Organizational Challenges and Barriers to Implementing IT Governance in a Hospital

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Abstract: This paper describes the challenges and barriers to the introduction of "IT Governance" into a Hospital environment. It further addresses the relationship between corporate governance (hospital strategy and organization) and the role of IT Governance in managing new services deployment. Both ITIL and COBIT are introduced as a best practice for supporting Hospital Information Systems (HIS) management. IT Governance is an extensive framework; therefore we focused our study on ITIL Assessment combined with COBIT. The assessments were centered on IT Service Management, which, according to our findings, is being carried inefficiently in Hospital São Sebastião (HSS).

We used both COBIT and ITIL assessment to audit and identify IT Governance weakness. These processes revealed a way to assist the organization at becoming aware about IT improvement priorities. The results were used to rethink HIS strategy in order to properly address the need to develop new health services like ambulatory surgery and connecting with out-patients services. We used the IT Governance standard ISO/IEC 38500 to provide guiding principles for the effective use of IT according to Calder-Moir *framework*. Starting with a COBIT assessment we identified IT management priorities and metrics, then we focused on the ITIL assessment steps. Finally, we applied the framework on both Service Desk and Incident Management processes. We analyzed the level of IT governance maturity and produce some recommendations to improve IT Service Management practices. The ITIL assessment identified existing gaps between the current organization practices and how the organization should perform according to ITIL, and what key actions need to be taken to close those gaps. At the end disclosed that IT Governance inefficiency is an important barrier to HIS management, mostly in IT service management which has a direct impact in users' daily work flow, and therefore on Healthcare services delivery.

Keywords: IT Governance, hospital information systems, IT organization, COBIT, ITIL

1. Context

The need for improved and more effective healthcare services is pushing National healthcare Systems to develop more adequate and reliable Information Systems (Kuhn et al., 2007). An Information System (IS) is both required for supporting health professionals at point-of-care and to allow proper health unit management by accessing production and resources usage data. The design, development and implementation of such an Information System is recognised by many not to be an easy task, mostly because it is a long and complex process (Berg, 2001; Aarts et al., 2004, Lapão, 2007). Many information systems departments (ISD) in hospitals are still far way for being ready (either by organizational processes or by number of quality professionals) to entirely support health services. As an example, the standard ISD in Portugal is lacking both organisational and technical maturity to appropriately address the IS management. These aspects have consequences since it means that ISD organisations are not suited to develop more sophisticated IS (Lapão, 2007). Problems such as the lack of skilled personnel, lack of project management practices; unbalanced IT budget allocation; fragile IT operational management; lack of data protection and security management; lack of IT strategy and leadership; were commonly identified (Haux, 2009; Gomes and Lapão, 2008). Attending to the nature of these problems, one may notice that they are related with IT Governance inefficiency as the main barrier to HIS development (Van Grembergen and De Haes, 2009). IT Governance can be defined as the preparation for, making of and implementation of decisions regarding goals, processes, people and technology on a tactical and strategic level of the IT organisation (Simonsson and Johnson, 2005).

We aim at assessing how well the IT Governance procedures meet the requirements of COBIT and ITIL at the case hospital. To validate our hypothesis we studied COBIT and ITIL assessment performed at Hospital São Sebastião (HSS). HSS was selected because it can be considered as one of the most mature among the Portuguese hospitals (Lapão, 2007; Gomes and Lapão, 2008): additionally worth to be mentioned that HSS was an awarded HIS in 2008 (Microsoft, 2008).

The HSS is a healthcare unit located in Santa Maria da Feira and it was founded in 1999 as the first hospital with an enterprise-like organisation (within a National Public Service, but with more managerial autonomy). This hospital has 310 beds (HSS' 2009 Annual Report) and a total of 986 professionals working there (159 physicians and 276 nurses (HSS, 2009)). It serves the north side of Aveiro's district (in the North of Portugal), serving a total population of around 383.000 inhabitants (HSS, 2009) with emergency, surgery services and outpatient clinic (referenced from primary-care units included within the "Primary Health Centres Trust" of Santa Maria da Feira). This study was designed to elucidate about the value of IT Governance practices in the hospital setting. Although literature (mostly gray literature) reveals the many benefits brought by COBIT and ITIL to organisations, they all depend on how good the planning and implementing processes are (Steinberg, 2008). In this field, as in other IT-related fields, the evidence of the positive impact of these frameworks is still missing.

2. Methodology

The implementation of IT service management processes is very difficult due to many aspects: mainly the network of various actors involved with different interests and different understandings of the role of the services to the organization (Raux, 2006). We focused our study on the beginning of the implementation of an IT Governance framework. Initially the framework was intended to include both COBIT and ITIL components, as well as ISO security-related standards. These procedures, which are crucial to assist on the alignment of corporate strategy with IT strategy, enable the identification of weaknesses, ways of improvement and a ways for the organisation to gain consciousness about the actual value of IT. Since one could consider that IT governance is a triad (people, processes and technology), an assessment should provide a holistic view of the results and actions to take in that regard (Steinberg, 2008). Finally, we will be applying the framework to a hospital (HSS), focusing the assessment on practical issues of IT services management. We have chosen both Service Desk and Incident Management processes for their impact on daily hospital operations. Furthermore, since IT Governance is an extensive framework, our study is focused on one single problem: the "IT Service Management". Regarding that ITIL assessment goal is to identify the gaps existing between the current organisation practices and the "how the organisation should perform" according to ITIL, and what key actions need being taken to close those identified gaps (Steinberg, 2008; Lloyd, 2001).

We also considered that during the assessment process many interactions took place between the author and the hospital team (the CIO, the director of the HIS department, which is also a non-executive member of the Board, CFO is one of the five members of the hospital Board in charge of the HIS business, and the IT Governance Project Leader, which works at the HIS department, under the CIO's supervision) were strictly guided by an agenda. The agenda specified that participants in the case study were expected to:

- be involved in the research planning process, in order to ensure that the research questions are relevant to their concern;
- participate in data gathering, and an interest in the results;

In our case, we managed to have regular meetings biweekly and most of the data were taken from internal document and reports, surveys, interviews, discussions, participant observation, group work, and performance measurement.

Additionally, since the IT Governance standard ISO/IEC 38500 provides guiding principles to the effective use of IT according to the Calder-Moir *framework,* which sets out six principles (related with the challenge of changing an organisation's way of using information). These principles are: responsibility; strategy; acquisition; performance; conformance; and human behaviour (Steinberg, 2008).

3. The IT Governace Framework: COBIT and ITIL

The IT Governance framework to be implemented at the hospital started with both an ITIL and COBIT assessment. Following Van Grembergen and De Haes (2009)'s definition of "enterprise governance of information technology" as an integral part of corporate governance that addresses the definition and implementation of processes, structures and relational mechanisms in the organization that enable both business and IT people to execute their responsibilities in support of business/IT alignment and the creation of business value from IT-enable business investments. Although literature quotes the many benefits brought by both COBIT and ITIL to organizations (Steinberg, 2008; Van

Grembergen and De Haes, 2009), it indeed depends on many variables that we wish to have a better understanding. We used both COBIT and ITIL assessment to audit and identify IT Governance weaknesses and opportunities. These processes could reveal a way to help the organization to become consciousness about IT improvement priorities. The results are to be used in rethinking HIS strategy in order to properly address the need to develop new health services, like new ambulatory surgery services and connecting with out-patients services.

In this study, we also used the IT Governance standard ISO/IEC 38500 to provide guiding principles to effective use of IT according to Calder-Moir *framework*. The implementation of IT service management processes is usually very difficult due to many actors and standards involved. Starting with a COBIT assessment we identified IT management priorities and metrics, then we focused on the ITIL assessment steps. Finally, we applied the framework on both Service Desk and Incident Management processes. In this context, our motivation is not only to understand the current situation of ITIL practices in Hospitals, but also to understand how, for instance, an ITIL implementation can bring actual benefits. We analyzed the level of IT governance maturity and produce some recommendations to improve IT Service Management practices. The ITIL assessment identified existing gaps between the current organization practices and how the organization should perform according to ITIL, and what key actions need to be taken to close those gaps.

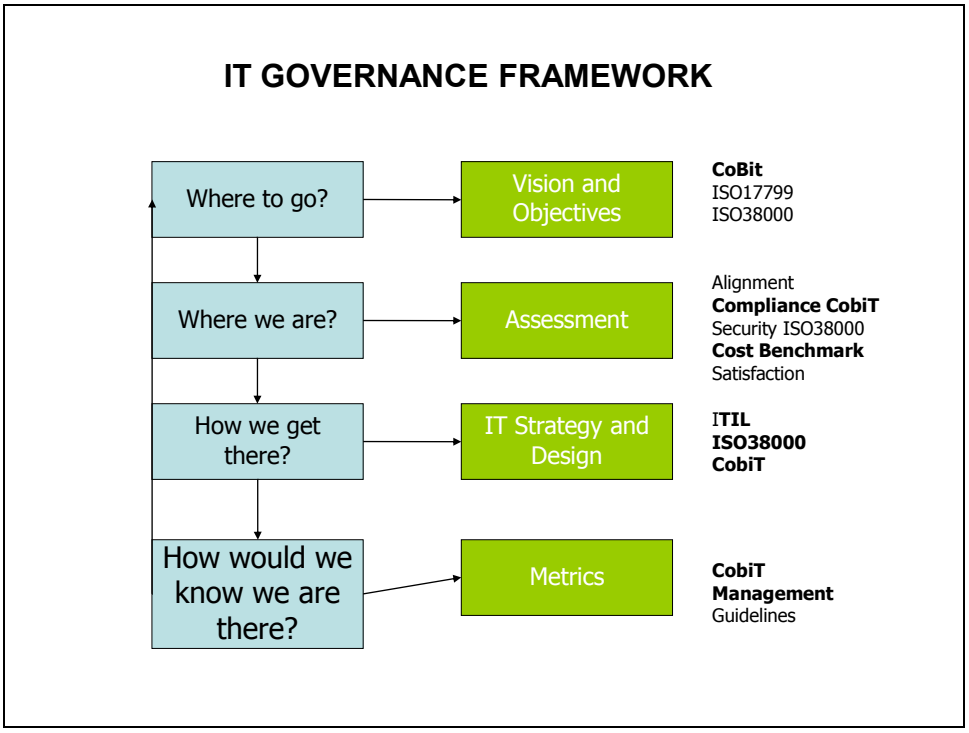

Figure 1. IT Governance Framework

3.1 COBIT Procedures

COBIT (Control Objectives for Information and related Technology) is a tool (based on best practices) that provides a method to help on the alignment of business with IT processes. Therefore managers and users could benefit from the development of COBIT because it helps them understand their IT systems and decide the level of security and control that is necessary to protect their organizations' assets through the development of an IT governance model. We used COBIT 4.1 with four domains (COBIT, 2007; Van Grembergen and De Haes, 2009): Planning and Organisation, Acquisition and Implementation, Delivery and Support, and Monitoring and Evaluation. Decision making could be more effective with COBIT since it aids management in defining a strategic IT plan, defining the information architecture, acquiring the necessary IT hardware and software to execute an IT strategy, ensuring continuous service, and monitoring the performance of the IT system. IT users benefit from COBIT because of the assurance provided to them by COBIT's defined controls, security, and process governance. COBIT's package structure is as follows: Executive Summary; Governance and

Control Framework; Control Objectives; Management Guidelines; Implementation Guide; IT Assurance Guide.

There is the need though to contextualize the use of COBIT within the environment of the hospital, i.e. it is necessary to validate that the COBIT frame work has validity also in healthcare.

Executive summary: At HSS, the realization of this exercise represents an indication of high maturity, since it means that the Board of Directors accepted the challenge proposed by the CIO to allocate resources for improving IT management, expecting it to improve efficiency at point of care (demanded by health professionals) and therefore to increase productivity (and reduce work disruption costs). COBIT aims at fully exploring the framework's four dimensions (Planning and Organization, Acquisition and Implementation, Delivery and Support, Monitoring and Evaluation) as a process to enhance ISD working processes and procedures.

Framework: A successful health care organization should be built on a solid framework of data and information. Otherwise the lacks of proper information will jeopardy the decision making consequently leading to failure. The *framework* defines "how IT processes" delivers the information the business needs for achieving its goals. This delivery should be controlled through the 34 high-level control objectives, one for each IT process, contained in the four specified domains. The *framework* further identifies which of the seven *Information Criteria* (effectiveness, efficiency, confidentiality, integrity, availability, compliance and reliability), as well as which IT resources (people in the HSID, applications, information and infrastructure) are important for the IT processes to fully support HSS's care services.

Control Objectives: The key to maintaining profitability in a technologically changing environment, like a hospital, is how well one could maintain control. COBIT's "Control Objectives" provides the critical insight and the guidance needed to delineate a clear policy and good practice for IT management control. Included are the "statements of desired results" or the purposes to be achieved by implementing the 215 specific and detailed control objectives throughout the 34 high-level IT processes (COBIT, 2007).

Management Guidelines: In order to ensure a successful business, a Hospital CEO must understand and effectively manage the link between business processes and information systems. This "Management Guidelines" are actually composed of maturity models, to help determine the stages and expectation levels of control and compare them against health sector norms; "Critical Success Factors", used to identify the most important actions for achieving control over the IT processes; "Key Goal Indicators", important to help define target levels of performance; and "Key Performance Indicators", useful to measure whether an IT control process is meeting its objective.

IT Assurance Guide: In order to be certain that the control objectives are being achieved, there is an implicit need to assess the controls linked to them. The "Assurance Guide" provides the tools to assess the controls in every form needed, from their design to the results.

3.2 ITIL Assessment Procedure

An ITIL (Information Technology Infrastructure Library) assessment process comprehends the following main steps (Steinberg, 2008): process assessment; organizational assessment; technology assessment; governance assessment; assessment finding analysis; recommendation actions identification. The aim of an organization assessment is to analyze how well the organization might or not support an ITIL improvement initiative. The output of this stage should:

- Highlight organizational readiness for change;
- Highlight skill gaps;
- Identify current IT Service Management roles and responsibilities;
- Include stakeholder analysis; and,
- Identify organizational assessment findings.

To assist with the task of identifying roles and responsibilities and communicating levels of authority within the HISD, the RACI matrix can be used as a very useful management and communication tool (Rudd & Lloyd, 2007). When faced with a large project, the RACI model can assist the initial stakeholder analysis and project planning stage, which is also used to map out processes and identify areas of responsibility at the task level (which are critical in the implementation stage). To evaluate

the ITIL framework we focused our attention on two specific ITIL components: "Service Desk" and "Incident Management".

4. Hospital São Sebastião's IT Governace Initiative

At HSS the HIS department is coordinated by a person (with a degree in Engineering and a post-graduation in health information systems), who is as such a non-executive member of the Board, and is officially designated as "Director". He assumes a role as CIO, since he has a position as a non-executive member of the Board and with a very close relationship with the President of the board. Following the framework a HIS department's environment analysis was performed. There are potential issues that can negatively affect HIS governance performance (Lapão, 2007): The "Director" is not an executive member of the hospital board, but his taking part (at least as non-executive member) in the board is seen as a good IT Governance practice:

- There are also problems regarding strategy communication between CFO and CIO, which may compromise strategic alignment among service units;
- HIS department plays an important role and supports all the value chain.

The "help-desk service" is running for a couple of years with the basic functionalities. The "help desk system" has an integrated knowledge base, which supports an "incident management" workflow; however, IT service management comprehends a lot more than help desk and incident management. At HSS, physicians and nurses represent approximately 65% of the total amount of professionals and weight 50% on total expenses. They are the main source of value and are highly qualified (in the hospital, a workforce dependent organization): It is important to keep up their satisfaction levels. There is an acknowledged lack of personnel at HISD and the current hospital staff rationalization pressure is increasing the problem (mainly due to cost containment efforts leading to reduce the number of beds, increasing the ambulatory activity, etc.). Therefore, operational efficiency is an important issue to be addressed in order to mitigate personnel shortage.

4.1 Hospital Information System and HIS Department

HSS owns today a unified HIS platform (named MATRIX, based on Microsoft technology, which integrates all "fron-end" software used by the hospital clinical services. The MATRIX platform was developed internally (the process started in 1998), aiming to serve both management purposes and helping professionals doing their job better. This application provides physicians and nurses with an integrated view of patients' clinical information, from admissions to exams and surgery reports. Since 1999 those physicians could create and store medical records right into the Datacenter storage bank. The HIS architecture definition and implementation was a long working process that extended for 4 years. The HSS board have soon recognised that a huge effort was carried out to minimise risks concerning the information management, data privacy and protection (Gomes & Lapão, 2008). This HIS was distinguished as a very successful one (Microsoft, 2008; Grilo et al. 2010), and HISD is well positioned within the Nolan's maturity matrix compared with other national hospital information systems (Lapão, 2007). This HIS platform is also considered to be a very competitive one even compared with other countries (Microsoft, 2008). This success is the result of a long process driven by three main factors (Lapão, 2007): time (i.e., organisational strategic stability over time), CIO leadership (that allowed physicians' participation) and a natural emergence of *ad-hoc* IT Governance mechanisms in the first place.

4.2 COBIT Assessment

The HSS organization is essentially structured in three main areas: "patient care", "supporting services" and "management services". The HSS's mission can be express in the following way (HSS, 2009):
"The HHS mission is to serve the best possible way (with efficiency and quality at controlled costs) the attributed population with close articulation with primary-care services; and to enable the participation of health professionals in research and learning initiatives".
The defined four strategic lines are (HSS, 2009):

- Improve the response of ambulatory services (both external consults and emergency) to cope with demand;
- Reduce the waiting list for surgery by improving surgery room capacity;
- Improve response to oncology patients' needs; and,
- Improve social integration of patients.

Furthermore, HISD is leaded by a Director and it is divided in two sub-department areas "infrastructure and systems"; and "development". At HSS the COBIT assessment results showed that:

- Plan and Organize (includes the definition of an annual plan (PO1, PO3, PO5 and PO6) to cover IT investments negotiated between the Board and the HISD Director);
- Acquire and Implement (the proper use of procurement (AI2, AI3, AI4 and AI5) and project management processes (AI16) to address the introduction of new products),
- Deliver and Support (use of process to guaranty service level (DS1 and DS4), education (DS7) and fast support (DS8 and DS10)),
- Monitor and Evaluate (M1 and M2).

The outcome of the COBIT assessment shows that HSS is still not fully using all components. During the process, the HISD director has suggested that the assessment could also work as a "tool" to provide the Board with accurate information to enable future investments and decision-making.

4.3 ITIL Assessment

To assess the IT Service Management (ITSM) maturity we used the OGC questionnaires (OGC, 2001) (answered by the HISD Director and by the IT Governance Project Leader) to understand how well HISD is performing in comparison with ITIL best practices, which were then analysed to verify if the information gathered was in conformance with field observations. This allows avoiding answers that do not correspond to the reality of HISD. Figure 2 shows that HSS ITSM is of low maturity.

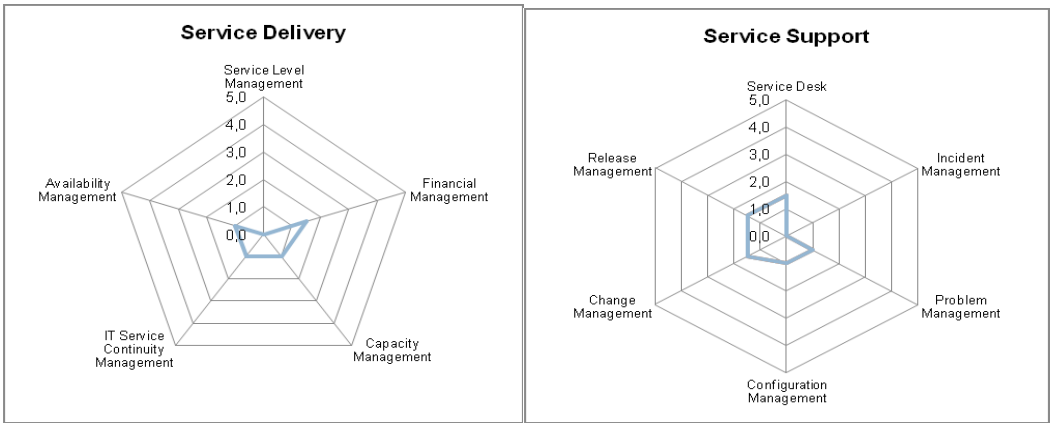

Figure 2: HSS ITIL Processes Maturity (from OGC questionnaires).

In general, when ITSM processes are at an initial stage they present maturity level of 1. Here, both Incident and Service Level Management fail to achieve the minimum level of prerequisites (maturity level of 0). This means that, "IT Service Management" processes are ad-hoc, show random approaches and actually few are defined. Regarding "Incident Management": First, it provides immediate benefits and it could be seen as a quick win, therefore is sometimes proposed as the first process to be tackled (Mendel et al., 2004). Second, it presents one of the lowest maturity scores, which we consider to be unacceptable for a HIS. Despite we could identify a workflow for "Incident Management", the reason it scores 0 is due the fact that it fails on the mandatory field "are incident records maintained for all reported incidents?" on pre-requisites level. The rate at which HIS members are directly contacted for incident resolution was readily noticeable during our first meetings. Actually, the HIS collaborators are the first to complain about how this problem affects their efficiency. The HISD structure, in which any one can do the Help-Desk, does not contribute to solve this problem. For the earlier given reasons we decided to focus our research on Incident Management and an in-depth assessment was conducted.

4.3.1 Incident Management Process Maturity Framework

An "incident" is any event which is not part of the standard operation of a service and which may cause a reduction in the quality of that service (Mendel et al., 2004). The main purpose of "Incident Management" is to return to the normal service level as soon as possible mitigating or eliminating the

effects of disturbances in IT services. To an in-depth assessment of "Incident Management" we followed Steinberg (2008)'s method and considered the ITIL's four P: *process*; *people (or organisation)*; *products (or technology)*; and *performance*. Finally, with the information gathered we mapped the "Service Desk" and "Incident Management" into the "ITIL Process Maturity Framework" (Rudd & Lloyd, 2007). With the information gathered we now have foundations to score "Incident Management" maturity according to the "ITIL Process Maturity Framework" (PMF). The PMF framework is interesting as it enable us to score an ITIL process according to five distinct dimensions: vision and steering; process; people; culture; and technology. Therefore, a more in-depth maturity inspection can be carried in comparison to OGC questionnaires. The result is presented on Figure 3.

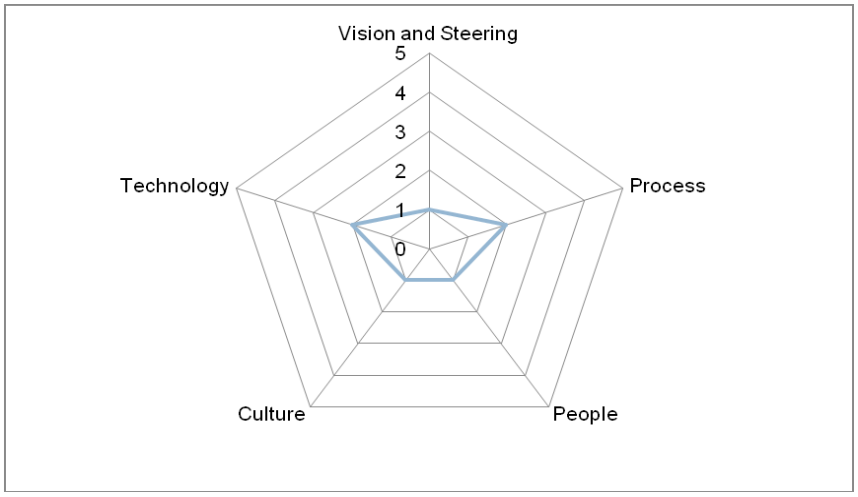

Figure 3: HSS Incident Management Process Maturity Framework score.

From Figure 3, one can notice that technology and process dimensions are the most mature "Incident Management" processes, scoring 2. Vision and Steering, People and Culture dimensions lag behind (scored 1). In this scenario, technology defines the process, therefore the higher scores in these two dimensions. Hence, HISD needed to do something to cope with the high rate of incident resolution requests of their HIS users, I.e. if organisational, cultural and management issues are not addressed in order to achieve a level 2 maturity, no further developments are possible for HSS "Incident Management".

4.3.2 RACI Model: HSS Team Structure and Responsibilities

To understand the team structure and the responsibilities of each member, we have used the RACI (Responsible, Accountable, Consulted, and Informed) chart (Ruud & Lloyd, 2007). Firs, HISD main functions were identified (see Table 1). The HISD RACI chart is presented on Table 2, which shows the team structure and their responsibilities regarding the department main functions.

Table 1: HSS HISD main function

IDFunction	ID	Function
1Department Administration and Management	8	User's Training
2User Support/Help Desk	9	Project Management
3Network and Communications Management	10	Procurement and Stock Management
4Database Management	11	Innovation
5Applications Management and Support	12	Probationers Coordination
6Clinical Applications Development	13	Informatics Prevention
7Support Applications Development	14	Business Interaction

The RACI chart completion reveals a high degree of overlapping functions among members (lack of organization?), and points out inefficiencies in IT service management: any member of the department could be responsible for help-desk, including the Department's Director himself. Actually, the Department Director is not only accountable, but also responsible for a large number of functions, including most projects' management. This last situation should generate an internal debate to introduce a more matrix-like structure with many other individuals being able to play the role of project management (Lapão, 2007).

Table 2: RACI chart for HSS HIS Department

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CIO	A/R	R	A/R	I	A/I	C/I	C/I	A/R	A/R	A/R	A/R	A/R	A/R	A/R
twork r	C/I	R	R		R			R	R		R		R	R
Project ger	C/I	R	R	R	R	A	A	R	A/R/I		R	R	R	R
Techni	C/I	R			R				C/I					
Progra	C/I	R		C/I	R	R								R
Databa ger	C/I	R	R	A/R	R	R	R	R	R/C/IR		R		R	R

5. Conclusions

This paper presented both a COBIT and an ITIL assessment framework applied to Hospital São Sebastião with relevant meaning: Some strategic planning fragilities in the link between the Board and HIS Director were identified, "IT Governance" inefficiencies are important barriers to HIS development, mostly in IT service management which has a direct impact in users daily working life, and it is relevant to assess the current state of COBIT and ITIL processes maturity and to analyze its impact on the Healthcare services delivery. It also means that the HIS Department Director will have to deal with its many variables and barriers, but that the combination of COBIT and ITIL provides a helpful framework to identify with significant accuracy the most important challenges that need to be tackled. The output at this stage highlighted organizational readiness for change; highlighted skill gaps; identified current "IT Service Management" roles and responsibilities; and included a stakeholder analysis. To assist with the task of identifying roles and responsibilities and communicating levels of authority, the RACI chart was used.

We have seen that the outcome of both the COBIT and ITIL assessments have shown that HSS is still not fully using all components of COBIT and at low level usage of ITIL tools, respectively. But what is most interesting was the director suggestion that the assessment had indeed work as a "tool" to provide the Board with accurate information to enable future investments and decision-making.

Finally, one should take in consideration that, since physicians and nurses represent the main source of value, it is very important that the Board manages to keep up their satisfaction and productivity levels. Therefore, as we have seen from the two assessments, "IT Governance" provides the tools to make decisions allowing the option for the right IT management, despite paucity of resources, and enabling to keep up with operational efficiency of health professionals.

References

Aarts J, DoorewardH, Berg M. (2004) Understanding implementation: the case of a computerized physician order entry system in a large Dutch university medical center. J Am Med Inform Assoc 2004;11:207-16.

Berg, M. (2001) Implementing information systems in Healthcare organisations: Myths and challenges. International Journal of Medical Informatics, Volume 64, Issue 2, Pages 145-156.

COBIT (2007). *COBIT® Mapping: Overview of International IT Guidance, Version 4.1. 2nd Edition*. May 2007.

Gomes, R. and Lapão, L.V. (2008) The Adoption of IT Security Standards in a Healthcare Environment. In *eHealth Beyond the Horizon – Get IT There*. Edited by Andersen SK et al, Studies in Health Technology and Informatics. Volume 136, 2008. 765 – 770.

Grilo A, Lapão LV, Gonçalves RJ, Cruz-Machado V. (2010) "The Development of Interoperability Strategies in Health Organisations", in *Handbook of Business Information Systems*.World Scientific Publishing, 2010.
Haux R. (2006) Health information systems – past, present future. International Journal of Medical Informatics, Volume 75, Issue 3, Pages 268-281.
HSS (2009). Hospital São Sebastião 2009 Annual Report.
Kuhn KA, Giuse DA, Lapão LV, Wurst SHR. (2007) Expanding the scope of health information systems - from hospitals to regional networks, to national infrastructures, and beyond. Methods Inf Med, 2007. vol 46 (issue 4): 500-2.
Lapão LV. (2007) Survey on the Status of the Hospital Information Systems in Portugal. Methods Inf Med,2007.46,4.493-499.
Lloyd V, Peters L, Rupchock K, Wilkinson P. (2001) *Planning to Implement Service Management.* TSO.
Mendel T, Garbani JP, Ostergaard B, van Veen N. (2004) *Implementing ITIL: How To Get Started.* Forrester Research 2004.
Microsoft. (2008) *Heroes Happen (here)* 2008. Microsoft.
OGC (2001): OGC IS Management Self-Assessment Questionnaire. Trafford Publishing.
Rudd C, Lloyd V. (2007) ITIL v3 – Service Design, p. 189. Stationery Office; Version 3 edition (May 31, 2007).
Simonsson M, Johnson P. (2005) Defining IT Governance - A Consolidation of Literature. Trafford Publishing.
Steinberg, R. A. (2008) Implementing ITIL: Adapting Your IT Organisation to the Coming Revolution in IT Service Management. Trafford Publishing.
Van Grembergen, W. and De Haes, S. (2009) *Enterprise Governance of Information Technology: Achieving Strategic Alignment and Value*. New York. Springer Science.

