"the easiest way to get the advantage in the market is to have systems that support the business processes and use the work of the employees"	
"part of my company's strategic and competitive advantage is the ability to respond and do something quickly about market opportunities"	
"if you don't innovate you die"	public
"a future challenge for the CIO role is to balance innovation against the current services"	
"I need to demonstrate that new IT projects are not just doing the same things better but also they offer better things"	
"to support the customer in more innovative things"	
"the real advantage is where you can demonstrate as an organisation that you are efficient and effective"	

Table 14: Innovation and competitive advantage quotations

Analysing the statements of the interviewed CIOs referring to innovation and competitive advantage aspects, there are two lower level responsibilities that have a place in their role agenda. The first one is reducing costs and therefore enhance the financial performance of the organisation as it has been previously supported by the literature (Bakos & Treacy, 1985; Buehler, 2000; IBM, 2007). The next section depicts how the interviewed CIOs introduce innovation through reducing costs. The second responsibility includes the Information Management

area that is under the CIO responsibility and aims to the introduction of innovation and competitive advantage. The CIOs' aim is to use the information resources they are responsible for more efficiently and create the prerequisites for innovation and competitive advantage.

4.4.1 Reduce cost

The cost reduction appeared as a CIO role responsibility in the majority of the cases. At Oscar case, the two main prerequisites of projects are the fit-for-purpose approach and the cost reduction. Oscar CIO stated that a lot of projects' initiatives are based on cost reduction through reducing cost as low as possible. According to the Oscar case, it is the Information Services department's duty to reduce or even eliminate the cost of old services across the whole organisation. Interestingly, he also pointed out that the challenge that his role is facing at the moment is to keep the balance between innovation against the current services. In the same vain, at Lima case a consolidation project of the ICT services is in plan and it is aiming at efficiency savings and cost reduction.

Lima CIO raised another issue related to cost reduction. This is the need for understanding the Information Technology related costs by the organisation. She explained that previous projects' experience showed that business cases do not always help to realise the benefits from the ICT projects. The Lima organisation's view is to look into the costs, to understand the charges, the unit price and then drive up the ICT benefits realisation. This approach is based upon the Cost Benefit Analysis although it is more focused on the benefits realisation side. That benefit realisation is facilitated through the analysis of the benefits for the whole organisation in the project bid phase. Each proposed bid for capital investment is required to explain the benefits that all the respective departments will achieve with the completion of the project.

The important role that the cost reduction plays for the CIO role agenda is shown from another viewpoint too. In the previous paragraphs cost reduction was likely the aim or part of projects proposed by the CIOs and their departments. Apart from that, at cases like Alpha and Oscar, it is demonstrated how the core function of the IT department, the management of the information resources, is linked to the cost reduction. In Alpha University, the CIO described the use of student information to reduce cost and decide on investments. Analysis of international students, in terms of their origin and the schools they prefer, is performed, and according to these schools' annual budgets, the university board decides where it should invest more financial resources. Similarly, at Oscar case when a decision on technology is made the cost is among the factors that are taken under consideration. In particular, Oscar CIO mentioned that *"we are seeking the best type of technology that we can apply to ensure that the information we have and we offer is as high quality and up-to-date as possible and costs us the minimum to keep up-to-date"* (Oscar CIO).

Reduce cost quotations	Sector
"a lot of projects initiatives are based on cost reduction through reducing cost as low as possible"	public
"the Information Services department's duty to reduce or even eliminate the cost of old services across the whole organisation"	
"a consolidation project of the ICT services is in plan and it is aiming at efficiency savings and cost reduction"	
"previous projects experience showed that business cases do not always help to realise the benefits from the ICT projects"	
"to look into the costs, to understand the charges, the unit price and then drive up the ICT benefits realisation"	
"how the core function of the IT department, the management of the information resources is linked to the cost reduction"	
"analysis of international students, in terms of their origin and the schools they prefer, is performed, and according to these schools' annual budgets, the university board decides where it should invest more financial resources"	
"we are seeking the best type of technology that we can apply to ensure that the information we have and we offer is as high quality and up-to-date as possible and costs us the minimum to keep up-to-date"	

Table 15: Reduce cost quotations

4.4.2 Information Management

The second responsibility of the CIO role under the innovation and competitive advantage aspect is Information Management. The term Information Management per se is a wide area and includes a variety of fields and techniques. Referring also to the definition of the CIO, it can be argued that

whatever the CIOs do is in a sense Information Management. However, this section exploits how the interviewed CIOs manage to bring innovation and competitive advantage to their organisations through Information Management processes.

There is a variety of Information Management projects that concern the CIOs of the cases examined. For example, Lima CIO is leading an Electronic Document and Records Management project, which is part of the organisation's information strategy and includes content life cycle management. A challenge for the Lima organisation is that the business and the IT sides are not yet joined together in respect to the particular Information Management project and that results on the efficiency and progress of the project. In other words, the business requirements are not clearly defined for the business functions and therefore the IT department is not able to build the infrastructure and deliver the appropriate Information Systems.

Similarly, the management of the informational resources plays a crucial role for the Oscar case. The CIO described in more detail how Information Management technology helps Oscar University to introduce an innovative communication channel among academics, administrative staff and IT employees. During project initiatives, the forum technology is deployed to help all the stakeholders to discuss and exchange their views about the forthcoming project. The academics and the administrative staff have the opportunity to describe how they use current Information Systems, to discuss the associated problems with them and exchange their views about the potential deployment of a new system. Then the stakeholders' needs are analysed by the IT department and are considered accordingly. As a result, the provided systems are fit-for-purpose and developed according to users' needs. At the same time, users are more receptive to the new technological artefacts and working procedures.

Another instance about the Information Management context, that is able to offer competitive advantage, is the potential customer identification. At Oscar

University, it is crucial to capture information about the potential students before the phase of registration, *"before being actual buyers"* (Oscar CIO). One of the CIO's priorities is to include to the Oscar infrastructure the mechanism that captures information even from the phase of enquiring about the University. This lengthening of the institution-student relationship aims at another source of information about the potential student needs. As the Oscar CIO explained, the competitive advantage can be achieved if the "hidden" knowledge about students who did not register is analysed and exploits the reasons why students' expectations were not met.

The Hotel case illustrates that the Information Management context is a top priority for the CIOs in public sector as well. As it has been mentioned before, the term competitive advantage per se might not be widely adopted by the public sector, however the value and how it can be obtained is certainly within the organisational aims in public sector. For example, Hotel CIO's responsibility is *"to look at the value of information along a value stream"* (Hotel CIO). It is identified that Information Management adds value to the organisation and CIO's attempt is to find where this value can be enhanced by removing bottlenecks, decoupling inefficient processes and use information as glue to join systems, services and organisations together. According to the Hotel organisational structure, knowledge and best practices that are developed and applied to the local operating plants have an adding value to the regional level. Based on that, Hotel CIO is trying to introduce the mechanisms to make this knowledge and best practices available to the regional level. An example of such a project was the national wide Picture Archiving and Communications (PACs) project. The project introduced the transformation of traditional wet-film X-rays and MRI type of images to a computerised digital image solution. The benefits of this transformation in terms of patients' information were achieved in different levels. Previous problems that are overwhelmed were that patient records were no longer missing, X-ray film and their associated packages quite often got misplaced or mislaid, and they were only available on one point and time.

A different aspect of information and data management is given by the Golf CIO. Answering how his role is related to the innovation and competitive advantage, he replied that *"a lot of the data management is not about the tools, it's about the disciplines and about having a shared view of what data is required"* (Golf CIO). Golf company is an airline with a huge amount of available data on a daily basis. Huge amount of information about customers, airplanes' functions and ground handling arrangements is captured and shared in real time. Golf CIO states that what it is important about this informational resources is hidden in their quality rather than their quantity. Quite few people with less technical background are "victims" of trends in terms of technology developments and technical equipment such as business intelligence, data mining, warehouses, data marts etc. Without being negative against the previous tools and capabilities of technology, the Golf CIO focuses on the business problem and the understanding of company's data. The percept of this case is lying on the advantage that can be achieved through understanding the corporate data and that is how CIOs should see innovation and introduce it in their organisations.

Information management quotations	Sector
"a lot of the data management is not about the tools, it's about the disciplines and about having a shared view of what data is required"	private
"to look at the value of information along a value stream"	public
"I am trying to introduce the mechanisms to make this knowledge and best practices available to the regional level"	
"I am leading an Electronic Document and Records Management project, which is part of the organisation's information strategy and includes content life cycle management"	
"how Information Management technology helps Oscar University to introduce an innovative communication channel among academics, administrative staff and IT employees"	
"it is crucial to capture information about the potential students before the phase of registration, before being actual buyers"	
"the competitive advantage can be achieved if the "hidden" knowledge about students who did not registered is analysed and exploits the reasons why students' expectations were not met"	

Table 16: Information management quotations

The analysis of the studied cases, in terms of innovation and competitive advantage, provides interesting findings about the CIO role. At first, it is found that the innovation and the creation of the competitive advantage are certainly part of the CIOs role. All the interviewed CIOs stated that in one way or another they have to exploit the informational resources of their organisations in order to

introduce new ways and serve their customers with more innovative products and services. They admitted that the potential value that organisational information has is a real source of value, which can be transformed to competitiveness through innovative solutions. In examples of projects from the cases, reducing cost and Information Management were the foremost responsibilities for this direction. Table 17 below summarises the contribution of the CIO to innovation and competitive advantage as it was depicted in the previous section.

P2: The Chief Information Officer role contributes to the organisation through enabling innovation and competitive advantage
- reduce costs
- information management

Table 17: The CIO innovation and competitive advantage role aspect responsibilities

4.5   Relationships building

The third proposition of the current study suggests that another important aspect of the CIO role is the relationship building within the organisational boundaries. Previous research about the CEO/CIO relationship has indicated the particular role aspect as a quality for the ideal CIO (Feeny et al., 1992). Also, a comparison study, between established and newly appointed executives, found that the latter build relationships faster, compared to the established CIOs (Applegate & Elam, 1992). Finally, it has been argued that as IS management matures, the spokesman and liaison role of the CIO becomes more important (Grover et al., 1993). This section examines the CIOs' views about the particular aspect and extracts the ways they facilitate relationships within their organisations.

The relationship building aspect of the CIO role is validated by the total of the analysed cases. All the CIOs mentioned that part of their role within their organisation is to develop effective relationships not only with their colleagues within the IT department but also with the other executives of the board and the rest of the employees. The India CIO consultant stated that *"what differentiates*

CIO candidates from the successful CIOs at the organisations is the relationship building abilities" (India CIO consultant). It is assumed that the technical skills are given for the IT employees who reach the executive level. They have developed their knowledge and skills about technology aspects already. So, there is a need, at the executive level, for enrichment with communication and relationship skills. This is also showed from the responses of the CIOs at the question about the main aspects of their role. For example, their responses were like *"one is business relations"* (Lima CIO), *"I am spending more and more time on working with IT people outside the ISS department"* (Alpha CIO), *"one is talking to them about our business as a whole"* (Golf CIO) and *"my relationship is mostly with the senior staff across those five other units [departments]"* (Oscar CIO). Therefore, the increased communication and interaction, not only with the employees of the IT department but also with the rest of the employees of the organisation, requires an effective relationships building approach from the CIO side.

The CIO's relationships building role aspect includes two paths of action and these are identified through the analysis of the cases. The one is the relationships within the IT department. The CIOs are leaders of a department or else a group of people who are inspired and motivated by the CIOs role. That particular pathway is incorporated under the general leadership skills that every executive should have and they are applied for CIOs too. The scope of this study is to examine the second part of the relationship building role aspect that refers to the interaction with the other employees and executives who are non-IT related or they do not belong to the IT department. Assuming that every manager needs to interact and build effective relationships with his or hers subordinates, the value of our analysis is coming from the particular relationship between the CIOs and the other members of the board and the staff.

The relationships building role of the CIOs is also shown by a number of activities they mentioned during the interviews. The CIOs referred a lot to the occasions that they have to talk to the other members of the board and explain to them the IT function. For instance, the Golf CIO talks to the other members of

the board about *"the IT function and also their business as a whole"* (Golf CIO). The new structure that is in place at the Lima City Council, provides the CIO the opportunity to *"discuss with the employees what they want to do with the IT from the business perspective or even from an IT perspective"* (Lima CIO). On the basis of that, it is CIO's responsibility to keep a balance between the IT and the business world in terms of communication. There is a need for the CIOs to understand the business needs and problems and on the other hand, it is the CIOs' responsibility to explain the role the technology plays for the business function. During board meetings at the Golf airline, the CIO does not run often with statistics as he mentioned. His role is *"to talk about critical severities that have impacted the business whether they think it is one off or it is something more serious as a fault and what they think they are going to do to fix it if anything that needs to be fixed"* (Golf CIO). Hence, the CIO relationships are also based on his or hers ability to interpret the business impact of the IT and convince the board on critical business issues rather than technical details.

The above cases are evidence for the relationships that the CIOs are building within their organisations. It is clear that the collaboration between the IT and the business is indispensable. Even the non-IT related employees become more mature on technologies and, that makes them able to understand and communicate what their requirements are in terms of the technology. Thus, the CIOs are building relationships with the other executives as well as with the other departments' employees about their needs and requirements. As the India CIO consultant said *"all have to be able to build effective relationships with the internal stakeholders or executives in the company otherwise if they work in silos the business will not benefit from their Chief Director or CIO knowledge and experience"* (India CIO consultant).

Relationships building quotations	Sector
"one is talking to them about our business as a whole"	private
"I talk to the other members of the board about the IT function and also our business as a whole"	
"to talk about critical severities that have impacted the business either they think it is one off or it is something more seriously as a fault and what they think they are going to do to fix it if anything that needs to be fixed"	
"what differentiates CIO candidates from the successful CIOs at the organisations is the relationship building abilities"	
"all have to be able to build effective relationships with the internal stakeholders or executives in the company otherwise if they work in silos the business will not benefit from their Chief Director or CIO knowledge and experience"	
"I am spending more and more time on working with IT people outside the ISS department"	public
"one of my main roles is business relations"	
"discuss with the employees what they want to do with the IT from the business perspective or even from an IT perspective"	
"my relationship is mostly with the senior staff across those five other units [departments]"	

Table 18: Relationships building quotations

From the analysis thus far, it is expressed that the building relationship aspect of the CIOs contains their interactions within the organisation. Building relationships though could include the interaction between the CIOs and the external stakeholders. According to the current study and its analysis, this kind of relationships is considered as part of the fourth proposition, which will be discussed later. However, the CIOs efforts are not limited to the personal or professional relationships between themselves and the other members of the board or employees. This role aspect also includes the CIO responsibilities of developing and improving their relationships at all the hierarchical levels and across the organisation. As a result, relationships are based on effective communication and collaboration among departments and their employees. Considering the role of information as a resource for communication and collaboration, the CIO's responsibilities are also extended to the point of ensuring that informational resources are effectively used for communication and collaboration. In this context, the building relationships aspect looks upon the personal relationships of the CIOs, as well as the responsibilities the CIOs have in terms of facilitating better relationships across the organisation. The following lower level responsibilities depict how the CIO role enables the relationship building across the departments and among the employees.

4.5.1   Enable communication

It is analysed previously that a main part of the relationships building CIO role aspect is the interactions within the organisation. Those interactions can be more effective if they are supported by communication channels that support quick and straightforward messages between the employees and their departments. This communication should be standardised and facilitated according to the organisation needs. Factors such as the globalised organisations and the mobile workers have changed the structure of the organisations and their needs of communication. This reality establishes the new needs of communication under the CIO role. CIOs try to introduce those communication channels that will support the business processes and adapt the structural changes. As the Hotel CIOs suggested *"we need to try to have a fairly systemised process of engagement communication ultimately depended on our governance needs"* (Hotel CIO).

Enable communication quotation	Sector
"we need to try to have a fairly systemised process of engagement communication ultimately depended on our governance needs"	public

Table 19: Enable communication quotation

4.5.2   Enhance collaboration

Communication can be characterised as the backbone of the organisations. On the other hand, the collaboration between the employees and the decision makers is also crucial as business processes are rarely based on one single employee or even one group of employees sitting at the same office and at the same time. As a result, the collaboration is equally significant, if not more, with the communication needs within the organisations.

The following example from the Oscar University case illustrates a communication channel initiative that enhances the collaboration among the employees. Discussing previously the Information Management responsibility of the CIO as an enabler of innovation, we saw how a forum available to the academics and the IT staff members assists them to exchange their views and

experience about a new IT initiative. The Oscar CIO explained how this forum enabled the communication between the various users who would be affected by the implementation of the new project. This communication channel improved the relationships between the IT department and the users and also provided the opportunity to identify possible drawbacks of the proposed project. Those two factors are an example of how IT and in some respect the CIO role, is able to enhance collaboration among the members of staff across the organisations.

Enhance collaboration quotation	Sector
"a communication channel initiative that enhances the collaboration among the employees"	public

Table 20: Enhance collaboration quotation

4.5.3 Facilitate consultation

The previous CIO responsibility, the enhancement of collaboration, was illustrated by the CIOs as a proactive process of relationships improvement. It referred to collaboration before a potential solution (i.e. Oscar case). Despite this scenario, the analysis depicts another important issue under the CIOs responsibilities. The interviewed CIOs mentioned that their job is to facilitate consultations among the IT developers or buyers and the users of the Information Systems. For example, one of the CIOs said *"we have a very strong consultations running with our major users who are the academic departments, the schools and the colleges"* (Oscar CIO). CIOs ensure that the agenda and the outcome of those meetings influence, if not determine, what the IT department will deliver. In particular, the public sector CIO described that *"she has got to get that consultation completed and anything that the staff raises, she has got to respond to that"* (Lima CIO). In addition, the Oscar University CIO explained that those consultations involve the user perspective from the customer point of view and not only the employee's one. Specifically, the Oscar university decides what it will offer *"by consultation with the staff and student groups and this consultation is quite intense consultation"* as the Oscar CIO said.

In addition to the consultation, CIOs give value to the user perspective through feedback and complaints handling. They are seeking for feedback from the users within the organisation and the customers in terms of the products and services that are provided by the IT function of the organisation. For the Oscar case, the users' opinions are all a source of feedback to the CIO for what they say. This feedback loop illustrates the relationship between the CIO and the users of the IT deliveries. This continuous relationship after the implementation of a particular project is beneficial for the organisation. Through comments and responses, the CIO team indicates problems and missing points and as a result, it can improve the already implemented projects. The critical point of this feedback procedure is the qualitative nature of the feedback the CIOs are seeking of. The Golf CIO said that when he is talking with his peers, he is aiming to qualitative feedback through trying to understand if his colleagues think that the IT department is doing its job effectively enough (Golf CIO).

Regarding the feedback process, there is another example that was mentioned before in the Information Management responsibility of the CIO. At the Oscar case, we saw how the IT helped the University to gather data from potential students who apparently are not registered. This is an example of how the information as a resource helps organisations to innovate and differentiate their selves against the competitors. It is a feedback process triggered by the customers and it is exploited by the organisations through IT.

Along with the feedback mechanisms, the CIO's role is acting as complaints handler. This part of the role is highly related to balanced relationships within the organisation and how the users' issues are reaching the developers. Nowadays, The IT enabled systems support complaints handling and feedback processes easier and more effective than a couple of decades ago. The customer complaints have been transformed from paper-based to electronic forms. As a result, there is an opportunity for CIOs to introduce and apply techniques for the analysis of this information in order to enable consultation within the organisation.

Facilitate consultation quotations	Sector
"when I am talking with my peers, I am aiming to qualitative feedback through trying to understand if my colleagues think that the IT department is doing its job effectively enough"	private
"I have got to get that consultation completed and anything that the staff raises, I have got to respond to that"	public
"we have a very strong consultations running with our major users who are the academic departments, the schools and the colleges"	
"by consultation with the staff and student groups and this consultation is quite intense consultation"	
"the users' opinions are all a source of feedback to me for what they say"	
"the IT helped the University to gather data from potential students who apparently are not registered"	

Table 21: Facilitate consultation quotations

4.5.4 Stakeholders' management

An additional responsibility, that is indicated by the CIOs and it is linked to the overall relationships building role aspect, is the stakeholders' management. The previous responsibility of consultations facilitation depicts one aspect of the stakeholders' management. It is mainly focused on the user requirements and the user perspective on the IT function. Consultations with users give the CIO the opportunity to understand their needs and their requirements in order to adopt those to the IT deliveries. However, the CIOs have an extra role that is underpinned by their relationships building skills. They have to monitor and control different, and in some cases contradictive, requirements in order to proceed to the development phase.

Communication and understanding are necessities for both the CIO and the users' sides. Hence, reality shows that those two sides quite often have contradictive positioning. It is argued that users do not understand technological issues and therefore they have a difficulty in stating explicitly their requirements for an automated system. On the other hand, IT staff quite often lacks the business background and has problems with delivering the appropriate solution. In addition, IT developers have to meet the time and budget restrictions while users try to reach their performance indicators. This differentiation on the starting point of each team, and sometimes the desired outcome, is possible to create friction between them and obstacles to the performance of the organisation. At this point, the CIO as the executive leader of the IT department

and function has the responsibility to manage those different perspectives, dilute the arguments and act as an orchestrator for the various instruments. This capability increases also the CIO performance, as the Golf CIO said while he was describing his roles. *"…secondly it's also about stakeholder management and that entails to understand what is important to them and what are some of their business issues, the more I can understand about their business and what is concerning them, that helps me do my job better"* (Golf CIO).

Stakeholders' management quotation	Sector
"secondly it's also about stakeholder management and that entails to understand what is important to them and what are some of their business issues, the more I can understand about their business and what is concerning them, that helps me do my job better"	private

Table 22: Stakeholders' management quotation

Summarising the findings regarding the third proposition of the current study, it can be argued that the relationships building role of the CIO is twofold. On the one hand, time and effort is spent by the CIOs to develop effective relationships with their colleagues and to collaborate with them for the organisation robustness. On the other hand, the communicational and interpersonal skills play an important role on the CIOs' skills portfolio. The second pathway of the relationships building role is related to the responsibility of the CIOs to spread effective relationships across the organisation. The relationships building aspect is not only seen as an individual's skill. It is also a crucial facet that spreads throughout the organisation and it is mainly based on effective communication and collaboration among the members of the staff. The analysis shows that the CIO, as the executive of the informational and technological resources of the organisation, is responsible to enable this communication and enhance the collaboration within the organisation. A CIO post holder also has to facilitate consultations with the users and to perform stakeholders' management, as the orchestrator of the various forces from outside and inside the IT department. Table 23 below summarises the contribution of the CIO in relation to the relationships building within the organisation as they were analysed in the last section.

P3: The Chief Information Officer role contributes to the organisation through relationships building
- enable commnunication
- enhance collaboration
- facilitate consultation
- stakeholders' management

Table 23: The CIO relationships building role aspect responsibilities

4.6 External environment

The last proposition of the current study suggests that the CIO's fourth role aspect is related to the external environment. External environment is a constant evolving variable for the organisations and the developments and changes that occurred affect their performance and continuity. The Information Management and Information Technology fields are characterised as rapid changing ones and therefore the job for the CIOs cannot be effective and beneficial if they are working on their own world. In other words, they need to base their proposals in accordance with what is going on at the outside world. CIOs have to be alert to changes in the technical environment through a monitor function (Grover et al., 1993), in the sense of being continuously informed on IT developments, and able to interpret their significance to their organisations (Feeny et al., 1992) as it has been previously stated. Furthermore, CIOs do not only build effective relationships with superiors and peers within the organisation, as we saw in previous section. They maintain close ties with IT external vendors, partners, firm's subsidiaries and customers covering all the stakeholders of the supply chain. In addition, since outsourcing is getting more expanded in the IT development, previous research has showed that CIOs have to compare, evaluate alternatives and sometimes shape vendors' offerings (Ross & Feeny, 1999), in order to decide the best offering for their organisation. The following analysis provides the insights from the nine cases examined about how the CIOs interact with the external environment, how they build relationships outside the organisation's boundaries and how this aspect of their role has a positive effect to their organisation.

The main characteristic of the external environment CIO role aspect involves the CIO's communication with external stakeholders. This communication entails contacts with suppliers, customers and other business partners. Regarding the suppliers, CIOs develop relationships with approved and potential suppliers in order to be always updated with the state-of-the-art in IT development and to be familiar with the new technologies, and the business solutions. The Golf CIO set the networking with suppliers and third parties to the same level of importance as his networking with peers. He said *"there is also the networking with some of my peers and suppliers and third parties that provide us with market intelligence in terms of technology"* (Golf CIO). The expansion of IT outsourcing is also a factor that forces CIOs to highly prioritise the communication with external parties among their responsibilities. For example, Romeo CTO, who is working for a software development company, said that *"we are building a partner network, so we know people who already sell to NHS people or in the area or who are designers and want to build websites based on Content Management Systems"* (Romeo CTO). From this statement, it is shown that the CTO is also involved in the actual selling process of the business. However, the Romeo case is a software development company and that means that the IT function and development is part of the actual business function. In this sense, the interesting outcome from that case is the conceptualisation of the selling process and the required networking responsibilities by the post of the CIO.

The external environment role aspect of the CIO involves also the collaboration with other CIOs from organisations of the same sector. This role aspect is identified from the Oscar University when the CIO was describing how he is keeping himself up-to-date with the IT developments and the potential of new technologies to add value to his institution. *"One way to achieve that is to utilise the universities' alliances, build on those networks and look for ways to learn from each other and get join up"* (Oscar CIO). Other organisations case studies offer a valuable source of experience and the CIOs, who acknowledge those sources and they are using them for the benefit of their organisation, are more successful on their post.

The external environment CIO role aspect does not only include the communication with suppliers and third parties. CIOs have an active role regarding this interaction and as they are using the networks they are building to add value to their organisations. In particular, Lima CIO is pressing the Lima suppliers to help her bring innovation to the organisation. She mentioned that *"I recently just have to be talking to our suppliers saying… "ok we have spent three years getting business as usual"… ok, but what I want to use them for is pure innovation"* (Lima CIO).

Moreover, CIOs need to develop negotiating skills when it comes to outsource particular IT functions of their company. For example, *"in terms of outsourcing, when a company decides to outsource its IT function or one of its services like telephony, internet, helpdesk to some other provider and the CIO has to find the best provider and who would be responsive in certain time, who would give certain prices for the company and all the contract negotiation happens, the CIO handles them"* (India CIO consultant). Those negotiation skills and responsibilities the CIOs have, they are related to their networking and relationships with IT vendors and as a result with the external environment. Therefore, the CIOs responsibilities are expanded to the external environment and their aim is to exploit the suppliers' capabilities for the organisation's benefit.

External environment quotations	Sector
"there is also the networking with some of my peers and suppliers and third parties that provide us with market intelligence in terms of technology"	private
"in terms of outsourcing, when a company decides to outsource its IT function or one of its services like telephony, internet, helpdesk to some other provider and the CIO has to find the best provider and who would be responsive in certain time, who would give certain prices for the company and all the contract negotiation happens, the CIO handles them"	
"we are building a partner network, so we know people who already sell to NHS people or in the area or who are designers and want to build websites based on Content Management Systems"	
"I recently just have to be talking to our suppliers saying… "ok we have spent three years getting business as usual"… ok, but what I want to use them for is pure innovation"	public
"one way to achieve that is to utilise the universities' alliances, build on those networks and look for ways to learn from each other and get join up"	

Table 24: External environment quotations

Analysing the external environment aspect of the CIO role, the main responsibility so far is the communication and networking capabilities that CIOs need to have with the suppliers and third parties. Besides those, the analysis of the cases shows also some other aspects of the CIO role that are related to the external environment. These are their relationships with the customers, the technology awareness they need to have and the obligation to follow regulations and standards.

4.6.1 Relationships with the customers

Regarding the external environment, CIOs have an additional responsibility that is related to their relationships with the customers. The CIOs and, the department they are leading, provide services not only within the organisation but also to the customers. In this context, CIOs have to understand their needs. They have to develop systems that will provide the expected level of service according to those needs and finally, communicate the function of those systems to the customers. One example of this context is described by the Romeo CTO, *"All these solutions we are usually doing have to do with the web and therefore just looking at the software side or at the technology side is quite often not enough"* (Romeo CTO). And he continued *"but there is a need to look at the human site of it"* (Romeo CTO). In other words, Romeo CTO explained the importance of communicating to the customers the human side of projects rather than just the software and the technology parts of them. As CIOs understand the business processes (operations, customers needs etc) and they know the technology capabilities, they operate as a bridge between the Information Technology and the customers' needs.

Supporting this role as a bridge between the business needs and the IT capabilities, CIOs propose also solutions that will add value to the organisation. Regarding customers side, CIOs interpret the capabilities of the technology developments and they extend their functionality to add business value. At Oscar university, the CIO proposed the extension of the entry point for the students. Previously, the student record was being created at the point of

registration or application. According to this infrastructure, the university did not have the opportunity to contact students who applied or even enquired the Oscar university but they were not registered eventually. That student segment included dissatisfied students or students whose expectations were not met by the Oscar University. From the business perspective, the opportunity to contact those students and acquire useful feedback from them was neglected. Suggesting a solution to this issue, the Oscar CIO proposed the extension of the student entry point and the appropriate infrastructure in order to acquire the respective information. This proposal added value to the organisation, in the sense of better understanding of customers' needs and adjustment of provided services accordingly.

An important aspect of the CIOs relationships with the customers is the way they contact and communicate with them. Besides the customers' needs, CIOs are aware of their level of understanding about technology and particular the IT terminology. Thus, they talk with terms easily understandable by the customers and they focus on customer services and business benefits. The Romeo CTO regarding this part of the relationship with the customers he mentioned: *"well if you are speaking to the IT part of the client then it's no problem. You can talk the lingua and they do understand it. You can speak one to one. And they learn over the years. And it's standard sales technique, if you speak to a communication person inside a client they won't understand IT terms and don't even start to use them"* (Romeo CTO). At this point, we need to clarify that when discussing about the CIOs relationships with the customers, we are referring to the broad sense of the term "customer". In Romeo case for example, as a software development company, the CTO has a stronger involvement on the selling processes and thus he has an active role to the interaction with the customers. However, this CIO active role is not limited to the particular sector.

Another interesting outcome from the current stage of analysis is the CIOs perception about the customers. At the majority of the cases, it is found that CIOs are well aware of the customers' needs and they put them in high priority

to their work. CIOs are responsible for the technological and informational resources of the organisations and their transformation to products and services. However, as customers represent an indispensable stakeholder for the organisations survival, it is important to be seen like that, by CIOs as well. Ultimately, CIOs are responsible for the Information Systems and management within the organisation that are required to serve the organisation's customers. This dimension is evident in the words of the Hotel CIO. He said: *"It's very difficult but ultimately our currency is patients, that's the thing that flows between our organisations, patient information and what with that we do is to give them the maximum benefit to improve that visit experience all the way along the continuum"* (Hotel CIO). Finally, an interesting observation is the fact that this statement comes from a public sector case. Previously, it is argued that public sector is not characterised with a high level of competition against the private sector. Yet, the perception of customer sovereignty is highly adopted by public sector CIOs and that is shown at the CIO role aspect regarding the relationships with the customers.

Relationships with the customers quotations	Sector
"all these solutions we are usually doing have to do with the web and therefore just looking at the software side or at the technology side is quite often not enough...but there is a need to look at the human site of it"	private
"well if you are speaking to the IT part of the client then it's no problem. You can talk the lingua and they do understand it. You can speak one to one. And they learn over the years. And it's standard sales technique, if you speak to a communication person inside a client they won't understand IT terms and don't even start to use them"	
"It's very difficult but ultimately our currency is patients, that's the thing that flows between our organisations, patient information and what with that we do is to give them the maximum benefit to improve that visit experience all the way along the continuum"	public
"I proposed the extension of the entry point for the students"	

Table 25: Relationships with the customers quotations

4.6.2   Technology awareness

All the respondents mentioned the technology awareness responsibility as part of their role. This responsibility includes acknowledgement of the available technologies, the developed tools, their implementation capabilities and their contribution to the business processes. The technology awareness is an evolving process and requires continuous vigilance of a fast changing environment. Furthermore, CIOs develop technology assessment skills in order

to compare available solutions and make decisions appropriately. Hence, part of their role is to be familiar with developing technologies through time, how those artefacts can be implemented in specific business context and how they can benefit their organisations.

Regarding the technology awareness responsibility, the interviewed CIOs precisely mentioned that it is part of their role. The Hotel CIO said that one of the significant parts of his job is being the *"corporate consciousness of informatics"* (Hotel CIO). At Romeo case, *"they see improvements in technology and new things they need to adopt"* (Romeo CTO). At the Oscar case, the CIO ensured that there are mechanisms to provide technology awareness as they are *"getting bombarded with huge amount of stuff and they have to try to shift out what is realistic and what is doable and what will give the most value to the organisation"* (Oscar CIO). Those statements imply that technology awareness requires realisation of the technology developments and recognition of their implication to the business processes for the benefit of the organisation. The Golf CIO expressed his department's technology awareness by describing the availability of different solution regarding business problems. In particular, they need to have technology awareness *"because there are possibly multiple technologies that could help solve the problem or could help do a particular thing"* (Golf CIO).

In this context, technology awareness involves the phase of assessment. Before implementing or installing a new technology or component to the applied IT infrastructure, CIOs need to certify that there are business benefits from it. Considering this, it is interesting that CIOs assess a new technology from a business perspective. They are interested on the business outcomes they are going to achieve and then they assess *"whether it is a good investment financially"* (Golf CIO). This is performed through the discounted cash flow implications on the relevant processes as the Golf CIO explained.

Another interesting finding of this analysis is related to the level of the technology awareness the CIO and the IT department have. In more detail, the Oscar CIO's vision for measuring the technology awareness in higher education is the number of visits his colleagues make at universities of United States. In particular, he said: *"if you look for instance at one of the things that I would take in technology in higher education as a marker of whether people are aware of what is going on, is how many people go to colleagues in the states"* (Oscar CIO). This implies that the collaboration with organisations in the same sector can have a positive effect in the technology awareness of the CIO and the staff members of the IT department.

Technology awareness quotations	Sector
"because there are possibly multiple technologies that could help solve the problem or could help do a particular thing"	private
"whether it is a good investment financially"	
"we see improvements in technology and new things we need to adopt"	
"one of the significant parts of my job is being the corporate consciousness of informatics"	public
"if you look for instance at one of the things that I would take in technology in higher education as a marker of whether people are aware of what is going on, is how many people go to colleagues in the states"	
"we are getting bombarded with huge amount of stuff and we have to try to shift out what is realistic and what is doable and what will give the most value to the organisation"	

Table 26: Technology awareness quotations

4.6.3 Regulations and standards

Regarding the external environment CIO role aspect, the last responsibility shown by the case analysis, is to comply with the legal regulations and standards. There are a number of occasions, in which the Information Technology function of the organisations needs to be in accordance with the legal directives in national and international level. For example, data security and privacy, IT security management and personal data sharing are subjects of individual counties' law and directives of partnerships of countries, such as the European Union. On the other hand, standards are the process of development and agreement upon technical standards. Standards might be mandatory or voluntary in nature yet, they signify another conformation for the CIOs in many perspectives. The lack of standardisation does not have legal consequences

but it obstructs compatibility and systems integration between the organisational ones and those of the suppliers, the IT providers and so on.

The interviewed CIOs indicated the above responsibility of regulations and standards as part of their role. They mentioned that they face regular enterprise data security and privacy issues as they are expected to effectively use technology to share data while still following specific rules and regulations to protect personal information. In order to conform to those responsibilities, CIOs need to be aware of what has been legalised and what is obligatory in terms of Information Management. Specifically, one part of the Romeo CTO role is *"to look at the legal aspects of the projects"* (Romeo CTO). The Hotel CIO explained that *"the way that the government agenda works is the information governance aspect, which is around secure and confidential information flow"* (Hotel CIO). In addition, the Golf CIO said: *"every once in a while you will get projects whereby you are doing them for statutory reasons"* (Golf CIO). The last statement implies that some Information Management projects are overheads for the organisations. Nevertheless, those projects are a CIO responsibility.

Another example of the IT function conformation to the regulations and laws is illustrated by the Hotel case, from the healthcare sector. At this case, the decisions of parliament on social welfare and health care affect the Information Management and the IT infrastructure of the organisations mainly in public sector. In this context, part of the Hotel CIO role is *"indeed to do with the National Programme for IT (NPfIT)"* (Hotel CIO). This United Kingdom national programme promotes a centrally-mandated electronic care record for patients, which is connected with the General Practitioners and hospitals around the country to provide secure and audited access to these records. Such governmental projects affect the healthcare authorities' IT infrastructure, which has to be designed and monitored according to the decided plan. The designing and monitoring procedures are basically under the IT department responsibility, and ultimately under the CIO. Regarding the regulations in the national level, there is another CIO role task that it is identified by the Hotel case analysis. Part of the Hotel CIO role is also to be involved with the development of such

initiatives rather than just the implementation of the programme to the CIOs' local organisations. This is an instance of the active and strategic role, the CIO post has.

Finally, the external environment CIO role aspect refers to standards. There are various types of standards regarding the specifications of systems, test methods, operating procedures and so on. As it was said previously, standards do not have the mandatory nature of law regulations yet, they assist the business processes and, the IT function in particular, to follow structured and effective procedures. At the Golf company, the CIO explained that they look for *"standardised solutions that are easy to scale, extend and ramp up"* (Golf CIO). Standards are well established at the IT project management field and CIOs introduce *"a standard project management approach"* (Alpha CIO) as well as *"standardised light methodology of managing projects all the same way"* (Oscar CIO). Another situation whereas CIOs follow standards is on the evaluation of IT projects. Such a standard is the Return On Investment (ROI) technique that is widely accepted by the CIOs. Specifically, Mike CEO/CIO said that *"it is a standardise tool to assess what you have invested in developing new technology and then you try in sense how much of that money that technology is bringing back in"* (Mike CEO/CIO).

Regulations and standards quotations	Sector
"every once in a while you will get projects whereby you are doing them for statutory reasons"	private
"we look for standardised solutions that are easy to scale, extend and ramp up"	
"it is a standardise tool to assess what you have invested in developing new technology and then you try in sense how much of that money that technology is bringing back in"	
"to look at the legal aspects of the projects"	
"I introduced a standard project management approach"	public
"the way that the government agenda works is the information governance aspect, which is around secure and confidential information flow"	
"indeed to do with the National Programme for IT (NPfIT)"	
"standardised light methodology of managing projects all the same way"	

Table 27: Regulations and standards quotations

The analysis of the cases provides interesting findings about the CIO role in terms of its relation to the external environment. The main assets the CIOs are responsible for (informational and technological resources) are basically used

and transformed within the organisation. However, this exploitation requires the awareness of the environment, which affects the IT processes in various ways. Firstly, CIOs relationships with the suppliers and the IT vendors are critical for the IT function and the organisations vigour. CIOs negotiate and proceed to agreements about outsourced solutions and IT supplies. They are also in collaboration with CIOs from other organisations of the sector and they exchange knowledge and best practices. The analysis also reveals the CIOs' active role with the customers of their organisations. They understand the customers' needs and they provide the respective services. An indispensable responsibility for the CIOs is the technology awareness. They assess available technologies and new developments of Information Management field in terms of capabilities and effectiveness. This technology assessment is performed by the CIOs through the business value lens. That means that CIOs have the knowledge and the skills to solve business problems, and further than that, to create business value from IT solutions. Lastly, the external environment CIO role aspect includes the responsibility of compliance with the government regulations and laws as well as with standards for reasons of efficiency and effectiveness. The Table 28 below summarises the contribution of the CIO role to the organisation in relevance to the external environment.

P4: The Chief Information Officer role contributes to the organisation through its reaction with external environment
- networking (suppliers, third parties etc)
- relationships with customers
- technology awareness
- regulations and standards

Table 28: The CIO external environment role aspect responsibilities

4.7   The proposed CIO role model

The case studies analysis, of the previous section, addresses the second research question of the study, regarding the CIO role contribution to the organisations currently. The proposed model (Figure 8) illustrates the responsibilities identified by CIO post holders. The responsibilities represent the ways the CIOs currently contribute to their organisations in relation to business

strategy, innovation and competitive advantage, relationships building and external environment.

Regarding the business strategy, the CIOs *participate in the strategic planning* of their organisations while they are responsible to bring the *alignment between IT and business objectives*. Another CIOs responsibility is the *development and implementation of the IT strategy*, yet that is under the business strategy umbrella, which means the focus is on business problems rather than on technology per se. Finally, as they are involved in business process reengineering and introduce systems that amend the business processes, CIOs have also *change management* responsibilities. Those elements demonstrate the current CIO active role, as well as, their wide spectrum of skills needed to be effective.

Innovation and competitive advantage CIO role aspect includes *reducing costs* and *information management* responsibilities. The informational and technological resources nowadays represent a unique source of innovative solutions and differentiation for the organisations and the CIO responsibility is to work on that direction. Moreover, with the legacy of IM projects out of budget, CIOs have to make sure that their proposals, on the one hand aim to reduce organisational costs and at the same time be within budget. The management of information is of particular interest for the CIOs, and as such it is their responsibility to add value to the business by exploiting organisational data and analysing informational resources.

The CIOs relationships building role aspect is twofold. On the one hand, CIOs develop relationships with their colleagues, other executives and so on. On the other hand, CIOs are the *enablers of communication*, they *enhance collaboration* and the *facilitate consultations* in order to improve relationships and information exchange within the organisation through the use of technology and information systems. Furthermore, the particular CIOs role includes the

control of various stakeholders with contradictive requirements and that leads to the responsibility of *stakeholders management*.

Last but not least, the external environment CIO role aspect is instantiated into responsibilities related to the outside environment. The responsibilities of *networking with suppliers, partners etc* and the *relationships with the customers* are of particular interest and, as such they are separated from the relationships building role aspect. One of the key responsibilities of the CIOs external environment aspect is the *technology awareness*, which incorporates not only the knowledge of available technologies and best practices from partners and competitors but also includes the responsibilities of evaluating and assessing alternative IT solutions that solve business problems. At last, regarding the external environment role aspect, CIOs are aware of and confront with *standards and regulations* regarding IT field and law restrictions.

Figure 8: The proposed CIO role model

4.7.1 Validation of the proposed model

This section compares the proposed CIO role model with the evolution characteristics identified in the literature (see chapter 2) and with the two role models by Maes' and IBM discussed in section 2.4.

Firstly, the proposed CIO role model integrates the seven evolving characteristics (see section 2.3 for the groupings of these characteristics) identified through the analysis of the three decades of CIO existence. The managerial responsibilities (grouping [1]) are depicted through the participation in the strategic planning, the participation in the change management and the

stakeholder management responsibilities. The internal communication characteristic (grouping [2]) is represented by the enabling communication, the enhancing collaboration and the facilitating consultation responsibilities. The characteristic of bringing competitive advantage (grouping [3]) is mainly part of the development and implementation of IT strategy as well as the information management responsibility. The fourth grouping (two-way alignment) is depicted through the alignment of IT and business objectives responsibility. It is obvious that the external environment characteristic (grouping [5]) is represented by the responsibilities of the respective main CIO role aspect, namely networking, relationships with customers, technology awareness and regulations and standards. The same rationale is applied to the innovation characteristic (grouping [6]), which is part of reducing cost and information management responsibilities, as well as the information management characteristic (grouping [7]) that is represented by the same responsibility.

The proposed CIO role model covers and complements the IM integrative framework (Maes, 2007). In particular, the strategic issues are included in the business strategy and IT strategy related responsibilities. The structural issues are represented by the responsibilities that refer to architecture such as IT alignment and business objectives, information management, communication, collaboration and consultation. The Maes' lower level issues (operations) correspond with reducing costs, stakeholder management and external environment related responsibilities. The advantage of the present study's model against Maes' is the emphasis that is given to the innovation and the competitive advantage role aspect and also, on the relationships building role aspect and related responsibilities.

Regarding the comparison with the IBM's CIO role model (IBM, 2009), it can be argued that the proposed one is more inclusive. Apart from the criticism about the research design, the IBM role model prioritises the ROI as a key role, ignores the external environment aspect and the building relationships role aspect. As such, the proposed model provides a more complete picture of the

CIO role as it includes the CIO post holders responsibilities in a more realistic way.

4.7.2 Application of the proposed model

In this section the proposed CIO role model is applied in the healthcare sector. In particular, the Hotel CIO job description (see Appendix III), provided by the Hotel Strategic Health Authority, is examined as to whether the proposed CIO role model addresses the Job purpose, the Duties, the Responsibilities and Core functions mentioned in the job description.

The Hotel CIO job description identifies the post as Strategic Head (see Appendix III) showing the strategic role of the CIO. Although, it is mentioned that the CIO reports to the Executive Director of Nursing, the duties and responsibilities explained further, indicate that the CIO reports to the Board members and the Chief Executive (duty 11 and 15). This point is also mentioned by the Hotel CIO during his interview. In particular, the job purpose of the CIO includes (see Appendix III):

- ✓ Strategic leadership and accountability for establishing Information Management and Technology as a critical enabler for transforming services and ensuring that the NHS has robust programmes in place to achieve the objectives of local and national policy and the benefits of the National Programme for IT.

- ✓ Provide leadership for the development and implementation of information management strategies, and the implementation of information technology across all organisations in the Strategic Health Authority (SHA).

- ✓ Encouraging networking between organisations, disciplines, networks and Trusts, and championing the use of information systems and IT to support the core business of the NHS.

- ✓ Ensure that national strategies and supplier contracts are managed to maximise local impact.

From the above CIO job purpose, it is clear that the CIO in Hotel SHA has a strategic role rather than an operational one. The core focus of the post is on information management and technological implementation (although the latter is emphasised less). Particular attention is also paid on the relationships building aspect of the CIO role; networking within the organisation boundaries is explicitly described in the job purpose. Furthermore, the key relationships section of the job description refers not only to internal stakeholders but also to external bodies, showing the extrovert nature of the CIO role. Finally, the national strategies and policies and suppliers contracts relate to the external environment and that it is a key area of concern for the Hotel CIO.

The CIO duties and responsibilities describe in more detail the Hotel CIO role. Table 29 compares the Hotel CIO duties, responsibilities and core functions with the main role aspects and responsibilities of the proposed CIO role model. The main role aspects of the proposed model are indicated with a capital letter (A, B, C and D) and the corresponding responsibilities are indicated with a number, as shown in Figure 8.

Hotel CIO Duties, responsibilities and core functions		Mapping
1	Establish IM&T as a key enabler of and integral to the strategies and business plans of both PCTs and their providers (w ithin Local Health Community, LHC, arrangements).	A2
2	Support the Chief Executive in his role as Senior Responsible Ow ner (SRO) for NPFIT in the Hotel area.	A1
3	Contribute to the national leadership of the IM&T agenda, including policy development and the promotion of the CIO role and IT profession.	A3
4	Be responsible for ensuring that PCTs and their providers have the capability, capacity and resources to execute their national and local IM&T responsibilities.	A3
5	Initiate an SHA-w ide strategy for the development of Informatics services and advise NHS Chief Executives of appropriate organisation models	A1
6	Collaborate w ith NHS *Connecting For Health* and IT suppliers to secure the benefits of IT investment through effective local implementation programmes based on evidence of best practice.	D1
7	Ensure the prerequisite business process changes are established in NHS organisations to secure implementation in accordance w ith deployment plans.	A4
8	Ensure the NHS implements all mandated know ledge, information, data and technical standards	D4
9	Ensure that the NHS and its providers have sound information governance in place, including separation of duties relating to patient confidentiality as appropriate.	A2
10	Support the SHA in holding Primary Care Trusts and NHS Trusts to account through performance management arrangements, in particular through high quality intelligence, accurate forecasting, and risk analysis.	B2
11	Liaise closely w ith the DH and CfH to inform and support the IM&T implications of policy development and implementation for the NHS.	A2
12	Provide high quality leadership of the IM&T function, facilitating and improving professional standards through key appointments and training and development.	A3
13	Provide authoritative advice to Board members, Senior Trust Managers and others on contractual obligations including handling commercially sensitive information and ensuring that agreed governance channels are applied.	C4, D4
14	Contribute effectively to the corporate performance of the SHA.	B1
15	Develop relationships w ith local Universities, Local Authorities and other agencies, Including the Local Service Provider.	D1
16	Determine and advise the Chief Executive and Directors of the IT implications of NHS policy developments and initiate the appropriate strategies to secure their effective implementation.	A1
17	Lead the development of SHA-w ide strategies and investment plans to exploit the opportunities afforded by developments in IT for the modernisation and transformation of the local NHS; identify other sources of potential funding	B1
18	Ensure that local NHS organisations develop effective investment plans to support their IM&T strategies.	A2
19	Provide guidance and leadership for the implementation of effective IM&T services w ithin the SHA	A3
20	NHS Hotel values the diversity that exists across the region and our aspiration is to reflect this across our w orkforce. The post holder must be aw are of, and committed to, the Equality and Diversity policies of NHS Hotel, comply w ith all the requirements of these policies and also actively promote Equality and Diversity issues relevant to his/her post.	D4
21	Maintain and develop an environment and culture that improves health, safety and security of the w ork place, ensuring effective risk management strategies are in place.	C1-3
22	Contribute to corporate decisions and strategic planning for Hotel SHA as part of the Authority's w ider corporate management team.	A1
23	Represent the Authority at appropriate local and national meetings, including deputising for the Directors and Chief Executive as appropriate.	D1
24	Striving to facilitate others' contributions and to share leadership, nurturing capability and continuing development of oneself and others in areas of practice	C3

Table 29: Mapping the Hotel CIO job description

As shown in Table 29, the majority of the Hotel CIO duties, responsibilities and core functions relate to business strategy aspects (almost 50% of responsibilities) which also agrees the findings from the case study. About 25% of the Hotel CIO responsibilities relate to the external environment role aspect

and the rest 25% are split equally between the relationships building and the innovation and competitive advantage role aspects. Finally, there are no aspects in the Hotel CIO job description that are not covered by the proposed role model.

4.8   Summary

This chapter addressed the second research question of the present study, related with the contribution of current CIOs in accordance with the conceptual framework of the study. A preliminary analysis of the examined cases revealed useful insights regarding the CIOs reporting level, their background in terms of qualifications and their career path. Comparisons were made regarding the CIO reporting level in the private and public sector, the CIOs first degree and expertise, as well as their professional trajectory in respect with their qualifications.

The proposed CIO role model, the primary contribution of the present, is developed in respect to the CIOs interviews. The CIO post holders indicated the ways their contribution is instantiated in terms of the four main roles. As such, in terms of business strategy, CIOs participate in the strategic planning of the their organisations, align the IT and business objectives, develop and implement the IT strategy and participate in change management. Within the context of innovation and competitive advantage, CIOs responsibilities are to reduce costs and manage information with new ways that could improve competitiveness. The CIO relationships building role aspect includes the enabling of communication, the enhancement of collaboration, the facilitation of consultation and the stakeholders management. With respect to the external environment, CIOs are responsible for networking, relationships with customers, technology awareness and regulations and standards.

Finally, the proposed CIO role model validation is based on the evolving characteristics identified in the literature review and the current CIO role frameworks (Maes' and IBM's). Furthermore, the model is applied to the Hotel CIO job description by examining to what extent it covers the roles and responsibilities described the actual job description obtained through a Freedom of Information request and shown in Appendix III.

Chapter 5:
Discussion

5.1   Introduction

This chapter addresses the third research question of the study, regarding the CIO role in the future and the how it is going to be shaped based on specific concepts. In particular, the discussion is structured on two axes: within the organisation context and in relation to external environment factors. At first, the CIO role is compared with the Chief Technology Officer (CTO), the role and the responsibilities of the latter and it is discussed if the presence of both could help the organisation. The second point of discussion is the CIOs' perception of innovation as it has been defined by the CIO post holders.

Regarding the external environment point of view, another two future aspects of the CIO role are discussed. The first is related with the ability of the CIO to integrate, build and reconfigure organisation's competences. In that sense, the discussion justifies the CIO role as an enabler of Dynamic Capabilities. Finally, it is discussed how current disruptive technologies such as cloud computing and social media could shape the CIO role in the future.

5.2 CIO or CTO

Based on the concept of the CIO evolving role, research has shown that the CIO status is rising and the context CIOs are working in is becoming more complex as they manage a large group of people and they have to lead change and shape the corporate strategy (Earl, 2000). The new different point of that study is the prediction for the split of the role. The author suggests that besides the CIO, who is responsible for strategy, change and information resources, there will be a Chief Technology Officer (CTO) responsible for technology policy, infrastructure and operations. Another study, based on this prediction, argues that these two responsibilities (the managerial and the technical) are too overwhelming for a single person (Beatty et al., 2005). The authors suggest that the role of Chief Technology Officer (CTO) could be introduced to manage the technical roles and responsibilities that are currently being handled by the CIOs.

The analysis of our case studies has shown that the above progress is not part of the CIO role evolution. At first, the interviewed CIOs stated that they have the necessary characteristics, skills and knowledge to direct not only the managerial needs but also the technical needs of their organisations. For example, among the Tango CIO responsibilities is to know *"what technology are we own how it can help the business, how we are going to use it, how we are going to get the highest use out of it"* (Tango CIO). In the Mike company, the CIO must *"be aware of the latest technologies, to design policies, to discuss new sub-systems (or modules) and how these can be put together to create new products"* (Mike CEO/CIO). In addition, the expectations of the CIO candidates are to *"bring fresh view on new technology challenges"* (India CIO

consultant). The above statements show that the CIOs role consists of both the managerial and technical characteristics required to lead the IM and IT function of their organisations.

Secondly, the introduction of another chief level executive in the organisational structure can be problematic. Taking under consideration the fact that after thirty years of existence the CIO role is still evolving, it can be argued that it will need a lot of effort to establish and define a new role that is also related to continuously changing areas such as IM and technology. In addition, since the technology is an integral part of all the business operations and managerial needs, it would be difficult, if not impossible, to distinguish the technical aspects of the role and assign them to another role. In other words, considering a proposal or a project, it would be conflicting to establish two areas of responsibility, one for the management aspects and another for the technical aspects, in the higher level of the hierarchy.

On the other hand, it should be clear that the CIOs are not doing everything by themselves. The CIOs lead teams, which run the projects and consist of people with various skills. The Lima CIO explained that she has three director reports from which the *"one is technology and infrastructure, so it's all tins and wires, one is applications and the other one is business relations"* (Lima CIO). Similarly, the Alpha CIO job has two parts: *"one is owning and developing university IT strategy and then coordinating university IT resources to deliver that strategy. Then the other part is the direct operational management and control of the central IT department"* (Alpha CIO). In this context, the technical aspect of the IM function of the organisation is under the responsibility of the CIOs through project teams. That shows that the technical responsibilities exist in the organisations, however they are not assigned to another chief level executive.

Therefore, the concluding argument is that the CIO as a role has both the managerial and technical competences to address the business needs and the

introduction of a CTO will be problematic. The CIOs are able to plan long-term projects and strategies as well as short-term technical projects. The CIOs have been evolved from the IS managers to a post with strategic responsibilities and managerial skills. This does not mean that they are not able to assess the technical aspects. We argue that those technical aspects should be assigned to directors or teams under the CIO post, rather than to another chief level executive, as the CTO.

5.3 The CIOs' perception of innovation

Innovation, being incremental or radical, and referring to final products (and services) or to internal processes, has definitely worried organisations and researchers. Innovation can be dealt as one strategic alternative or as the main responsibility of the Research and Development department of the organisations (Thompson & Martin, 2010, p.453-454). The analysis of the innovation is out of the scope of this study, however interesting insights were revealed regarding the CIOs' perception of innovation. As it is discussed in this section, the CIOs of the examined cases have different views on innovation.

5.3.1 Innovation as a final product or service

The first perception of innovation described by the CIOs is the one related to the main business operations from the customer point of view: the final products and services. According to this view, innovation is performed by "*supporting the customers in more innovative things*" (Lima CIO). This perception of innovation involves the new products and services that are offered to the consumers. At this context, the challenge is how the Information Technology can facilitate the development of new products or provide new services. For example, the Lima city council's CIO referred to the WiFi city project. According to this project wireless access will be offered to all the citizens of the Lima city. In the same vein, the Golf airline CIO mentioned the WAP technology as another means of check-in, apart from the desk and the web options that other competitors offer.

5.3.2 Innovation as a way of thinking

The second perception of innovation is based on the incremental type of the term. Surprisingly, one of the private sector's CIO talking about innovation said that "*innovation doesn't have to be revolutionary*" (Golf CIO). Explaining the project about the check-in procedure by implementing the WAP technology, he continued "*this is not rocket science, it has been done before, but like anything else, it's a matter of us doing it and there are a lot of airlines that have not done this yet*" (Golf CIO). At this case, innovation is not a radical change introduced and implemented for the first time. In the literature, a new process or service adopted from another country or sector is defined as radical change (Thompson & Martin, 2010, p453-454).

The most interesting point of that view though, is that innovation is not based on the implementation of a new technology. The Golf CIO sees innovation as technology independent and describes it as a process of thinking and solving a business problem. In particular, he said that "*it is not about deployment of technology; it's more about bringing some discipline thinking to a problem and helping to shape the problem*" (Golf CIO). Considering technology as the means to implement innovation, rather than a panacea, this view incorporates the importance of the design and the role that the resources will play in the implementation of an innovative idea.

5.3.3 Innovation as a radical change

The last perception of innovation is clearly related to the radical change. The point made by the participants of the study is that it is their responsibility to introduce something new, never used before that will benefit their organisations. In particular, the India CIO consultant explained that candidates for the CIO post are supposed to be able to "bring fresh view on new technology challenges" (India CIO consultant). In addition, the Hotel CIO mentioned that "it's until you demonstrate that this is not the same thing better but it does better things". Clearly enough, this innovation perception focuses on essential changes on products, services and processes, which will enhance the customer

experience and increase the business value. In more detail, the Hotel CIO indicated that innovation in his organisation is focused on the efficiency and the cost reduction having as the ultimate goal the customer experience.

Summarising the relationship between the CIOs and their perception of innovation, it is argued that the role of the CIO is related directly with innovation in a significant way. However, the CIOs participated in the study expressed different views on what innovation is for their respective organisations although their views are also to some extent complementary.

More specifically, for the public sector CIOs, despite the fact that there is low level of competition in that sector, they are concerned about innovation in terms of the business processes and the customer experience. They perceive innovation as enhancing efficiency in order to reduce costs. In addition, they are trying to serve the customers with new products and services to increase the customer experience.

Finally, private sector CIOs described innovation as a process rather than an outcome. Innovation is related to the way of thinking and solving about business problems and exposing the organisation to new technology developments. Emphasis is given on understanding the needs of colleagues and at the same time, help them understand what their needs are. As a result, it can be argued that innovation is not a one-fit-all approach and regarding Information Technology, it still focuses on business processes.

5.4   The CIO as an enabler of dynamic capabilities

It is argued that Information Management is an important tool for the developing of the dynamic capabilities of organisations and the CIO as the overall responsible for the organisation's information resources is an enabler of the

dynamic capabilities (Strickland & Theodoulidis, 2010). In particular, the roles of relationships building and external environment of the proposed role model are found to involve responsibilities that enable organisations to adapt quickly to changing market conditions. This section describes how these CIO role aspects are related to the dynamic capabilities and suggests that the CIO is the appropriate c-level executive to enable the dynamic capabilities of the organisation.

5.4.1 Dynamic capabilities

Dynamic capability is defined as the 'firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997). A resources-focused definition defines dynamic capabilities as the firm's processes to integrate, reconfigure, gain and release resources in order to match and even create market change (Eisenhardt & Martin, 2000). The concept of dynamic capabilities changed the field of management and particularly, the area of strategic management. Following the competitive forces and resource-based view, dynamic capabilities emphasise the notion of evolution (Teece et al., 2000). The important thing in this management approach is the evolving process of the organisation, its resources and its reaction to the changing environment. The dynamic capabilities are instantiated into three areas of activity. They refer to the process of learn quickly and build strategic assets, integrate new strategic assets within the company and transform or reconfigure existing strategic assets (Eisenhardt & Martin, 2000).

Research has shown that Information and Knowledge management, as well as their related technologies, have an impact on the development of dynamic capabilities of the organisations (Bollinger & Smith, 2001; Pavlou et al., 2004; Sher & Lee, 2004). Furthermore, while the strategic role of IT becomes more prominent in turbulent environments (Pavlou & El Sawy, 2006), the lack of strategic IT alignment impedes the development of IT competences (Chen et al., 2008) and as such the dynamic capabilities. In parallel, a factor that

influences the manager's activity in developing dynamic capabilities is their commitment to them (Schlemmer & Webb, 2008). The fact that none of the managing directors is formally committed towards the development of dynamic capabilities, affects negatively the development activity of dynamic capabilities. For that reason, there is a need for the organisation to make a commitment so that an executive director is responsible for the development of dynamic capabilities. In an answer to that, it has been found that the CIOs have realised the necessity to develop dynamic capabilities and, in particular, among their role aspects is to enable quick learning and transformation and reconfiguration of the strategic assets of the organisations (Strickland & Theodoulidis, 2010).

The main aspect of the dynamic capabilities concept is the ability to renew competences. By definition, this implies both reactive and proactive action to adopt the environment changes. From the one side, time-to-market is crucial if competition is intense and from the other side, innovative responses can robust firm's position. The interviewed CIOs concur to both instances of reconfiguration. In the fast changing environment, organisations need to accomplish this reconfiguration of their competences as soon as they can. In most of the times a competitor introduces the cutting edge technology and the other marketers have to respond. The Golf CIO said: "*the market is fairly dynamic in our industry, and the point is how quickly we can respond*" (Golf CIO). Part of the CIOs role is to be alert to competitors' moves in terms of technology and Information Management. They are responsible for transforming their practices, rearrange business processes and use information assets to respond to competitors moves. On the other hand, CIOs emphasise the proactive nature in environmental change. They point out how important it is to introduce innovation in their organisation. The same CIO mentioned: "*I have a duty to bring that innovation in the organisation so I spend some time doing that*" (Golf CIO). In most cases traditional ways of doing things are getting obsolete. Product development or sales management are examples of business processes that occur through new channels and different rules. Telecommunications and internet services establish customer entity in the development process of services and products. Therefore, proactive action from

the c-level executive who is responsible for the IT and IS infrastructure of the organisation is required. CIOs see innovation as their duty and they declare that they spend time on that while they are trying to bring innovation into their organisation.

5.4.2 The CIO as an enabler to "learn quickly"

A prerequisite of dynamic capabilities is to learn quickly and build strategic assets (Eisenhardt & Martin, 2000). In more detail collaboration and partnership as well as common codes of communication help members of staff to exchange knowledge and use information as a strategic asset to renew competences (Eisenhardt & Martin, 2000). CIOs that were interviewed for the purposes of this project highlight the importance of collaboration within and outside the firm boundaries. They build their work in consultation with colleagues and users. They are getting feedback from them about the IS infrastructure and pay attention to what the staff raise. Particularly, the Lima CIO said: "*we have very strong consultations running with our major users*" (Lima CIO). In addition, CIOs are there to understand what is important to the users and what some of their business issues are. As the Golf CIO admitted: "*the more I can understand about their business and what is concerning them, the more help I got to do my job better*" (Golf CIO).

However, collaboration is not part of the CIO job only within the organisation. CIOs are exchanging ideas and are seeking information from partners and third parties. Building new strategic assets requires alliances and acquisition processes that import know-how and experience from suppliers to the organisation. More specifically, the Golf CIO argued that "*there is also the networking with some of my peers and suppliers and third parties that provide us with market intelligent in terms of technology, in terms of best practice, in terms of innovation*" (Golf CIO). And this part of the job is not always easy. There are indications, from the public sector case, that directors are more internally focused. As a result, CIOs have not only to collaborate with external

partners but also convince colleagues that this collaboration will enable organisation ability to adopt changes in the market.

One step further, the need for collaboration continues to the relationship between organisation and customers. In order to integrate new strategic assets, customer experience needs to be linked with the business processes. In other words, suppliers capabilities are not taken for granted, and firms are not developing products and services that are introduced to the market through push techniques. Instead, the customers' needs more often drive and initiate new developments. CIOs try to accomplish that. They find ways to integrate customer perception into the production process. Current technology achievements such as web 2.0 support more than ever the customer involvement to business processes. CIOs are aware of that and they suggest projects that integrate this asset within the business processes. The Oscar university CIO explained how they utilise the university student portal to get feedback from current students, prospective students and graduates. They are seeking for feedback about student experience in order to adjust their future plans in the way they reach new students.

Collaboration within the organisation is affected by the use of common codes of communication. Employees from different departments are more effective in terms of collaboration if common codes of communication are used. People are not familiar with all the different channels of communication or the interface those channels have. From the Information Management and Technology perspective, a universal infrastructure must be introduced to smooth diversities. In that context the Oscar CIO said that "*the distinction between those different areas of activity is much less clear and sharp than it would be in most other organisations where they are individual silos*" (Oscar CIO).

5.4.3 The CIO as an enabler to "transform and reconfigure"

According to our analysis so far, the CIO role includes aspects that promote organisation's ability to reconfigure assets to market changes through collaboration and communication. In addition, dynamic capabilities require the transformation of the existing assets. In other words, this change involves environment scanning and market evaluation (Eisenhardt & Martin, 2000). Both these aspects consist part of the CIO role (Strickland & Theodoulidis, 2010). The interviewees agreed that they have to be alert to technology changes and at the same time to evaluate the alternatives in order to proceed with the most profitable solution.

CIOs have a number of means to scout the external environment. They participate in committees and conferences about new technological achievements. The Lima CIO said that "*looking at new technologies and new areas is part of my job*" (Lima CIO). The nature of their subject demands their awareness as the technology is a fast evolving tool. The Hotel CIO also agreed that "*one of the other significant parts of my job is being the corporate consciousness of informatics having a fairly varied background*" (Hotel CIO). Furthermore, CIOs enforce the members of their department to collaborate with similar IT directors and exchange ideas and practices that enable organisation competitiveness. In particular, the Oscar CIO monitors how often his assistants collaborate with others in the United States. He uses that aspect as a marker to identify if people are aware of what is going on, and how many people turn to other colleagues in the states.

Scouting the external environment is not a prerequisite for reconfiguration by itself. The Oscar CIO explained that "*as a consequence you get bombarded with huge amount of stuff and you have to try to shift out what is realistic and doable and what will give most value to the organization*" (Oscar CIO). CIOs are doing some sort of prioritisation of technologies. They estimate the capabilities of the available technologies and decide which one provides the best solution to specific organisation needs. The Golf CIO explained that "*you have to have*

means of prioritising and a means of deciding what is an area of focus and what isn't an area of focus" (Golf CIO). There are a lot of alternatives in terms of technology solutions and quite often most of them are exciting artefacts. CIOs job is to recognise the innovative solutions that will bring value but also to avoid the extreme solution that will not be accepted by the customers. A method that helps CIOs in prioritisation and technology evaluation is benchmarking. Benchmarking assists executives in comparing Information Systems (in terms of accuracy, cost, time and quality) to standards and best practices. Specifically, the Lima CIO, referring to benchmarking, mentioned that "*it's one of the mechanisms whereby I wanted to identify gaps that we need to look at in service delivery*" (Lima CIO). Through this process of technology evaluation, the Golf CIO emphasised the need for reconfiguration and transformation of the information resources. He said that "*if I have two technologies not only will I look for the business outcome but I also come back and say well from an infrastructure perspective, from an IT perspective, my strategy is that I prefer to choose a solution that would allow me in future to be scalable, flexible, extendable*" (Golf CIO). This statement is another evidence of CIOs awareness about the need of reconfiguration and continuous transformation of the organisation assets.

5.5   The CIO role and key technological drivers

In the literature review chapter, the CIO responsibility areas were presented in parallel with the key technology areas that were leading the Information Management and Information Technology field the last thirty years. This link provides useful insight and understanding about the evolution of the CIO role. The CIO transformed from a technician that was during the cradle years of the role, to a functional manager through the 1990s, and became an executive the last ten years. This transition is highly related to the technological developments in the area of Information Management. The last thirty years a noticeable transformation occurred in the mainframe era of the 1980s, to the client-server architecture of the 1990s and to the mobile and cloud computing of today. This

section attempts to envisage the affects to the CIO role by current disruptive technologies such as cloud computing and social media.

At first, CIOs of the future will need to pay attention to technology awareness responsibility as it has been defined in the proposed role model. New technology developments are often attractive without enough assessment of the actual solutions they offer to a particular business problem. In respect with innovation, it is argued that if we pour new technologies into old business models, innovation will never get translated into customer orders and new revenue (Bergstrand, 2011). Therefore, CIOs might not mistake great technology for great innovation, yet they should compile their business knowledge with technology assessment skills for the benefit of their organisations.

New technology developments need attention regarding their capabilities, as well as their implementation in new areas. For example, considering the cloud computing technology in the healthcare sector, a CIOs future challenge is to transform services that are inherently slow and inefficient into more effective by cutting through latency in every process except direct, hands-on patient care (Fogarty, 2011). As a result, CIOs will give additional attention to technology developments not only from their capability perspective but also from their potential implementation on new sectors. Moreover, the responsibility of regulations and standards in terms of sensitive personal data will be of particular interest for the CIOs in such cases.

Another challenge for the CIOs of the future, related to the cloud computing technology, is the additional negotiation abilities in cases of outsourcing business intelligence and business analytics processes. As explained by Kathleen Barret, president and CEO of the International Institute of Business Analysis, outsourcing cloud services is more difficult than storage facilities (Nash, 2011a). In more detail, it is argued that the right data needed for a business analytics scenario are often indicated after the first attempts of

analysis have been made. Therefore, in cases of using outsourced cloud computing services, the managers might need extra data than those agreed in the initial contract. In such a case, the CIOs will need to predict those needs or be able to renegotiate new terms for data availability with the vendor. The respective responsibility, of the proposed CIO role model, affected by that is the networking one.

Another example of today's disruptive and famous technology is that of social media. More and more organisations are creating virtual instances on the web 2.0 environment, they base marketing campaigns on that, they interact with their customers through those channels or they use social networking sites to promote their businesses. The so far, fast changing business environment is rapidly changing with the intrusion of social media technologies. In that context, most organisations struggle to make sense of the data tsunami crashing over them, and while CIOs have always had to anticipate, and staff for, technology and business shifts, the expansion of social media makes the changes faster (Nash, 2011b). As a result, the responsibility of information management will have an increasingly important value for the prospective CIOs.

The vast amount of available data through social media technologies will also have an effect on the building relationships role aspect of the CIOs. With the right integration tools, social media data could paint a much more vivid picture of customers, which would allow marketing to fine-tune its effort, and thus the CIO-CMO relationships matters most (Johnson, 2010). It is argued, that if an effective relationship between the executives responsible for IT and Marketing is missing, social media projects will fail and financial resources will be wasted without achieving the desired business impact.

In the same context, the projects related to those disruptive technologies should be tackled strategically rather than operationally. Incorporating social media is a business strategic move closely related with the organisational and IS strategy of the organisation. It is not about a one-off marketing campaign. A study

mentions that 73% of the Fortune 100 have registered a total of 540 Twitter accounts, yet more than half of those accounts are stagnant (Burnham, 2011). As such, planning, from both business and technology perspective, is needed in order to transform this opportunity to a strong communication channel. CIOs will have the first say and the main responsibility on those initiatives.

Finally, a comment can be made on the future trajectory of the CIO role. There is an increasing number of CIOs who become CEOs. It can be argued that with the increasing role of technologies, this trend could determine the CIO career path in the future.

5.6   Implications of the present study

The analysis of the present study illustrates the role of the CIO regarding the main aspects that this role consists of and the responsibilities each role incorporates. In addition, the results can be further discussed and provide practical implications to both industry and academia.

The proposed CIO role model is applicable to industry as a guideline for the job description of the role in question, as well as an evaluation scheme for the post holders. One of the assumptions of the present study was the unclear role of the CIO. The main aspects and the responsibilities of the role evolve through time and vary in different organisations; as a result there is a need for continuous investigation and examination of the CIO role model. The suggested role model combines the salient role aspects and defines in more detail the responsibilities for the post holders. As a result, the model can be used as a template by organisations in order to assist them to identify their specific needs and develop their complete CIO job description.

One step further, the proposed role model can be used for evaluation purposes of the CIO post holders. The employees' evaluation schemes are usually based on a set of Key Performance Indicators (KPIs) that calculate various aspects of projects or organisational roles. In that context, the suggested responsibilities can be linked with percentages according to the organisation's needs for each role aspect, in order to estimate the performance of the post holder. For example, a service provider that keeps huge amount of data of its customers could rate the information management responsibility with a higher percentage than the relationships building role aspect. In that case, the particular CIO will be motivated to focus on innovative solutions by exploiting the available resources, rather than spending more effort on stakeholders' management.

Finally, the present analysis of the CIO role has a potential impact on academia. The CIO career path is a hot topic and there is a need for the university community to design graduate and executive programmes that are more focused on the real organisations needs in relation to the IM and IT functions. In that sense, the proposed role model identifies the skills and the abilities the current CIOs have and the CIO candidates are expected to develop. Thus, according to the current study, the curriculum of the university programmes should include the areas through which the CIO contributes to the organisation. The four main role aspects and the respective responsibilities are an integrated structure of the skills, the abilities and the knowledge required from the chief level executive, which is responsible for the informational and technological resources of the organisations.

5.7 Summary

This chapter addressed the third research question of the study, regarding the CIO role in the future and the how it is going to be shaped based on specific concepts. In particular, the discussion was based on two axes: within the organisation context and in relation to external environment factors.

At first, the CIO role compared with the Chief Technology Officer (CTO), the role and the responsibilities of the latter. Particularly, it was argued that the technology aspect is included in the CIOs' competences and the presence of two c-level executives is problematic. Therefore, the CIO role is proposed as the predominant one. The CIOs perception of innovation is of particular interest as it reveals directions of initiatives and projects in the near future. CIOs understand innovation as a final product or service, as a way of thinking or as a radical change.

The future CIO role is likely to be the most appropriate c-level executive responsible for the dynamic capabilities of the organisations. In more detail, there is a need for a director to be committed to the dynamic capabilities, and the CIOs role include responsibilities related to dynamic capabilities. In addition, how the disruptive technologies of today will shape the CIO of the future is discussed in this chapter. It is reasoned that cloud computing and social media technologies would have an effect on relationships building and external environment CIO role aspects.

Finally, the implications of the present study are discussed in this chapter. The proposed CIO role model has practical implications to both industry and academia. Organisations can benefit from the model by using it as a template to develop the CIO job description that corresponds to their needs. Moreover, an evaluation scheme for the post holders can be developed based on the suggested main aspects and responsibilities. Regarding the academia, the CIO role model could help on the development of the graduate and executive programmes that are needed to educate the CIOs of tomorrow.

Chapter 6:
Conclusions

6.1   Summary of the present study

Since, the informational and technological resources that are now available to the organisations constitute a source of prosperity and differentiation, if not survival, the role of the Chief Information Officer is crucial and vital. Although, the role has already reached thirty years of existence, its aspects and responsibilities are still evolving. This study, based on the factors that affect this evolving role of the CIO, aims to clarify the CIO role aspects and provide insights to that c-level position of the organisations.

The starting point of the conducted research was the literature review in terms of the role aspects and the responsibilities the CIOs have the last thirty years. It was found that the CIO was first technical oriented, inheriting the characteristics of its predecessor the Data Processing Manager. As the technological environment changed with the introduction of advanced information systems that offer collaboration between the different departments and processes, the CIO became a function oriented director who had the responsibility of integrated information processes. Then, things changed rapidly with the development of the internet and the World Wide Web. The ways to do business remind few from the past. Accordingly, the CIO runs a department that is similar to the production line. The majority of the organisations base their operations on information systems and in addition, there are organisations that serve customers completely through the web. As a result, the CIO gained a strategic role among the board of directors for the sustainability and robustness of the organisations. In other words, the contribution of the CIO to the organisations cannot be easily argued.

The literature review also indicated the lack of a well defined and accepted role model for the CIO post. There is no concrete knowledge about the means through which the CIOs offer their contribution to their organisations. Therefore, the present study is based on a conceptual framework that incorporates the previously stated responsibilities in a structured way. The qualitative design was chosen and nine case studies were examined in terms of the Chief Information Officer role.

The conceptual framework of the study includes four main aspects of the CIO role through which the senior executive contributes to the organisation. These role aspects are:

- ✓ the business strategy,
- ✓ the innovation and competitive advantage,
- ✓ the relationships building, and

✓ the external environment.

The qualitative design of this study is based on this framework. The case studies were picked from a variety of organisations, such as the private and the public sector, as well as from small and larger organisations. The organisations were approached and their CIOs were indicated as the contact point. Interviews were arranged with the nine CIOs and additional material from the organisations (mainly the websites) was analysed in terms of the CIO role and the Information Management projects of the organisations.

The analysis of the cases indicated the ways the CIOs contribute to their organisations in respect to the four main aspects of the conceptual framework. In more detail, the participation of the CIOs to the overall business strategy was identified through their participation to the strategic planning of the business mission and objectives. They are also responsible to align the IT with the business objectives, making sure that both are adjusted to the requirements and the capabilities of the other. They are certainly supposed to develop and implement the IT strategy of their organisations, based on the business needs and not to work isolated. In addition, the spread of Information Systems across the organisations emerge the change management skills of the CIOs.

Regarding the innovation and competitive advantage role aspect, the CIOs are very well concerned. First, they are driven by the need of cost reduction and the Information Management field assist their effort on that. They have in their agenda the need for innovation and at the same time, they balance the new initiatives with the efficiency and effectiveness of the current processes. In the same area, their effort also goes to the ways Information Management can offer competitiveness. They are responsible for the informational resources their organisations collect, store and share and therefore they find solutions to add value with this resource.

The third area of investigation was that of the relationships building. As the CIOs are involved more and more with all the business processes and indeed in

a more active and strategic role, they have realised the need of communication and collaboration with the other departments and colleagues. They facilitate consultation with the users of the Information Systems in order to take under consideration their needs and problems in using the IT departments developments. Furthermore, they develop stakeholders' management skills, since the recipients of the IT services are quite often contradictive. They have the technical background and they understand the business requires, so they are able to blunt the different perceptions. The relationships building aspect of the CIO role also includes their responsibilities to enable communication and enhance collaboration among the organisation. They are expected to provide the infrastructure and the equipment to promote communication between departments and employees within the organisation, or to those who are located to different countries. As it is discussed in the previous chapter the Information Technology has rapidly changed the employees and the ways they collaborate.

Finally, the analysis identified the responsibilities of the CIOs regarding the external environment. The technology awareness is the first that comes to mind as their priority; however they are involved with other aspects as well. The networking with suppliers and third parties is crucial, especially when it reaches the level of negotiations for procurement purposes. Besides that, the CIOs have developed their relationships with the customers. The Information Systems are not exclusive back office functionality and the systems are used by, and sometimes interact with the customers. At last, the CIOs responsibilities include the regulations and standards that underpin the Information Management area in the national and global level.

6.2 Contribution and comparison with previous research

The overall original contribution of the present study lies on the proposed CIO role model. The particular role model defines the main aspects of the CIO role and explains which responsibilities are included in each role aspect. It describes in detail how the CIOs contribute to their organisation through those four main

roles. These roles and the respective responsibilities are self explanatory, while they minimise the overlapping between concepts and processes. In the context of the evolving CIO role and the need for continuous investigation of the role, the current study provides knowledge on the modern CIO role and its contribution to the organisations.

In addition, the validation of the role model by the CIOs from the industry enhances the value of the proposed role model. In particular the analysis of the study shows how the roles are instantiated to responsibilities, what responsibilities and in what extent are applied, according to factors such as the sector and the CIO position in the organisational hierarchy.

Finally, the present study discusses the CIO role in relation to the evolution of the technology, the position of the CTO, the perception of innovation and the dynamic capabilities of the organisations. It is shown that the strategic role of the CIO is related to the current key technology areas and their implementation to the business operations. The analysis of the CIO role indicates that the required technology skills and knowledge are part of it and in that sense the technology officer should report to the CIO and not exist as another chief-level executive. Useful insights are exposed about the perception of innovation and how CIOs understand the term and proceed to innovative solutions. Last, but not least, this study suggests that the CIO is the most appropriate chief-level executive to facilitate the organisation's ability to integrate, build and reconfigure the internal and external competences to address changing environments. In other words, this study suggests the CIO role as an enabler of the dynamic capabilities of the organisation.

6.2.1 Results comparison

The results of the present study are comparable with the previous research in the following aspects. The business strategy CIO role aspect and the respective responsibilities are indicated in the past (Buehler, 2000; Reich & Nelson, 2003;

Weiss & Anderson Jr., 2003; Feld & Stoddard, 2004). The same occurs with the building relationships aspect (Haselkorn, 2003; Smaltz et al., 2006; Watts & Henderson, 2006). The external environment role aspect of the CIO post is indicated to less studies (Watson, 1990; Grover et al., 1993), yet it is implied as an awareness ability of the CIOs to be able to confront with the external challenges. The innovation and the competitive advantage role aspect is indicated as well (Polansky et al., 2004; Sutton & Arnold, 2005; Watts & Henderson, 2006), yet without going in more detail how the CIOs implement innovation and competitive advantage.

In the literature review chapter, two CIO role models have been discussed. Regarding the IM integrative framework (Maes, 2007), the results of the present study include all the aspects of the framework. It has been shown by the interviewed CIOs that are involved in the strategic positioning of their organisations, the structural (mid-term) planning and the operations with a lower level. It is also showed that the CIOs are aware of the external environment challenges and opportunities not only in terms of technology but also of business aspects, a role that was represented on Maes' framework as the role of "trend watcher". However, the innovation and the competitive advantage role aspect is not explicitly stated. In addition, the role model in question does not involve the relationships building aspect as a responsibility and ability of the CIOs of today.

Another CIO role model, discussed in the literature review chapter, is the one by IBM (IBM, 2009). This study is limited in terms of the research design. The data collection phase is ambiguous as it is not clear if the CIOs were contacted through questionnaires or interviews and in either case the analysis process is not stated. Also, it can be argued that IBM, as a major technology vendor, has an interest on the CIO role and for that reason the results suffer from bias. However, the particular role model is in conjunction with the proposed one. Attention has been given to the innovation and business impact role aspects of the CIOs by both role models. The IBM role model prioritises the ROI factor that includes reducing cost and adding value. The first responsibility is incorporated

in the innovation and competitive advantage aspect of our model, while the second spreads on almost all the CIO role aspects. This is reasonable according to the critical importance of the informational and technological resources that the CIOs manage and as such they have the responsibility to add value through different role aspects. For example, CIOs add value while they enable communication or enhance collaboration between employees and departments.

6.2.2 Methodology comparison

In contrast with the present study, the previous research about the role of the CIO or the senior executive for the IM and IT function of the organisation is focused on the quantitative research design. The main focus of this kind of research (Benjamin et al., 1985; Penrod et al., 1990; Watson, 1990; Applegate & Elam, 1992; Grover et al., 1993; Gilbert et al., 1999; Gottschalk, 2002) is to explain the relation between variables from internal and external environment with the CIOs' role aspects.

Although the results of those studies are interesting, they are based on previous models, i.e. (Grover et al., 1993; Gottschalk, 2002) and they assume that the CIOs follow the established managerial role models. In the context of the technology evolution and the respective evolution of the role, the hypotheses testing method is not able to exploit the new roles and responsibilities the CIOs gain and facilitate within the organisations through the years. Furthermore, there is evidence that the CIO role is distinctive from leadership in general (Karahanna & Watson, 2006) and as such the traditional managerial models cannot be fully applied.

In addition, the questionnaire-based survey refers to statements that are exposed to CIOs without additional explanation. The results show that the CIOs rank the alignment of IS organisation with the enterprise as their first responsibility (Gilbert et al., 1999), or that they are spending most of their time on IT strategic planning and control (Applegate & Elam, 1992). However, the

particular studies do not explain what is included in the IT strategy or how the alignment is elaborated. The present qualitative design offers this opportunity by analysing the perceptions of the CIOs.

6.3 Limitations

The present study is not an exception regarding the difficulties faced by researchers during their work. In particular, there are two issues that limit the research range of this work, that is the size of the sample and an additional research objective. However, those two limitations do not affect the quality of the analysis and the results discussed in the previous chapters.

The first limitation is the size of our sample. The nine case studies examined is a relative small size. This renders on the difficulty to achieve a contact with an executive in the highest level of the hierarchy such as the CIO. Although, a lot of organisations were contacted and their CIOs were approached, only nine accepted to give an interview and reveal details about their role and responsibilities. This limitation has been overcome with the detailed research design. Prior to the interviews, a detailed examination of each case was conducted by the researcher to be aware of projects that have been run by the participants. That aspect, with the assistance of the structured interviews, was able to help on achieving direct answers and exploit the CIOs' role aspects. As a consequence, our results are comparable to other studies as discussed previously.

Another limitation of the present study is an additional research objective that could expand the range of the current work. Another research objective could have been the validation of the proposed role model through a quantitative design with a larger sample. This extra validation could offer potential generalisation to the model. Unfortunately, the time and financial restrictions did not give the opportunity for this additional component. In an attempt to overcome this limitation, more effort was put on the review of previous work with

the intention of developing an integrated and complete conceptual framework that incorporates the previous findings. Regarding the last limitation, it should be clarified that for the purposes of the current explorative study, where no hypothesis of CIO roles and responsibilities were assumed, the interviewing other staff in the organisations is outside the methodology design and the research objective of this study.

Despite the limitations, the results of the present study are still comparable to similar research. The analysis is based on the conceptual framework that is the result of the integration of the previous research about the role of the CIO. As a consequence, the discussion of the limitations triggers some of the aspects for further investigation on the topic.

6.4   Future work

Reaching the end of the present study, there is a number of suggested directions for future work. At first, a set of directions emerge from the limitations and the attempt to overcome them. Secondly, a follow up data collection from the same participants and based on the same research design could give interesting results. Finally, future research could go into more detail and focus on a specific role aspect or responsibility.

The limitations discussed in the previous section, offer directions for future research. Based on the current research design, the increase of the sample would offer an expanded view of different sectors or different countries and cultures. With such a larger sample, the analysis could be specialised to different sectors or different cultures and interesting results will emerge about the role of the CIO in different locations. Afterwards, those results can be linked with other characteristics of the organisations in different areas and investigate their relations.

Regarding the second limitation, the additional objective of validating the current results through a quantitative research design comprises a valuable next step. The main role aspects and the responsibilities of the proposed model could represent the independent variables of an experimental design that will test their relations and effects to the dependent variables such as sector, organisation size and so on. That case will also give the opportunity to examine differences in the CIO role that are related with their tenure, background and similar variations.

An interesting opportunity for future work is a follow up interview with the same CIOs. There will be of great interest to contact and interview the CIOs that participated in the current study in a period of two years from the previous interview. That case will raise the evolution aspect of the CIO role. The CIOs will have the opportunity to discuss their role in a period of two years, at the same or a different organisation, and validate the current results. That research will test the evolving role of the CIO by comparing the current responsibilities with the future ones. Further analysis will indicate the established CIO role aspects and in what extent the CIO role is adopted by the organisations. Although there is previous work that investigates the CIO role in two periods of time (Passino & Severance, 1988) or with established and newly appointed CIOs (Applegate & Elam, 1992; Earl, 1996), the participants of the two groups were not the same.

Another direction for future work on the particular area is to focus the research on one particular CIO role aspect or responsibility. For example, regarding the main role aspect of innovation and competitive advantage, it is interesting to examine in more detail the information management responsibility. Potential research objectives are the specific ways the CIOs manage the informational resources of the organisation, the used technologies that support the respective processes and the evaluation techniques they are using to assess the business impact of those resources and technologies. A starting point for this direction is the ESTeMA Unstructured Information Management (UIM) process and evaluation scheme (Strickland et al., 2009). This work establishes a component-

based unstructured information management process and proposes a set of criteria that consider both the individual tasks that are involved in the process as well as the overall characteristics of the process itself.

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Appendix I

Interview Agenda

Firm profile

Item 1:   Can you please let me know how many people work in the IT department under your supervision and the level of your group's annual budget?

Item 2:   According to your organisation's structure, to which role-person you are entitled to report?

Item 3:   Usually, do you raise issues to the board about new projects or the board defines a problem and the IT group is called to find a solution? Or who decides if an issue is an IT issue?

CIO's profile

Item 4:   Can you please define the main activities of your role or what is included in your job description?

Item 5:   Can you give us examples of recent projects that you have run recently?

Item 6:   In terms of your post, what kinds of Key Performance Indicators are used to evaluate your role and by whom?

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Item 7:   Do you think that "introducing innovation" and "drive IS to competitive advantage" are parts of your role?

Item 8:   In which specific domains-processes of your organisation, the above aspects can be mostly implemented?

Item 9:   In recent projects that you have introduced, can you name the Information Technologies proposed?

Item 10:   Can you explain which of those projects or those technologies helped more your organisation in creating business value?

Item 11:   In those particular projects, with what techniques-methods you proceed with the evaluation of those technologies, for example ROI, CBA, etc?

Item 12:   With that particular technique, is it possible to evaluate the technology itself or it is more finance related?

Item 13:   Would you like to add any comment?

Thank you very much for your time.

Appendix II

Case Study: Alpha

Interview: Alpha Chief Information Officer

S: Can you please let me know how many people work in the IT department under your supervision and the level of your group's annual budget?
A: It's important to say that the University is just going through a major transition. So, I can say where we are currently are and also what we would like to be in a year or so. So the University has a distributed IT service model. Any generic IT support service is done within the central department which is ISS. But there is also local support and service provision within the faculties and other parts of corporate services. But by far the largest area is the central IT department ISS. So, we cover all networking, telephony, corporate information systems, transaction of management information systems, bulk of the data storage, data centres, help desk, training, student clusters, and service support. So we deliver at a wide range of generic services that are used by all or most of the University.

We have got in the department 210 FTE, full time equivalent staff reporting to me and then I report to the Deputy Vice Chancellor. Outside ISS there are about another 200 FTE IT or IT related staff. So there is about 400 IT staff across the university, half of which are in ISS.

The budget for the department, there are two parts to it. There is one the centrally funded one is coming straight from the university and then is the discretionary income that either comes from the faculties and schools or specific research groups or external funding from outside the university. So our core funding is about £11 million and our discretionary funding is about £6 million a year.

S: Usually, do you raise issues to the board about new projects or the board defines a problem and the IT group is called to find a solution? Or who decides if an issue is an IT issue?
A: There are two different answers to that. If they are largely IT, technology focused the initiative comes from the department but based on the university IT strategy. So we have a university IT strategy which is in need of updating. So these are the sort of things that we are going to be doing over the next 5 years. That is agreed by university steering groups and executive bodies. What we then do is to develop our plans directly from there. So, they are very much, the technology ones, they are based on the university IT strategy but the detail of the projects is really up to us. So, when upgrading the network say we don't consult with anybody, we just have it in the IT strategy that has to be maintained. And then we do the upgrading. The University IT strategy has something about remote access, so we have implemented a wireless network across the university but we put in this [wireless network] security and configuration needs which is purely by us. So, those are the IT ones.

The IS type ones, especially the corporate information systems or the transactional management information systems, those are completely driven by a group of senior executives and academics based on the university strategy. So the university strategy says we need to increase our support for international students. So, this group sits down with me and head of information systems to work out what projects, information systems projects, we need to develop to support that statement. So that is very much driven by the university outside IT and then we deliver the projects in partnership with our colleagues outside. But there is two very different means of prioritisation.

S: Can you please define the main activities of your role or what is included in your job description?
A: There are two parts to my job. One is owning and developing university IT strategy and then coordinating university IT resources to deliver that strategy. Then the other part is the direct operational management and control of the central IT department. So those are the two main parts. As time goes on, I was originally recruited purely for the latter which is looking after ISS but as the university has changed and my role has grown, I'm spending more and more time on working with IT people outside ISS. Now we are going through a significant change so I will now become responsible for all the IT across the university.

S: So, if you are allow me to make it more simple, the one part is the strategic one and the other is the more let's say the operational one?
A: Yes.
S: And now you say that the focus is going on the operational part?
A: No, on the other way round. So, it is more on the strategic part and then the university wide working together rather than delivery through the ISS. So I'll be looking at more of the university strategy and more of the university wide resources rather than just the central resources.
S: In terms of your post, what kinds of Key Performance Indicators are used to evaluate your role and by whom?
A: No, no. It's something that I have tried to do. As department we do have Key Performance Indicators but they [KPIs] are very technology focused and hither to the department …There not been much engagement with IT across the university cause it works and because of a background of things so, trying to get engagement and try to get KPIs that reflect the business impact of the IT has been very hard. But we are at last changing that right now.
But as my role is concern I have specific measures for my performance year on year but that's based on objectives rather than overall performance of the department.
S: Can you mention an example of that?
A: An example of the KPIs or an example of my objectives and measures?
S: I was interested in your position.
A: My objectives tend to be fairly project based but strategic project based. So, there is one which is deliver 5% efficiency savings and the measurement for that [objective] is my budget goes down by 5%. So, that's a really easy one to measure. So rather than getting £11 million for 2007-8, for 2008-9 it goes down by 5%. So, that's the sort of thing then it's support for external and internal audit and the measure would be one priority audit recommendations in successive years. So that's a fairly easy measure to make.
Another one which is much less easy to put some measure on is about these measures change programmes we have started. And the only measure that we got on that is the final proposals to be approved by senates November 25th 2009. It's an objective which is to develop the university-wide IT delivery service. So, this and the service proposals to be approved by the senate, those are the sorts of things.
S: Now, if we can go a bit deeper into projects that you have recently run in relation with information technology and information management. Do you have in mind examples of such projects?
A: It depends because I don't really get involved in any delivery projects what so ever. So, it depends on what you are after. I sit on no steering groups for any projects and I am not a sponsor for any project at all. So, it would have to be things that the department deliver but, as I say my role is much more steering and strategic rather than operational and they are change projects that I get involved in rather than delivery projects.
S: So, as you are involved somehow in the approval and the further forwarding of the projects to the chancellor? Are there any criteria you use for each project?
A: We have got a standard project management approach, so all projects have to get through 4 stages and 3 gateways. So, before we can spend any work … We can spend sometime doing investigation to help understand what the scope of the project is, what the possible benefits are, and then there is an informal decision point which depending on the size of the project, [a decision point] is within a team in my department or if it is significant then it goes up to departmental executive group that I chair, and then if that seems to be about right then further work goes on to create an outline business case. And there is a specific format for that, it has to say what the business benefits are, what the costs are, both capital and recurrent, the impact across the university, any technology, any change, any organisational changes. So, that has to be a formal document the amount of time that it takes to do that depends. But, then there is a gateway, decision point that again would be made by my executive if it was sufficiently high where we formally review the business case with the project manager and the sponsor if it is not one of ours and assess its impact. And then, if we think that yes the business case stands up, we agree the next stage or we get the people to get more information. Then we spend much more time to get a full business case and that has to be a very rigorous document and once that is agreed again in a formal fashion then it turns into a delivery project. It can depend. The outline business case could be a day's work when the full business case could be 4 days work, or the outline could be a week's work and the full business case work could be 5 weeks work. But whatever you don't go from the one stage to the next without a formal decision and we don't commit resources [for a new project] until the full business case is formally approved.

S: According to your experience, do you think that information technology can increase business value?

A: Very much so, very much so. I mean, a lot of what the central IT department does is hidden and so much of it [IT department] is ensuring that the business operates and it's the business value for a lot of what it is.

If it fails the business doesn't operate. But, then for some of our areas like the high performance competing that we do here, we have identified of the investments that we have made in the machines and the support staff over the last 7 years, we have actually been directly involved in 10 times more research income, purely as a basis of the investment in high performance computing based on that investment. So, that's a real example of the value.

Other areas where it adds, where it can create value I think, [another area of adding value] is in information systems for decision support. So, that we can analyse where are our international students are coming from, what the amount of money we are coming from, or how school or an institute is performing so that we can understand where we should be putting more investment in there or less. So, that's the other obvious way where they can improve value.

S: What kind of challenges, problems you face as a director of ISS when you assess projects, when you inform your superiors about them?

A: I think the one that faces any IT director is the fact that a lot of the IT is technical and it's not immediately obvious how it can help the business whether it's higher education or the private sector. But its [IT] absence harms the business. There is also a lack of common language very often and [lack of] an engagement between key stakeholders and the IT department. That's always a new challenge which isn't unique to me or to this university.

And IT directors tend to be at a point as people who are good at managing and the operation, but [IT directors are] not so good at influencing and networking and talking outside and so that is just enhances the gulf so that an IT director who is spending most of her or his time in the IT department, is building barriers where as an IT director or a CIO who spends most of her or his time working with stakeholders is a lot more effective, provided with people who run the operation. So, I think that's the main one up until recently…

There is also the fact that we have not had any IT governance arrangements whereby we can have discussions on priorities of IT projects against other ones. So, it's really been up to me to make the decisions on how we spend the £10 million pounds. What we have now got is a totally changed strategic and executive management structure that allows me to have these proper discussions to make the right decisions. So, anything with an IT director, as far as I am concerned, its communication and influencing is the biggest challenge and actually delivering the projects [is another big challenge]. They are always difficult but nothing like as difficult as bridging the gaps.

S: Ok, I have been through all of my questions. Is there any general comment that you would like to add?

A: No, no. It's the point I made in the paper which I forwarded to you is the fundamental one and one I just made. Until the higher education sector especially but IT in general, stops appointing IT directors who are very good with the technology and not good at talking to people then we are always going to have problems. And there aren't too many people who can bridge the gap. And I am not saying that I can. But those are the skills to be able to talk to senior stakeholders and business leaders as well as the IT team who then have to deliver it and they are quite rare people.

S: Thank you very much for your time.

Case Study: Lima

Interview: Lima Chief Information Officer

S: Can you please let me know how many people are working in the IT department under your supervision and the level of your group's budget?
L: Employees, I think it's about 23,500. Annual budget 10,9
S: According to your organisation's structure, to which role-person you are entitled to report?
L: I report to ... he is the strategic director but he actually uses the title of City Treasurer. He is the guy who looks after the money.
S: Please forgive for the terms I might use but as an international student I don't really know the structure of the public sector in UK.
L: As you are in the public sector, you have permanent staff obviously with Chief Officers but also with the local democracy you also have elected members who are elected locally. And we have, I think it's 96 members who have been elected through the democratic system; of those there are a number of executive members, those executive members with the executive strategic directors, make really the equivalent of the cabinet for the organisation. And between them... they actually make the real decisions, the big decisions for the organisation.
S: Usually, do you raise issues to the board about new projects or the board defines a problem and the IT group is called to find a solution? Or who decides if an issue is an IT issue?
L: It is sort of divides into two things. So, we have that cabinet that sit at the very top and they look at things from both a member and an officer perspective. Obviously, through where I am as a Chief Officer, I am reporting through the officers' side. So, I produce a business plan currently working through Lima's ICT Strategy which will be ready at the end of October. So, all of that has to go through up the officers' side for approval. And so, by that I mean, we have a strategic management team, and that's the chief executive, the strategic directors. So I report directly to one of those strategic directors, so my business plan goes to them to be approved, my ICT strategy would go to them to be approved so, all the strategic side goes for approval and ultimately they go to members then, as well, for the final sign off. Day to day... my IT programme on a day-to-day basis which are the projects, I am wholly responsible for those but I have to make sure that it's [the IT programme] following the right strategic direction of travel for IT, so that is wholly my responsibility.
S: Can you please define the main activities of your role or what is included in your job description?
L: My role...I sit above the...I have a unit human management team. So, I have three director reports. One is technology and infrastructure, so it's all tins and wires, one is applications and the other one is business relations. We are currently putting in a new structure, [we are currently putting] a brand new business relationships team, and also we are changing the technology and infrastructure team. I am heavily, I am managing a service improvement project. And I have been doing this for three years now. One of my first deliverables was to consolidate the ICT service across Lima. So, when I got here in the August of 2005, we have very dispirit IT departments in other services area and by the time I got here the business had decided that we would consolidate the ICT services. So, that is what I am currently working on. [consolidation project] It's lot of changes...
S: It's like system integration project...
L: Yeah, if you like. We are just bringing it [ICT service] back to the centre and the management of ICT will be managed here by me. So, it will be a consolidated service looking for efficiency savings, but in saying that, if you look at the business plan there are very hefty projects in there to do with the virtualisation, so driving down the number of service in its simplest terms and driving up the efficient savings as a consequence we are all running thin client technologies and that means that here at the data centre we can just throw down the pipe we want to change, well we don't have to throw it down the pipe. Ultimately as part of the strategy, as part of the IT strategy, linking in with our property strategy is we just want to move the body, we don't want to move the kit. At the moment we got a churn of moving kit because this is moving with the person, so, I am involved in heavy strategic things but also sometimes I'll come in on the business as well.

S: So, if I give you some examples of activities like create business value?

L: It depends on what you term by business value. We are looking at…I have put in a brand new charter mechanism from the 1st of April, so, we are using the trading account principle, and what I am using enough for is starting to prove value for money, so I am proving to my customers. I am saying for a desktop with the telephony what are the unit charges for that so, I have a unit charger then multiplied by the number of users in the organisation. So I can tell each service, you have that many users as therefore your unit charges is that, so my unit charge can then be compared outside of Lima to other, you know, other public sectors or private sectors, so they can start to look at me and my value that I am giving back into the organisation. So, we are very much working on that, and that's in my business plan, as one of the objectives that I am working through. The other thing that we have done is, last year, we have something called SOCITM and it's the society for the IT managers, it's a national organisation and it generally looks at the public sector and they do a lot of good stuff, and so they offer benchmarking services, so last year we did a benchmarking service so, we could look at our performance and I wanted to do it before we consolidated the service and then do it when we have actually consolidated the service. Unfortunately the ratification of the structure is taking longer so it's still not in and at this point we are doing it again, so, nothing is going to change much but what the first thing did help me do is identify gaps that I need to look at and it will do that year on year then. So [benchmarking service] it's one of the mechanisms whereby I wanted to identify gaps that we need to look at in service delivery.

S: In terms of your post, what kind of Key Performance Indicators are used to evaluate your role and by who?

L: Ah yes. I have sorted, put them in my self, for want a better word. We are…there are no organisation wide KPI yet. Why I don't have, because I am consolidating the service. We have designed the last 12 months a brand new performance management framework for the staff, so, but not been very target driven, shall we say. So we have designed a performance management framework we've designed induction course and we have just done some, spent the last 3 months, doing some re-training on management development. So within the performance management framework, KPIs are coming out of there but at the minute, they are very light touch, because what I am focusing on is the culture and the culture change and the staff because I am bringing people in and some people don't want to come, they are happy with where they are. So the performance management framework has got KPIs in there but they are very much around doing appraisals, [KPIs are] very much around doing team meetings, one-to-ones to support all the development and all that consolidation.

S: So they are not based on the financial perspective?

L: Not yet. They will be. My concern and my priority at the moment, because I am consolidating the service, is the people side of it, at the moment. Once I know that those things are in place and to a quality that I want and the structure then they will go (completely because it's in culture) and we will start to because we are building other things, like I said we are putting the trading account that will allow me to actually benchmark properly on value for money and put a KPI for that. We are looking at the SOCITM KPIs as well, to actually use some of those and we reported on those back to do the benchmarking. So, we have done a lot of preparatory work, but I just have to, because the new structure is out in consultation with the staff and trade unions at the minute, that's my focus. I have got to get that consultation completed and anything that the staff raise, I have got to respond to that and then start to fill those posts. So that's my focus.

S: Can you give us examples of recent projects that you have run recently?

L: The WiFi that is run by Dave Carter. When I got here we had started projects for the implementation of the SAP, you know SAP is enterprise wide solution, so when we… I have to put in an application support team and take the SAP from implementation into stabilisation and we, on the 1st April 2006 we took SAP finance procurement, HR and Payroll, it is very scary as a very major, really serious project. And we took them [application modules] from the implementation stage straight into stabilisation. And because we didn't have time to recruit, we used the implementer who was a private company to help us do that. But since then, we have not any stabilised it, we have also replaced all of those, the private sector, with our own people and since then they have all been trained as well. And we are very heavily committed on trying to bring and develop the staff, permanent staff etc etc. That was fairly huge. We have brought the brand new charter mechanism, as I've said; we are consolidating the ICT service and there are various deadlines within those because it's such a big project. Below the business plan, there is a copy of it on all the objectives on that… Below that is the actual action plan to put

those objectives into place and we've developed a tool whereby, with the IT one line objective is a myriad of projects. So it's a lot of projects, individual projects to make… to achieve that one objective. If you talk about the Green Initiative, take essentially the footprint of individuals. So it makes up a lot of different projects. So those projects are actually in a roadmap. So, I talked earlier about … I have three direct reports, each of those individuals have something called the roadmap. And on that roadmap, all of the projects for their area…some of them are outside the business plan which I am sure you can appreciate, the business plan just prioritises the strategic directions but the business comes at me for their own requirements as well. So there are lots of daily projects, I head up the wider, more strategic projects and the other thing again which is still, which will take my time for some time is the structure will put in place in a brand new business relationships team and that will talk to the business. We have a new business integration model that we want to put in place. So we will put in customer account management for the first time, and they will go out and start talk to the business and start to understand what they are doing. Right now we are very reactive, so my business plan I have written in isolation of my own what shouldn't be done. I should come after that business plan in order to do that so, in a September what I wanted to put in, and I was hoping this September, but we haven't been able to do it, because the restructure won't be signed off next September we will sit down with all users, and they will confirm the number of users they have and I will talk to them about the coming year and what they want to do from an IT perspective or even from a business perspective so I can understand how I support that. Because what we do is we now have a regime of business plans across the organisation and this year our drafts for the new business plans have got to be complete by the end of October. So, it's … both of us getting understanding of what is in a prioritisation for the business as well as for me, because I am a support service. So all of that has got to be worked on for the next year.

S: Do you think that "introducing innovation" and "drive IS to competitive advantage" are parts of your role? I don't want to refer to all of those little projects you are saying, but can you mention any of these that have to do with innovation and create competitive advantage?

L: I think client does. What level are you talking about? You know, there is a lot of…

S: Let's say for example in the area of information management.

L: We are only just produced our information strategy. And we are looking…we have a project set up, a board set up to look at the EDRM (Electronic Document & Records Management). We have the opportunity on our network…we have life cycle content … content life cycle management functionality but again the business doesn't quite know yet what it wants as regards that [information management] and we are not joined up in respect of information management. So, there is a lot to be done on it. And we are in a next phase of SAP investment but again the business hasn't decided what investments it wants which is fortunate for me because I am still consolidating the ICT service. So for the actual projects, it's more my UMT will give you more details of that. Because they drive that through their roadmaps and my interest is purely how it fits strategically for the unit as a whole going forward, so supporting the customer in a more innovative things and they will know that because they're small projects and then really hit my agenda unless there is a problem, unless we have made a commitment and we haven't achieved it and therefore it goes to escalation plan. Through IT innovation, I would say we are not in the real, true innovation in the way that I want it to be, because up to this point … I recently just have to be talking to our key suppliers saying: "ok we have spent three years getting business as usual ok but what I want to use them for is the pure innovation". They know the market better than I know the market, better than my guys know the market, because we are very much here, very much internal focused. So we want to work with them and our customers and say ok what is innovation, why is it happening in the marketplace so that we can actually bring it in. So, not that I would class this as true innovation like a WiFi city we're still doing that kind of thing. But we are trying to join ourselves up to actually agree to some business solutions that we do want to be where we want to be, where we want to go…..I would go more on the bigger ones like thick clients, the vertilisation of the service because I am more interested in driving up the efficiencies as well at the moment, and as I said we are all very reactive, we have a lot of resource that isn't here.

S: How the evaluation of these technologies and the projects is done?

L: We have a Lima methodology … [we have] a project management system that is a Lima method. And we do use …[our project management systems] it is based on PRINCE (Projects In Controlled Environments), but our culture isn't more easily of doing benefits realisation. We are all getting there; you know that's the business case and doing the business case for it. The

SAP investment, because it was so large, it was 25 million and there was a business case done, 18 months prior to when I came but that didn't really drive up our benefits realisation. So it's something as an organisation we are all working on, about understanding the cost, understanding the charge, understanding the unit price, because it's only when you can understand that, that you actually then drive up the benefits realisation. So within this year, up to spending the unit charge for IT it's going to help us a lot to understand the benefits realisation from an ICT perspective of a project.

S: So, the Lima method that you mentioned, is it based more on the Cost Benefit Analysis and the Return on Investment or it tries to assess the technology itself?

L: No, it is more Cost Benefit Analysis, it is about benefits realisation. The other thing is that we do have what is called the Gateway process where people can actually bid for capital investment into projects and it's quite a structure in it, you know you have to go through each gateway and you have to analyse and you have to say what return we all are going to get in on the investment. So that's for very large projects. So the culture is changing and I am getting better at it but it's not where we wanted to be.

S: As a CIO, are you satisfied with the evaluation schemes that they are so far in the market and they are focused on the financial perspective of the projects, of the technology, of a new system, a new package? Or you think that there should be criteria that actually evaluate the usage of the packages and their functionality?

L: Yeah there has to be. It's got to be criteria to understand both the visible and the invisible costs. Also, around the impact of the packages, is it the living in the market place, is that going to fit on what we need. It is about the Return on Investment but it's also about how it supports the business going forward, what changes it can bring to the business, what benefits it can bring to the business. And while, I couldn't tell you that we have a criteria and this is it we are looking more and more at what value projects make to the organisation. But what you have to realise is that as well as I am consolidating ICT, all of the support services are being consolidated. So, up to this point we have been very silent based, so it's a big culture change for the whole organisation at the moment and we are not there. You know, we are getting there as we are churning and turning but for me to get really finished... The consolidation for me, the structure is only the baseline. What at then will allow me to do is get people here who can then start to look at the ….for example the applications across the organisation. Currently we have four time recording systems, you know it's classic public sector, we just added and people gone off on their own with their own focus and all that kind of stuff. So, all of the support services are up to this now have this remit to consolidate and to start to focus on the organisation as a whole, what's the benefit for the organisation as a whole and can we drive up value for money and efficiencies as a consequence.

S: Ok, would you like to add anything?

L: No, it's a big time of change for the organisation. But it's good, it's a challenge. Sometimes it is hard.

S: Thank you very much for your time.

Case Study: Golf

Interview: Golf Chief Information Officer

S: Can you please let me know how many people are working in the IT department under your supervision and the level of your group's budget?
G: We are outsource, I guess the question is, do you mean directly working for me or do you include the provision of the outsource partners? Because obviously there are a lot of people in the outsource organisation…
S: I am interested in your department, within the group of Golf.
G: Ok, just give me one second…32 in total.
S: And roughly your department's annual budget?
G: This is slightly challenging for us. I guess like anything else. It depends what are you include and how much of that is essential stuff, but my estimate is... we are probably spending in the region of 15 to 25 million.
S: According to your organisation's structure, to which role-person you are entitled to report?
G: I report to Deputy Chief Executive Officer. We have a Chief Executive and a Deputy Chief Executive, and I report to the Deputy Chief Executive. I also sit on the board.
S: Usually, do you raise issues to the board about new projects or the board defines a problem and the IT group is called to find a solution? Or who decides if an issue is an IT issue?
G: Both.
S: Any case more often than the other?
G: I would say that probably more often than not a lot of the things emanate from business issues that we have. And what we are trying to do is solve a business issue so, we decide jointly as a business and as a board where our priorities are going to be and then based on that we will then look to see what role technology plays on that and to contribute to that particular business issue or business endeavour, business project, business aspiration. So more often than not that is how it works. So they are occasions whereby a new technology might come on board and we would say here is something that we have found from a technology perspective that, we think, has the opportunity to help our operations in this area and then we would facilitate a meeting with that department so, that we would bring them up to speed on what this technology does and get them to try and decide whether that is something they want to do sooner than later.
S: Can you please define the main activities of your role or what is included in your job description?
G: If you look at what a lot of my job is, at my level, it is obviously to provide leadership to my department and employees and that entails talking to them about our business as a whole and ensuring that I also talk to them about the IT function and how our IT function fits in our business and ensuring that the focus for the IT department is clear to my employees and therefore they understand what they should be spending their time on and what they should be investing their time in and equally what they shouldn't be investing as much time on. So, some prioritisation because, I have an analogy that IT is like the NHS the demand will always outpace supply. And therefore you have to have means of prioritising and a means of deciding what is an area of focus and what isn't an area of focus. Because people will always have initiatives that they might want to do…but the thing is that you have to provide some leadership to let people know that this is important but something that we can't do in the short term and this is not important and therefore we shouldn't do anything at all on it. So, that is one area that I provide, secondly it's also about stakeholder management with a lot of my peers on the board with other people in the business and what that entails is just understanding what is important to them what are some of their business issues are and the more I can understand about their business and what is concerning them that helps me do my job better. So, I would say that is more the strategic end of it and then there is also the networking with some of my peers and suppliers and third parties that provide us with market intelligent in terms of technology, in terms of best practice, in terms of innovation, I have a duty to bring that [innovation] in the organisation so I spend some time doing that and I then obviously [I] get involved as a key stakeholder in our investment project and that entails deciding which project we should be

championing and trying to move forward and so part of my job is to sponsor and push those forward and ensure that they are delivering according to the planned time, cost and quality and then ensuring that people are happy with them once they go live. And then the final thing is the operational stuff. Like anything else you have to keep the ship running and other things that happen to me is just … I receive escalation on every important issue that have serious impact on the business.

S: You mentioned that one of your roles is about strategic innovation, is it possible to describe any recent projects that they have implemented this strategic innovation?

G: One that I can tell you about, that is kicking off and that is a convergence of touch point channels for consumers in terms of check-in functionality. The whole thing behind it is that in the past what both suppliers and a lot of airlines have done is for example that you might check-in on-line, you might check-in at a kiosk at the airport, we are trialling mobile check-in, WAP check-in. Those are all different channels and in the past there would have been 3 different applications that would have been written with very different consumer experiences depending on the channel. Now, one of the things that we have been championing, I have been championing within the IT function, we can become much more flexible, much more agile, we can provide a more consistent interface for the consumer by actually merging the behind the scenes technology that effect all you are doing as customising the experience based on the device with which the consumers are interacting as supposed to completely having a stand alone environment for each channel. Now whether you think this is innovation in the traditional sense of the word in that something new quite frankly, yes you can have a debate about that, but I think it [innovation] doesn't have to be revolutionary, it has to be from an airline perspective given the types of margin that we are operating on and given the fact that you are trying to provide consumer with an experience that allows them to move through the administrative aspect of their journey as quickly as possible, then for me these are the things that are win-win. Consistent consumer journey allows us to be able to customise, change, update, support at a lower cost and far more flexibly, far more quickly. These are things that have been understood by the business and have now they've bought into. And you can then in a fact use a kiosk as a portal, you can use the web as a portal, you can use a mobile as a portal and just add more back-end functionality or applications to the consumer through a consistent touch point. You know… This is not rocket science, it has been done before but like anything else, it's a matter of us doing it and there are a lot of airlines that have not done this yet.

S: What about other areas that can bring innovation, for example managing information internally?

G: Ok, let me talk about that in terms of innovation. Again, I wouldn't say that within our company the IT function is the unique function. What has ended up happening is that both my self and our chief financial officer have very similar views in terms of data management and the fact that a lot of the data management is not about the tools, it's about the disciplines and about having a shared view of what data is required, what KPIs you want to use to run your business and then ensuring that the data that you have is, in a fact what you think you have, if that make sense, and by that I mean there is a lot of garbage … people… a lot of businesses have tones of data but they don't have an insight. And the problem is that building data warehouse all of a sudden they are going to have an insight, they will not have insight. They will just have a warehouse with a lot of data, and that is a very expensive solution. So, for me I think, again I wouldn't call this innovation, but I think in the context of this company what I see… (?) and I have tried to do is focus people on what the real issue is as opposed to thinking … allowing people to think that a panacea is to have a data warehouse. I am not sure if that is whether that comes within your framework of innovation. I think that is more a matter of being very clear about how you have to solve the problem and been very clear that you not allow people think that technology … all they need to do is buy a piece of technology and miraculously the problem goes away. Because in the case of insight I don't think that insight is a technology issue, I think insight is a data management issue. We are drifting a bit here into philosophy but … I think if there is any innovation it is not about deployment of technology, it's more about bringing some discipline thinking to a problem and helping to shape the problem. So, when people say 'when are you going to get me an answer to?' 'When are you going and buy me a data warehouse or a data repository?', I would say 'Ok, let's have a conversion, I am happy to facilitate it, about how we want to run this company. Because if a give you a piece of data, what are you going to do with it?' And if the answer is just 'I am going to look at it' then quite frankly, there is no point for me giving you that piece of data, because you are not going to do anything with it.

S: That's right. And in that direction, I am interested if there are any plans to implement technologies like data mining, text mining that not only provide data but they can improve information management internally, or track competitors moves and introduce innovation for your company?

G: The answer is yes, we are doing work, and there are a couple of projects on the go to do that kind of thing [data and text mining], to do more insight in certain areas. And my philosophy on that is that where a company, and ours falls in that category, where a company is not certain about what it wants or how might be able to do it, I think they know what they want but I don't think they would be able to articulate it. It's almost you have to give people an opportunity to try something. So what we have found a way is to do in the IT, is that we've found a way that has given the company an opportunity to have a low risk introduction to some insight, we've found a supplier and a means to deliver, how do I say, data mining light. Whereby your risk investment profile is far lower, but at least gives people the opportunity, as they say in IT, to have a little playing area, and then they can see what it is like, and that will help them, I think, refine their thinking and my belief is that after they have played with that they will have real data and they will be able to come back and say 'this is great, we think we know what we want now and that is what we want'. So, that is how we are doing that, and yes there is a plan to do that and there is project that is up and running right now in that space and it's expected to deliver in the next 6 months.

S: In the same direction, can you also name projects that help in creating competitive advantage, like build barriers to entry, build in switching costs?

G: Well this is very interesting. Just let me tell you my view on that one. Golf as an airline… our approach to things is that we have a much more opportunistic view. So, we look for opportunities in the market and then we try to respond very quickly. So from an IT perspective, my challenge is to provide… if you ask me what are the requirements in the business I would be able to tell you, look here are the projects that we have on my go, but I also know that this is a business that looks for opportunities and therefore I don't really know what I am going to need in 6 months to 12 months above and beyond what I have already in the plan, I do know that probably I will have something thrown at me that this business will want to do but they are not planning on doing it right now. Because of the fact that this is how we respond to the market place. And therefore from an IT perspective my job is to create flexible, extendable, scalable, agile infrastructure. And therefore my approach is very much, as opposed to what we have in the past, where we've done is we made investments that potentially have appeared to be much cheaper or the initial price point has been much more economical, however from a strategic perspective of being flexible, extendable, scalable, and agile has not been. And therefore when you want to apply this infrastructure, including applications I mean by that, in an environment where you have to be able to respond and react quickly then in fact it becomes hindrance. And therefore from my perspective, what our IT strategy has become since I've joined, because I haven't been in this business for too long, I have been here for 18 months now, our IT strategy is very much around putting in place flexibility, agility, scalability, extendibility and therefore we try as much as possible to have very standardised, and/or… Standardised solutions are solutions that are easy to scale, extend and ramp up. So, if we are doing other things it is easy to bolt them on. Now, that may seem a very basic saying. I guess the other assumption inherent in that is that more often than not, most of what we believe we do is actually fairly standard stuff. So there is probably very little competitive advantage in some of the core things that we do. We believe that part of our challenge is to respond to opportunities in the market and part of our strategic and competitive advantages is actually the ability to respond and do something quickly. So, I think if you use traditional Porter type things, I think that I am not completely convinced that some of those things apply as much in this business or you are almost counteracting the nuances in the airline business, why, because the airline industry more often than not when you choose a supplier and a system it takes a long time to move off of that system. So, if you do too much customisation or you don't have flexible infrastructure, your switching costs are huge. And therefore they actually lock you in to an environment that can competitively hurt you because you cannot change very quickly. And therefore you look at the vendors in this industry… I don't know that there is one that you can get over the vendors in this business. I am not sure that that applies…likewise this thing where you make it harder for clients to switch … I don't thing there is anything unique that stops customers from switching anymore. The market is fairly dynamic in the airline industry in that it's been around for quite a long. So I think a lot of what is happening is that … the airlines it's how quickly they respond.

Certainly that is how we see our selves, and therefore we think that this is what we have to do with our IT infrastructure.

S: In terms of your post, what kind of Key Performance Indicators are used to evaluate your role and by who?

G: Let's do the KPI in terms of the operational stuff. Obviously there are SLAs for all the different systems around and we monitor that. The reporting on those tends to happen on an exception level and really from the perspective of root-cause analysis more than anything else. So if you find a pattern and you try to investigate and clean it up otherwise quite frankly hardware breaks down and therefore there is not much you can do about it preventatively, it happens. So as long as you can do your maintenance there is not so much that you can do about it. So, we monitor those things, and I would say they are more…they are the things that make sure that nothing happens that you shouldn't expect to happen. Because you know machines are not infallible, they break down, software is not infallible, it breaks down, so a lot of that type of monitoring is more long the lines of … have we got everything in place to deliver against to what we think we need in terms of availability? And as I say, in this business we've gotten to the stage that we monitor those on an exception basis at the board level. You know, I don't go to the board every week and say in this system we have 98% availability but in this one 99% so I don't run often with these statistics, the only thing I have to talk about is critical severities that have impacted the business whether we think it's one off whether it's something more seriously at fault and what we think we are going to do to fix it if anything that needs to be fixed. I would say those types of things are more vie exception. We then get into the project side of it, and the project's KPI are quite frankly tend to be the actual business plan that was put together for that project. And it tends to be a business case for the project in terms of this kind of cash flows and making sure that project delivers against that. And likewise all the projects… before the project is completed, making sure that the project is delivering against time, cost and quality. Those tend to be the standard metrics that most projects are measured against.

S: So, the metrics are more focused on the financial perspective of the project?

G: Oh, not necessarily. The business case will have a number of things associated with it, but ultimately what the business case entails is this kind of cash flows. Because in theory, and in practice, this is the only way that you can measure the value of the product or the value of an investment. Now, the reality is that there might be other factors that come in to it, but ultimately what you try and do is articulate it in terms of a cash impact on the business. Because the reality is that you cannot lie about cash. I either have it or I don't have it. ENRON happens, because people don't look for the cash, they believe the profits and the sales. I cannot fake cash, it's either in my bank account or it's not in my bank account. And it's the same with the project; the project either delivers cash or doesn't deliver cash. Now, every once in a while you will get projects whereby you are doing them for statutory reasons. Quite frankly, this isn't a cash thing. If I wanted to convert it into cash then I could say … how much my business is going to suffer if I don't implement this. Well I might get a fine from the government and therefore that's my avoidance. I am avoiding having to pay cash in terms of fine for something like that. So, for statutory projects, you know people might say they are not really cash but you can articulate them that way same with projects that you have to do because, how can I say, the economic value of an asset is died and therefore assuming that that activity is still worthwhile and as a business justification you have to replace the asset. Now in theory, there isn't a discounted cash flow for that but in practice you do because you can articulate if you stop doing that activity what the cash impact would be to the company.

S: Ok, I agree with the need to interpret projects in real financial figures. But, what about technologies those need to be compared in terms of functionality? Are they any evaluation schemes that you are using to evaluate technologies used?

G: That is embedded in that. That happens before you get to financial… So, what you would do is you would articulate what the benefit… you would articulate an outcome to the consumer, or an outcome to the company in terms of its processes. You would also articulate a change in behaviour; you might also articulate a change in terms of how you might be viewed from a PR perspective. There might be a number of things that you might put into that and you would expect those outcomes of those changes to come as part of the project and they would be defined. So you would have expected outcomes, and those are also… would also be tracked… but ultimately they are embedded as part of the project. So you are quite right. When a project is attempting to do its bit….you are trying to implement that functionality and when the outcome comes in…this why I say the quality, when I told you that you look at the project from the perspective of time, cost and quality. Quality is not just about did you implement the software

properly, it's about did you do the business change and then did you get the business outcome that you planned when you started the project? That's embedded in there. But from a finance perspective they always look at the discounted cash flow. From a business perspective you look at both: what business outcomes am I going to get and then to assess whether it is a good investment financially you look at what the discounted cash flow implication on the business is going to be. So, you don't just look at the numbers and say I will do it irrespective of whether it is aligned with my strategy. You do it because of the fact that you are looking for business outcomes. The financials just help you decide either you are going to get a good return on your capital. Does that make sense?

S: Yeah, yeah. That is one assumption of my project: that we need to evaluate technologies in the context of a business case before the financial assessment of each project.

G: Yeah that is done … very much so. And on many occasions before you even… so the process would always be that if business for example…the way I talked to you before, either a new technology comes along or we get the business involved to look at it or the business comes to us with the business problem, we try to find technology that helps solve the problem, there are possibly multiple technologies that could help solve the problem or could help do a particular thing. Part of the evaluation before the business case is done is to look at whether the technology is aligned to sorting the business problem. So, you would do an evaluation on the underlying technology. And, if I have two technologies not only will I look for the business outcome but I also come back and say well from an infrastructure perspective, from an IT perspective, my strategy is that I prefer to choose a solution that would allow me in future to be scalable, flexible, extendable, therefore if I have two solutions put in front of me that both solve that business issue to the same extent and one cis more tightly aligned to my strategy of giving me greater flexibility, scalability, extendibility I would choose that one over one that gives me less flexibility, scalability, extendibility. Does that make sense?

S: Yeah, yeah. I am ok with my questions. Would you like to add anything as a general comment or something?

G: I think, the only other area that I come back to that about the KPI for IT manager and it's a subtle one and it is very much one where I think the indicator it's not one that you measure by a number. But it's the ability, the perception amongst the business community within the company that IT is actually contributing to the development and the enabling of business strategy. It's a soft thing, because most people think that all IT does, like the old days that all we did was we kept the plumbing going. You know the IT service function we kept the boxes and the wires churning. So, this is a soft issue. The only way I can find that out is to ask people whether they think we are being proactive, whether they think we are bringing intellectual capital, whether they think we are bringing the right facilitation in resources that help them and help our businesses as a whole look at the art of the possible in solving some of its business issues or identifying new business opportunities. And so, for me there is a soft… a KPI that is more… not a number…but is more I go and speak to my peers, to people in the company and it's more about qualitative feedback that says do they think that we are doing that effectively and enough? So, do they see it? Do they see us trying to do it? And if they do see us trying to do it, do they think we are doing it well? And if the answer to either of these questions is NO, then obviously we are not doing our job. Because quite frankly if all you have to do is a plumbing shop, you might as well be just completely outsourced. And I think this is from either role of IT is two things: i) you outsource the commodity stuff and therefore you have to work to make sure the commodity stuff works but then ii) the big thing is that you have to contribute to that strategy, if you don't doing that, quite frankly, it's very difficult to justify having a senior person on the board doing that.

S: Thank you very much for your time.

Case Study: Oscar

Interview: Oscar Chief Information Officer

S: I would like to discuss a bit first is the structure of the university in terms of your role, do you report to the chancellor, do you lead a department, how many people work for that, what sort of budget do you have, to whom you report and how projects are initiated?

O: The university is divided as an organisation to 6 major blocks. There are 3 academic colleges that contain all the academic business i.e. all the faculties we call them the schools and there is a vice principal at the head of each one of those 3. There are 3 support groups of which I am the head of one and so, the university's finance is divided into 6, not equal, but into 6 pieces and I am the head of one of those pieces. All 6 of those people who head those sections are on the senior management team and report directly to my vice chancellor who we call a principal.

Our information services has about 600 members of staff, it has a turnover of approximately 27 million pounds a year, and it [my department] contains within it the library, the IT service, the e-learning service, the classroom technology, the audio-visual service. Then we have 2 JISC-funded outward facing activities one of which is the Digital Curation Centre and the other one is the National Data Service called EDINA.

S: So it's a wide range of activities in terms of your department.

O: Yes, yes. Although, the way that we have organised ourselves is different to most of the Roscoe group types universities in that we do not have a separate library, a separate IT and a separate e-learning service. We have integrated them fully. So that the distinction between those different areas of activity is much less clear and sharp than it would be in most other universities where they are individual silos, if you'd like, we have broken those silos.

S: Have you done that by looking other Universities or it's an initiative that maybe the principal initiated it?

O: It didn't really come directly from the principal. It came partly because we looked at other universities but also because we realised that these areas are business of activity, were converging on each other. There are many questions and many developments that we needed to do that required input from two or three different areas. And still there is a driver on this, it's [business integration] a design towards the future as much as is a design for the present.

S: In terms of the projects initiatives, is there a top-down or a bottom-up approach?

O: Both of those things are true. Major projects, for instance we are replacing our whole student record system and we are developing a research computing infrastructure, a stronger research computing infrastructure, we are redesigning the university web-site, you know the content management system, and the whole way it's put together. Those major projects come top down in the university. We are running essentially an OTC gateway and a PRINCE 2 type of management process for projects like that. We have project governance, a project team and formal budgets and formal reporting. But lots of things within my area are much smaller than that. And so although we run them as projects because that is how we manage as much as possible of what we are doing and we are trying to get to a standardised light methodology of managing projects all the same way. Because, historically, the library and the IT service, the e-learning etc did things very differently. We are trying to converge on a standard but not too heavy way of managing projects. And plenty of those are initiated internally, for instance the university's entry in IT in June that we are just completing and setting it up so, academic staff can upload materials. That's a small project that emerged within the service rather than it has been decided one day by me, that we needed to do that. But, all of these things have a strategic plan. The university has a very strong strategic plan which is now its second of these really quite well designed and very inclusive strategic plan. Information service has its own strategic plan which fits within the university's plan. And so, our developments are guided by that and we do have milestones and objectives and targets within it that we decide that over the next five years we want to do the following sorts of things. So, although it's possible for spontaneous projects to arise, but our small major project tend to arise as part of the strategic planning.

S: In terms of your profile, the CIO profile, what kind of activities are you involved in?

O: The job description is really rather vague, it just says to lead essentially the strategic development of the support services and ensure that high quality fit for purposes services are

available across the university. I also, because I am vice principle, have responsibilities beyond my support group but as such a CIO librarian it's [I have the responsibility] to overall see the development of the projects. So, it's the strategic level rather than an operational level. It's setting the strategic directions, it's ensuring, and this is particularly effective within our university that the six budget holders on the senior management team. The senior management team works very well in trying to decide what the real priorities for the university are and what it will take to achieve them. And so, I have a contribution into that [strategic plan] and also I take from that discussion guidance to what we should be doing and not doing. So we have a very strong consultations running with our major users who are the academic departments, the schools and the colleges. And so my relationship is mostly with the senior staff across those five other units.

S: Are they any Key Performance Indicators that are used to evaluate your role?

O: There are no formal Performance Indicators in the sense that I suppose that I could point to them, but there clearly are in practice in the sense that if I sense that there was a miss match between what we were doing as an organisation and where the academic business of the university, which we support was going then that would be a qualitative sort of marker of the fact that we were not really well aligned. What I do take actually as a kind of performance indicator is the extent to which unhappiness escalates to me. And so, if you have an organisation, inside the university in particular, which is failing to deliver, what happens is that you detect a high level of unhappy noise at top of it. One of the markers is how much unhappy noise comes to me. And the other, which is a very important one from my perspective, [another marker] is how much unhappy noise goes to the vice chancellor, to the principle about the quality of our services. And actually I am very happy to say that he gets essentially none. Now, that hasn't always been true. So, we have a measure over the time of the extent to which senior academics escalate their unhappiness to the top of the organisation, to the VC. And that tells you whether you are aligning, what you want to do, by running your services in accordance with what is needed. And I think is probably the most valuable Performance Indicator, because actually is entirely independent of us measuring it. This is what the VC sees and hears.

S: This is very interesting as a complaint measurement, but what about complaints that are not reported. Is there a mechanism to monitor those too?

O: Well yes. From the IT point of view, we reviewed the university's IT services a few years ago and a set of recommendations came out. This university has about 400 computing officers, IT professionals. And we didn't have a way of enabling them to be a single community to share their views, to make their input felt in policy and strategy discussions and in operational discussions. So, I now have a thing called IT professionals' forum which I don't own and manage but I do support and, in a small way, fund and that is a democratic forum essentially of all the IT professionals within the university. And they will debate amongst themselves. For instance, one of the issues that was debated intently recently was that we are implementing a staff and student e-diary and it ran into quite serious technical difficulties for a variety of reasons, and so we had to decide the back track away from that and put something new in, and then that something new, the obvious thing to put in was Microsoft Exchange, and a lot of our computing officers are IT professionals were uncomfortable with going to that proprietary product, so there was an intense debate with them, the debate to help them to look at the needs of the university as well as their own local needs and wishes and to agree what were actually going to do. We are able to bring that in that group. And they [IT professionals' opinions] are therefore for all a source of feedback to me because of what they say.

S: I would like now to discuss in more detail your role in terms of creating business value. From what you are describing up to now, is about improving services within the University but what about introducing innovation or taking advantage of information to drive University as a whole? Are information and the related technology seen as an overhead or something that can add value to the organisation?

O: I think we are moving away from that. I think that some of the projects that we have initiated recently and are still in are clearly examples where the university is looking to leverage IT. One of the student records where we are moving from, it's slowly been moving from a very database, very centralised student records system that only the registry staff who owned it could see; we progressed over a period of years towards a position where students could see, we have a student portal, very well developed student portal, and we use that student portal to reach students right from the time that they are enquiring the university. So, we made the constitution that "hey, we got this portal that all of our students could see and we can feed them content of very sorts and we can interact with them through it". We decided that we would extent the entry point for that to the point where the student enquires the university, not even applies, enquires.

We are also using it in a way of reaching our segmented student markets which we've traditionally not done. We tended to look upon all students as students. But of course increasingly we've got international students, many more post grads taught students etc, and so we beginning to differentiate what we offer to them through that electronic domain.

The other is the change that we are making to the student record towards saying that actually instead of having lots of staff keying in all this stage, we ought to be moving to a self-service model in which people update their own data that they are able to edit and change things so that we're not doing it, they are better than us. And our university web-site is redesigned again is saying what is the best type of technology that we can apply to ensure that the information we have and we offer is as high quality and up-to-date as possible and costs us the minimum to keep up-to-date. So, all of those are absolute direct use of technology to add value to the business process.

Our management of the whole RAE return was very similar, and now to the back of that we have a publications repository, and now we are aware, we have this ability to get our publications and our research datasets out into the public domain will increase our citations which will increase our score in the RAE.

So all of those are IT, I mean they are all business decisions delivered through such as technology. The technology hasn't driven it, these are business strategic business decisions that we can deliver through the use of technology and that is how we see them.

S: About the student record system you mention the enquire phase and onwards but what about after the students graduation, the alumni part?

O: Yes, we have a very strong alumni office and so what happens is that just the student reaches the end of their time with us as a student and graduates their data are migrated automatically into the alumni database and we retain for every student a unique ID so when the student return to us they just drop back in essentially where they were. So we actually, it is from enquiry to grade in a sense because you are in the alumni for your rest of you life and we do have a very strong use of technology to maintain, we have specialised software to maintain the contact relationships. We are gradually moving towards a CRM type of modelling effectively which says, you know, as soon as somebody enquires they become a customer, they have an identity, we know what they are doing, we manage them and also of course we go back to them and talk to them if they decide not to come and so not only we are gathering data from students who come to us, we are gathering information from students who decide not to come to us because of course they are more important in some ways than those they are coming to us in terms of telling us how well we are doing.

So, capturing information in a very early stage of perspective buyers is important to us.

S: How much of your role is driven by technology? Do you keep an eye on technologies, what is possible to do with technologies and then interpret this in terms of how you can add business value?

O: Yes, we are active in that [technology awareness]. If you look for instance at one of the things that I would take in technology in higher education as a marker of whether people are aware of what is going on, is how many people go to colleagues in the states. Because, that is the premier event for watching technology in higher education. And we always have a team of people over there. And we are constantly visiting, when we go, we often make visits to our peer universities, I often go to Berkley and Stanford fairly often, into Michigan and Indiana so, within North America and in particular within the States, we have a strong set of contacts. We also utilise our universities' alliances, we are members of the Queen Group, we are members of the universitas 21, and we are members of the League of European Research universities and we use those in a way, I mean actually in about ten days time I am in Canada in Montreal and I shall go to Mcgill and give a presentation to their information service and talk with them about what they are doing. And we are looking for ways to learn from each other and get join up. So we got very strong horizons scanning running.

In fact if you could see my office, you would see that it is completely littered with publications from everywhere, research papers, we read and talk a lot about this. So, we are pretty aware, as a consequence you get bombarded with huge amount of stuff and you have to try to shift out what is realistic and doable and what will give most value to the organisation. That is what we are watching all the time.

S: Do you think of any specific technologies coming that will be important for the Universities or any specific areas?

O: Handheld devices, like the one I am talking to you, mobiles. Because you only have to look what students are carrying in their hands now, the new ones. You know, to see that they've

become really, very sophisticated. Almost all of our students arriving with a laptop as well. So as a consequence that whole area of access, access to information and also use and manipulation of information on handheld and small portable devices, I think is going to be the one that it's going to be a real challenge for us.

S: Well, the mobile is the technology that is delivered but what about the actual information that you are going to prioritise, because obviously you cannot deliver everything you have to prioritise the services that you offer.

O: I agree and we will decide what it is that we will offer by consultation with our staff and students groups, quite intense consultation we use very standard research methodology such as you are using now, one-to-one interviews and focus groups as our surveys are limited. And out of that we will get an idea of the sort of things that they would value most immediately. And we will go for those, rather than sitting in a room and deciding what we should offer and then finding that nobody is interested. So we will be very much guided by what they think they would actually use and then we will monitor the effectiveness [of the technology that we have implemented]. We are quite active in the use of research methodologies and that maybe because partly I am an academic and this is my research area. As a consequence, that influences this.

S: You mentioned effectiveness, does this imply that there is some kind of Return On Investment that you use to evaluate things that you do in terms of the technology, for example using specific technologies or specific architectures for a specific problem? Do you have an evaluation method for this?

O: We don't really have a sort of an automatic evaluation methodology that we apply. The majority of what we do really I guess is based on whether a) it is recognised as being valuable and fit for purpose by our using groups and b) also we are always constantly looking to reduce our cost as low as possible. So, there is always a pressure on us to try to get the maximum that we can out of the minimum of money. But we don't have any formal ways in which we evaluate, if you like, the value for money or the return, at least we don't have formalised Return On Investment types of methodologies. Partly because I think they [IT evaluation methods] are of very limited value unless they are able to capture a lot of qualitative measures. I suppose in a sense what we do is we juggle the priorities, we imply the minimum money that we can and then we maximise the satisfaction level of our users.

S: Is there any kind of assessment for the overall of your job? Are the things as you imagine them to be or are they any challenges? And how you see them involving in the future?

O: Well, I suppose there is a formal evaluation in the sense how well I get on because I report directly to the VC, and the VC does my appraisal at regular intervals, I have to report on progress and what it's going on. So, in that sense from his point of view, I have a line manager appraisal rather than one which is independent of that. We do review our support services at regular intervals and so we will be reviewing international information services probably. And we do external review on different components of what we do at certain points in time so; we do subject ourselves to some degree of externality every now and again on specific areas.

The biggest challenge right now is disappearing money. I mean serious down turn, library materials gone up hugely, IT prices beginning to rise, staff billing beginning to rise and the money is going downwards. This is the challenge. And I suppose really within that given that nothing will stand still in this area it's how you balance innovation against the current services. How you reduce the cost of or eliminate the cost of old services and continue to innovate because if you don't innovate you die.

S: Thank you for your time.

Case Study: Romeo

Interview: Romeo Chief Technology Officer

S: So, can you first give me some details about your organization?
R: So, Sitekit labs is part of the Sitekit Solutions Ltd. Sitekit Solutions has 19 people. Roughly, there is a revenue of £1m per year.
S: As a CTO, do you report to the CEO, to the CFO? How is the structure of your organisation?
R: The structure, we have a CEO, we have a CFO, a COO, a Sales Marketing Director and they all form the Board and all the directors report to the CEO and sit on the Board.
S: And so as yourself?
R: Yes, and so as myself. The CTO reports to the Board.
S: Usually, do you raise issues to the board about new projects or the board defines a problem and the IT group is called to find a solution?
R: It runs in both directions. Because the board will have business problems you know either on the sales or marketing side or on the financial side and then they ask me to find IT solutions for that. But on the other side [of the direction] is because …you know for a long time I was also COO for the operations issues, you know, so still the current COO asks me a lot directly for solutions and then we propose jointly to the board. Because we are a software company, we are also hosting, a lot of our services are based on technology, so we see improvements in technology, new things that we need to adopt that then we need to get budget approval from the board. So we say we need that new storage way or whatever and that is a huge expense and I need to get board budget approval. So it goes in both directions.
S: Can you describe to me currently projects that you are running or what are they about?
R: For IT improvements, one for example was upgrade of our own kind of services infrastructure we are running on Microsoft Small Business Server and we upgraded it on the latest version. We currently have a project running that's upgrading our IP ranges. We have IP ranges, because we have a data centre and we have IP ranges and we upgrade them to be independent of our band ranges providers, that's a big project.
S: Any other projects that might be related with Information Management?
R: Yes, last year we upgraded, we changed our CRM system, from a client based into one that is integrated with exchange. So we changed from Act to a system called CS Outlook which is more integrated with Outlook and Exchange. I..we introduced a similar one, a separately leads management system actually for the marketing department. On Knowledge Management we had a big change; we had a separate system for our Knowledge base for our clients. And we integrated it all into an extranet with a knowledge base with different levels of access for our clients. We have clients, we sell through partners and they all need to see different levels of information. So, we deployed our extranet which part of it is knowledge based which previously was a separate system.
S: Talking about clients, what kind of clients do you have that you sell your products to them?
R: Well, there are two types. You know, the software that we develop is a product that we sell. We are usually not selling software development on its own. We are selling a product, for some clients who want some additions we then sell bespoke software. But the software that we sell is used to build big websites, big corporate websites and most clients recently are all in the health sector. So we have a lot of NHS Trusts, like Westminster, North East, Essex, Portsmouth you know there are a lot of Trusts that have websites based on Sitekit CMS.
S: How is this process with the clients working? Are you working with the IT department?
R: It's more likely the Communications Department of the client. Because our product, which is the software we are doing, is quite focused on the communications of a company, namely their fountain public website it's not necessarily their internal IT problems. Usually our sales department sell to a country NHS Trust Communications team e.g. that they need a new web portal, they buy our software, they then use their IT department or external designers, you know other software companies to build that portal on our software. We quite often sell it ourselves but in the last 2-3 year we are more selling by partners. We are building in a partner network.

So we know people who already sell to NHS people or in the area or who are designers and want to build websites based on Content Management Systems. So those people find the client and then want to build it on Sitekit CMS and use it as the basis. So, usually we deal with the end clients, quite often IT teams are getting involved if other data needs to be integrated, you know, from internal systems and then turns out that data needs to be routed differently because is not publicly available. That is usually a consultancy job from our side where we then we help them to come up with the right decisions.

S: Could you identify some problems in that process, when you are trying to communicate with your clients?

R: Problems with the process or typical client problems?

S: Well, problems with the clients? Do they easily understand their problems? They know how to solve it? Do they understand the IT terms?

R: Well if you are speaking to the IT part of the client then it's no problem. You can talk the lingua and they do understand it. You can speak one to one. And they learn over the years. And it's standard sales technique, if you speak to a communication person inside a client they won't understand IT terms and don't even start to use them. You are absolute right in terms of saying there is problems and there are usually problems when you start specifying solutions. There are several scenarios. Either the client has so much trust in you, you tell them in a few words "this is what we are going to deliver, cause I understand your problem", and they trust, and they understand and they will take it. Usually it ends up to a lot of maneuver afterwards because they [clients] say that but they meant that.

Or you specify something very strictly, spend a lot of time in specifying, spend even a lot of time explaining to the client what all the specifications means. The end is more defined there but the issue is that you spent a lot of time.

What you need to weigh up in our case is always the balance between smaller projects [and bigger projects] and not specifying and knowing that you will still find an end point with the client that is acceptable and bigger projects where you spent a lot of time in specifying everything before, so [in bigger projects] you have clear defined ends, and deliverables that can be signed off. But if you have a project that is 2-3 thousand pounds it's not worth spending a day specifying stuff. If you have a project that is 10,000 pounds it's worth spending a day specifying completely and negotiating with the client to make sure and explaining to the client all the terms.

S: And talking about how this is evaluated, in terms of Key Performance Indicators or techniques that are used to evaluate and assess each project. What is usually used?

R: A) we have a time sheet, a time recording system that we give each project budgets and people record that time to the projects and we evaluate how much time we have spent on it or how much over time we have spent on it. We are very aware of that time doesn't show the actual…It's a good Key Performance Indicator on time spent but it doesn't necessarily show the value of the project to the company or [that KPI does not show] the actual how it went because it only shows us numbers of the hours.

We realized that, well introduced last year a new indicator at certain key stages of the project where we have meetings with key personnel of the project and give it a score. You know, how is it going or how did it go in certain aspects of the project. And we are using this in addition to the time sheet.

You see the time is quite often misleading because something that has a huge value to the client might actually only take a few days so it might have been sold as, let's say, 10,000 thousand pounds project. This is hypothetical ok? Actually it's not so much work for us. It might be a week's work say, or two weeks work say 7,500 (with day rate 750). So if it is delivered in two weeks it actually has what we expected but it is been sold to us as 10,000, that is more working days in the budget. So you see [with only the time sheet] there is some kind of discrepency.

S: What about the new measurement, you said it's not only based on time but also?

R: It's based on this scoring that we have introduced so the key personnel comes in and says how did the project go in a score from 1 to 10. And that [scoring system] is scored according to a few criteria that I don't have at hand at the moment.

S: Are these criteria the same for each project?

R: Those [the performance criteria] are the same for each project, but there are more on a subjective scoring rather than on an objective scoring on numbers.

S: So, they can be adjusted for each project?

R: They can be slightly adjusted but we try to keep them the same.

S: In terms of the Content Management area, what kind of techniques and technologies do you think they are adding business value?

R: I am not so much involved in our sales, I am only involved if there a special consultancy project out there. Repeat your question again.

S: You mentioned that your projects are quite often around the Content Management Area, so according to your experience what are the techniques and the technologies that are to solve these business content management problems that your clients are facing?

R: Most projects that we are doing are based on our Content Management System that we then sell to them. So Sitekit S [my organisation] can solve a lot of problems for them [clients]. The most problems they are having are if they want to integrate other data into their CMS. And they [customers] don't have enough technical knowledge on that, or they might not have the expertise. And then we help them get up to speed on integrating systems. You know via web services, XML and all that stuff. But that's the main problem, you know, on the CMS. A lot of times those problems are solved by our partners, if somebody comes in. If it is a good design house, they will have people who can give end clients strategic advice on the website communication which is really important you know. You don't just let anybody write for your website because …That is marketing rules and strategic communication advice [to the clients]. And that is all stuff that given in one sense or another from us or our partners to the end client. There is also a lot of emphasis on the health sector right now, on accessibility. Those websites specifically for the health sector need to be accessible and there is again a very specific skill-set to provide accessibility and accessible text and everything for the website. Which again our partners might provide or we might provide because we have twenty years experience on that. There are few problems, there are accessibility, interoperability between the systems, there is actually marketing strategy and communications strategy, that's all points problems that clients have which either we directly or with our partners, solve for them. So not just on the software side. If you see it only as software is quite restrictive. It's really interesting, you know, I have been to Athens last week to a conference on web science, not sure if you aware of that new thing. It's actually a new research initiative to produce a new field. It's like after they introduced computers, a few years later… you know… because computers were introduced by mathematicians and logic people. And a few years later they saw, we need a new fields for this let's call it computer science and combined it and make sure everything is part of it. Now the web has been introduced, nearly ten years ago, more than that, there is the computer science and there is all the human sciences and they are all involved on this. And this research initiative looks at bring all that together. So, all these solutions we are usually doing have to do with the web, and therefore just looking at the software side or at the technology side is quite often not enough. But there is a need to look at the human site of it and in this case for the websites quite often it is marketing, the communication, those aspects. It's really interesting to note that in website projects, software projects people should start including the other aspects more often.

S: So, if I got it is also about aspects like business value, introducing innovation? If I got it right?

R: It's not just that, it's also looking at the legal aspects [of the projects]. Well you named business value that is economic aspect. It's very interdisciplinary; it's looking at the projects rather than just looking it from an IT point of view.

S: Now I see what you mean, not to see it as an IT solution but to see it how it contributes to business processes.

R: Yes, and how the business processes are affected and making sure all the business processes are involved in the solution. So, quite often that is neglected. It's quite interesting, I think, what is the University next to you?

S: The Metropolitan? The Salford?

R: In Salford, they are introducing an MSc in Web science. This will be introduced in the next 2 years in the universities in the UK more and more. It's a new science looking at it from all angles.

S: Right, ok I think I have covered my topics of interest. Is there any general comment that you would like to add about the role of the CTO your role?

R: The role in general is really…there is a lot of visionary things [about my role]…you know looking at new technologies and looking at new areas. Where other board members wouldn't even look at them yet because they don't know what is out there. And you need to educate them [other board members]. And this education [to other board members] aim to bring new better solutions to business but also to educate them [other board members] so they know what

they are talking about if they are speaking to other people. So, there is an education role in there and [there is] a visionary role in there.

S: And is that role difficult?

R: Sometime yeah, sometimes people [other board members] don't want to be educated [as part of my role]. Specifically "C" people, people with a "C" in front of their names.

S: Thank you very much for your time.

Case Study: India

Interview: India Chief Information Officer Consultant

S: Can you please give us some details of your role in India? For example, what is your job title, to whom you report, whether you supervise other people, how your department is organised, how many years do you work for them, how many in that particular post.
I: OK, well I report to the partner in the CIO practice in London and I am senior associate in India and I cover the technology sector, its industrial and I cover vertical CIO across everything but the stock markets. So banking stock markets, national banking sits with a colleague of mine and CIO practice.

S: What are the main tasks in your job description? What are the typical kinds of activities that are included to your role? Can you describe a typical daily scenario of your work?
I: We have an assignment and we have to find the best candidates for the clients, to fit the role that the client needs to be fitted. And we do not work as we have a candidate and try to sell candidates to the clients; it's the other way around. Client has a need and we try to find the best candidate suitable for the role. We have to know the market, obviously, we know CIOs are on the market, we know FTSE 100 and we know wider populations as well. But because we are working at the top-level, board level and slightly below board level, it's not too big sample not too big population of the CIOs that we have to know.

S: Can you describe in more detail how companies approach your firm? What are they usually looking for e.g., degree, experience (relevant project, sector, position)? And how they communicate their needs to you? What are the job titles that relate to CIO that you have been involved with?
I: Quite often the clients have their own view of what sort of experience, in which area they would like to see in a potential candidate. However we might slightly modify their impression, in terms of sector for example. If they want to have a candidate from the telecommunication sector, we may say it's fine but in order to broaden your horizons we would like to present you someone from semi-conductor sector for example, which is not so far but can bring fresh view on new technology challenges that semi-conductor sector faces. So, if it is a CIO position for FTSE100, it is quite clear that the potential candidate has to have about 15 years of experience, and already a comparable scale of operations in the past. Because you can't jump from 1 million to 8 billion.

S: And apart from their experience do they mention other kind of tasks like shape business strategy, create business value, build effective relationships or scout external environment?
I: All these are requirements already included. It is already given that CIO at this level at these days is not an IT director that manages the IT infrastructure. It is quite often that the CIO, especially in big companies, they do report to the board directly. It is not rare that the CIOs report to the Financial Director but quite often they have access to the CEO of the company and board of directors. And they have to have an overview of where the company is going in order to be able to build the effective infrastructure, and let the company to grow.

S: So, from your experience could you distinguish some of those skills?
I: All have to be able to build effective relationships with the internal stakeholders or executives in the company otherwise if they work in silo the business will not benefit from their Chief Director or CIO knowledge and experience. They have to know where the company is going to, which market or, I don't know which factories they want to build or what they are going to dispose of which assets in order to understand what they are doing with their piece of equipment and the applications. So, all executive roles are effectively relationship building roles, it's one of the aspects that they have to possess.

S: Yeah I understand that all of the executive need to build those effective relationships, but I was wondering if the role of the CIO particularly has a trend to one of these skills.
I: What is the CIO now is that he has to combine all the tasks together. If it is a very large company it would be a team reporting to the CIO, and members of the team would focus on particular tasks. But CIO as such would have to have an overview of everything that is going on. If it is just relationship building or business strategy is not a CIO, it is a functional role.

S: Do they give you a detailed job description? Do they mention specific activities/projects/tasks etc for the required role?

I: It is pretty much task related. If it is in a software application area then the tasks are the knowledge of the software platform in the particular sector, reservation systems for example. And it is a very specific tool to a particular task or in the distribution business a person has to know how the distribution logistics processes work, and they quite probably understand that if a person comes from the software business, he/she might not know how the distribution works. They may have a general idea but they wouldn't know in great detail how the distribution processes are set up and the requirements for the systems and vice versa.

S: Do your customers give a note or pay more attention for the role of the CIO to contribute to business value?

I: It is important, because all of the CIOs bonuses are paid on the performance of the company and it is quite understandable that the IT systems these days play a crucial role in business performance.

S: Are you aware of techniques of evaluation for the role of the CIO e.g., for the award of bonuses, promotions etc? Are you aware of specific criteria such as Key Performance Indicators that are used?

I: Each company has their own KPIs. And it well maybe very detailed or maybe strategic. Strategic is what is the revenue or profits in the company by the end of the financial year. That's a strategic overview. If it is a very specific, the launch of the factory and Q4 for this calendar year and it will be very specific even if it's a new candidate a new CIO who just sign the contract, he may have the KPI but the factory has to be launched because it is mission critical by the end of Q4.

S: So, are you aware of any specific criteria, metrics for the KPIs?

I: Its profit should be at a certain level either should be the organisation has to be profitable or IT has to be within a certain budget or the budget has to be reduced by an X number. It's different I think, some companies have benchmarks across the sector and they say our ratio is at 20% and they would like to go down to 15% although the industry average is 22%, we are bellow average we are doing well but we still would like to, or assume there is room to go down. In terms of outsourcing contract a company decided to outsource their IT function to or supply of these services like telephone, internet, helpdesk to some other provider and the CIO has to find the best provider and who would be responsive in certain time, who would give certain prices for the company and all the contract negotiation happen, the CIO handles them and that could be his KPI to be within the certain budget for the certain services.

S: Ok, so the KPIs are based only in processes related to external customers? What happens with the internal processes by the CIO and how this is evaluated?

I: Let's take the example of MBS. And MBS decided that they didn't need IT support anymore, so the 2 guys who sit in the lab they don't belong to the school they are outsourced somewhere. So they may not be physically present in the school, they are maybe employed by a technical company and they will have to report to somebody else who will give them the tasks. So, if the pre-cost from the MBS comes in, they might not be in their priority list. So IT director or CIO of MBS has to make sure that when a request from MBS comes in although those guys are not employed by the MBS anymore and they don't report to him anymore, the MBS request would be in their priority list . It will be number 1 or number 2. Or he has to negotiate that all the phone calls that MBS does they should be within the budget. So, assuming that schools spends about 2,000 a month on telephone calls and the average call cost would be 10p/minute, it is in the hands of the CIO to renegotiate that with the telephone provider saying "we would like to outsource the internet to you as well but we would like to get the price per call down to 5p". This is an example of outsource contract. And it's about internal customer it's not about external customer.

S: Where do you search for possible candidates? Do you have your own list? Do you look for similar positions in competitors?

I: Yes we have database. And yes we do look at competitors of the clients.

S: Are you looking for particular skills/previous experience of the candidates? For example, introducing innovation, improving competitive advantage through IT, experience with competitors, able to shape market, etc? Possible a combination of these so is there a ranking/order of importance?

I: Yeah, leadership, innovation is always in the top of the list.

S: Innovation?

I: Innovation and thinking outside of the box, leadership, everything.

S: Improving competitive advantage maybe?

I: Of course. That's the easiest way to gain the advantage in the market if you have systems that support the processes and use the work of the employees.

S: Ok. Would you like to add anything general?

I: At this time, in this world people are more looking for leadership skills, to be honest. The technology skills at that level are given. If you came up at, in your way to the senior position, it is assumed that you have technical competence. And what differentiates people really is relationship building abilities leadership skills. And external awareness, what is going on, in the market. If people have their extensive network over their colleagues and they know what is going on, in the market, which technologies are introduced or are about to be introduced and what technologies have in terms of advantages and disadvantages because new technologies sometimes, unless they are tested many times they are not really good. If they are capable of knowing what is good or bad that is external awareness.

S: I suspect all these skills they are not let's say for supporting the current business processes. So far the IT department was to support the business processes and I was wondering if now it has gain an extra role to create business value through IT?

I: Business' usual support is not what CIOs do. Support of business is usual, it's just anybody in his or her team could. The CIO role is a leadership, they have to know what they can implement now to improve the processes in the company. This is the external laws of business; knowing what is often on the markets it's not just support business as usual.

S: Thank you for your time.

Case Study: Tango

Interview: Tango Chief Information Officer

S: Can you please let me know how many people are working in the IT department under your supervision and the level of your group's budget?
T: I've got 72, and the budget is 8.5 million…relative small comparing to London.
S: According to your organisation's structure, who do you report to?
T: I am reporting to director of finance but this will change next year cause we are creating a new service transformation or service improvement department, so I will report to that director.
S: Usually, the board defines a problem. In response to this is it the role of the IT group to find a solution or advise the board on new technology or new projects?
T: It tends to be the latter scheme at the moment. The role is more for us to push information up to the board about what is feasible and what can be done.
S: And according to your experience is it difficult to convince them about their value?
T: Eeehm, no in general no. The challenge is always the funding.
S: Can you please define the main activities of your role or what is included in your job description?
T: Yeah, I mean, I suppose my role is split 50-50. 50% inward looking to the IT department, in terms of what we are doing what our road map, what progress we are making and so on and so forth. And the other 50% would be on the business side, what technology are we own how it can help the business, how we are going to use it, how we are going to get the highest use out of it and so on and so forth. So, broadly speaking we have to have a small element also of what is going on outside Tango in terms of representing the borough or in fact chairing groups like Data Connects or Tango is part of a regional partnership as well, we got 6 West London boroughs in one regional alliance. So, say-to-day has to be split internally looking after IT use, departments, working on the business but also the external bit either representing the borough or working jointly on initiatives.
S: So, if I got it correctly is 50% business management as we usually know it and 50% a technologist…?
T: Well…it's not the technologist that matters; what you could say it's 40% on the people and the technology in the IT department…
S: …as a supervision role, let's say
T: mmm, no…well, we've got managers to do the supervision in terms of the people management issues. But at day-today, it's more what resource level we have, what programmes we have, where are the programmes, how they are progressing so on and so forth. So it's the in good looking about our work programme, our resourcing, staff issues, what have you. So, you could say 40% is then working with the business in a variety of ways, either where IT is involved or they want IT to be involved and 20% is working outside of the council…
S:…scout external environment about what other boroughs are doing
T: Yeah, another element is that, is a strong element the networking. There are groups like Data Connects and there are groups like I said boroughs in a formal West London alliance so there is a joint working in initiatives with other partners.
S: Would you say that among these activities one is to introduce innovation?
T: Yes, absolutely. Yeah, I mean that is part of, networking is obviously about picking up good practice from elsewhere, or forming alliances to do some joint working, so it's a range of things, or just gathering experience on how to do some things, oh yes that is part of it.
S: In terms of your post, what kinds of Key Performance Indicators are used to evaluate your role and by who?
T: The main KPI we use are based on the SOCITM ones but also increasingly the audit commission. So, that's the two environments we primarily work with. On top of that, we have internal KPI which are effectively set by my boss, the director of finance.
S: And do they have to do with finance indicators like reducing cost?
T: They are across the board from service desk performance to cost of network links, cost of IT staff so on and so forth. They are used to benchmark services across London.
S: So, they are not only quantitative in terms of finance but also qualitative in terms of user satisfaction?
T: Yeah.

S: Can you give us examples of recent projects that you have run recently? I saw two reports of your recent projects with Data Connects group, CDI and ROI calculator; in terms of those projects what kind of technologies have you used?

T: Obviously the reports are generic ones on CDI, so for Tango that took on a flavour of using software from a company called Initiate, so it's CDI technology which is all about matching data, algorithms and so on and so forth. That was the technology that was deployed.

S: Any other details about this process of collecting data, analyse them and deliver value from them? I have defined from the report indexing, databases, any other technologies like data mining, text mining maybe?

T: No, it's all about pulling data, matching data, then using it and effectively it's an information management project, so it's about identifying your data sources, where are the most trusted data sources, what data do you need to put in to your hub, it's about the technology that enables you to match the information and then display it, so that is primarily where it's coming from, for the projects that we are involved anyway.

S: Can you explain which of those projects or those technologies helped more your organisation in creating business value?

T: Internally within Tango we got the CDI project, and we are about to implement a new CRM system. So that would be an example where we can see a service improvement as financial as well as quality and service improvement.

S: And what kind of technologies they are used in CRM and CDI projects?

T: Do you want to know the underlying technologies? Whether it is .NET and sequel? It's a mixture of them. In terms of the actual application for the CRM is a product called Lagan, you can actually look up all the applications LAs have on the website, I don't know if you know that?

S: No, I'll have a look on that, it's useful, thank you,

T: It's called e-government register. So if you go there you'll see and it's broken down by sectors. What CRM systems are out there, what CDI solutions are out there and so on and so forth.

S: In those particular projects, with what techniques-methods you proceed with the evaluation of those technologies, for example ROI, CBA, etc?

T: Yes, I mean…to be honest with you most of it is in the Best Practice report, in the CD you picked up. If you are talking about CDI, yes, if you go to the report you'll see the short version is from a technical perspective one thing we would apply obviously is trying to use real data so the potential suppliers have to use real life data when they actually doing the matching and so on and so forth. Engaged with the business, involved with the business in the selection process so it's not just a group of techies that select the tool, it's has business users, because ultimately they are going to be your data stewards and the ones you are going to work with to actually start tidying up the data, so that would be two tips I can give you. And a third would be less to do with the technology but obviously you need to get the business buying before you start doing this type of work.

S: So, you do use ROI and CBA but you put more effort in the business evaluation these projects and the user satisfaction?

T: Yes. That's the key part of it. What we've seen across London is the importance of engaging with the business. And obviously one of the reasons why we did the report is there aren't many metrics out there to do a detailed business case, that's one of the reasons we did this report this year.

S: With that particular technique, is it possible to evaluate the technology itself or it is more finance related?

T: Yeah, but it's a mixture of both of them, isn't it?

S: Yeah, but I don't know if more finance-oriented techniques are able to evaluate the real processes of the technologies?

T: No, no, they are not. I mean it's about two separate things. But obviously you've got to justify, most of the LAs these days work on an invest to save basis, i.e. you secure funding in one year, on a condition that you ultimately make savings over future years, so you've got to do your homework on the ROI side to ensure that whatever investment you get you can leverage savings over time. But obviously the other part of it is that you have to be very clear on your processes and your data and your technology is actually going to be the solution, so, it's a combination of the two. They need to go together but they are separate entities.

S: Ok. Would like to add any comment?

T: Not really. The Data Connects group is not only about Tango, is about the whole London so when you look at the reports, they are two reports. One is about how to do the project and the

other is what is going to be the financial quality benefits, so the two need to go together. And every LA is different so some LAs may not have to do such a detailed business case because their CIOs are convinced of the value of the projects while others will need the detailed business cases. There is a very broad church out there. But in both of the reports every LA should find what they need.

S: Thank you very much for your time.

Case Study: Hotel

Interview: Hotel Chief Information Officer

S: Can you please explain a bit of the organisation of your department, the number of people involved and perhaps the budget?
H: Part of the role is indeed to do with the National Programme for IT, but that's one part of the portfolio. The department in the Newcastle Office is effectively the headquarters department which has 8 people including my self; those people are focused on a set of activities including information governance which is extremely important, some local information support needs to support the business of the SHA, and the National Programme of IT which is at varying stages of evolution around the country, to England. In addition to the team that I have in Newcastle there is a further team based in Darlington, who are an extended role of the Strategic Health Authority team and their primary focus is around deployment, engagement and service management aspects of the National programme. They are about 9 full time equivalents in that part. So, in total we have a team of about 18 members of staff delivering to a North East population of about 2.5 million patients and setting the total context of NHS employees in the North East there are 77,000 NHS staff.
S: According to your organisation's structure, to which role-person you are entitled to report?
H: In the currently reporting structure I report to an executive director, it's actually the director of nursing and patient safety, but the practicalities or the reality of life is my interaction is principally with the chief executive. And the reason for this hybrid model is really a legacy of how the NHS in the North East has evolved from a management point of view. All I would say, I anticipate that role to be reviewed in the non too distant future.
S: Usually, do you raise issues to the board about new projects or the board defines a problem and the IT group is called to find a solution? Or who decides if an issue is an IT issue?
H: The governance structure within the SHA itself, the deciding body will ultimately be the SHA board, from the directors' side. Below that, there is an operational board known as the management team of which I am a member, and the management team receives propositions, proposals that then will ultimately make some formal decision. In parallel with that there is a governance structure with an informatics programme board which receives information from National policy and populates from the local health community (LHCs) where information projects will be discussed and approved prior to the SHA formal board approval if necessary. So we have a degree of autonomy within certain criteria in terms of financial approvals etc. So anything of major strategic significance would come through the programme board then up through the SHA board for final sign off. But there is a management team that sits in parallel with that for day-to-day operational decisions, that should they require that level of formal approval.
S: Can you please define the main activities of your role or what is included in your job description?
H: Certainly, informatics strategy, and when I say informatics now, this is a title widely used in the NHS but I guess over recent years given the focus on the National programme, we've been somewhat fixated on a programme of work, and there are other things we need to do, you know, equally as important. So therefore … I joint the SHA last September and really decided to rebrand the work that I and my team need to undertake, hence the title informatics.
So seemed would see my key elements of my role around developing the regional informatics strategy which [IT strategy] is consistent with national policy and directives and that would include things such as governance, the programme itself and other areas of what I would term collaborative information development so there are things we need to do that are outside the National Programme of IT that equally as important.
S: Can you give some examples of the collaborative information developments?
H: It may be that we look at methods of joining up of our knowledge management processes. So we have a structure where we are increasingly providing power through the local operating plants down to primary care organisations. And therefore some of those programmes are developing in isolation, what we need to do is to try to provide the mechanism to share, to learn those best practice activities that may have more a regional reach and I guess it's a function of

world class commissioning and other competitive type of processes that allow people to work more in isolation. What I am trying to do is to be a bit more joined up in the North East, by looking what we can do collaboratively to make the North East as a whole more efficient and effective in the way we use information and its associated systems. That's quite important.

I see my role not only as a strategist but also [I see my role] as providing some professional leadership. Clearly I guess I am the new responsible owner for the informatics profession in the North East and therefore if we need to educate, train and develop those informatics professionals, well that's one of my key duties to try to expand the capacity, the capability and the professionalism of those very senior people.

I see my role very much as a facilitator to [I] try tease out some of those really good ideas that are at grass roots level and poo and engage other people within the organisations and the ultimately test I guess is to demonstrate that informatics enables organisational and transformational change, rather than always it seemed to lead it and I guess going up a little bit of a tangent ….

If you want an IT project to fail put an IT person in charge of it. Because what is about is not demonstrating IT for the sake of IT, it's using information and its associated systems to transform our very critical health and business processes, really demonstrate efficiency, effectiveness and patient advantage. That's really what I am about.

And last, but not mean least, I would say one of the other significant parts of my job is being the corporate consciousness of informatics having a fairly varied very background. My background is originally from an engineering discipline. So therefore is how we look at the value of information along a value stream, see where we can enhance that value by removing bottlenecks, decoupling inefficient processes and using information as glue to join systems, services and organisations together.

S: So, I presume this kind of information integration is where you see the business value coming from?

H: Absolutely, absolutely. I mean if you consider information technology as the conduit then information becomes the fluid that flows through the pipe and it's the fluid that allows us to connect various parts of our systems and services and it's making sure that we get the right system connected by using the right information to make corporate and patient decisions.

S: Can you give us examples of recent projects that you have run recently? And how you evaluate the aspects of your role? Are they any Key Performance Indicators?

H: Every project needs to go through a project initiation document or PID you may or may not be familiar with. Within those projects or programmes we have staff who are trained in formal deployment methodology, something like managing successful projects or programmes, prints. Within NHS we are also increasing, [we are] becoming more focused on benefit led change. And within that we indentify significant elements of the project which demonstrate value. It may be things like finance: cost saving or cost avoidance, so they are key parameters; they are may be productivity elements: which are talking about changing a process or a workflow from an AS IS stage to a new and more efficient TO BE stage and therefore we are taking out things such as non-value added steps and maybe improvements in the work that individual staff members need to undertake. So, there is time that you revisiting some of those elements, clearly quality and safety are major parts of the Key Performance data set so, if you can improve a process by increasing the safety element, decision support within a prescribed function, you know, you could effectively save lives. It's as fundamental as that.

I think what we always try to promote is the business that we are in is about providing improved health care services for our patients and the information component is one key process in that. It's not the reason we are doing it, we are doing it to make sure patients have a better care offering. But the information value add is about, you know, making sure that records are not duplicated; information is accurate, timely and deliverable to the point of care. So, there is a number of things that we are able to do, the formal methods being a method that we have factored into our project initiation documents.

And once we have implemented the solution we have a formal review mechanism 40, 50, 60 days after the goal life to make sure that those initial benefits have been realised and then thereafter we have a continual monitoring process to make sure that those benefits are mainstreamed and sustainable. So, a benefit is forever not just for the goal life being itself.

S: Is it possible to tell us a specific project as an example of something that has demonstrated these benefits?

H: A classic would be picture archiving and communications (PACs). The PACs was a transformation in terms of the way radiology departments work in acute hospitals in particular.

Effectively taking away the legacy of wet film X-rays which were the mechanism of the way we used to capture X-ray or MRI type images for patients. That was replaced by a computerised solution, maybe 3-4 years back. The benefits that were delivered from that were clearly patient records no longer went missing, X-ray film and their associated packages quite often got misplaced or mislaid, they were only available on one point and time. There were often high cost in association with the chemicals and the time delays associated with processing that old technology. By implementing PACs and computerising that process immediately images were available at the point of care, so radiologists were able to identify problems very quickly, reports were very quickly produced and therefore treatments were set up far quicker than with the traditional method. So there is a massive benefit to patients, you know, patient risk of diagnosis being missed were, you know, reduced significantly. The cost of using old film technology and the cost of those chemicals were immediately eliminated. For the NHS itself, there is an overall benefit in terms of the way radiologists were able to access those images and report on them quickly. And it's not confined to the organisation where those people were originally employed, you could then start to share expertise across organisational boundaries, should you choose do that. You know there are major HR implications in the way that the service was more efficient and effective. Now, those things readily identified within the radiology and the X-ray departments almost over night, but if you start roll those things out into wards, into out patient clinics, perhaps into the GP surgeries, then you are completely streamlining those processes and [we are] making sure that you [we] are using information as an effective decision support tool, without the risk of loosing some of those very critical records that the traditional held with the X-ray film.

S: If I am correct this is a type of a national type of programme?

H: Well PACs existed prior to the national programme, but when the national programme saw this as a real benefit, it was corporated. And certainly from the North East point of view, a number of organisations took up the national PACs solution and deployed it at a pace. As I said it probably been in place 3-4 years, but you know it's unparalleled in the way that it's actually really delivered some significant transformational benefits to the NHS and its patients.

S: So, it's like you said use information in an effective way making sure that information is delivered to the right person, in the right time and in the right format is important and in fact it's the main reason or one of the main parts of the CIO profile. Now the thing is about technologies on the other hand, you mentioned somehow that technologies are important in a way, is that what you are saying?

H: Can you please repeat?

S: Well as a CIO I imagine that if you want to evaluate an idea or a problem or recommendation you have to be also familiar with what is technologically possible?

H: Absolutely, I completely agree but I think it's really a combination of the technology, the infrastructure and looking at how you can actually deploy the significant change using that. But ultimately the benefit that you realise comes from the business process itself. So, you know for example if you replace an IT system with another IT system then you get probably a slightly better IT system. If you replace an IT system with an Information System that spans organisational boundaries then you are actually transforming some of these workflows and associated with that. But clearly it goes without saying that the underpinning technology has to be fit for purpose. And technology's advancing the pace and what may be state-of-the-art this week, next week will be quite outdated. But you have got to, sometimes the benefit of installing new technology doesn't have the value to the business that people may wish it to have. It's like if you replace Microsoft Office 2003 with 2007, it doesn't readily lend itself to the business benefit cause you are still word processing, you still use spreadsheets. It's until you demonstrate that this is not the same thing better but it does better things. That is what is about.

S: The last question is in terms of communicating with the Chief Executive and other senior people in the organisation. Do you think that talking about benefits coming out of the information management is the right way to go? I assume there is gap talking to these people about IT? How do you manage this gap?

H: First of all, I don't talk about IT [with other executives], I talk about the benefits that we are providing in the NHS and its stakeholders. And the selling point is about the way we use some IT and doing this. If I am being absolutely critical one of the reasons why the National Programme for IT has been difficult to sell is because is called the programme for IT. It is nothing really about IT, it is about changing services using some technologies and those technologies are advancing the pace, so it's really demonstrating value and benefits principally to people, and the people are the tax-payers, the patients and the organisations themselves, but

really to say by implementing the solution, we have saved money, we have improved processes, we have improved quality, we have improved service but ultimately we have improved safety and enhanced decision making. That is really in a headline level, the sort of things that I could talk about.

S: It's clear by now that your main focus is on business processes and how these can be improved and create business value. The question is if you have in mind terms like innovation and maybe competitive advantage in terms of your role and projects you are running?

H: I understand, my background was private sector, I came from the chemical industry five years ago, so I understand the three stages of evolution effectiveness, efficiency and competitive advantage. That is exactly from where I came from. There is a slight change of focus in the NHS because whilst we are not looking generally at competitive advantage through the recent emergence of world class commissioning which is really merges on things like innovation, foundation trusts are clearly in a competitive world now because they are challenged to compete against other FTs as providers, and in the independent sector. Those organisations will look at new and improved ways of using systems and services to get ahead of the game. So, there is something of the competitive arena emerging, ultimately where we share patients along a pathway or a health care environment. It's slightly difficult if organisations work in different ways. So, I think where the real advantage comes is where you can demonstrate as an organisation that you are efficient and effective and therefore your headline costs are reduced as a consequence of those efficiencies. That's really where organisations can utilise technology to an advantageous level. It's very difficult but ultimately our currency is patients, that's the thing that flows between our organisations, patient information and what with that we do [what we do with information is] is to give them the maximum benefit to improve that visit experience all the way along the continuum. And that's the slightly difference between working in a commercial environment and in the NHS. We are there to provide value to the patient ultimately.

S: You mentioned "governance" a few times and for me governance is a bit wider in the sense that it involves risk management and legal aspects and maybe things like data protection and freedom of information. I'd imagine these are parts of what you mentioned governance.

H: Absolutely, I mean the way that the government agenda works is the information governance aspect which is around secure, confidential information flow because that is quite a significant part of our organisation reputation. There is also the governance of bringing national policy through the various stakeholder groups and how we manage policy change and local requirement again that is part of the governance and the structures that support that. There is obviously the legal constitutive governance arrangements around Strategic Health Authorities, the department of Health going up the way, but, also how we then use our governance and associated structures to lead some of the challenges that our primary care organisations have got. So we need to try to have a fairly systematised process of engagement communication ultimately dependent on our governance needs. And that's really how it tends to work.

S: Thank you for your time.

Case Study: Mike

Interview: Mike Chief Executive/Information Officer

S: Can you please let me know how many people are working in the IT department under your supervision and the level of your group's budget?
M: So there are 6 folks at the moment, 2 bioinformaticians (1 bionformatics & 1 medical informatics), 3 pure IT folks and 1 web-designer (web-administrator)
S: Can you define the budget your IT department has for its own?
M: We are private company, we don't publish these numbers but it's roughly under 1 million/year
S: Can you give us examples of recent projects that you have run recently?
M: By projects, I'll mention a couple of EU projects, Dr Theodoulidis is aware of Parmenidis, there a ACGT (Advanced Clinico Genomic Trials) project which is another EU project, you can find additional information for each of those in our web-site, if you want to ask something specific you can tell me. So, you can see all of our EU projects online, we also run internal projects which have to do with the development of technologies, most of which of course I cannot go in too many detail about.
S: Well, that's actually the idea, to tell us not too many details of the projects themselves but on the type of projects and specifically projects that target on increasing business value and increasing competitive advantage. We are talking about primarily project that have to do, the ones that we are interested in, with better organisation of the information, digital resources, and the management of these resources, like the project you were talking about speeding up the access.
M: OK, so…
S: Types of projects rather than details of projects
M: Types of projects as you know are…technology is broadly, a literature mining technology, and products around the extraction, management, processing, let's say, of very large corpora of unstructured textual information. So, that's our primary, let's say data which we work on, so the kinds of technologies that we are developing revolve around…..
So, we have, for example technologies on Information Extraction, we have worked on, what I call, Advanced Database technology, there to put it simply we had solved the problem of vary fast and efficient access of really big databases.
S: Well, that in terms of Databases is called indexing. So, you, kind of, try to index the database.
M: Ok, let's call it indexing or new kinds of database designs, I cannot go in too much detail, it's not exactly…although it has been implemented in a relational database we are using other kinds of structures on top of the relational model to achieve that kind of performance that I mentioned before. Roughly, we are about 10 times faster than a columnar type database, so, you know that for certain types of applications they are based on…RDBMS model is not so good but then you have the columnar databases which give you about 100% fold increase in speed but we are about 10 to 20 times faster than columnar databases in terms of speed. And we are talking about databases, as I've said before, of the order of about 4 billion rows size. In terms of Gigabytes they are not so big, they are about, let's say, 150GB, but in terms of rows, as I've said, is really significant. And of course in terms of the space that we are searching in order to create the 4 billion rows, it's in trillions of combinations. So, we are looking at, Dr Theodoulidis knows that one of our sources is PAB-MENT, where you have the order of the 18 million abstracts and we are scanning those abstracts for the millions of terms that we have, in our ontology. This is another kind of technology. We are looking at ontology, searching ontology organisation, again, for search purposes or for comparison purposes.
S: Which ones of those technologies, do you think they have a better contribution to your business in terms of increasing business value, and increasing competitive advantage?
M: I think, they all play their own role, it's difficult to isolate, I mean we don't have that broad scope of products… all of them play an essential role. Databases' speed and reaction time are very critical of course. We are living in a kind of Google world and instant gratification which means that people are used to web-browsers and kind of 1~2 sec delays before they get paged results. So, we are competing in that kind of space, in a sense, so there is a need for us to be

very fast, even though we are dealing with much more complex analysis behind the scenes. Though databases are very important, extractions, disambiguation, poly-semi is a very hard problem, we are working on it, we haven't manage to find something better at the moment than it is out there, the state-of-the-art. We are no worse or no better in that percept. But that is another very important part of our world, our applications, our technology.

S: According to your organisation's structure, to which role-person you are entitled to report?

M: My consciousness reports to my brain.

S: Usually, do you raise issues to the board about new projects or the board defines a problem and the IT group is called to find a solution? Or who decides if an issue is an IT issue?

M: We are small company, so everybody in Mike has multiple roles which means that every person is required or is encouraged at least to look out for new applications, new problems. So we have internal weekly discussions, and everybody is updating everybody else. In a small company somebody like myself has more of that role to look out what's happening, be aware and give the general directions of work. In general, there is a role for lower or middle management to inform the higher management for what is happening technologically and make recommendations.

S: Is there a particular approach to decide what areas are of interest and what projects are worth?

M: It is kind of opportunistic, of course we are building on what we have, so one aspect of our work is to strength and further develop the products that we have. And the other one is as we are talking with our customers, as we are doing our own update on the latest technologies but also business problems, trying to see which of those we can solve. Although we are not so successful, we try not to be too technology driven but to be problem driven so, we don't develop a tool that we like, we think is cool but no-one else thinks is cool, which is often the case.

S: Problem driven?

M: Problem driven in terms of opportunities, namely unsolved problems in the community-market that we are active in, we try to see if the current products that we have or with a variation, or with a new product that uses the technologies that we have internally we can address that problem.

S: Can you please define the main activities of your role or what is included in your job description?

M: If I were to create a CIO position, what I would require it would be: to be aware of the latest technologies, to design policies, to discuss new (sub-)systems (or modules) and how these can be put together to create new products, and then organise our own primary information so that is "processible" and analysable in a multitude way. For a small company I think, create a kind of platform technology that you can cut in a various ways into new products is quite important. From a small number of core technologies, have the ability to mix and match them with a flexible way into diverse products.

S: Do you focus on internal development and know-how work or also consider getting services from other people, in building a solution?

M: We have done in the past. We don't want to reinvent the wheel, so for one of our products, we have bought a module from a third party. What is very important to us is the business model that this third party requires so, if it some kind of royalty, or sharing business proceeds, we are much more sceptical. If it's a kind of a licence that we pay once and that's it or a subscription is much better. Otherwise we try to develop things in house.

S: In terms of your post, what kind of Key Performance Indicators are used to evaluate your role and by who?

M: We don't have that post at the moment so, in theory, one KPI would be related to how confident I felt that the CIO was keeping us update with latest and greatest technologies, another would be to have this flexible platform [see above]. We would need to devise in this case some kinds of metrics that we say how easy we capture the amount of effort that require developing new products.

S: What about the ROI in these products, in a sense that you build a case you produce something?

M: That is the classical one, so ROI is much easier to capture and to quantify. So tha answer is yes, ROI is a standard tool to asses what you have invested in developing new technology and then you try in sense how much of that money that technology is bringing back in. Of course, when we are talking about platform technologies, it is a bit hard to proportion the amount of

money that goes to multitude of products, and proportion the contribution of each technology to your bottom line. But nevertheless this is what someone would do in assessing ROI.

S: Do you think that "introducing innovation" and "drive IS to competitive advantage" are parts of your role?

M: Yes, obviously.

S: Or they are not just supporting the business processes. They are the ones that can enforce to those directions.

M: In our case, this is the case. Because we are selling, we are always at the leading edges of the technology so IS and innovation is a key ingredient for the nature of our business. We are also offering services using our tools so, we for that reason having efficient, and… value adding systems is paramount. There is a lot of competition even at the service level, even if you have a unique service-technology; you are competing with internal departments (in our case pharmacy or biotext) many of the concepts that we are selling are new so, everything has to work let's say in clockwork fashion, to get the sell basically.

S: Because the role of the CIO involves internal and external facing projects. How this kind of role involves or is compared with internal projects, improving business performance as such. The project may be improving innovation or competitive advantage of the company or at the same time. Well does it count more to be innovative rather to be efficient, or the other way around?

M: In our case is the former, innovation is for us the primary metric, efficiency is…If you ask me I think our team is very efficient, with the size of the team that we have, I think with the size of the team that we have is fantastic, everybody has multiple roles and performing quite well. But that's the nature of being an SME. I think once you become to be a larger company with larger groups, you start coming across with these other issues of internal efficiency in projects and systems. We just don't have them at the moment. One is the size of us and the nature of our business where we are so much innovative focused. And you are talking about highly innovative things the yard sticks of efficiency are not that well defined. By definition some of the services that we are offering are very efficient but for our clients, otherwise we wouldn't exist. So we have to be efficient for our clients or our solutions have to increase efficiency for our clients but internally we are efficient but we don't have the need of the sense that you mentioned before of making internal processes. I think it's a matter of size.

S: My understanding is that the types of clients that you are dealing with and the numbers of clients and the size of the company essentially means that is more important to be innovative rather than to be efficient. Efficient you would be to be if you have hundreds of customers and you sell the same or similar things…

M: We have smaller number of higher value paying customers, so our products are high end products meaning high value products and hence high cost. So we have few of those but larger projects.

In which specific domains-processes of your organisation, the above aspects can be mostly implemented?

S: Or do you use your products internally for your purposes rather than offering them as services?

M: Yes, we use, not rather than, we use our own technologies internally to build services that we also sell.

S: And do you use them in specific domains of your business, ie supply chain or CRM?

M: We use them for service development, we are an IT company, some of these concepts that are not …you have to treat us as a special case. So our suppliers are data providers, content providers, we are using a combination of free sources, paid for content and also customers private content so in that content this is our supply chain. And there the rules are pretty clear either is a free source you take it and you do whatever you want with it or either the customer would give it to you to make some analysis that they can't on their data or we pay some journals to get data. For CRM is again a very personal thing, cause we talk again about high value projects, there is need to be a personal touch and relationship.

S: In recent projects that you have introduced, can you name the Information Technologies proposed?

M: Advanced Databases, Indexing, Information retrieval, Information Extraction, Ontology, Querying, Knowledge Discovery.

S: Can you explain which of those projects or those technologies helped more your organisation in creating business value?

S: And you mention that you give more attention to efficient database processing?

M: Yes this is one major problem. Information Extraction is another big chunk, because if we don't get information as we are extracting at a good state all the rest is down hill. That's why we have quality assurance teams. Beyond the team that I mentioned before, there is an external team of, shall I call them experts, but definitely they are domain savvy, biologists, doctors who do a quality assurance aspect on the data that is extracted automatically from our IE technologies.

S: So, these guys they are evaluating essential your…

M: They are doing quality assurance on the output of our IE tools, and they get the level of accuracy that we need.

S: So, do you think that this kind of involvement creates business value for you? Can do analysis (formal or informal) either these guys do produce value?

M: Yes, they do produce, let me give you an example, the kinds of accuracy you get by the automatic tools is in the order of about 85% at least our own tools, and I am talking in a production environment not in the nice academic set of exercises that you can get higher results. We get about 85~90% accuracy and we are selling some of our applications are guarantying 99% accuracy. So, the gap between 85 and 90, 95% is bridged by this QA team (Quality Assurance). So the gap of 14% is the value that this team adding in this case.

S: In those particular projects, with what techniques-methods you proceed with the evaluation of those technologies, for example ROI, CBA, etc? Or for example this QA process, how do you evaluate this kind of improvement for 85% to 95%?

M: This unfortunately is all manually done. And then we have a two tier operation. So, we have the basic QA folks, and then we have a QA manager who is supervises using random sampling techniques in the output of this team. So, it's a three face operation, first is the system the IT, then is the first pass from the human and then there is second pass by the supervisor.

S: Do you involve the customers?

M: That's a good question; yes but it's a mechanism through the software itself. So, when the customer finds some mistakes there is a submission process which allows them give us whatever mistakes they've found and they go in the database and then everybody is in the process. But it's rarely used.

S: First of all you have define this process, so you have a way to evaluate them in a sense how many such requests you get, if these requests have been checked or why they haven't been checked etc.

M: Yes it's a simply process, I hate, I have to admit, we process them all 100%. We don't receive as many which might be interpreted in two ways either that we don't have many mistakes, in any case we do our random sampling and we do achieve the 99% which is more than good enough, or the customers just don't bother to report it when they find them. At the end they tend to be happy with the products so maybe they don't invest the time to correct these minor (in their minds) mistakes.

S: And this evaluation methodology also comes together with the ROI?

M: Ahh yes. Because everything costs money of course… so when you get some errors it gets you some amount of resources to correct them. So that is calculated as well. But as I said is a very   minor   at   least   to   our   experience   up   to   date   amount.

S: As an executive which one of two evaluating tools, the one that you implement or ROI do you think that it really gives you more business value?

M: At this stage of our existence the ROI I think. But I can envision with bigger systems in bigger companies that the other techniques would allow one to get a lot of insight. The ROI is a kind of single dimension… at the end of the day it's kind of a summary. But if you want to drill down and see where the problems are I think you need to have other types… In our case this kind of analysis is pretty simple and straightforward.

S: We have covered the questions. Do you want to add anything? *With that particular technique, is it possible to evaluate the technology itself or it is more finance related?*

M: In question 12, for a technology we get a feel more than some kind of systematic figure. So, we track how much each technology is used, how much percent it represents of the value of each of our products/service. And in the end of the day, each …we are always assessing new technology so that is one of the things that we do in a systematically basis and there of course is a simple criterion: does it solve our problem or not? And if it does we keep it, if it doesn't is out of the window. We keep it until someone reports a problem. As an example here, when we are looking at our database, we ask our suppliers of an object-oriented database to see if they could come up with something and I hate to say for them they weren't even able to digest the amount of data that we had. So their system it couldn't even read than a long process. And I

think we gave them a sample of about 2 million of our records to put them into their database. So, that technology is out of the window.

S: This is commercial technology?

M: Yes commercial technology. This is an example of technology that if it doesn't do the job is out of the window.

I might say we are a chasing in the high tech arena, an SME, with leading edge products which creates specific kinds of problems.

All large companies have their own business intelligence departments and innovation departments. But large companies try everything and when they see that something is worthy they do it internally or they buy the companies that implement it (SMEs or academia).

S: Thank you very much for your time

Appendix III

Hotel CIO Job description

<u>Job Description</u>

NHS Hotel

Job Title :   **Chief Information Officer (Strategic Head)**

Salary :   Band 9

Hours :   Full time —actual hours as required by the job

Location :   Hotel Strategic Health Authority (with frequent travel across the SHA and nationally)

Reports to :   Executive Director of Nursing

Responsible for :   NPFIT team: Deputy CIO/Programme Manager (8b/8c), Deputy Programme Manager (8a), Programme Officer (7), Programme Support Officer (6), PA to team (TBC).

IG/ICT manager (8b — to be recruited), Knowledge Manager (8a), IT officer (7)

Regionwide team, based at Hotel PCT and managerially accountable to the PCT CEO, also report to the CIO via Programme Manager.

<u>Job purpose</u>

- Strategic leadership and accountability for establishing Information Management and Technology as a critical enabler for transforming services and ensuring that the NHS has robust programmes in place to achieve the objectives of local and national policy and the benefits of the National Programme for IT.
- Provide leadership for the development and implementation of information management strategies, and the implementation of information technology across all organisations in the Strategic Health Authority (SHA).
- Encouraging networking between organisations, disciplines, networks and Trusts, and championing the use of information systems and IT to support the core business of the NHS.
- Ensure that national strategies and supplier contracts are managed to maximise local impact.

<u>Key Relationships</u>

PCTs, NHS Trusts, Foundation Trusts and other healthcare providers, and their LHC configurations
Department of Health
Other key National Bodies (e.g. Healthcare Commission, Monitor, Audit Commission, NHS Confederation, NICE etc)
Government Office and other regional bodies

Local Authorities
Patient/Public Representative Bodies
Relevant National and Local Policy Leads
Connecting for Health
SHA Chief Executive

SHA Management Team

All SHA staff members

Organisational Culture

As a member of the organisation the post holder will:

- 'Own' individual responsibilities and share team objectives
- Contribute to creating improvement and innovation
- Contribute to creating a work environment that is marked by pride, enthusiasm and collaboration
- Manage and/or contribute to financial performance and target delivery
- Lead by action and inspire others
- Communicate positively and effectively
- Actively give and receive feedback in a constructive manner
- Be adaptable, work with integrity and be trustworthy
- Show constancy, courage and resolve in the pursuit of the vision and aims of NHS Hotel

The vision of NHS Hotel will feature clearly and consistently throughout the actions and corporate identity of the strategic health authority. As an employee of the authority, you will be responsible for ensuring that the vision is incorporated into:

- the induction programme for all new appointees
- staff development and appraisal scheme
- templates for policies and procedures, content of meeting papers
- terms of reference for all meetings
- job adverts and recruitment/application packs
- job descriptions and person specifications

Duties, Responsibilities & Core Functions

1. Establish IM&T as a key enabler of and integral to the strategies and business plans of both PCTs and their providers (within Local Health Community, LHC, arrangements).
2. Support the Chief Executive in his role as Senior Responsible Owner (SRO) for NPFIT in the Hotel area.
3. Contribute to the national leadership of the IM&T agenda, including policy development and the promotion of the CIO role and IT profession.
4. Be responsible for ensuring that PCTs and their providers have the capability, capacity and resources to execute their national and local IM&T responsibilities.
5. Initiate an SHA-wide strategy for the development of Informatics services and advise NHS Chief Executives of appropriate organisation models
6. Collaborate with NHS *Connecting For Health* and IT suppliers to secure the benefits of IT investment through effective local implementation programmes based on evidence of best practice.
7. Ensure the prerequisite business process changes are established in NHS organisations to secure implementation in accordance with deployment plans.
8. Ensure the NHS implements all mandated knowledge, information, data and technical standards
9. Ensure that the NHS and its providers have sound information governance in place, including separation of duties relating to patient confidentiality as appropriate.

10. Support the SHA in holding Primary Care Trusts and NHS Trusts to account through performance management arrangements, in particular through high quality intelligence, accurate forecasting, and risk analysis.
11. Liaise closely with the DH and CfH to inform and support the IM&T implications of policy development and implementation for the NHS.
12. Provide high quality leadership of the IM&T function, facilitating and improving professional standards through key appointments and training and development.
13. Provide authoritative advice to Board members, Senior Trust Managers and others on contractual obligations including handling commercially sensitive information and ensuring that agreed governance channels are applied.
14. Contribute effectively to the corporate performance of the SHA.
15. Develop relationships with local Universities, Local Authorities and other agencies, Including the Local Service Provider.
16. Determine and advise the Chief Executive and Directors of the IT implications of NHS policy developments and initiate the appropriate strategies to secure their effective implementation.
17. Lead the development of SHA-wide strategies and investment plans to exploit the opportunities afforded by developments in IT for the modernisation and transformation of the local NHS; identify other sources of potential funding
18. Ensure that local NHS organisations develop effective investment plans to support their IM&T strategies.
19. Provide guidance and leadership for the implementation of effective IM&T services within the SHA
20. NHS Hotel values the diversity that exists across the region and our aspiration is to reflect this across our workforce. The post holder must be aware of, and committed to, the Equality and Diversity policies of NHS Hotel, comply with all the requirements of these policies and also actively promote Equality and Diversity issues relevant to his/her post.
21. Maintain and develop an environment and culture that improves health, safety and security of the work place, ensuring effective risk management strategies are in place.
22. Contribute to corporate decisions and strategic planning for Hotel SHA as part of the Authority's wider corporate management team.
23. Represent the Authority at appropriate local and national meetings, including deputising for the Directors and Chief Executive as appropriate.
24. Striving to facilitate others' contributions and to share leadership, nurturing capability and continuing development of oneself and others in areas of practice

Effort and Environment

PHYSICAL EFFORT
- Minimal physical demands, though keyboard used routinely as part of the job.
- Travel required to all parts of the Hotel and frequent national travel.
- Tiredness due to long hours travelling

MENTAL EFFORT
- High levels of concentration needed for chairing meetings, maintaining a continual alertness to potentially politically and commercially sensitive issues, holding onto strategic objectives at all times, writing detailed reports, and developing action plans.
- In managing staff, may be frequently interrupted to support their issues and in dealing with requests for advice.

EMOTIONAL EFFORT
- Limited emotional effort involved. May be stressful in working to targets, chairing meetings and carrying out presentations.

WORKING CONDITIONS
- Shared office environment for all but Executive Directors. Computers are used routinely as part of this role.

Signed: ……….............……. (Postholder)   **Date:**……………

Signed: ………………… (Executive Director)   **Date:**…................

Person Specification

	Essential	Desirable
Education and Qualifications	Possession of a relevant degree and/or professional qualification, together with a demonstrable commitment to and evidence of Continuing Professional Development	A post graduate management qualification
Knowledge and Experience	Demonstrable experience of strategic IM&T planning and high level delivery, with an ability to translate organisational vision into successful outcomes. Strong understanding of the workings of government and the ability to develop strong relationships with key individuals within the DH and Whitehall. A successful track record of professional leadership and workforce development A clear understanding of the governance arrangements and technical standards relating to IM&T. Significant experience of system and process development and management within a whole system approach. Demonstrable evidence of successful programme management of large-scale IM&T programmes	Considerable experience as a Board-level director, within the NHS, or other service driven organisation of comparable size and complexity. Demonstrable experience of significant I&T procurement Demonstrable involvement in the development of policy at a national level
Skills and Abilities	Demonstrable evidence of leadership, and particularly of influencing skills, when working across organisational boundaries. Clear evidence of effective partnership working. Demonstrable personal qualities to ensure delivery of objectives Leading the change through people and empowering others Holding to account Effective strategic influencing and collaborative working Demonstrable capabilities in setting direction Broad scanning and seizing the future Intellectual flexibility Political astuteness Ability to establish and operate through formal and informal networks	
Personal attributes	Demonstrable personal qualities a. Self belief and self awareness b. Self management c. Drive for improvement and results d. Integrity, probity and accountability	

Other requirements		

Organisation Chart

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│                    │  Director of Nursing and │                    │
│                    │      Patient Safety      │                    │
│                    └─────────────────────────┘                    │
│                                 │                                  │
│                    ┌─────────────────────────┐                    │
│                    │ Chief Information Officer│                    │
│                    │       (This post)        │                    │
│                    └─────────────────────────┘                    │
│                                 │                                  │
│                    ┌─────────────────────────┐                    │
│                    │ Information Governance and│                   │
│                    │        ICT Manager       │                    │
│                    └─────────────────────────┘                    │
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│                    ┌─────────────────────────┐                    │
│                    │  Desktop Support Officer │                    │
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