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IS Performance Management Systems: An Action Research Perspective

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Abstract

Our research questions are: - What factors affect the design and implementation of IS Performance Management Systems? - - How do these factors influence the shape of IS Performance Management Systems, and how can they be managed? In order to answer these questions, we employed an action research framework to facilitate the collection and analysis of data. We decided to apply this research methodology for two reasons: - the factors we wish to investigate are not explicit in the organization and thus practitioners are not willing to discuss them with external persons. We believe that researchers are only able to understand these elements if they work with practitioners; - companies need help to handle the different implementation phases, reach an agreement on the achieved results and complete the implementation project. The thesis is set out as follows. Chapter One describes the background to IS Performance Management Systems research. In particular it summarizes the most important research already carried out and organizes it into four main streams of research. Chapter Two details the action research methodology and justifies the choice of it. It pays particular attention to the operationalisation of action research projects undertaken in this research, the data collection methods and the role of researchers. Chapter Three draws upon the literature presented earlier so as to develop a research framework. This performs the function of identifying where our research sits within a broader scheme. Chapters Four, Five, Six and Seven describe the cases in which the action research was undertaken and the action research cycle followed in each project. Chapter Eight analyses the four action research projects using the Research framework and discusses the results. Chapter Nine presents contributions and conclusions of this research and possible future research in the area of IS Performance Management.

Keywords: performance management systems, scorecards, business intelligence

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Introduction

Over the last few years, Business Performance Management has become extremely relevant to management as a result of different changes in the nature of work, competition, business processes, organisational roles, external demands and the power of Information Technology (Neely 1999). This fact could be considered rather peculiar because Performance Measures have been part of the planning and control cycle for a long time, but nowadays the traditional financial measures do not fully meet the requirements of organisations because they:

- encourage a short-term view and local optimisation;
- fail to provide data on quality, responsiveness and flexibility;
- encourage managers to minimize the variances from standard rather than attempt to continually improve;
- fail to provide information on customers' needs and competitor performance.

Therefore a lot of practitioners and scholars have studied a new performance management framework that enhances the performance measurement with non-financial measures (e.g. customer or employee satisfaction).

The evaluation of performance is critical in all functional departments (accounting, marketing and operations etc.); each department is involved in Performance Measurement and must demonstrate its contribution to Business. In particular, the control and governance of internal services such as Information System[1] (IS) has become quite critical in organizations due to the large degree of

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[1] Information System (IS) refers to a system of persons, data records and activities that process the data and information in an organization, and it includes the organization's manual and automated processes (Camussone 1998, De Marco et al. 1987). According to Alter (1996 p. 61) "*information system is a system that uses information technology to capture, transmit, store, retrieve, manipulate or display information […]. It typically includes people, methods and procedures for doing something with the information*".

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expenditure and investment. So IS managers have faced growing pressure to measure the performance of IS departments in order to justify such an appreciable investment and evaluate the IS Business Value.

The term IS Business Value is commonly used to refer to the organizational performance impacts of IS, including productivity enhancement, profitability improvement, cost reduction, competitive advantage, inventory reduction and other measures of performance (Devaraj and Kohli 2003, Hitt and Brynjolfsson 1996, Kriebel and Kauffman 1988).

Researchers have used the term performance to denote both intermediate process-level measures as well as organizational measures. According to this distinction, Barua et al. (1995 p. 7) developed a model incorporating both "*first-order effects on operational level variables*" such as inventory turnover, as well as "*higher level variables*" such as market share. Starting with these observations, Melville et al. (2004 p.287) define "*IT business value as the organizational performance impacts of information technology at both the intermediate process level and the organization wide level, and comprising both efficiency impacts and competitive impacts*".

Therefore IS Performance Management Systems, which can be defined as the set of measures used to quantify both the efficiency and effectiveness of IS actions (Neely 1995), could help IS departments to evaluate the outcomes of IS activities, practices and processes at all levels of the IS organization and, consequently, to face the issues presented above. They can also help IS departments to face a serious credibility problem due to lack of management practices that can provide real benefits in business operations and grant investment return.

According to this perspective, IS Performance Management Systems suggest a new point of view from which to evaluate the success of IS. This new perspective highlights the managerial role of IS evaluation which should support an IS Governance approach (Martinsons 1999, Van Grembergen 2000, Pasini and Canato 2005, Pasini et al. 2005). As a matter of fact, measurement is a prerequisite to management. IS Performance Management Systems "*allow*

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managers to see the positive and negative impacts of IT applications and IS activities on the factors that are important to the organization as a whole" (Martinsons et al. 1999 p.85).

They help the Chief Information Officer (CIO) to understand the reasons for the actual performance, define how to improve practices and procedures to better align IS to business changes and finally improve IS performance. The possibility, through measurement, to identify the weakness and strengths of the IS department transforms IS Performance Management Systems into IS Governance tools (Gu et al. 2008).

In confirmation of that, the IT Governance Institute (ITGI)[2] considers Performance Management to be a fundamental area of the IS Governance process which starts with setting IS objectives for the organization. IS activities are then developed and their performance is measured and compared to the objectives and, finally, the measurement result redirects and balances activities and objectives where necessary. In addition, international standard methodologies, like CobiT, have added the concept of process Key Performance Indicators (KPI) to their traditional approach, based on the measurement of results.

Therefore, for IS departments, the IS Performance Management System is not only a tool to evaluate the IS impacts on organizational performance but also a management and internal marketing tool to prove the management capability to top management and to improve the image of the IS department (Ranganathan and Jha 2008).

Although IS Performance Management Systems seem to be the right solution for the CIO and IS department's problems, they are not so widespread in companies for several reasons.

First, a robust and complete model with which to evaluate IS Business Value that practitioners can apply in their companies does not exist (Gable et al. 2008). If scholars' research has been able to define quantitative and perceptual

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[2] Website: http://www.itgi.org; last access: 4 July 2008

measures to assess the efficiency of IS, the issue of evaluating IS effectiveness is unresolved.

The difficulty of measuring IS Business Value is due to the distance between IS investment and organizational performance. As a matter of fact IS impact on firm performance is mediated by intermediate processes (Soh and Markus 1995, Melville 2004). "[..] *organizations spend on IT and, subject to the varying degrees of effectiveness during the IT management process, obtain IT assets. Quality IT assets, if combined with the process of appropriate IT use, then yield favorable IT impacts. Favorable IT impacts, if not adversely affected during the competitive process, lead to improved organizational performance [..]*' (Soh and Markus 1995 p. 39).

Secondly, to feed IS Performance Management Systems it is necessary to have source data that is produced by several IS management tools (e.g. the accountancy of IS costs, IS human resource management, project management systems, customer surveys and Help desk automation). Recent research shows that few companies have all the current input data available (Perego 2006).

The reasons presented above do not sufficiently explain why IS Performance Management Systems are not widespread in companies. In other contexts complete frameworks with which to measure performance are lacking, but that has not been an impediment, for example, in Marketing departments where evaluating the return on investment in term of brand awareness is not simple. In the same way, the lack of source data could cause an extension of implementation time and costs, rather than a reduction in the importance of these systems.

We believe that the difficulty in implementing this type of system has been determined by internal factors such as the culture and power balance. Furthermore, we believe that these factors affect the design and implementation process, and the shape of IS Performance Management Systems in terms of a set of measures used to measure IS performance.

Thus our research questions are:

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- What factors affect the design and implementation of IS Performance Management Systems?
- How do these factors influence the shape of IS Performance Management Systems, and how can they be managed?

In order to answer these questions, we employed an action research framework to facilitate the collection and analysis of data. We decided to apply this research methodology for two reasons:

- the factors we wish to investigate are not explicit in the organization and thus practitioners are not willing to discuss them with external persons. We believe that researchers are only able to understand these elements if they work with practitioners;
- companies need help to handle the different implementation phases, reach an agreement on the achieved results and complete the implementation project.

The thesis is set out as follows.

Chapter One describes the background to IS Performance Management Systems research. In particular it summarizes the most important research already carried out and organizes it into four main streams of research.

Chapter Two details the action research methodology and justifies the choice of it. It pays particular attention to the operationalisation of action research projects undertaken in this research, the data collection methods and the role of researchers.

Chapter Three draws upon the literature presented earlier so as to develop a research framework. This performs the function of identifying where our research sits within a broader scheme.

Chapters Four, Five, Six and Seven describe the cases in which the action research was undertaken and the action research cycle followed in each project.

Chapter Eight analyses the four action research projects using the Research framework and discusses the results.

Chapter Nine presents contributions and conclusions of this research and possible future research in the area of IS Performance Management.

The thesis closes with references.

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1.   Theoretical Perspective

The assessment of IS effectiveness and their contribution to Business has been widely debated among both business scholars and practitioners.

Interest in the debate has increased even though the conclusions of several studies in this area can be summed up using Robert Solow's famous remark: "*we see computers everywhere except in the productivity statistics*" (Solow 1987).

Brynjolfsson called this phenomenon the "IT productivity paradox" (Brynjolfsson 1993) and he suggested that traditional measures of productivity may not be appropriate to estimate the contribution of IT to business outcomes.

Over the last two decades several researchers have been undertaking studies on this issue using different assumptions and approaches which can be summarized in the following mainstream academic literature:

- IS Payoff;
- IS Business Value generation process;
- IS success measures;
- IS Balanced Scorecard.

1.1 IS Payoff

Brynjolfsson posited that productivity is the fundamental economic measure of a technology's contribution.

Thus the lack of good quantitative measures for the output and value created by IS has made the IS manager's job of justifying investments particularly difficult. Unfortunately even academics have had problems assessing the IS impact on business performance.

He proposed various explanations that can be grouped into four categories:

- Mismeasurement of outputs and inputs;
- Lags due to learning and adjustment;
- Redistribution and dissipation of profits;
- Mismanagement of information and technology.

Explanations 1 and 2 point to shortcomings in research, rather than practice, as being "the root of the productivity paradox". It is possible that the benefits of IS investment are quite large, but that a proper index of its true impact has yet to be analyzed. Traditional measures of the relationship between inputs and outputs fail to account for non-traditional sources of value. Secondly, if there are significant lags between cost and benefit, then short-term results look poor but ultimately the pay-off will be proportionately larger. This would be the case if extensive learning, by both individuals and organizations, were needed to fully exploit IS, as is the case for most radically new technologies.

The other two explanations propose that there really are no major benefits, now or in the future, and seek to explain why managers would systematically continue to invest in IS. The redistribution argument suggests that those investing in IS benefit privately but at the expense of others, so no net benefits show up at the aggregate level. The final type of explanation examined is that companies have systematically mismanaged IS: there is something in its nature that leads firms or industries to invest in it when they should not, to misallocate it, or to use it to create slack instead of productivity.

Starting with Brynjolfsson's studies, several other researchers have tried to examine the relationship between investments in IS capital and labour and their effect on organizational performance.

They have employed several theoretical paradigms based on the Microeconomic theory. The theory of production has been particularly useful in conceptualizing the process of production and providing empirical specifications enabling an estimation of the economic impact of IS (Brynjolfsson and Hitt 1995). Researchers have also employed growth accounting (Brynjolfsson and Hitt 2003), consumer theory (Brynjolfsson 1996; Hitt and Brynjolfsson 1996), and data envelopment analysis (Lee and Barua 1999).

Nevertheless the connection between IS and productivity is still elusive.

One reason could be the aggregate unit of analysis at the organizational level, which makes it difficult to isolate the impact of any individual technology. As a matter of fact, the results of IS payoff studies show that "*the more detailed the level of analysis, the better the chance to detect the impact, if any, of a given technology*" (Deveray and Kohli 2003 p.275).

Many economy-level studies (Baily 1986, Roach 1987, Morrison and Berndt 1991) observed a negative relationship between technology-related variables and performance.

At the industry level, on the other hand, the results are mixed, with some studies documenting a positive impact of IS (Kelley 1994, Siegel and Griliches 1992) while other studies detect no significant advantage to IS investments (Berndt and Morrison 1995, Koski 1999).

Finally, at the more-detailed firm level, a lot of studies present results that indicate a positive relationship between technology and performance (Diewert and Smith 1994, Hitt and Brynjolfsson 1995, Dewan and Min 1997). For example, a study by Lee et al. (2003) describes how knowledge management systems (KMS) produce an organizational performance payoff that stimulates positive feedback to initial enablers, processes and intermediate outcomes. Whereas Aral et al. (2006) found that Enterprise Resource Planning usage improved organizational performance, which enabled the subsequent adoption and use of Supply Chain Management and Customer Relationship Management systems, which further improved performance.

Other firm-level studies found evidence of the positive effect of IS capital and labour on outcome measures (Menon et al. 2000, Devaraj and Kohli 2000).

1.2 IS Business Value Generation

Other researchers have moved the debate "*from the question of whether IT creates value to how, when and why benefits occur or fail to do so*" (Soh and

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Markus 1995 p.29) and focused their attention on the construction of the IS Business Value generation process.

One of the first to move towards this new direction was Weill (1992).

He argued that previous research on the performance effects of IS investments had generally not included the context of the firm in the analysis because they assumed the context to be a constant and that all firms use their IS investments equally effectively. On the contrary, IS implementation literature identifies the important role of the firm context in the effective use of information technology. Weill posited that each firm has a particular climate that influences how well it converts its IS investments into productive outputs. "*The organizational climate is a relatively enduring quality of an organization's internal environment which distinguishes it from other organizations and results from the behaviour and policies of members of the organization*" (Weill 1992).

He called "conversion effectiveness" the aspect of the firm's climate which influences IS and defined it as a quality of the firm-wide management and commitment to IS. Conversion effectiveness contains four of the factors which the literature suggests will help ensure the successful use of IS. The factors are:

- top management commitment to IT,
- previous firm experience with IT,
- user satisfaction with systems,
- the turbulence of the political environment within the firm.

In 1995 Markus and Soh proposed a process theory synthesis of some famous theoretical models of IS value creation.

They analyzed the following models in particular: Lucas (1993), Grabowski and Lee (1993), Markus and Soh (1993), Sambamurthy and Zmud (1994) and Beath, Goodhue and Ross (1994). They synthesized these prior theoretical contributions in a chain of three different process models. Each element in such a theoretical chain would specify a sequence of necessary (but not sufficient) conditions in a "recipe" that explains how outcomes occur or not (see Figure 1).

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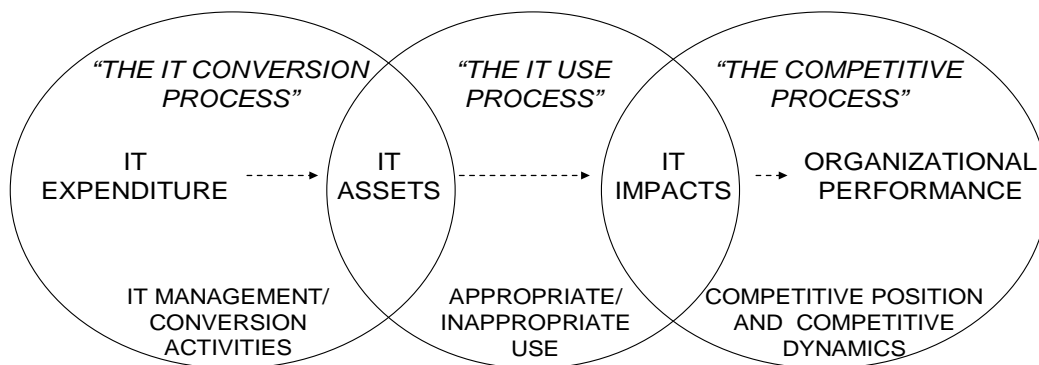
Figure 1 - How IT creates Business Value: a process theory (Soh and Markus 1995)

"The recipe comprises necessary conditions and probabilistic processes in the following sequence: organizations spend on IT and, subject to the varying degrees of effectiveness during the IT management process, obtain IT assets. Quality IT assets, if combined with the process of appropriate IT use, then yield favorable IT impacts. Favorable IT impacts, if not adversely affected during the competitive process, lead to improved organizational performance" (Soh and Markus 1995 p. 39).

Their study highlights the distance between IS investment and organizational performance. As a matter of fact the IS impact on firm performance is mediated by intermediate processes.

Since then, a lot of researchers have undertaken studies on the factors that lead to IS Business Value. A synthesis of the major highlights can be found in the "Integrative Model of IT Business Value" proposed by Melville, Kraemer and Gurbaxani (2004).

The integrative model of IT Business Value is the result of a broad analysis of how researchers have modelled IS business value. In their model the authors identify the organization as the locus of IS business value generation, but they also emphasize the role of external factors in shaping IS business value. As a consequence, their integrative model consists of three layers (see Figure 2):

- Focal firm.
- Competitive environment.
- Macro environment.

In the first layer IS business value is generated by the employment of IS resources and complementary organizational resources. In this model two types of IS resources are defined:

- Technological IS resources (TIR): IT infrastructure and specific business applications that use the infrastructure.
- Human IS resources (HIR): technical and managerial knowledge as application development skills, expertise in the integration of multiple systems and the ability to identify appropriate projects and motivate development teams.
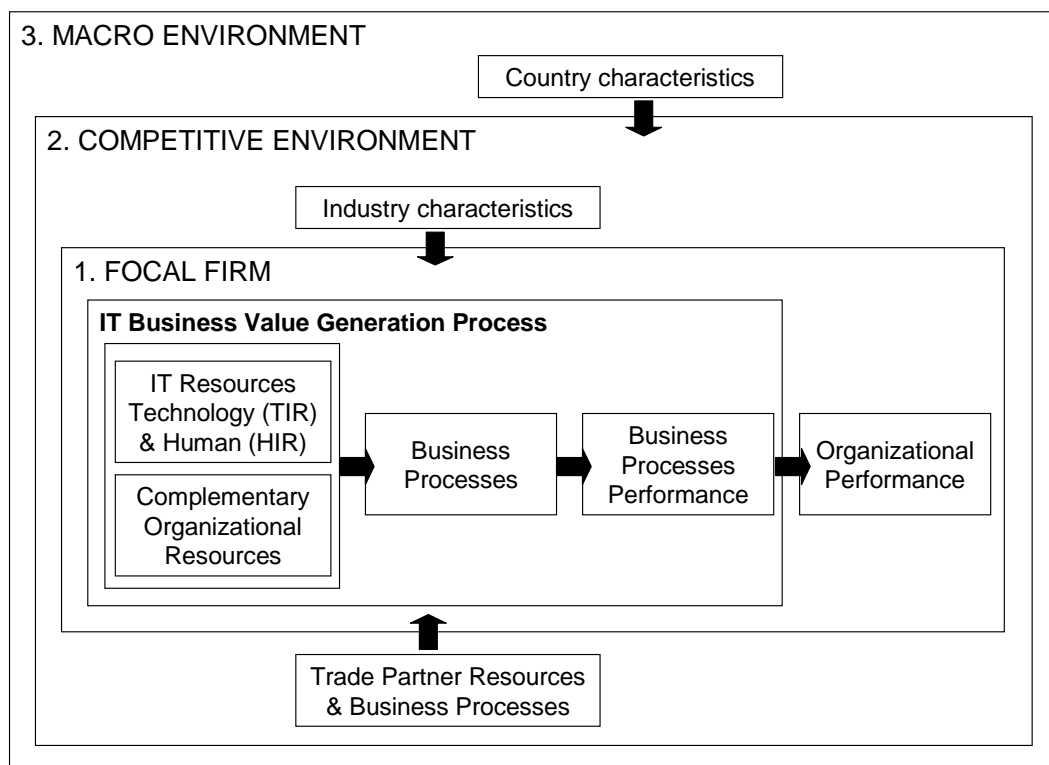
Figure 2 - IT Business Value Model (Melville et al. 2004)

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Complementary Organizational Resources are defined as non-IS existing resources which create synergies with IS resources in order to improve organizational performance. According to Barney (1991), they may include non-IS physical capital resources, non-IS human capital resources and organizational capital resources.

The result of the synergy between IS and complementary organizational resources is an improvement in firm performance. In particular in a firm there are two types of performance: business process performance and organizational performance. Business Process Performance is linked to operational efficiency enhancement within a specific business process, whereas organizational performance means impacts across all firm activities.

The analysis of this first layer allows us to understand the link between the type of IS and the nature of business process and organizational performance impacts.

The second layer is the competitive environment in which the focal firm operates, which the authors separate into two components:

- Industry Characteristics which include competitiveness, regulation, technological change, clock speed and other factors that shape the way in which IS is applied within the focal firm to generate business value.
- Trading Partners which play a role in the IS business value generation when the firm spans its boundaries.

The characteristics of industry (e.g. concentration, supply chain configuration, regulation and IS standards etc.) can shape how IS is used within focal business processes and as a consequence influence the generation of IS business value.

This understanding does not lead us to think that all firms in an industry respond to IS in the same way because firms have their own specific characteristics even if they operate in the same environment and are subjected to the same stimuli.

IS allows focal firms to span their organizational boundaries, join up with multiple firms via electronic networks and software applications and link their business processes.

Therefore the local firm is not the only player who determines IS Business Value. The role of trading partners increases because their IS and non-IS resources are also involved in IS Business Value generation. For example, the IS business value of an inter-organizational system initiated by the focal firm is influenced by the degree of business process efficiency and updating of technology within trading partner firms. In the same way the competence of partner IS units in development and implementation would be included in the human IS resources of both the focal and external organization.

The third and final layer is the macro environment. The authors describe how country and meta-country specific factors can have an impact on the application of IS and as a consequence on the improvement of organizational performance. For example, government action in the promotion and regulation of technology development and information industries, IS talent and information infrastructure is an important factor that influences the impact of IS. This layer highlights that it is necessary to understand the political, regulatory, educational, social and cultural contexts in which the focal firm operates in order to analyze all the factors that have an impact on the generation of IS business value.

1.3 IS Success Measures

A third research stream concerns IS Success Measures.

The first study that sought to impose some form of order on IS researchers' choices of success measures was the paper by DeLone and McLean (1992). In their paper they proposed an IS Success Model that represents the starting point for much other research.

Based on the communications work by Shannon and Weaver (1949) and Mason (1978), they identified six distinct categories or aspects of information systems (see Figure 3):

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1. System Quality.
2. Information quality.
3. Use.
4. User Satisfaction.
5. Individual Impact.
6. Organizational Impact.

These categories could be "*rearranged to suggest an interdependent success construct while maintaining the serial, temporal dimension of information flow and impact*" (DeLone and McLean 1992 p. 83).

System Quality and Information Quality singularly and jointly affect both Use and User Satisfaction; additionally, the amount of Use can affect the degree of User Satisfaction (positively or negatively) as well as the reverse being true. Use and User satisfaction are direct antecedents of Individual Impact; and, lastly, this Impact on individual performance should eventually have some Organizational Impact. Their model shows that IS effectiveness is a multidimensional concept, according to Weill and Olson (1989).

Therefore to measure IS success these six dimensions of success must be incorporated into an overall model of IS success.
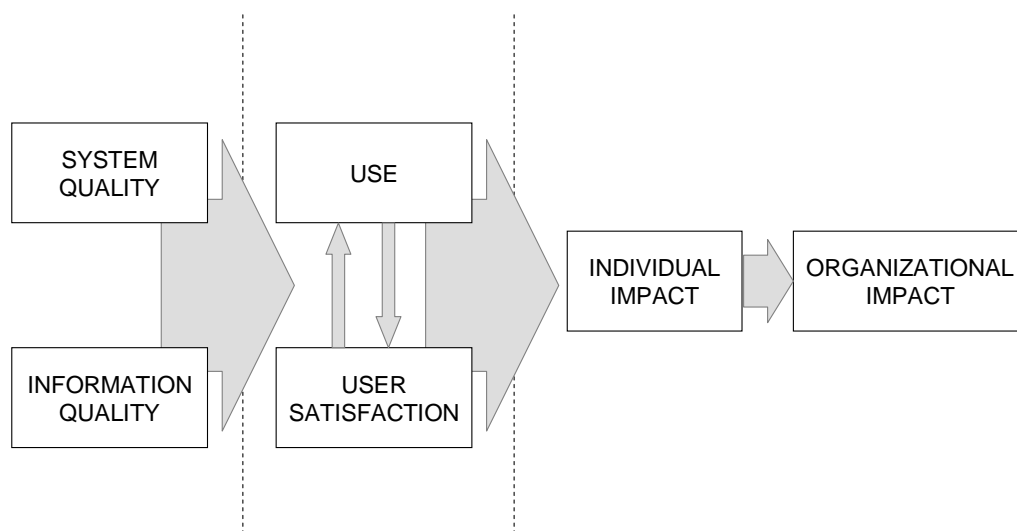

Figure 3 - IS Success Model (DeLone and McLean 1992)

"*Researchers should systematically combine individual measures from the IS success categories to create a comprehensive measurement instrument. The selection of success measures should also consider the contingency variables, such as the independent variables being researched; the organizational strategy, structure, size, and environment of the organization being studied; the technology being employed; and the task and individual characteristics of the system under investigation*" (DeLone and McLean 1992 p. 88).

Contributions on how IS performance measures should be selected were given by Saunders and Jones (1992) who examined how IS department performance dimensions were ranked in importance by IS executives, how the IS executives measured performance in each dimension, and the value they placed on the measures. The highest-ranked dimension was the IS department impact on strategic direction, followed by the integration of the IS department planning with corporate planning, the quality of information outputs, and the IS department's contribution to organizational financial performance. The measures used in the highest-ranked dimensions tended to be weak, surrogate measures and were not as highly valued by the IS executives as the more direct measures of the operational efficiency of the IS department, such as system response time and system availability. The authors suggested that one reason for this contradiction might be the fact that IS operational efficiency has been stressed for years while IS impact on strategic direction is a fairly new dimension and measures are still being developed. They also propose that "*as the IS function matures, measures likely change from a structured focus on operational efficiency and user satisfaction to a more unstructured concern for IS impact on strategic direction*" (Saunders and Jones 1992 p. 80).

Myers, Kappelman and Prybuto (1997) sought to combine DeLone and McLean's IS Success Model and the contingency approach formulated by Saunders and Jones and others into an IT Assessment Selection model.

Another relevant contribution to the development of DeLone and McLean's IS Success Model was given by Pitt, Watson and Kavan (1995).

They pointed out that the role of the IS department within the organization has broadened considerably over the last two decades. Once primarily a developer and operator of information systems, the IS department now has a much broader role. "*Users expect the IS department to assist them with a myriad of tasks, such as hardware and software selection, installation, problem resolution, connection to LANs, systems development, and software education. Facilities such as the information center and help desk reflect this enhanced responsibility*" (Pitt et al. 1995 p. 173).

IS departments provide a wider range of services to their users. They have expanded their roles from product developers and operations managers to become service providers. Thus, the quality of the IS department's service, as perceived by its users, is a key indicator of IS success (Rockart 1982).

In their studies they proposed SERVQUAL (Parasuraman et al. 1988) to assess IS user expectations and perceptions of service quality. The instrument consists of three parts:

- 22 questions to measure expectations. Questions are framed in terms of the performance of an excellent provider of the service being studied;
- 22 questions to measure perceptions. Questions are framed in terms of the performance of the actual service provider;
- a single question to assess overall service quality.

SERVQUAL measures perceptions and expectations through five dimensions that customers use when evaluating service quality, regardless of the type of service. These dimensions are:

- Tangibles: physical facilities, equipment and appearance of the personnel.
- Reliability: the ability to perform the promised service dependably and accurately.
- Responsiveness: willingness to help customers and provide prompt service.
- Assurance: knowledge and courtesy of employees and their ability to inspire trust and confidence.

- Empathy: the caring, individualized attention the service provider gives its customers.

Service quality for each dimension equals the difference between the average ratings of a dimension's corresponding perception and expectation statements.

Inputs to complement and extend DeLone and McLean's IS Success Model also came from Grover et al. (1996), who built a theoretically-based construct space for IS effectiveness.

Utilizing the theoretical perspective of organizational effectiveness, he proposed a synthesis of previous effectiveness measures and research approaches through three definitional dimensions:

1. *Evaluative referent* which describes the relative standard that is used as a basis for assessing performance. In particular Grover identified three potential evaluative judgments:
    a. Comparative, which attempts to compare the effectiveness of a particular system with other "similar system";
    b. Normative, which compares the system with the "standard of best practices" that emerge from the literature;
    c. Improvement, which assesses how IS has evolved or improved over time comparing past performance to current performance.
2. *Unit of analysis,* which describes the level of analysis. To build a complete picture of IS effectiveness, an evaluation must be conducted from both a macro (organizational level) and micro (individual level) view. Different units of analysis lead to different IS effectiveness measures. "*From the macro perspective [..] IS effectiveness is related to how much the IS helps organizations in gaining competitiveness. From a micro perspective [..] IS effectiveness is related to which IS satisfies the requirements of the organization's member*" (Grover 1996 p.181).
3. *Evaluation type*, according to organizational effectiveness literature three types of evaluation can be considered to assess effectiveness:
    a. process, which captures user dependence on the IS, user perceptions of system ownership and the extent to which IS

permeates organizational administrative and operating procedures;

b. response, which captures the reaction of the individual, the organization and its external entities to the IS service or product;

c. impact, which captures the direct effects of IS implementation on individual or organizational performance.

Integrating the three definitional perspectives Grover et al. proposed six classes of IS effectiveness measures that define the overall construct space of IS effectiveness (see Figure 4):

1. *infusion measures* (completeness, efficiency and accuracy in the analysis and distribution of information);

2. *market measures* (the reactions of internal and external customer markets to the introduction of IS and the dynamics of market mechanisms);

3. *economic measures* (quantitative changes in financial or competitive positioning resulting from investment in IS);

4. *usage measures* (if, when, how much and why users depend on IS to accomplish their business activities);

5. *perceptual measures* (user attitudes, beliefs and perceptions toward IS);

6. *productivity measures* (managerial performance and productivity).

The first three classes of effectiveness measures are associated with the macro level evaluation of IS, whereas the other three classes are for IS evaluation at the micro level.

DeLone and McLean suggested that the selection of effectiveness measures should consider contingency variables such as technological context (i.e. the characteristics of the system being evaluated) and evaluative perspective (i.e. the constituents who actually evaluate the system). They also argued that other dimensions affect the choice of evaluative measures, which can be summed up in the following questions (Grover et al. 1996 p.183):

- From whose perspective is effectiveness being evaluated?
- On what domain is the evaluation focused?
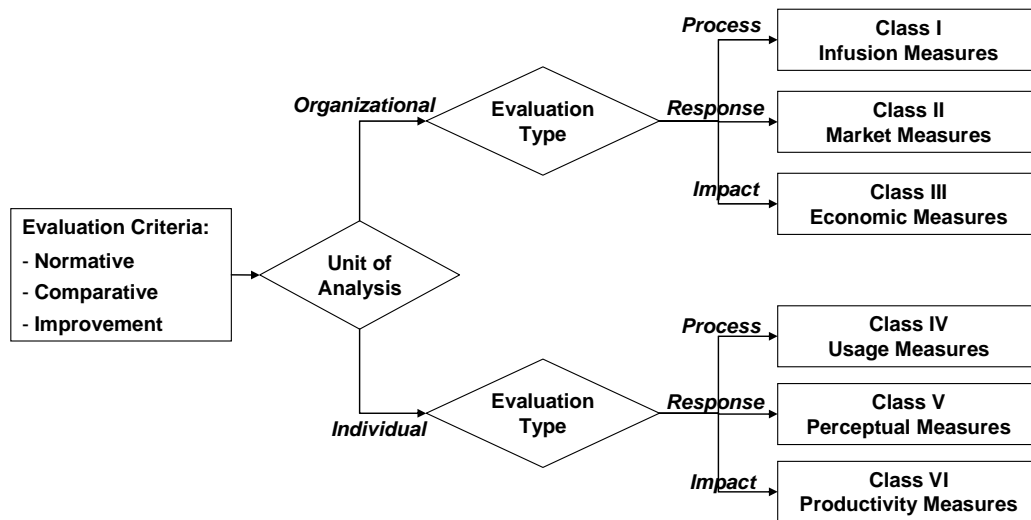
Figure 4 - The construct space for IS effectiveness (Grover et al. 1996)

As Cameron and Whetten (1983) suggested, one reason no 'best' criterion exists is because there is no 'best' constituency. Effectiveness must be assessed from an explicit viewpoint and thus they argued that "*the specific view of four different constituencies: users, top management, IS personnel, and external entities (suppliers, customers, etc.) should be considered*" (Grover et al. 1996 p. 183).

The second question is important because a variety of domains can be identified by various types of IS (data processing systems, management information systems, decision support systems and office automation systems etc.).

Evaluators should clearly specify the target systems that will be assessed. Specifying the domain affects the selection of relevant criteria for evaluation and limits contradictory results and inaccurate assessment.

Building on both the preceding studies and the work of Grover et al. (1996), Seddon (1999) purposed an alternative to DeLone and McLean's model of IS success based on the seven questions that organizational psychologists, Cameron and Whetten (1983), argue must be answered when measuring organizational effectiveness. The questions are as follows:

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1. From whose perspective is effectiveness being judged?
2. What is the domain of activity? (depends on tasks emphasized in the organization, competencies of the organization and demands from external forces)
3. What is the level of analysis? (individual, subunit, organization, population and societal)
4. What is the purpose of the evaluation?
5. What is the time frame employed? (short or long)
6. What type of data is to be used? (objective or perceptual)
7. Against which referent is effectiveness to be judged? (the effectiveness of this organization compared to: another organization; an ideal level of performance; the organization's stated goals; the organization's past performance; or certain desirable characteristics)

They pointed out that all these questions are relevant to IS professionals who measure IS effectiveness and they defined the construct space for IS effectiveness measurement. In particular the combination of questions 1 and 3 and question 2 suggest the definition of two key dimensions that can help to choose the appropriate set of measures for a specific situation.

The two dimensions are: *Stakeholders* and *System*. A Stakeholder is a person or a group in whose interest the evaluation of IS success is being performed. In particular Seddon identified five points of view:

- the independent observer who is not involved as a stakeholder;
- the individual who wishes to be better off;
- the group, which also wishes to be better off;
- managers or owners who want the organization to be better off;
- the country which wants the society as a whole to be better off.

Whereas, the System used to classify the type of system that is being evaluated, is articulated in the following six components:

- an aspect of IS use (e.g., a single algorithm or form of user interface);

- a single IS application (e.g., a spreadsheet, PC or library cataloguing system);
- a type of IS or IS application (e.g., TCP/IP, a GDSS, a TPS, a data warehouse, etc.);
- all IS applications used by an organization or sub-organization;
- an aspect of a system development methodology;
- an IS function of an organization or sub-organization.

Alter (1999) argued that Seddon (1999) had ignored "*a central problem in understanding information system effectiveness, namely, that information systems are increasingly becoming integral parts of other work systems. Information systems and the work systems they support are increasingly like Siamese twins that are inextricably connected: (1) remove the information system and the work system can't operate and (2) ignore the work system and the information system has no meaning*" (Alter 1999 p.41).

Therefore IS effectiveness assessment needs to consider both the information system and work system, especially the overlaps between them.

Starting from this debate, recent studies have tried to empirically and theoretically assess these theoretical models of IS success in an IS use context (Rai et al. 2002) and address several areas of uncertainty with past IS Success research designing robust, economical and simple models which practitioners can put into practice (Gable et al. 2008).

Finally, other research has deepened the relationships among constructs related to information system success and it has underlined the importance of user-related and contextual attributes in IS success (Sabherwal et al. 2006).

1.4 IS Balanced Scorecard

A last research stream proposes the adoption of the Balanced Scorecard concept (Kaplan and Norton 1996) to measure the value of IS and evaluate IS Performance.

Kaplan and Norton argued that traditional financial accounting measures (like ROI and payback period) offer a narrow and incomplete picture of business performance. As a result, they suggested that financial measures be supplemented with additional ones that reflect customer satisfaction, internal business processes and the ability to learn and grow.

Their Balanced Scorecard is designed to complement "*financial measures of past performance with measures of the drivers of future performance*" (Kaplan and Norton 1996 p. 8). and to keep score of a set of items that maintain a balance "*between short- and long-term objectives, between financial and non-financial measures, between lagging and leading indicators, and between internal and external performance perspectives*" (Kaplan and Norton 1996 p. viii).

Management attention to such a broad set of performance measures should not only help to ensure good short-term financial results, but also to guide a business in order to achieve its strategic goals.

They proposed the Balanced Scorecard not only as a tool for clarifying and communicating strategy, but also as a foundation for actively managing it. A Balanced Scorecard based system could come to resemble an organizational activity support system. Despite the hype that has started to accompany some published reports about the Balanced Scorecard, such an action-oriented framework, which focuses on customer-based business processes rather than just financial results, should help managers to monitor and improve business performance on a real-time basis.

Another core design element for a Balanced Scorecard is causality.

Performance Management Systems such as the Balanced Scorecard aim to exceed the benefits of disconnected lists of performance indicators by providing a reliable prediction of process outcomes, which are based on cause-and-effect relations among performance measures.

Starting from these concepts, Martinsons et al. (1999) developed a Balanced Scorecard for Information Systems that "*allows managers to see the positive and*

negative impacts of IT applications and IS activities on the factors that are important to the organization as a whole" (Martinsons et al. 1999).

Their studies have integrated efficiency and effectiveness measures, "doing *things right and doing the right things respectively*" (Martinsons et al. 1999).

They also pointed out that measurement is a prerequisite to management and, as a consequence, they proposed the IS Balanced Scorecard as a strategic IS Management tool that can be used to monitor and guide performance improvement efforts.

Martinson suggests the following four perspectives for a balanced IS scorecard: business value, user orientation, internal processes and future readiness (see Figure 5).
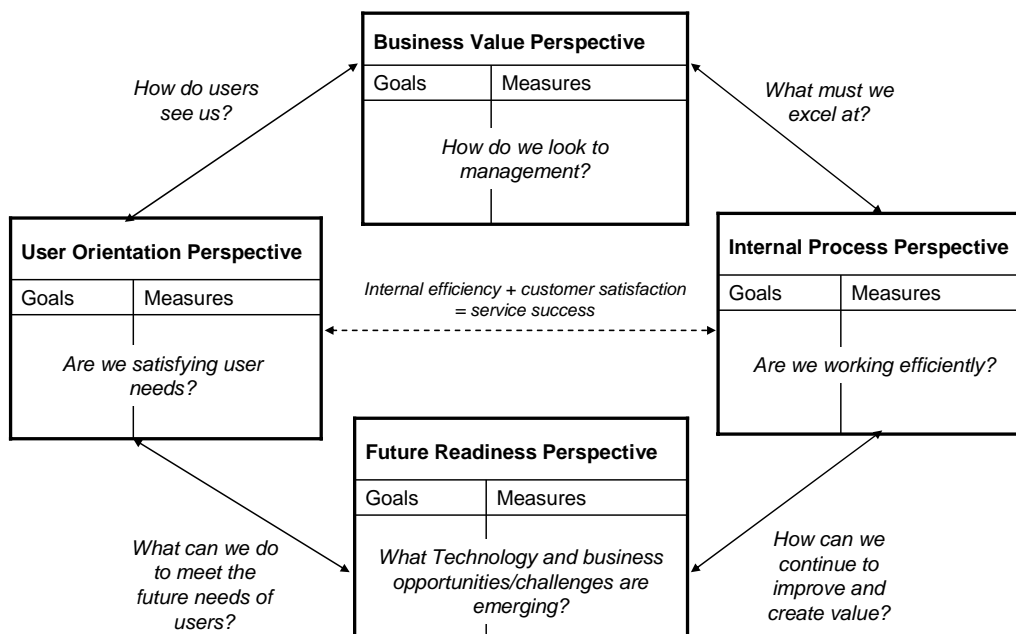

Figure 5 - Relationship between the four perspectives in the balanced IS Scorecard (Martinsons et al. 1999)

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Business value encompasses short-term (focus on individual projects) and long-term (focus on the whole application portfolio and the IS department) evaluation of IS performance. Both traditional financial measures such as "IS costs per employee" or "percentage over/under overall IS budget" and value-based measures are included within this perspective. Whereas the benefits of IS investments are easy to estimate through productivity gains of staff or the increased availability of systems, value is a much broader concept that refers to the company's value creation.

Instead, User orientation addresses both the satisfaction of internal users and external customers (e.g. customer satisfaction with an extranet). The performance measures within this perspective are focusing on user satisfaction with delivered IS services and the partnership between business managers and IS managers. Relevant measures can be gathered by surveys or semi-structured interviews in order to gain deeper insights. (Van Grembergen and Van Bruggen 1997).

Internal Processes require that core processes within an IS department are measured (Martinsons et al. 1999):

- the planning and control of IS resources;
- the development of new applications;
- the operation and maintenance of the installed base.

Other processes according to international standard methodologies such as ITIL and CobiT can also be considered within this perspective.

Finally, Future readiness is concerned with IS skills development, the ongoing upgrading of the application portfolio and the evaluation of the emerging technologies' suitability to incorporate the IT architecture.

According to the considerations presented before, the IS Balanced Scorecard becomes an IS Performance Management System evaluating the outcomes of IS activities, practices and processes at all levels of the IS organization. Therefore they suggest a new point of view of IS success evaluation.

2.   Research Methodology

The way in which research is conducted may be conceived of in terms of the research philosophy subscribed to, the research strategy employed and the research instruments utilised in the pursuit of research objectives and research questions.

2.1 Research Philosophy

Frameworks for the classification of philosophical paradigms exist in the literature, covering social research in general (Lincoln and Guba 2000) and information systems in particular (Iivary et al. 1998, Monod 2002), as well as other fields of business research (Chua 1986). According to these frameworks, two major research philosophies have been identified: positivism and interpretivism.

The two paradigms are different in the ways they answer the four key philosophical questions (Figueiredo and Cunha 2007):

- the ontological question enquires about what can be known;
- the epistemological question looks into what is knowledge and what knowledge can we get;
- the methodological question enquires about how we can built on that knowledge;
- the ethical question asks what is the worth, or value, of the knowledge we build.

Orlikowski and Baroundi (1991 p.5) described the differences between what is traditionally viewed as positivist or interpretive as follows: *"Positivist studies are premised on the existence of a priori fixed relationship within phenomena which are typically investigated with structured instrumentation […] primarily to test*

theory in an attempt to increase predictive understanding of phenomena […] positivist studies are characterized by evidence of formal propositions, quantifiable measures of variables, hypotheses testing, and the drawing of inferences about a phenomenon from the sample to a stated population […] interpretative studies assume that people create and associate their own subjective and intersubjective meanings as they interact with the world around them. Interpretative researchers thus attempt to understand phenomena through accessing the meanings that participants assign to them […] reject the possibility of an objective or factual account of events and situations, seeking instead a relativistic, albeit shared, understanding of phenomena […] generalization to a population is not sought […] the deeper structure of a phenomenon can be used to inform other settings […] interpretive studies are characterized by evidence of a nondeterministics perspective […] increase understanding of the phenomenon within cultural and contextual situations […] examined in its natural setting […] researchers did not impose […] a priori understanding on the situation".

The assumptions, role of the researcher and characteristics of positivist and interpretive epistemologies are so different that the two approaches are mutually exclusive: from a positivist perspective research takes place "behind the glass", where the researcher observes but does not interfere with a phenomenon; interpretive studies generally acknowledge the researcher's interaction with subjects and attempt to reflect their biases as integral to the insights derived (DeLuca et al. 2008).

We believe that an interpretive philosophy is required for our research questions, as set out in the Introduction. The nature of the phenomenon which we are attempting to investigate requires an observation of social dynamics during the design and development process, and interaction between researchers and subjects to evaluate the results of action taking to face problems which could stand in the way of project success. Our choice is consistent with Klein and Myers' thought: "*interpretive research can help IS researchers to understand human thought and action in social and organizational contexts; it has the potential to produce deep insights into information systems phenomena*

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including the management of information systems and information systems development" (Klein and Myers 1999 p.67).

2.2 Research Strategy

A large number of research methodologies have been identified (Galliers 1992, Alavi and Carlson 1992). There are research methodologies that typically conform to the positivist or interpretive paradigms.

Interpretive methods of research in IS are "*aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context*" (Walsham 1993 pp. 4-5). Generally they are illustrated with case study research, ethnography, grounded theory and action research.

A case study involves an attempt to describe relationships that exist in reality, very often within a single organisation. This restriction to a single organization could be considered a weak point because it is difficult to generalise findings. Furthermore, different researchers may have different interpretations of the same data. The principle differences between case study methods and ethnographic research methods are the length of time that the investigator is required to spend in the field and the extent to which the researcher immerses him or herself in the life of the social group under study (Klein and Myers 1999). "*Ethnographies usually require long periods of time in the 'field' and emphasize detailed, observational evidence […]. In contrast, case studies are a form of enquiry that does not depend solely on ethnographic or participant-observer data*". (Yin 1994 pp. 10-11). Grounded theory is a research method that seeks to develop theory that is grounded in data systematically gathered and analyzed. According to Martin and Turner (1986), grounded theory is "*an inductive, theory discovery methodology that allows the researcher to develop a theoretical account of the general features of a topic while simultaneously grounding the account in empirical observations or data*". The major difference between grounded theory and other methods is its specific approach to theory development – grounded

theory suggests that there should be a continuous interplay between data collection and analysis. Action research differs from other interpretative research methods by creating organizational change where the action researcher is directly involved in planned organizational change. The action researcher intervenes and simultaneously studies the impact of this change (Baburoglu and Ravn 1992).

The discipline of IS seems to be a very appropriate field for the use of action research methods (Baskerville and Wood-Harper 1996). IS is a highly applied field, almost vocational in nature. Action research methods place researchers in a helping role within the organizations that are studied (Schein 1987). According to Baker (2007) and Avison et al. (1999), action research could be useful in investigating the design and implementation of a specific IS application.

These characteristics make action research consistent with our purpose. As described in the Introduction, companies need help to face problems and a framework to use as guide in the design and development process of IS Performance Management Systems in order to improve the rate of successfully delivering these Systems. Therefore the link between theory/practice and research/consulting, which is characteristic of the action research approach, becomes essential in undertaking this research and collecting consistent and reliable data on the design and development process.

The following sections contain a detailed description of the action research method and how we intend to adopt it in our research.

2.3 Historical Background of Action Research

The action research method was developed during World War II.

Kurt Lewin (1947) developed the method at the Research Centre for Group Dynamics (University of Michigan) in order to study social psychology within the framework of field theory. A similar method was also developed by another group working independently at the Tavistock Institute as a sort of psychosocial equivalent of operational research. The Tavistock Institute dealt with social

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illnesses caused by battlefields and prisoner-of-war camps. Scientists intervened in each case by changing some aspect of the patient's being or surroundings. Thus, the scientists were participants in their own research. The effects of the actions were recorded and studied. In this manner, a body of knowledge was developed about successful therapy for the illnesses.

Lewin's studies led to a general theory of how social change could be facilitated. His original model of action research included iteration of six phased stages:

1. analysis;
2. fact finding;
3. conceptualisation;
4. planning;
5. implementation of action;
6. evaluation.

A foundational stream of related work in action research follows Lewin and the Tavistock experience. This work generally arises in the field of organizational sociology and social psychology, although Blum (1955) published a discussion on the implications of action research for the more general scientific arena.

After the initial period, the approach seems to have gone through a period of experimentation that disclosed some essential problems. The refereed material on action research of this period is dominated by the social science researchers who recognised problems and limitations with action research.

The major problems identified with the use of the technique in social science concerned:

- ethical dilemmas. According to Rapoport (1970) there are three dilemmas that severely inhibit the ethical use of the technique in practice:
  - o goal dilemma between the practical problem and the research question. Sometimes these two goals conflict and that brings an ethical conflict to the research;

- o role dilemma between the roles of researcher and consultant in which one individual must serve. Sometimes these roles conflict, for example when consulting fees are paid to the researcher or editorial control over research reports passes to the client;

  - o value dilemma. The values that inhabit the client culture (i.e. high value on quick, decisive action) may conflict with those of the researcher (i.e. lengthy abstract reflection before action).

- the funding structure of social science research. Peter Clark (1972) reasoned that research was being increasingly sponsored by public money. In response, leading researchers tended to seek projects that relied on quantitative data. This emphasis on professionalism and precise data collection methods led to a general decline in qualitative research skills. As a result, action research methods were seldom applied, and when they were used, they were often of marginal scientific quality due to the limited resources.

- increasing association with action research and organizational consulting. Edgar Schein (1969) began exploring the use of action research for developing solutions to group problems in organizations. His *Process Consultation* (Schein 1969) had an extremely large and positive impact on the field of organizational consulting. Unfortunately, this may have only increased the perception among the scientific community that action research was a practical method with little scientific significance.

In the late 1970s, action research regained some of its respectability (Susman and Evered 1978, Hult and Lennung 1980).

The main stream of action research work became more closely related to the organizational sciences, but also more clearly fragmented along defined streams of ideas within the organizational sciences. The consulting stream that evolved out of Schein's early work continued through others (Lippitt and Lippitt 1978, Kubr 1986). In the field of medical practice, action learning (Burnard 1991, Pedler 1991) was discovered and became important as a mechanism to solve the educational crisis. Two other streams developed during this period that emphasise the relationship between reflection and action. One stream evolves

from work by Argyris and Schön (1978) on double-loop organizational learning. The second stream arises in Checkland's merger of action research and systems science in creating the concepts of systems thinking, and soft systems methodology (Checkland 1981). In the same period IS action research originates as a distinct application area for action research (Mumford and Weir 1979, Wood-Harper 1985). Nevertheless, action research was not often used as research methodology.

In 2004 Baskerville and Myers promoted action research in a special issue of MIS Quarterly which aimed to publish empirical studies that can serve as models of how to perform action research. They argued that action research methods provide one potential avenue to improve the practical relevance of IS research. After their article the community of scholars started to consider action research as a rigorous research method and researchers began to start applying their studies.

2.4 Forms of Action Research

Action research refers to a class of research approaches that share some agreed characteristics that distinguish action research from other approaches to social enquiry. In particular there is widespread agreement on the following four characteristics (Baskerville and Wood-Harper 1996):

- Process Model. Different action research forms are characterised by three distinct process models:
    - the iterative process model which involves a repeating sequence of activities, typically alternating between action activities and problem diagnosis activities (Blum 1955).
    - the reflective process model which is necessarily iterative, but focuses less on problem diagnosis than on the reflective analysis of the theory-in-use versus the espoused-theory[3]. A reflective process

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[3] An espoused theory is one that an individual claims to be following. A theory-in-use is one that can be inferred from action (Argyris and Schön 1978).

model concentrates on the discovery of differences between the two theories.

- o the linear process model which does not involve iteration, but rather a single sequence of activities such as: engage, diagnose, unfreeze, change, freeze and disengage.

- Structure. Two distinctive forms of structural guidance are characteristic in different forms of action research:

  - o rigorous structure which is characterised by delineated stages, steps or activities carried out in a sequence or cycle, or selected according to rules or heuristics;

  - o fluid structure which defines activities very loosely, allowing substantial simultaneity or leaving the temporal location of various activities relatively undefined.

- Typical researcher involvement. Individual researchers can choose to be involved with their study subjects in highly independent and different ways.

  - o Collaborative involvement implies that the researcher is an equal co-worker with the study subjects. The study tasks are shared without distinction and the participants' backgrounds are assumed to be equally valuable.

  - o Facilitative involvement distinguishes the researcher as an expert among the study subjects. While the work is still cooperative, the tasks of the researcher and the subjects are quite distinct. The burden of solving the immediate problem setting rests with the study subjects. The task of the researcher is to facilitate or help the subjects with expert advice, technical knowledge or an independent viewpoint. However, the subjects are responsible for determining exactly what interventions will be created.

  - o Expert involvement also distinguishes the researcher as an expert among the study subjects, and still involves cooperation and distinct tasks. However, the burden of solving the immediate problem

setting rests with the researcher. The researcher's decisions will determine to a large degree what interventions will be created.

Choosing facilitative versus expert involvement involves reversing the tasks of the subjects and the researcher with regard to the immediate problem. Some forms of action research allow the researcher to adopt different involvement roles depending on the problem setting.

		Canonical Action Research	Information systems prototyping	Soft systems	Action Science	Participant observation	Action learning	Multiview	ETHICS	Clinical field work	Process consultation
Primary goal	Training						■				
	Scientific knowledge	■			■	■			■		
	System Design		■	■			■	■			
	Organizational Development	■		■	■			■	■		■
Typical involvement	Experiment					■	■	■			■
	Facilitative		■	■	■			■	■	■	
	Collaborative	■	■					■			
Structure	Fluid			■	■	■	■	■	■		■
	Rigorous	■	■								
Process Model	Linear							■	■	■	■
	Reflective				■	■	■				
	Iterative	■	■	■							

Table 1 - Characteristics analysis of action research forms (Baskerville and Wood Harper 1998)

- Primary goals. The different forms of action research can be used with many different goals in mind. However, each form is characterised by certain primary goals in their common formulations:
  - o Organizational development involves a primary goal of improving the human organization. In this viewpoint, the human organization is considered to be embodied in the regular patterns of social interaction among the persons involved in the organization. Thus organizational development implies the development of the social conditions of the organization. These conditions may include higher morale, structural efficiency, structural effectiveness or better information flows.
  - o System design involves a primary goal of creating or modifying organizational systems. These systems are the structural artifacts that people create as a consequence of the human organization.
  - o Scientific knowledge implies a primary goal of contributing a generalizable understanding of the problem setting to the scientific literature in the field. The generalization is necessary for practitioners to use the understanding in different settings, or for scientists to build further studies on the knowledge.
  - o Training involves a primary goal of individual learning from the study. This is an educational goal, where the primary reward is the improved understanding of certain types of problem situations by a single researcher (or group of researchers) who undertake the study.

According to the classification of action research forms presented above, in our research we have applied the canonical form which is characterized by the iterative process model, a rigorous structure, a collaborative involvement between researchers and practitioners and has organizational development and scientific knowledge as primary goals. Canonical Action research has been used with particular frequency to advance our understanding of IS design and development (Baskerville and Wood-Harper 1996).

2.5 Canonical Action Research Cycle

"*Action research simultaneously assists in practical problem solving and expands scientific knowledge, as well as enhances the competencies of the respective actors, being performed collaboratively in an immediate situation using data feed back in a cyclical process aiming at an increased understanding of a given social situation, primarily applicable for the understanding of change processes in social systems and undertaken within a mutually acceptable ethical framework*" (Hult and Lenning 1980).

This definition highlights action research as an interventionist approach to the acquisition of scientific knowledge based on a cyclical process. Susman (1983) proposed a five stage process (see Figure 6):

1. diagnosing;
2. action planning;
3. action taking;
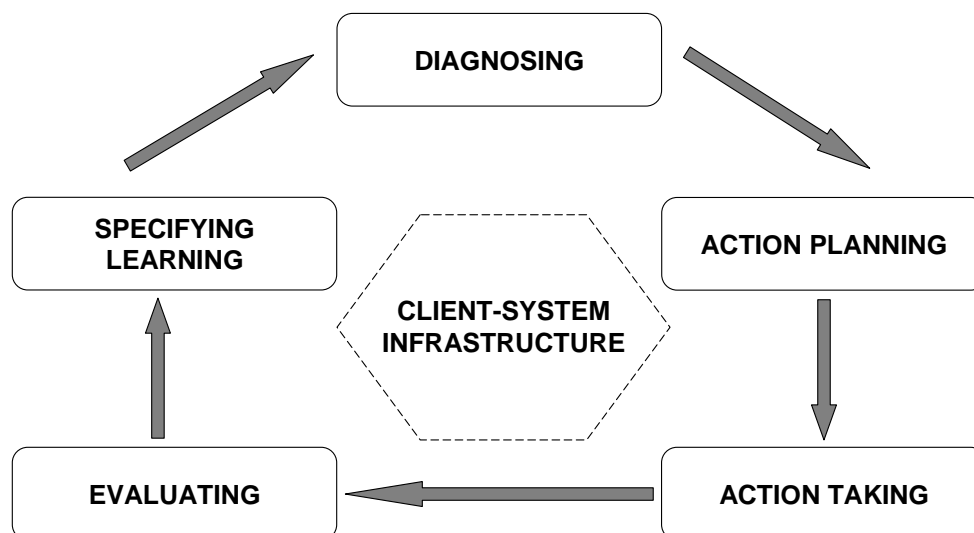4. evaluating;
5. specifying learning.

Figure 6 - The Canonical Action Research Cycle (Baskerville and Wood Harper 1998)

The approach first requires the establishment of the client-system infrastructure.

The client-system infrastructure is the specification and agreement that constitutes the research environment. It provides the authority under which the researchers and host practitioners may specify actions. That includes the determinations of action warrants, power over the structure of the project, and processes for renegotiation and/or cancellation. There are three notable patterns in action research projects (Avison et al. 2007):

- Client dominant. The research team does not hold action warrant, it could recommend and justify action to organizational managers outside the team.
- Staged dominant. The power domination migrates among the action research stakeholders depending on the scope and the field of the action. "*A project that begins rather informally regarding a problem that the practitioner organization does not feel is serious, might initially be dominated by the researcher. As the collaborative team develops organizational awareness of the gravity of the problem […] the power domination may migrate from the researcher into a form of collaborative power sharing. A further, wider scope stage may even migrate power from the collaborative form to a final practitioner dominated form*" (Avison et al. 2007 p. 29).
- Identity dominant. This form means that researchers and the practicing organization professionals are the same people. Researchers are internal members of the practitioner organization, and they already possess the action warrant authority necessary to make the interventions.

Our action research projects are characterized by a "client dominant" pattern. Formally researchers have not the authority to decide actions but the collaborative environment makes it possible to share the power domination and together reach an action definition.

The client-system infrastructure also includes the research domain boundaries, and the entry and exit of the scientists. It may also describe the rules the researchers must follow in the dissemination process of the learning that is

gained in the research. This infrastructure should also define the client's and researcher's responsibilities to each other. The research scientists work closely with practitioners who are located within the client-system. These individuals provide the subject system knowledge and insight necessary to understand the anomalies being studied.

We define the boundaries of our action research projects using construct space dimensions for IS Performance Management, which are a synthesis of those proposed by Grover (1996) and Seddon (1999). In particular in each action research project we identified:

- Evaluation perspective.
- Domain under evaluation.
- Unit/Level of analysis.
- Purpose of evaluation.
- Types of data (objective or/and perceptual).
- Evaluative referent.

The responsibility of the project is charged to the host organization even though the researchers are completely committed in the projects and they feel accountable for the success or failure.

Finally, the agreement between the researchers and the client sets out that researchers can publish the results of the projects and use them in other research but only after the approval of the client organization in order to verify that no confidential information will be disclosed.

There is no limitation in the use of the results as long as researchers do not disclose the names of the companies that participated in the research. For this reason, in this thesis, we have not used the real name of the client organizations.

The second stage is diagnosing, which corresponds to the identification of the primary problems that are the underlying causes of the organization's motivation for change. This involves a self-interpretation of the complex organizational problem that lead to the development of certain theoretical assumptions about the nature of the organization and its problem domain.

In our action research projects we collect formal and informal documents about Business Strategy, IT Strategy and existing methods of performance evaluation. In order to understand the organizational context and praxis, which are not formalized, we conducted interviews with managers, professionals and key users who could explain "*theory-in-use versus espoused-theory*" (Baskerville and Wood Harper 1998). Finally we used participatory observation in order to collect data.

By collecting this information we can identify contingency variables such as strategy, structure, environment and technology that are independent variables affecting the selection of IS success dimensions (DeLone and McLean 1992, Sugumaran and Arogyaswamy 2004).

Therefore, this phase allows us to identify possible problems and impediments to action research projects, build our understanding of the organizational context and working hypotheses, and provide the necessary information to the next phase: action planning.

Action planning specifies organizational actions that should relieve or improve these primary problems. The discovery of the planned actions is guided by the theoretical framework, which indicates both the desired final output and the actions/changes that would achieve such a final output. The plan establishes the target for change and the approach to change.

Our Research framework highlights the dimensions and measures that could be considered in order to design IS Performance Management Systems and the prerequisites of implementing them, e.g. IS management tool, explicit IS strategy and IS service level agreement.

A clarification of the prerequisites is essential because it shows the infrastructure on which it is possible to build up IS Performance Management Systems. We speak about "infrastructure" not in technical terms but rather in reference to all the conditions (organizational, technical and managerial) that allow the project to be successfully completed. The construction of the missing infrastructure part is the task of our action research because problems arise in this activity. These problems, and how they are solved, affect the shape of IS

Performance Management Systems. Therefore the framework attempts to point out those factors which could impact on the choice of IS performance dimensions and measures, and thus on their relevance for IS performance measurement scopes.

The subsequent chapter gives a detailed description of the Research framework underlying our research and its application in the iterative action research process.

The "Action taking" stage then implements the planned action. Researchers and practitioners collaborate in active intervention into the organization, causing certain changes to be made.

Once the actions are completed, the researchers and practitioners evaluate the outcomes. This includes "*a determination of whether the theoretical effects of the action were realised, and whether these effects relieved the problems. Where the change was successful, the evaluation must critically question whether the undertaken action, among the myriad routine and non-routine organizational actions, was the sole cause of success. Where the change was unsuccessful, some framework for the next iteration of the action research cycle should be established*" (Baskerville and Wood Harper 1998 p.97).

While the activity of specifying learning is formally undertaken last, it is usually an ongoing process. The knowledge gained from the action research can be directed to three subsequent scopes:

- the restructuring of organizational norms to reflect the new knowledge gained by the organization during the research (Argyris and Schön 1978);
- foundations for diagnosing in preparation for further action research intervention;
- knowledge important to the scientific community for dealing with future research settings, based on the success or failure of the Research framework.

Therefore, the action research cycle can continue to develop further knowledge on the organization and the validity of relevant theoretical frameworks. "*As a*

result of the studies, the organization thus learns more about its nature and environment, and the constellation of theoretical elements of the scientific community continues to benefit and evolve" (Baskerville and Wood-Harper 1996 p.97).

2.6 Action Research Criteria

Action researchers attempt to find relevance in their results by committing to a particular problem situation. This, unfortunately, leads to the following limitations and pitfalls (Baskerville and Wood-Harper 1996):

1. lack of impartiality on the part of the researcher;
2. lack of rigor;
3. mistaken for consulting;
4. context-dependency leading to a difficulty in generalizing findings.

Therefore, many researchers have tried to design criteria that avoid the limitations and pitfalls presented above (Lau 1999). Iversen et al. (2004) formulated the following criteria guiding action research process:

- Roles. An action researcher "*acts and simultaneously observes himself acting*" (Mansell 1991 p. 30), thus it is important to clarify the researchers' role and which activities they are involved in. "*Clarifying roles can help establish researchers' impartiality and explicate the discipline in collaborating with practitioners*" (Baskerville and Wood-Harper 1996).
- Documentation. Describing the data collection approach is a key element that distinguishes research from consulting (Baskerville and Wood-Harper 1996). "*There are two kinds of processes to record in social action research, the learning process of the host [practitioners], and the discovery and interpretation process of the guest*" (Jönsson 1991 p. 391). In order to collect relevant data, various types of data collection techniques can be used in action research such as interviews, observations, document reviews, focus groups, surveys on experiments and diary writing (Jepsen et al. 1989, Lau 1999, Mathiasen 2002).

- Control. Control issues are extremely relevant when making sense of the research process and its outcomes. Avison et al. (2001) proposed three control structures that researchers should be aware of and report on:
  - o control over initiation which may be (1) by the researchers (if they have theories or approaches to be tried in practice), (2) by the practitioners (if they are facing difficult problem situations) or (3) evolve from existing collaboration;
  - o determination of authority (see paragraph 2.5);
  - o the degree of formalization which may be characterized by (1) formal contracts between researchers, practitioners and the client organization, (2) informal agreements and commitments between the partakers or (3) the formality evolving over time as part of the action research process.
- Usefulness. Establishing the usefulness of action research results supports the impartiality of the action research, represents the pragmatic basis for evaluating action research and creates a baseline upon which the results might be transferred (Nielsen 2007). As a matter of fact, Checkland (1981 p. 253) states that the *"criterion by which the research was judged internally was its practical success as measured by the readiness of actors to acknowledge that learning had occurred, either explicitly or through implementation of changes"*.
- Theory. Checkland and Holwell (1998 p. 24) argue that "*it is clear that the recognition that the changes have occurred and lessons have been learnt will be much helped if we have declared in advance the intellectual framework within which 'lessons' are defined*". Therefore relating results to existing frameworks supports the impartiality of our research and provides a basis for discussing the transferability of results.
- Transfer. Creating clear conditions for the transferability of results addresses the context-dependency of action research and highlights the limitations of the generalization of research findings. In order to do that it is necessary to relate results to existing bodies of knowledge, and

explicate the research contribution and the general characteristics of the findings and the conditions for transferring them to other situations.

The application of these criteria to our action research projects is described in the following pages.

The action research projects are undertaken in a collaborative environment, according to the characteristics of canonical action research. The researchers are in charge of and select the research approach, develop the theoretical framework and undertake the final phase of specifying learning. Whereas both the researchers and practitioners are involved in the diagnosing stage, action planning, action taking and evaluation of the result. The researchers do not have the power to decide what actions to take but they guide the practitioners through the research course and thus they must be proactive and suggest possible actions to the practitioners, consistently with the theoretical framework.

The data collection is carried out through recorded interviews with the CIO and IS staff (managers and professionals), the review of formal and informal documents on business and IS strategy, the organizational structure of the companies and IS department, procedures and structured rules, and so on. The last technique is participatory observation.

Referring to the control issue, action research projects are initiated by researchers, even though the host companies faced IS evaluation problems. The practitioners have the decision making warrant, thus it shapes a "Client dominant" pattern and the relationship between the researchers and host organization is regulated by a formal contract.

The Usefulness of the results is evaluated at the end of the projects by seeking elements and references, in the host organization documents, on its perception and evaluation of the usefulness of the developed IS Performance Management Systems, and monitoring the subsequent usage of the research results by the host organization.

The Research framework used in the research will be presented in the next chapter.

Criteria for the Principle of the Researcher–Client Agreement
• Did both the researcher and the client agree that CAR was the appropriate approach for the organizational situation?   • Was the focus of the research project specified clearly and explicitly?   • Did the client make an explicit commitment to the project?   • Were the roles and responsibilities of the researcher and client organization members specified explicitly?   • Were project objectives and evaluation measures specified explicitly?   • Were the data collection and analysis methods specified explicitly?
Criteria for the Principle of the Cyclical Process Model
• Did the project follow the CPM or justify any deviation from it?   • Did the researcher conduct an independent diagnosis of the organizational situation?   • Were the planned actions based explicitly on the results of the diagnosis?   • Were the planned actions implemented and evaluated?   • Did the researcher reflect on the outcomes of the intervention?   • Was this reflection followed by an explicit decision on whether or not to proceed through an additional process cycle?   • Were both the exit of the researcher and the conclusion of the project due to either the project objectives being met or some other clearly articulated justification?
Criteria for the Principle of Theory
• Were the project activities guided by a theory or set of theories?   • Was the domain of investigation, and the specific problem setting, relevant and significant to the interests of the researcher's community of peers as well as the client?   • Was a theoretically based model used to derive the causes of the observed problem?   • Did the planned intervention follow from this theoretically based model?   • Was the guiding theory, or any other theory, used to evaluate the outcomes of the intervention?
Criteria for the Principle of Change through Action
• Were both the researcher and client motivated to improve the situation?   • Were the problem and its hypothesized cause(s) specified as a result of the diagnosis?   • Were the planned actions designed to address the hypothesized cause(s)?   • Did the client approve the planned actions before they were implemented?   • Was the organization situation assessed comprehensively both before and after the intervention?   • Were the timing and nature of the actions taken clearly and completely documented?
Criteria for the Principle of Learning through Reflection
• Did the researcher provide progress reports to the client and organizational members?   • Did both the researcher and the client reflect upon the outcomes of the project?   • Were the research activities and outcomes reported clearly and completely?   • Were the results considered in terms of implications for further action in this situation?   • Were the results considered in terms of implications for action to be taken in related research domains?   • Were the results considered in terms of implications for the research community (general knowledge, informing/re-informing theory)?   • Were the results considered in terms of the general applicability of Canonical Action Research?

Table 2 - Criteria for Canonical Action Research

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Finally the transferability issue is faced using the framework proposed by Modol and Muniategui (2008) which shows four "structural configurations" that can characterize the setting in which IS phenomena occur. The framework is based on two dimensions: rules and power. In particular rules can be formal, formulated and shared by the players that constitute the social setting, and unshared. Whereas, power can be symmetric or asymmetric, which means that it is the distribution of resources (which constitute the dominant structure and from where power is exercised) that is symmetric or asymmetric.

In order to ensure the rigour and relevance of our action research, we also considered the 5 principles elaborated by Davison et al. (2004):

1. Principle of the Researcher–Client Agreement.
2. Principle of the Cyclical Process Model.
3. Principle of Theory.
4. Principle of Change through Action.
5. Principle of Learning through Reflection.

These principles can be articulated in 31 criteria which are listed in Table 2.

3.   Research Framework

Starting from the literature review presented in Chapter One, we have built a Research framework that has two aims:

- to provide a wide set of IS Performance dimensions and measures which can support companies in the design of their IS Performance Management Systems;
- to identify the factors (internal and external; explicit and implicit) which affect the choice of IS Performance dimensions and measures, and as a consequence the shape of IS Performance Management Systems.

Figure 7 depicts the Research framework, but does not list the IS Performance dimensions and measures included in the Measurement Areas, and the contingency, IS and Relational variables that will be described in the following sections.
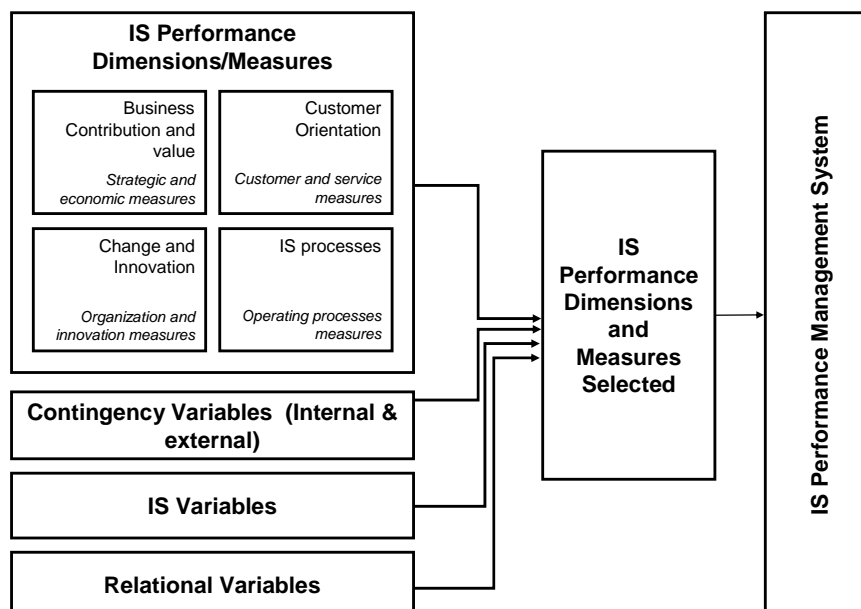
Figure 7 – IS Performance design model

3.1 IS Performance dimensions and measures

In order to reach the first objective, we synthesized previous studies and built a model organized into four Measurement Areas according to the Balanced Scorecard concept (Kaplan and Norton 1996), but in these areas we attempted to gather all the measures and dimensions that we found in the literature. The four Measurement Areas are as follows:

- Business contribution and value, whose mission is to demonstrate to stakeholders how IS processes support strategic objectives and improve organizational performance.

- Customer Orientation, which assesses the degree to which internal/external customers are satisfied with IS services.

- IS Processes, which evaluate if IS processes are efficient, complete and of high quality.

- Change and Innovation, which inquires if the IS department is equipped with the necessary resources to deliver organizational and technical innovation.

The "Business contribution and value" Area is focused on the measurement of IS contribution to achieving business goal and to improving organizational performance. Here we especially gather measures proposed by the IS Pay off literature and by the stream research started with McLean and DeLone. Some examples are:

- Operating cost reductions.
- Staff reduction.
- Overall productivity gains.
- Increased revenues.
- Increased sales.
- Increased market share.
- Increased profits.
- Increased Stock price.
- Increased work volume.

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This Area also includes measures on Control IS expenses and the Business Value of IS projects (Van Grembergen and Van Bruggen 1997):

- Return on investment.

- Percentage above or within the budget.

- Index of allocation of the IS budget

- IS expenses per staff member.

- Distribution of IS investments between new developments, infrastructure and replacement investment.

- Percentage of the development capacity engaged in strategic projects.

The "Customer Orientation" Area is focused on the answer to internal and external IS users' needs.

If the previous Area generally uses quantitative measures, in this Area perceptual measures are more common to measure User satisfaction (Weill 1992, DeLone and McLean 1992) and Service Quality (Pitt et al. 1995). For example through surveys companies can investigate the customer satisfaction connected to specific applications, the overall application portfolio, information (difference between information needed and received, quality, relevance, usefulness, understandability, readability, clarity, format, accuracy, precision, reliability, currency and timeliness etc.), IS support with decision making and IS Services, etc.

The Individual impact measures (DeLone and McLean 1992) could be included in this area. Generally these measures are collected through surveys which have the aim of discovering the perception of each person on IS applications, IS services and their contribution to individual tasks and activities (operating and decision making). Some examples are:

- Decision effectiveness (Decision quality, Improved decision analysis, Correctness of decision, Time to make decision, Confidence in decision, Decision making participation).

- Improved individual productivity.

- Change in decision.

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- Causes management action.
- Task performance.
- Quality of plans.
- Individual power or influence.
- Personal evaluation of IS.

Notwithstanding this, it is also possible to use some of the quantitative measures that DeLone and McLean proposed to evaluate Information Use:

- Number of inquires.
- Amount of connect time.
- Number of records accessed.
- Frequency of report requests.
- Number of reports generated.
- Regularity of use.

In this Area quantitative measures on the IS Service Level could be also relevant in order to compare the perception of the Service Quality with the reality (quantitative and objective measures) (Van Grembergen and Van Bruggen 1997).

The use of these measures is only possible in those companies where an IS Service Level Agreement between the IS department and User departments is set up. Where it is not, the relevance of this measurement drops because there is no threshold, defined by both the IS department and User departments, that represents the limit beyond which users are satisfied.

The "IS Processes" Area is focused on the efficiency of the IS department in terms of technological and human IS resources (Melville et al. 2004) and their employment in IS processes.

Therefore in this Area there are technical measures which evaluate what DeLone and McLean called "System Quality", i.e. Data accuracy, Data currency, System accuracy, System flexibility, System reliability, System sophistication, Integration of systems, System efficiency, Resource utilization, Response time and Turnaround time.

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Other relevant dimensions are:

- the workload of IS professionals and capacity saturation;
- the employment of IS Human resources on critical activities or projects;
- speed in execution;
- backlog;
- project management capability;
- application management capability;
- problem management capability;
- optimization of technological resources.

The last measurement Area is "Change and Innovation". It is focused on the ability of the IS department to ensure up-to-date Information Systems from both the technical and organizational point of view, which are able to change with the company's needs and support Business Strategy.

This Area collects measures on:

- the permanent education of IS staff (i.e. the number of educational days per person, the educational budget as a % of the total IT Budget);
- the expertise of the IS staff and their skills (i.e. the number of years of IT experience per staff member, IT staff age pyramid, skill gaps);
- organizational climate (i.e. IT staff satisfaction, turn over, rate of absenteeism);
- age of the applications portfolio (i.e. the number of applications per age category, the number of applications less than 5 years-old);
- research into emerging technologies (i.e. percentage of the budget spent on IT research or prototyping).

The measures are aimed at evaluating the readiness of the IS department to seize upon new technological opportunities in order to improve the efficiency of business processes, but even at supporting the development of innovative services and products which can suggest new business and competitive strategies. This should be the guarantee that IS departments are able to maintain their role in the organization and continue to perform it in the same way, or better.

3.2 Variables affecting the design of IS Performance dimensions and measures

The second part of our Research framework aims to highlight the factors that affect the shape of IS Performance Management Systems in order to investigate their real impact on the choice of IS Performance dimensions and measures.

In particular we have identified three types of variables/factors:

- contingency variables;
- IS variables;
- relational variables.

According to Weill and Olson (1989) the contingency variables are: (1) business strategy, (2) organizational structure, (3) size, (4) external and internal environment, (5) Technology (type of IS or technological sophistication), (6) Individual (individual differences, personality factors, social support and organizational stresses) and (7) task (types of activities to be supported by information systems). Several researchers introduced these types of variables in their Selection Model of IT success dimensions and measures (Saunders and Jones 1992, DeLone and McLean 1992, Myers et al. 1997, Sugumaran and Arogyaswamy 2004).

IS variables refer to specific characteristics of the IS department. As a matter of fact we believe that these types of factors do not affect only IS Performance (Soh and Markus 1995) but even IS Performance Management Systems.

In their IS assessment selection model Saunders and Jones (1992) included variables such as IS Executives Hierarchical Placement and the size and structure of the IS department. Other researchers suggested that other variables that also referred to the IS department may impact on the relevance and usefulness of IS Performance measures: the maturity of the IS department[4] (Mahmood and Becker 1985), IS management expertise, IS end-user skills, the

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[4] The maturity of the IS department can be evaluated through the variables of the Capability Maturity Model (Humphrey 1989): policy, standard, process, procedure, skills and tools.

strategic role of IT, IS budget size, climate (Davis and Hamann 1988, Harris and Katz 1991, McKeen et al. 1994, Premkumar and King 1994, Scott 1977, Weill and Olson 1989, Zmud 1979, Myers et al. 1997), formalized rules and procedures, differences between procedures in use and espoused procedures, IS operational and managerial capabilities (Francalanci and Galal 1998, Tippins et al. 2003, Banker, et. al. 2006, Tanriverdi 2005) and the IS outsourcing strategy (Bardhan et al. 2006, Rai et al. 2006).

The third category of variables refers to the existing relationships inside the IS department and between the IS department and User departments. Previous studies suggest considering variables like Top management support, user participation/involvement, power balance and the delegation system with regard to IS contents and managerial decisions (Saunders and Jones 1992, Weill 1992, Myers et al. 1997, Sugumaran and Aroyaswamy 2004).

Reviews of the literature and analyses of the studies reveal that all IS assessment models aim to define "appropriate" dimensions and measures. Appropriate means relevant and useful to the evaluator in order to understand the IS impact on organizational performance. The final goal is to develop an "*algorithm for selecting the appropriate dimensions and measures*" (Myers et al. 1997) in order to provide the most relevant, reliable, and representative set of IS performance dimensions and measures that refer to the specific internal and external environment of the organization considered. These considerations imply clarity and a willingness to pursue organizational goals rather than private aims, and that only one appropriate set of dimensions and measures exists for a company.

We do not believe this assumption to be completely true, thus our research aims to investigate how individual, unit or department interests affect the choice of the "appropriate" set. In particular we attempt to study this phenomenon using the Relational variables of our Research models which emphasize the climate between the IS department and User Departments and the existence of organizational tension which can lead people to take the defensive rather than promote a collaborative context.

3.3 Application of the Research Framework

The Research Framework described in the preceding sections defines the stages of the canonical action research cycle presented in Chapter Two.

In the first diagnosing stage researchers and practitioners attempted to collect information about the (internal and external) Contingency, IS and Relational variables in order to understand the context in which the research takes place, and to start to define the "appropriate" set of IS Performance dimensions and measures starting with the ones included in the framework.

We believe that the list of dimensions proposed can be considered complete, but we are not confident enough to state the same for the list of measures because the measures definition activity could lead to the creation of new ones that are strictly dependent on the contingency, IS, and relational variables.

In the following action planning stage, researchers and practitioners design the "appropriate" set of IS Performance dimensions and measures and start to analyze its implementation needs.

Figure 8 shows, for each Measurement Area, the IS Strategic and Management tools necessary to calculate the measures proposed.

The fulfilment of the measures of the "Business Contribution and Value" Area requires data referring to the alignment between the business strategy and IS, and to the relation between Business Performance and IS cost/investment which can be found in the IS strategy plans, IS MasterPlan, IS Planning and Budgeting, IS Portfolio Management, IT Asset and Liability (tangible and intangible) Management and Compliance Policies.

The necessary data to fulfil measures in the "Customer Orientation" Area can be found in the IS Strategic and Management tools concerning the relationship between the IS department and User departments such as Internal SLA, Service Contracts, Customer survey, IS services catalogue, Demand Management Procedures and IS accountability rules.
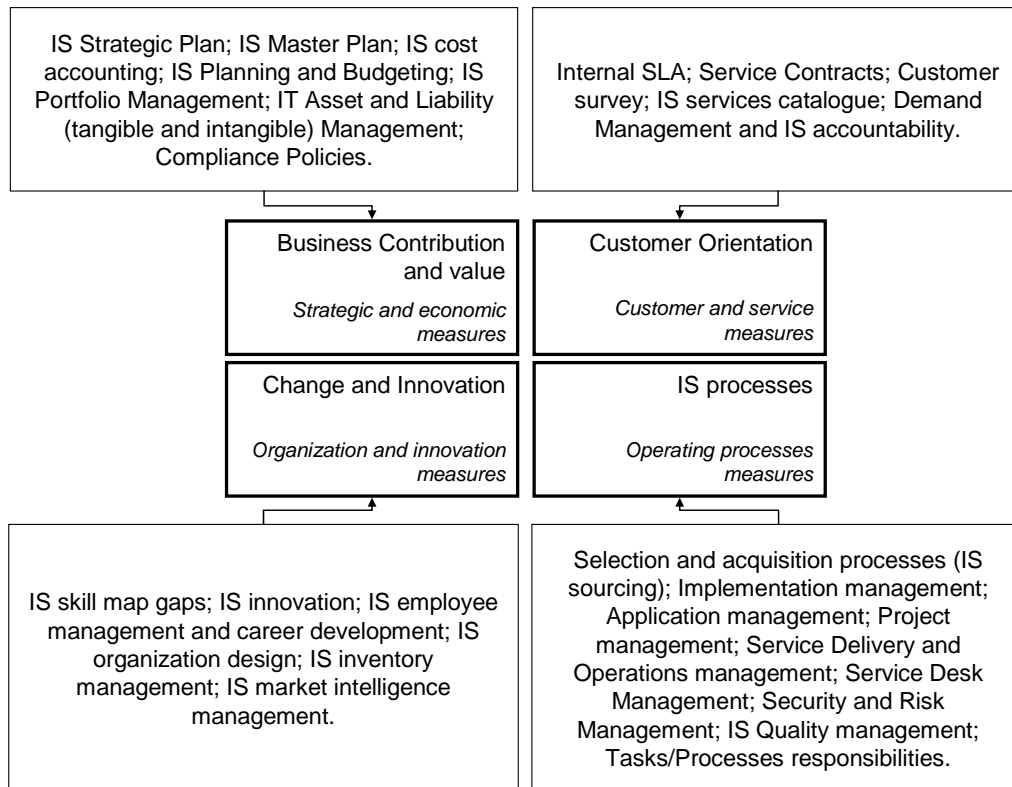
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IS Strategic Plan; IS Master Plan; IS cost accounting; IS Planning and Budgeting; IS Portfolio Management; IT Asset and Liability (tangible and intangible) Management; Compliance Policies.	Internal SLA; Service Contracts; Customer survey; IS services catalogue; Demand Management and IS accountability.
Business Contribution and value *Strategic and economic measures*	**Customer Orientation** *Customer and service measures*
Change and Innovation *Organization and innovation measures*	**IS processes** *Operating processes measures*
IS skill map gaps; IS innovation; IS employee management and career development; IS organization design; IS inventory management; IS market intelligence management.	Selection and acquisition processes (IS sourcing); Implementation management; Application management; Project management; Service Delivery and Operations management; Service Desk Management; Security and Risk Management; IS Quality management; Tasks/Processes responsibilities.

Figure 8 - IS Strategic and Management tools concerning each Measurement Area

The measures concerning the "IS processes" Area, on the other hand, require data from the tools that manage and monitor the IS processes: Selection and acquisition processes (IS sourcing), Implementation management, Application management, Project management, Service Delivery and Operations management, Service Desk Management and Tasks/Processes responsibilities. Other important data for this Area comes from the Security and Risk Management tool and IS Quality management tool.

Finally, measures concerning the "Change and Innovation" Area are calculated by gathering data from tools that support the management and development of IS staff (career and skills), and the monitoring of IS innovation (updating of the ICT infrastructure and IS application, and IS testing). Some examples are: IS skill map gaps, IS innovation, IS employee management and career development, IS organization design, IS inventory management, and IS market intelligence management.

The analysis of the tools presented above is necessary to identify missing or immature IS Strategic and Management tools and plan actions in order to build or develop them. Through this assessment we can collect additional useful information about some of the IS variables in the Research Framework. For example, the presence of the Service Level Agreement and Customer Survey shows significant attention to the IS customer, and at the same time a high IS awareness of User departments and user participation and involvement. Whereas unstructured project management, service desk, and Service Delivery management tools are signals of a low IS maturity.

Apparently this course could be linear, but we do not believe that all the variables in our Research Framework can be found in an only diagnosing stage as many of them are not explicit or practitioners are not willing to speak about them.

Consequently, we must learn through interaction and observation. We can study their reaction during the project, social dynamics and their resistance and inclinations towards actions proposed.

Therefore the process becomes iterative. Starting from an appropriate set of IS Performance dimensions and measures, we can study in an iterative cycle what actions are necessary to implement it, how the variables included in our framework offer resistance to the construction of missing input and attempt to modify the appropriate set, and in what way actions could be taken to find a solution to the problems that have arisen and avoid the modification of the set of dimensions and measures.

4. AudioEntertainment Action Research Project

AudioEntertainment[5] is a global electronics group engaged in the development, design, manufacture and sale of electronic equipment, instruments and devices for the consumer and industrial markets.

It operates through four segments: electronics (audio-visual, informational and communicative equipment, instruments and devices), game (portable game consoles and related software), motion pictures (image-based software), and Financial Services (life, home, automotive and medical insurance).

AudioEntertainment is the worldwide leader in consumer and professional electronics due to is strong Brand awareness. The group, which employees 163,000 people, operates globally in over 204 counties across Japan, North America, Europe and Asian countries, and is headquartered in Japan. It recorded revenues of approximately 75 billion euros during the fiscal year ended March 2007. In Italy it generated revenues of 700 million euros and actually employs 370 people.

Its Business Strategy is focused on positioning the company as the leading global provider of networked consumer electronics and entertainment. In particular, the company focused on strengthening core businesses, changing the customers' Audio and Visual Experience, which should lead to a general improvement of customer experience, enhancing network initiatives and leveraging international growth opportunities to build for the future and drive further growth and profits.

The Italian subsidiary has to implement Global Business Strategy in the local market, which is rather complex and fragmented. The organizational structure encompasses three Business Units (consumer electronics, professional

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[5] AudioEntertainment is a fictitious name. We have not used the real name of the company for the reasons explained in Chapter Two.

technologies and MPE), and traditional functional departments like Human Resources, Purchasing, Information Systems, and Administration and Control.

The Italian IS department reports to the Chief Financial Officer but there is also a functional relation with the EMEA IS department located in London, which is in charge of ERP application services, worldwide integration projects, and defining global policies and procedures. The Italian IS department consists of 20 people and is divided into 3 main units: Business Application is in turn divided into sub-units referring to the main business processes, IT Operations and Support, and IT Infrastructure. Its principal role is to support business processes assuring that corporate applications are effective in the local context, making customizations if necessary, and to develop specific applications where IS users need them so as to complete the IS applications portfolio. In 2006 the Italian IS budget corresponded to 1.1% of revenues. This percentage included the costs for IS services provided by the EMEA IS department.

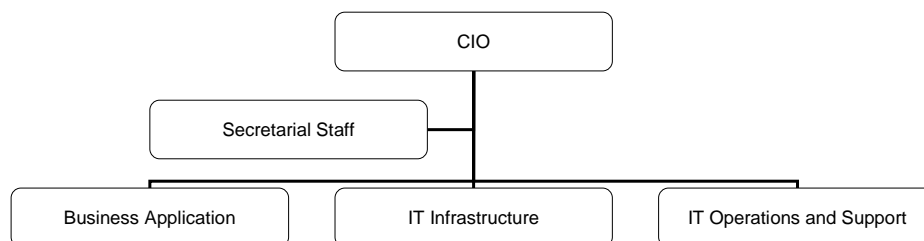Figure 9 shows the Italian IS department organigram.

Figure 9 - Italian IS department organigram

IS users are heterogeneous because they are AudioEntertainment employees, freelance sales agents, distributors and resellers, and AudioEntertainment final clients. As a result, the IS department has to answer different types of needs: supporting internal managerial and operating processes, which could also involve external persons as in the case of the sales process, providing data and service to external players (e.g. distributors and re-sellers) so as to apply an integrated supply chain approach, and finally providing services to final consumers with the aim of improving their brand loyalty.

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4.1 Project Objectives and boundaries

In AudioEntertainment corporate control is quite strong, as is attention to expenditure. Therefore every year subsidiaries, or better each department of the subsidiaries, is subjected to a rigorous internal auditing process.

In 2005 the Italian IS department received a poor evaluation from the audit team because, although the in-depth analysis conducted in all Italian subsidiaries revealed the relevance of the IS contribution in the success of business processes, there was no proof or data to support this perception. Therefore, in May 2006, the Italian CIO decided to start a project that would provide data on the effectiveness and efficiency of IS to show the audit team the following year.

The project was sponsored by the CIO and its primary goal, as described above, was to answer audit team questions. As a result, the main evaluation perspective was that of the CIO, but the aim was to share the IS performance measures with the Directors of User departments in order to formalize and stimulate the already existing collaborative environment.

This project was also a good opportunity to demonstrate the strategic and critical role of the Italian IS department to the European Headquarters. The motivation behind this secondary goal was in the evident trend to centralize and standardize IS activities thereby reducing the size and importance of local IS organizations.

The domain under evaluation was the Italian IS department and Italian IS services. Corporate IS services, like ERP application services and worldwide integration projects, were outside the boundaries of this project.

The evaluation was conducted from both the department and individual perspective so as to build a complete picture of the effectiveness of IS services, and applied objective and perceptual measures. The CIO considered perceptual measures essential in order to highlight the collaborative and positive climate between the IS department and User departments, which was a sign of the great effort made by IS professionals to understand business problems and do their

best to support business users in their activities, thinking of solutions first and the critical state second.

Finally, the evaluation would have been conducted every year in order to collect the data necessary for the auditing process, and to assess IS performance improvement over time, comparing past performance to current performance so as to identify weak points to work on.

4.2 Diagnosing

The project started with data collection on the variables affecting the choice of IS performance measures: contingency, IS and relational variables.

The data collection was conducted by analyzing documents that already existed in AudioEntertainment, starting with the competition environment and organizational context.

Afterwards, the project team studied the IS department's organization in terms of outsourcing strategy, (structured and unstructured) procedures, IS management tools (e.g. Project Management, IS Cost Accounting, Help Desk Management and Application Management) and climate. Finally, the analysis focused on the relationship between the IS department and the rest of the company's organization, seeking to evaluate Top management support, user participation and the position of IS decision rights.

In order to collect this data the project team interviewed the IS professionals responsible for the various IS units. This data collection technique is essential to find the practices in use that are not formalized or described in official documents. At the beginning, the researchers included in the project team also evaluated the possibility of using other data collection techniques, such as a questionnaire, but interviews were established as a better method because it is difficult to structure a questionnaire in such a way that it can objectively detect variables such as the maturity of management tools, management expertise, IS skills and the like. In addition, it could actually be considered biased, as the responders were personally involved in the measurements objective. To avoid

bias in the researchers' interpretations of the interview results, each researcher individually analyzed the tape of each interview and coded it so as to retrieve information on variables included in the Research Framework proposed. Finally, the researchers compared their analysis and discussed the differences so as to reach a common result.

Information on the competitive environment and company positioning has already been presented in the previous section of this chapter.

As regards the IS department, the data collection showed strong task specializations between IS professionals, which was also the result of a delegation system established by the CIO. As a matter of fact, even though the IS department was not very large, the CIO built a clear structure of decision rights and task responsibility distribution so as not to be involved in operating activities and instead focus on management activities. He placed particular focus on Human Resources Management because it was one of main points in the AudioEntertainment strategy Agenda (e.g. career and skill development), and on the relationship with User departments and the EMEA IS department. As a result, most of those now in charge of IS Units had started work at AudioEntertainment as IS technicians many years ago and had had the opportunity to improve their competences and to establish a career. Another consequence of this attention to Human Resources was the construction of a highly collaborative and friendly climate in which people were satisfied and felt appreciated.

Notwithstanding the CIO's high management expertise, the maturity of IS management tools was set at medium level due to the size of the department, allowing phenomena (e.g. projects) with spreadsheets and reports handled by the CIO's assistant to be monitored. The size of the IS department, the possibility of applying mutual coordination and the collaborative climate also made it possible to avoid the adoption of strict procedures so as to maintain action flexibility and respond to users' needs better. The EMEA IS department, on the other hand, defined standards and policies, but they only referred to corporate applications and IS services shared among subsidiaries.

The main characteristic of the Italian IS department, which was also the reason for its successful results, was its strong willingness to understand the business issues and become a trustworthy partner for User departments to find solutions or new opportunities to support business processes and the achievement of business goals through technology. Therefore, the involvement of Users in IS projects was extremely high, as was the mutual esteem.

4.3 Action Planning

The aim of this stage was to design an initial set of IS performance measures based on information collected in the diagnosing stage, and then to plan the actions necessary to gather the data required to calculate the measures.

The first step in the design of each Area was to evaluate the usability of measures included in the Research Framework. Consequently the project team sought to devise new possible measures in order that the researchers did not lose the opportunity to enrich their framework and the CIO could design a system completely fitting his company context.

According to the primary goal of producing data for the internal auditing process, the project team initially focused on the "IS Processes" Measurement Area. All measures showing the amount and quality of IS activities could be potentially useful. The IS department did not outsource activities and thus the measures had to cover new development, maintenance, evolutionary maintenance and support activities highlighting efficiency in terms of speed, costs and quality. Therefore the project team considered relevant dimensions such as System Quality, Project Management Capability, Speed in execution and IS staff workload, and identified the following measures:

- Server unavailability percentage.
- Network unavailability percentage.
- Number and severity of incidents and malfunctions.
- Number of application bugs.
- Percentage of incidents solved by first line Support Help Desk.

- Average time to answer user calls.
- Average resolution time for type of incidents.
- Percentage of projects "on time".
- Percentage of projects "on budget".
- Percentage of IS hours allocated to maintenance activities per type of application (operational or managerial).
- Percentage of IS hours allocated to evolutionary maintenance activities per type of application (operational or managerial).
- Percentage of IS hours allocated to projects.
- Backlog.

The data necessary to calculate these measures should have been included in Incident Management, Application Management, and System and Network Management tools. An IS staff timesheet was also necessary in order to be able to quantify the IS staff time allocated to the various activities. The project team was aware that the last tool, i.e. the IS staff timesheet, did not exist, and thus it would have been the first tool to be built.

The second Measurement Area was "Customer Orientation". The project team started to design the Customer Satisfaction dimension and corresponding relevant measures. The Customer Satisfaction dimension was translated into the following measures:

- User satisfaction index referred to IS Service.
- User satisfaction index referred to the Help Desk.
- User satisfaction index referred to the current SLA.

The calculus of these measures would have required several actions in order to collect the necessary data. First of all, the definition of an IS Service Catalogue, and second the planning of a customer survey which implies the definition of a method to evaluate satisfaction and the method through which to conduct the survey. In particular, it was decided that satisfaction would be measured by defining its determinants and asking IS users about their level of satisfaction and the importance of each determinant so as to be able to find the overall

satisfaction level as an addition of each satisfaction judgement weighing up its corresponding importance level.

In "Customer Orientation" the project team also included measures which showed the degree to which the IS department was considered the preferred IS supplier and the level of partnership with users. The "preferred IS supplier" dimension was considered relevant because a part of the IS budget was allocated to User departments that could decide how to spend it and with which IS partner, and thus IS department customer orientation and reliability affected the choice of the IS partner. Instead, "Partnership with users" was a dimension that measured the IS department's efforts to involve users and to be involved by users. In particular the following measures were defined:

- Percentage of applications delivered by the IS department.
- Number of IS projects with mixed project teams (users and IS professionals).
- Percentage of IS hours engaged in meetings with users.

In order to calculate these measures the project team needed data deriving from the Project Management tool and IS Staff Timesheet. Other essential elements were the complete lists of software applications, hardware and IS services not provided by the IS department. These lists are not currently available.

The third analysed Measurement Area was "Change and Innovation". The project team worked on five measurement categories: the organizational climate, the permanent education of IS staff, the expertise and skill of IS staff, age of the application portfolio and research in emerging technologies. In particular, it decided to use the following measures:

- Index of IS staff satisfaction.
- IS department turnover.
- Average age of IS staff.
- Number of educational days per person.
- Percentage of IS budget allocated to education.
- Number of years of IS experience per staff member.

- Percentage of necessary skills covered by IS staff.
- Number of applications for age category.
- Average age of software applications.
- Local application portfolio turnover.
- Percentage of IS budget spent on IS research.
- Percentage of IS hours allocated to IS market intelligence.

Necessary data would have been included in the IS staff skills and development management tool, the Application Management tool and IS Cost Accounting. The IS staff timesheet would also have been useful for this Measurement Area . Finally it would have been necessary to create a survey to discover the level of IS staff satisfaction.

The last Area was "Business Contribution and value". The project team identified Contribution to achieving business goals, IS Costs control, Business Value of IS projects and Contribution to brand awareness as being the appropriate dimensions for this Area. As a result, the following measures were defined:

- Cost reduction percentage.
- Revenues increase percentage.
- IS costs to support core processes.
- IS costs distributed across innovation, growth and run activities.
- IS costs for local applications and EMEA applications and services.
- IS costs for User departments.
- Percentage of IS expenses above or within budget.
- Percentage of projects focused on critical processes.
- ROI of new projects.
- Number of incidences of IS department initiatives in magazines and public events.

The data necessary to calculate the measures presented above should have come from IS Costs Accounting and Project Management Systems. Instead, the

data on the last measure would have been gathered through ad hoc research among IS specialized magazines and reviews.

4.4 Action Taking

The previous action planning highlighted which actions had to be done in order to collect all the necessary data to feed the IS Performance Management System.

The planned actions were:

- data retrieval from Incident Management, Application Management, System and Network Management, Project Management, IS Cost Accounting, IS Human Resources Management and other tools identified in the previous stage;
- building new tools: IS Service Catalogue, IS staff timesheet, Customer Survey and a list of software applications, hardware and IS services not provided by the IS department.

Some problems arose whilst performing these two activities and the researchers' understanding of AudioEntertainment increased.

Some data was not available in the management tools or was scattered over several spreadsheets or required manual elaborations. In other cases it was impossible to gather the necessary data, for example there was no data on staff time saving, the increase of decision effectiveness, the improvement of the quality of business processes and the like, and thus it was not possible to calculate the measures as a percentage of the cost reduction and a percentage of the revenues increase.

Finally, in some cases IS staff members proposed changes, improvements and the broadening of the proposed IS performance measures, for example to obtain, through the customer survey, a personal evaluation of the IS department and IS professionals investigating characteristics such as competences, the

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ability to understand problems, willingness to support IS users and speed in providing a solution.

4.5 Evaluation and further action research cycles

During this first evaluation stage the project team were given the task of analyzing the results of the previous step which could be one of three types:

- measurement result: the project team had to evaluate whether or not the identified measures were really relevant and significant in order to demonstrate a phenomenon;
- problems that arose: the project team had to make an in-depth analysis of the problems that arose, it then started a new research cycle aimed at solving them;
- new opportunities: the project team had to evaluate new opportunities and, if reasonable, add in the action planning.

During this stage researchers improved their understanding of the AudioEntertainment context by analyzing the results obtained through observing (done in previous stages) the social dynamics, reactions to proposals and the existing (explicit or implicit) obstacles to carrying out some of the planned actions. The observation allowed researchers to collect data in order to relate the facts, actions and results to variables included in the Research Framework and investigate what factors affect the choice of IS performance measures, and consequently, the shape of the IS Performance Management System. Instead, the host organization learnt more about itself and its informal mechanisms, and was able to improve its management capability through the development of new tools or the improvement of the old ones.

In subsequent action research cycles, the project team faced problems that had arisen and thus modified the first proposed set of IS performance measures.

Table 3 shows the final set of IS Performance Measures that was implemented in AudioEntertainment.

"Business Contribution and Value"	"Customer Orientation"
Contribution to achieving business goals: • Number of critical applications *IS Cost control:* • IS costs to support core processes. • IS costs distributed across innovation, growth and run activities. • IS costs for local applications • IS costs for EMEA applications and services. • IS costs per staff member. • IS costs per User department. • Percentage of IS expenses above or within budget. *Business Value of IS projects:* • Percentage of projects focused on critical processes. *Contribution to brand awareness:* • Number of instances of IS department initiatives in magazines and public events.	*User Satisfaction:* • Index of user satisfaction referred to IS Service. • Index of user satisfaction referred to the Help Desk. • Index of user satisfaction referred to the current SLA. *User Personal Evaluation:* • Index of perceptual evaluation of the IS department. *Preferred IS Supplier:* • Percentage of applications delivered by the IS department. *Partnership with user:* • Number of IS projects with mixed project teams (users and IS professionals). • Percentage of IS hours charged for meeting with users.
"Change and Innovation"	"IS processes"
Organizational Climate: • Index of IS staff satisfaction. • IS department turnover. • Average age of IS staff. *Permanent Education of IS Staff:* • Number of educational days per person. • Percentage of IS budget allocated to education. *Expertise and skill of IS Staff:* • Number of years of IS experience per staff member. • Percentage of necessary skills covered by IS staff. • Percentage of competence development goals reached in the year. *Age of the application portfolio:* • Number of applications for age category. • Average age of software applications. • Local application portfolio turnover. *Research in emerging technology:* • Percentage of IS budget spent on IS research. • Percentage of IS hours charged for IS market intelligence.	*System Quality:* • Server unavailability percentage. • Network unavailability percentage. • Number and severity of incidents and malfunctions. • Number of application bugs. *Project Management Capability:* • Percentage of projects "on time". • Percentage of projects "on budget". *Speed in execution:* • Percentage of incidents solved by first line Support Help Desk. • Average time to answer user calls. • Average resolution time for types of incidents. *IS Staff workload:* • Percentage of IS hours allocated to maintenance activities per type of application (operational or managerial). • Percentage of IS hours allocated to evolutionary maintenance activities per type of application (operational or managerial). • Percentage of IS hours allocated to projects. • Backlog.

Table 3 - AudioEntertainment IS Performance Management System

In particular the project team made an in-depth analysis of the existing IS Management tools and discussed the opportunity to change them with specific software applications (e.g. Application Management and System and Network Systems) in order to collect more data and automatically feed the IS Performance Management System. The CIO considered the investment too large in relation to the benefits. Some calculus algorithms were therefore changed in order to calculate the measures with the available data; for example server and network unavailability was calculated by considering the data from Incident Management Systems due to the unavailability of the System and Network Systems. As a result, this measure only considered service interruptions reported by users and not all service interruptions, thus its usefulness was reduced.

The construction of the IS staff timesheet also met some obstacles and thus it was only applied for a fixed period of time; IS performance measures were estimated on the basis of the data required to calculate them. On the contrary, a big effort was made to define the IS Services Catalogue and determine the cost of each IS service.

Due to the difficulties of calculating the proposed measures for the "Business contribution and Value" area, the project team decided to substitute them with only one measure, i.e. the number of critical applications, which was simpler to calculate but equally meaningful.

Observation also confirmed a good atmosphere inside the IS department and with user departments, but highlighted the tension between the Italian IS organization and the EMEA IS organization and the willingness to show it the importance of the local IS department in terms of its huge competence and understanding of business processes through the measures included in the IS Performance Management System.

The link between variables included in the Research Framework and the shape of the IS Performance Management System will be discussed in Chapter Eight.

5. MedicalSound Action Research Project

MedicalSound[6] is the worldwide leader in the hearing aids retail and service market. In 2006 it sold around 500,000 articles and had consolidated revenues of nearly 500 million euros. It is a multinational company and present in 10 countries with highly recognised brands. This is a peculiar characteristic of MedicalSound because no other players can boast such a widespread diffusion throughout the world.

MedicalSound has the largest retail and service network with around 2,200 retail outlets, 3,000 service centres, 2,100 licensee network affiliates and 2,500 hearing aid fitting specialists.

Business Strategy is focused on the following points:

- Revenue Growth supported by aggressive marketing strategies towards final customers and stronger relationships with the ENT community, and an aggressive acquisition campaign.
- Optimisation of the current market coverage through rationalisation and strengthening of the existing distribution network, and coverage improvement through local consolidation (e.g. France, Switzerland).
- Increasing Customer Satisfaction through the standardisation of fitting procedures, R&D on innovative application systems and fitting software, and technical and sales training of the Group's Front Line personnel.

IS has become essential in this context because the achievement of this business strategy implies increasing the business process efficiency in order to increase profitability, providing relevant data to businesses so as to improve their effectiveness (e.g. marketing actions), and integrating new companies in a short time so as not to spend too much time and resources on a transition period.

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[6] MedicalSound is a fictitious name. We have not used the real name of the company for the reasons explained in Chapter Two.

MedicalSound has its Headquarters in Italy, which delivers shared services (Supply Chain, Information Systems, Financial & Administration, Human Resources and Organization, and strategic marketing) to the ten country subsidiaries (included Italy). Each subsidiary has its own IS Organization which is sized according to the local market complexity, which hierarchically reports to the Country Manager and functionally to the IS Corporate Department. The IS Corporate department is in charge of defining methodologies, standards and policies of providing software applications able to support the Sales and Marketing processes of subsidiaries, and of supporting the activities of shared services. In 2007 the IS Corporate budget was 1.8% of revenues.

The IS Corporate department consists of 32 employees and is divided into 4 main units: three of them refer to the main business processes (Finance, Control & Human Resources, Supply Chain and Services, Sales and Marketing) which are in charge of understanding user requirements and developing and enhancing specific business applications; the fourth is IT Infrastructure which is responsible for the IT architecture and providing technical support. Furthermore, there are two staff units: IT methodologies, Standards and Policies, and Country Integration Projects. The latter underlines the willingness of the IS Corporate department to support Business Strategy. Figure 10 shows the IS Corporate department organigram.
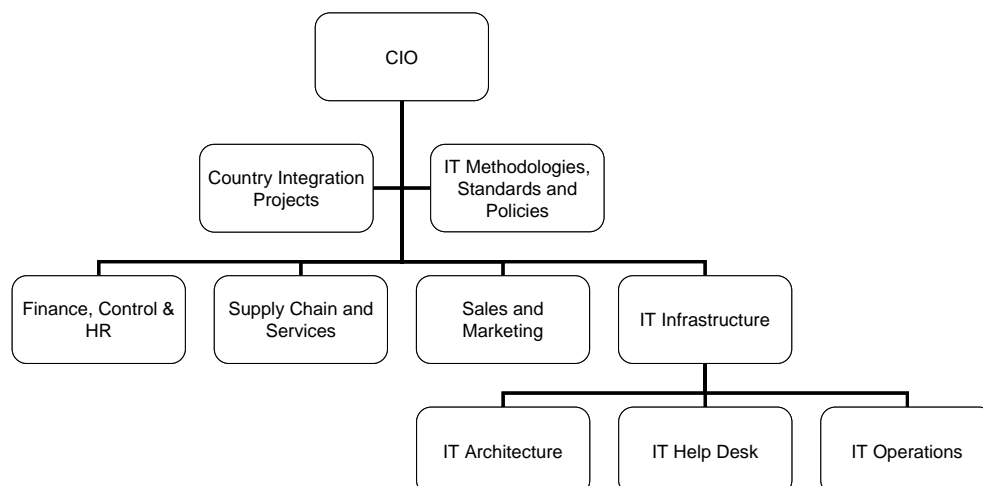

Figure 10 - IS Corporate department organigram

The IS users are quite heterogeneous. Local IS organizations support employees, retail outlets, services centres and licensee network affiliates. On the other hand, the IS Corporate Department supports employees of shared services functions and local IS organizations which should act as an intermediary for their local end users.

5.1 Project Objectives and boundaries

The aggressive acquisition campaign has moved the equilibrium and routine of the IS Corporate department which was sized to serve a fairly stable number of users. The environment complexity has increased, and this new acquisition strategy has been required to perform new tasks for the IS department as well. Furthermore, some companies that were acquired performed very well, and as a result top management was worried about effecting the revenues and profitability reduction, changing organizational structure, procedures or software applications. The same issue was felt by the managing directors of subsidiaries who had to maintain their business performance without relying upon their consolidated and tested organizational and technical structures.

Therefore, IS effectiveness has become a priority in order to guarantee that IS Corporate Services were equal or better than local IS Services, and thus the change of IS could not cause disorganization in the subsidiaries. At the same time top management required assurance of the IS department's ability to support the business strategy and of handling this extra work-load generated by the acquisition campaign.

In this stressful context, the CIO, in agreement with the CEO, decided to stipulate an IS Service Level Agreement with Subsidiary Managing Directors so as to avoid possible future organizational tensions.

Therefore, in October 2006, the CIO launched a project with the objective of defining relevant measures for IS Service effectiveness, in order to assess the current IS performance according to the defined measures, and finally, in agreement with the managing directors, to establish a value threshold for each

measure which had to represent the "minimum" goal in terms of the quality of service that the IS department had to pursue and guarantee.

These bases led to the adoption of several evaluation perspectives: the CIO's perspective was interested in assessing IS department efficiency and effectiveness and defining actions to improve them (e.g. acquiring new resources, optimizing the use of available resources, etc.); the CEO's perspective was interested in the overall IS performance picture and in the tangible IS contribution to the achievement of group business strategy.

The domain under evaluation was the IS corporate department and IS corporate services. Local organizations and their activities were outside the boundaries of this project.

The evaluation was conducted from both the organizational (group and subsidiaries) and individual perspective so as to build a complete picture of the effectiveness of IS services. The goal of arriving at an agreement makes the objective measures more relevant but the idea of using perceptual measures was not ruled out.

Finally, the intention was to conduct an evaluation every six months in order to verify the keeping of the agreement and monitor the IS performance improvements over time.

5.2 Diagnosing

The project started with the analysis of documents which already existed at MedicalSound, in order to collect data on contingency, IS and relational variables.

The project team also interviewed the IS professionals responsible for the various IS areas so as to make an in-depth analysis of the practices and Management tools (e.g. Project Management, IS Cost Accounting, Help Desk Management and Application Management) adopted in the IS Corporate department. Furthermore, in this project, in order to avoid bias in the researchers'

interpretations of the interview results, each researcher individually analyzed the tape of each interview and coded it so as to retrieve information on variables included in the Research Framework proposed. Finally researchers compared their analysis and discussed the differences so as to reach a common result.

Information about the competitive environment and company positioning have already been presented in the previous section of this chapter.

The data collection results for the IS Corporate department showed an extremely complex organization which had to manage different types of relationship. As a matter of fact, it had to interact, inside the company, with top management (CEO, Country managers and shared services departments directors) and local IS organizations, and outside the company with technological suppliers and partners.

The complexity of the relational environment has increased over the last few years with the acquisition campaign, and thus the IS Corporate department had started to tackle the new situation by changing its organisations, introducing new staff units (i.e. Country Integration Projects and IT Methodologies, standards and Policies) and also becoming a coordinator and controller of the various local IS organizations. This process of change not only involved organizational change but also the improvement or development of management and monitoring tools which were not structured well-enough or complete. Top Management gave the IS Corporate department very clear goals, the achievement of which would have highly influenced its future credibility.

In this context the climate in the IS Corporate department was quite tense but the CIO sought to maintain a consensus on IS decisions and the actions to be performed. Tension was also caused by the different backgrounds of IS employees: some of them were able and ready to change their roles and job contents, but others lacked the necessary managerial background to make this change.

5.3 Action Planning

Starting with the Research Framework and the project's primary goal, the project team initially focused on the "Business Contribution and Value" Measurement Area. The project team identified the appropriate dimensions for this Area through contribution to achieving goals, the Business Value of IS Projects and IS Costs control. Thus, the following measures were defined:

- IS costs to support Success Key Factors (acquisition campaign, reinforcement franchising network, customer care and fitting device).
- Percentage of projects per business process.
- IS costs distributed across innovation, growth and run activities.
- IS costs for IS services.
- IS costs for compliance projects.
- Percentage of IS expenses above or within budget.
- Index of IS budget allocation among subsidiaries.

In order to measure the IS contribution to the achievement of business goals the project team used the percentage of IS costs engaged in business goals, as there was no existing data on staff time saving, increased decision effectiveness, the improvement of the quality of business processes and the like. This solution assumed that IS impact depends on the degree of IS investments starting with the assumption that the IS Corporate department is efficient. This measure was considered acceptable because even if the company had had data on time or cost saving, cost reduction and the like, it would not have had the certainty that these results depended on IS investments. The data necessary to calculate the measures presented above should have come from IS Costs Accounting and Project Management Systems, and the project team was confident it would find them.

The second analysed Measurement Area was "Customer Orientation". In this Area the project team started to design the Customer Satisfaction dimension and thus find the corresponding relevant measures. In this first part of the

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project, the Customer Satisfaction dimension was translated into the following measures:

- User satisfaction index.
- Percentage of projects "on time" and "on budget" per type of project.
- Index of respect for the Service Level settled with users per IS service.
- Index of respect for business requirements defined by users.
- Collaboration with users index.

During the first meeting of action planning approval by the CIO, he discarded the user satisfaction index as it was not a priority at that moment, the project's goal being to establish an IS Service Level Agreement with country managers in order to be in a position to pursue the defined IS Services quality and finally to have objective measures with which to evaluate the respect of settled quality levels. The CIO thus preferred to concentrate efforts on defining the quantitative and objective measures and postponed the customer satisfaction survey, which was an extremely time consuming activity as regards the size of the user population.

The calculus of these measures required the definition of the IS Service Catalogue, then, for each IS service, the design of appropriate measures representing the service quality, and finally the establishment of a value threshold necessary to evaluate the achievement of the settled service quality. To feed the Measurement Area, the project team also required data on projects in relation to arranged time and costs, and defined business requirements arising from Project Management tools.

The subsequent Measurement Area in the design process was the "IS Processes" Area, which especially focused on System Quality, Speed of execution, Project Management Capability and IS staff workload. The project team identified the following measures as relevant:

- Unavailability of the server (percentage).
- Unavailability of the network (percentage).
- Response time.

- Number and severity of incidents and malfunctions.
- Number of application bugs.
- Average resolution time.
- Percentage of IS hours charged for innovation, growth, and run activities.
- Index of saturation of IS capacity.

In this Measurement Area, besides the data from Application Management and Project Management, data on IS staff time allocation and the availability of the server and network were necessary.

The last measurement Area was "Change and Innovation". The project team worked on two measurement categories: the organizational climate, the permanent education of IS staff and age of the application portfolio. In particular, it decided to use the following measures:

- IS department turnover.
- Average age of IS staff.
- Number of educational days per person.
- Percentage of IS budget allocated to education.
- Number of years of IS experience per staff member.
- Percentage of necessary skills covered by IS staff.

The project Team did not expect a critical state to occur in order to be able to collect the necessary data to feed this Measurement Area.

5.4 Action Taking

The action planning stage highlighted the following actions to perform in order to collect all the necessary data to feed the IS Performance Management System:

- data retrieval from Application Management, System & Network Management, Project Management, IS Cost Accounting, IS Human Resources Management and other tools identified in the previous stage;
- build two new tools: the IS Service Catalogue and IS staff timesheet.

The project team had some problems in performing these activities. As a matter of fact, some data was not available in management tools, for example the IS cost Accounting system did not allocate IS costs per type of activity (innovation, growth and run) and per Success Key Factor. Other data was scattered over several spreadsheets or required manual elaborations to the project data. Finally, in some cases IS staff members proposed changes, improvements, and the broadening of the proposed IS performance measures, in order to use the data already available and thus render the IS performance management system more complete and rich without huge efforts.

5.5 Evaluation and further action research cycles

During this first evaluation stage, as in the other action research projects, the project team had the task of analyzing the results of the previous step in order to evaluate if the identified measures were really relevant and significant, making an in-depth analysis of problems that arose and starting a new research cycle aimed at solving them, and evaluating new opportunities and adding to the action planning if reasonable. As in the other action research projects, this stage improved the researchers' understanding of the MedicalSound context through the analysis of the results obtained by observing (done in previous stages) the social dynamics, reactions to proposals and the existing obstacles to taking planned actions. They therefore collected new data on variables included in the Research Framework. On the other hand, the host organization learnt more about itself, its users (headquarters and subsidiaries) and improved its management capability by developing new tools or improving the old ones.

In subsequent action research cycles, existing IS Management tools (e.g. IS Cost Accounting, Application Management, and System and Network Systems) were analyzed in-depth and the project team discussed the opportunity of improving them in order to collect more data and automatically feed the IS Performance Management System. According to the IS Corporate department's strategic role, the CIO and CEO considered the investment absolutely necessary

in order to improve control capacity on ICT infrastructure and application. A feasibility study was therefore started.

The first priority was to define the IS Services Catalogue and determine the value threshold for each IS service.

"Business Contribution and Value"	*"Customer Orientation"*
Contribution to achieving business goals: • IS costs to support Success Key Factors (acquisition campaign, reinforcement franchising network, customer care and fitting device). • Percentage of projects per business process. *Business Value of IS projects:* • Percentage of projects on Success Key Factors. *IS Cost control:* • IS costs per staff member. • IS costs distributed across innovation, growth and run activities. • IS costs for IS services. • IS costs for compliance projects. • Percentage of IS expenses above or within budget. • Index of IS budget allocation among subsidiaries.	*User Satisfaction:* • Percentage of projects "on time" and "on budget" per type of project. • Index of respect for Service Level settled with users per IS service. • Index of respect for business requirements defined by users. • Average time to perform Ideation or Feasibility studies. *Partnership with user:* • Index of collaboration with users.
"Change and Innovation"	*"IS processes"*
Organizational Climate: • IS department turnover. • Average age of IS staff. *Permanent Education of IS Staff:* • Number of educational days per person. • Percentage of IS budget allocated to education. *Expertise and skill of IS Staff:* • Number of years of IS experience per staff member. • Percentage of necessary skills covered by IS staff.	*System Quality:* • Server unavailability percentage. • Network unavailability percentage. • Response time. • Number and severity of incidents and malfunctions. • Number of application bugs. *Project Management Capability:* • Percentage of projects "on time". • Percentage of projects "on budget". *Speed in execution:* • Average resolution time *IS Staff workload:* • IS hours per business process. • Percentage of IS hours charged for innovation, growth, and run activities. • Index of saturation of IS capability.

Table 4 - MedicalSound IS Performance Management System

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Instead, the construction of the IS staff timesheet met some obstacles and thus an estimate was made in order to obtain the data necessary to calculate IS performance measures.

Observation also confirmed a tense climate inside the IS department and with user departments due to the difficult situation characterised by radical change and the adoption of new evaluation and relational methods which led the IS Corporate department to come under examination.

The link between the variables included in the Research Framework and the shape of the IS Performance Management System will be discussed in Chapter Eight.

Table 4 shows the final set of IS Performance Measures implemented in MedicalSound.

6.   HomeMarket Action Research Project

HomeMarket[7] is a no-food medium domestic distributor with 110 sales outlets. Its main characteristic is its family business nature. As the matter of fact, the founder entrepreneur is still the Managing Director and half of top management belongs to his family.

It is about the 10th commercial group in Italy with 4700 employees and revenues of nearly 900 million euros.

HomeMarket has very strong brand awareness in Italy and its Business Strategy is focused on improving the current market coverage through the following points:

- first price strategy;
- wide assortment;
- leveraging on furniture products.

At the moment, internationalization is not a strategic point due to a business model firmly and deeply rooted in the local commercial structure.

In this context IS are basic in order to achieve efficiency in business processes and coordination on the provisioning process which is a critical process in the strategy presented above and in which several players are involved.

HomeMarket's organizational structure is typically functional: Administration and Finance, Marketing and Sales, which includes Sales Outlets, Information Systems, Purchasing and Human Resources. Instead, the Sales Outlets structure consists of a Store Director and secretarial staff who perform administrative activities and are engaged on logistic and warehouse

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[7] HomeMarket is a fictitious name. We have not used the real name of the company for the reasons explained in Chapter Two.

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management processes managed by the provisioning department, and finally front line sales personnel.

The IS department reports to the Managing Director and consists of 10 people plus external people who equal 10 Full Time Equivalents. It is divided into 3 main units: Sales Outlet IS Management, IT Infrastructure and Operations, IT Applications and Web Development. The IS budget is actually 0.7% of revenues.
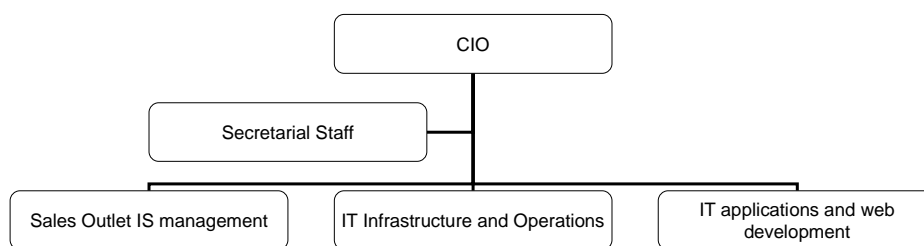
Figure 11 shows the IS department organigram.

Figure 11 - IS department organigram

The IS strategy attempts to involve internal IS professionals in core and value added activities, but to outsource activities like the Help Desk, Facility Management and networking which do not require critical technical skills.

The IS users can be employees of organizational functions or Sales Outlet employees who are administrative staff or front line sales personnel. However, users are always internal at the HomeMarket organization and do not possess significant technology skills.

6.1 Project Objectives and boundaries

HomeMarket is a typical Italian family company where success depends upon the entrepreneur's great and in-depth market knowledge. Generally speaking, IS does not play a strategic role in this type of company and IS investments are quite moderate.

Nevertheless, over the last few years HomeMarket has made several IS investments directed towards the optimization of business processes, updating the ICT Infrastructure, supplying even more user-friendly software applications and centralization of the IS architecture in order to reduce the IS maintenance activities performed by Sales Outlet employees and the problems that could arise from them.

The results of these investments were not so evident because their major beneficiaries were the Sales Outlets located around Italy, and thus it was not possible to receive feedback and comments if not explicitly required. Therefore the CEO asked the CIO to collect data in order that IS effectiveness could be evaluated according to the IS investments made over the last few years.

In February 2007, the CIO launched a project aimed at evaluating the impact of IS on business processes and the IS users' satisfaction.

As the CEO sponsored the project, the primary evaluation perspective was his, but the CIO was also extremely interested in having useful IS performance measures from which to receive evidence of the IS department's weak points to work on. As a consequence, the CIO's perspective was also considered in the design of the IS Performance Management System.

The domain under evaluation was the IS department and all IS services provided to the user departments and Sales Outlets.

The evaluation was conducted from both the organizational and individual perspective so as to build a complete picture of IS services effectiveness, and aimed to use objective and perceptual measures. The CIO was particularly interested in perceptual measures because the distance between the IS department and the majority of IS users made it difficult to be aware of their satisfaction and IS utility perceptions.

Finally, the CEO established that the evaluation would be conducted every year in order to assess IS performance improvements over time, comparing past performance to current performance.

6.2 Diagnosing

The data collection on the variables (contingency, IS and relational) affecting the choice of the IS performance measures set was conducted through the analysis of documents which already existed at HomeMarket, starting with the competition environment. Subsequently, the project team studied organizational variables referred to the company's overall organization and to the IS department (including procedures and management tools in use). Finally, the project team analyzed the relationships between the IS department, Top Management and User departments.

The project team also interviewed the IS professionals responsible for the various IS units in order to collect the information presented above. As in the other action research projects, the researchers included in the project team also evaluated the possibility of using other data collection techniques for this activity, such as a questionnaire, but, especially in this action research project, this choice proved to be appropriate because the management praxis were more informal than formal, IS professionals were used to coordinating with each other through informal communication and the focus was on doing things rather than on the way, in terms of followed processes, in which things were done. Furthermore, in this project, in order to avoid bias in the researchers' interpretations of the interviews results, each researcher individually analyzed the tape of each interview and coded it so as to retrieve information on variables including the Research Framework proposed. Finally, researchers compared their analysis and discussed the differences so as to reach a common result.

Information on the competitive environment and company positioning has already been presented in the previous section of this chapter.

As regards the IS department, the data collection showed that it is quite small and all people were involved in operating activities; it was difficult to find a task specialization, if not in terms of managed technology. The climate was collaborative and the few occasions when tension occurred were managed by the CIO and solved by the parties concerned reaching an agreement. For example,

this project team permanently consisted of three researchers and the CIO. IS professionals were only involved when required because their own responsibility areas were the subject of analysis. But the CIO organized meetings where all the people were present and discussed the work in progress outcomes of the project in order to achieve consensus on the IS performance measures was being defined. The collaborative and reliable environment did not lead to the definition of formal procedures through which to perform activities, and thus the few management tools were rather simple, for example IS accounting, IS portfolio management and IS project management. The IS staff had considerable technical skills but they had not developed managerial skills. Only the CIO had rather high management expertise but he came from the Account Department and hence his focus was more on monitoring the IS costs than on technological aspects. As a result, the IS department was not extremely innovative, but the CIO built several partnerships with IT outsourcers and software houses so as to exploit their updated technological skills as a source of IS innovation.

From the interviews it emerged that Top Management's interest in IS was not very high but there was trust and that contributed to the establishment of a good climate in which to facilitate the discussion of ideas and obtain agreement on better actions to take. Formally, the CEO and Top Management had the IS decision rights, but the CIO had a big influence due to his credibility.

The diagnosing stage showed quite a clear picture of HomeMarket's situation in terms of the external and internal environments. With this information the project team started to design the IS performance measures set suitable for this context and the following actions necessary to implement the overall IS Performance Management System.

6.3 Action Planning

Starting with the Research Framework and the project's primary goal, the project team initially focused on the "Customer Orientation" Measurement Area. In this

Area the project team started to design the Customer Satisfaction dimension and corresponding relevant measures:

- Satisfaction with the IS Service.
- Satisfaction with the Help Desk.
- Satisfaction with the Service Level settled with IS outsourcers.

The calculus of these measures would have required several actions in order to collect the necessary data. First of all, the definition of the IS Service Catalogue and the formalization of IS applications, second the planning of a customer survey, which implied the definition of a method to evaluate satisfaction and the method with which to conduct the survey. In particular, it was decided, as in the AudioEntertainment case, to measure satisfaction by defining its determinants and asking IS users about their level of satisfaction and the importance of each determinant so as to be able to find the overall satisfaction level as an addition of each satisfaction judgement weighing up its corresponding importance level.

The project team also decided to use the customer survey to obtain personal evaluations of the IS department to understand the perception gap caused by the distance between the IS department and the majority of IS users, and personal expectations in terms of improvements in IS application quality and IS professionals characteristics (competences, ability to understand problems, willingness to support IS users and speed in providing a solution). Finally, in this area the project team included Information Use dimensions, using the amount of connect time and the frequency of use as measures.

The second Area to be designed was "Business Contribution and Value". The project team identified the appropriate dimensions for this area as the Application Portfolio, Contribution to achieving goals and IS Costs control. Thus, the following measures were defined:

- Number of critical applications.
- Percentage of projects focused on critical processes.
- IS costs to support strategic goals (e.g. sales of furniture products).
- IS costs per Sales Outlet.

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- IS costs distributed across innovation, growth and run activities.
- Percentage of IS expenses above or within budget.

Some problems arose in the design of measures regarding the return on recent IS investment and the evaluation of IS contributions in the achievement of business goals. As a matter of fact, there was no data on staff time saving, increased decision effectiveness, an improvement in the quality of business processes and the like. The solution that was found consisted of using perceptual measures and finding an answer to this question: according to the IS users, to what extent do IS help them to perform their activities and reach their goal?

The necessary data to calculate the measures presented above should have come from IS Costs Accounting and Project Management Systems. The CIO was confident that the necessary data was present in the former; on the contrary he had some doubts that the latter included all the necessary data. As a result the project team planned to make changes in the Project Management System which was a spreadsheet containing data about projects (start date, allocated resources, work in progress situation, user department involved, project leader and expected deadline).

The subsequent Measurement Area in the design process was the "IS Processes" Area, especially focused on System Quality and Project Management Capability. This choice was coherent with the simple structure of the IS department and with the applied outsourcing strategy giving responsibility to external companies. The project team identified the following measures as relevant:

- Server unavailability (percentage).
- Network unavailability (percentage).
- Response time.
- Percentage of projects "on time".
- Average lead time for projects.
- Percentage of projects "on budget".
- Percentage of IS hours charged for projects.

- Percentage of IS hours charged for maintenance activities.

To feed this Measurement Area data was derived from System and Network Management, Project Management and IT staff time allocation tools. The project team expected some problems due to the immaturity of these tools.

The last Measurement Area, "Change and Innovation", was not so relevant for HomeMarket scopes, and thus a short amount of time was dedicated to it. The project team worked on two measurement categories: the organizational climate and age of the application portfolio. In particular, it decided to use the following measures:

- Number of applications for age category.
- IS department turnover.
- Average age of IS professionals.

The low relevance of this Area for HomeMarket was not only linked to the project's goals but above all to the size of the IS department and the fairly stable context in which the IS department worked, which did not require high levels of innovation. The project team did not expect a critical state to occur in order to be able to collect the necessary data to feed this Measurement Area.

6.4 Action Taking

The action planning was communicated to IS professionals during a meeting in which the entire project team (researchers and CIO) was present. The goal of the meeting was, for the CIO, to assign tasks in order to collect the necessary data (manually or through retrieval from management tools) and to implement or improve the instruments necessary for data collection e.g. the IS Services Catalogue and customer survey questionnaire; for researchers, to observe the reaction to the defined measures set and consequent actions so as to gather more information on the analyzed context and continue to investigate the effect of variables included in the Research Framework on the shape of the IS Performance Management System.

IS professionals, for example, were really worried about the declaration of IS services which meant that the IS department would organize their activities according to a Service Management approach, adopting a user perspective, and would be ready to provide them when required by User departments. For example, the IS department provided training courses on specific IS applications but occasionally an independent request was made, however it was not able to provide training courses upon request, as that would have implied not knowing the number and content of the possible requests. As a result, the IS department's inability to answer within a very short time could become a source of dissatisfaction. On the other hand they agreed that it could be an opportunity to show the complexity and variety of activities that they performed. Another extremely critical point of the action planning was the proposal to ask users for their personal evaluation of the IS department. The relationship between IS professionals and users was not particularly close, especially with regard to the Sales Outlets employees, and they had more opportunities for contact with outsourcer professionals (e.g. help desk operators) than with Internal IS department professionals, and thus their answers may not be particularly relevant in the evaluation of the IS department.

In performing planned actions other problems arose in terms of data availability. As a matter of fact, some data was not available in the management tools (i.e. System and Network Management and IS staff time allocation), and other data was scattered over several spreadsheets or required manual elaborations, as in IS Costs data.

6.5 Evaluation and further action research cycles

During this first evaluation stage, as in the other action research projects, the project team had the task of analyzing the results of the previous step in order to evaluate if the identified measures were really relevant and significant, making an in-depth analysis of problems that arose, starting a new research cycle aimed at solving them, and evaluating new opportunities and adding them to the action planning if reasonable.

As in the other action research projects this stage improved the researchers' understanding of the HomeMarket context through the analysis of the results of observing (done in previous stages) the social dynamics, reactions to proposals and the existing obstacles to taking planned actions. They therefore collected new data on variables included in the Research Framework. Instead, the host organization learnt more about itself, its informal practices and improved its management capability through the development of new tools or the improvement of the old ones.

In subsequent action research cycles, the project team made an in-depth analysis of the existing IS Management tools and discussed the opportunity to improve them (e.g. Project Management and Application Management) in order to collect more data to feed the IS Performance Management System.

"Business Contribution and Value"	*"Customer Orientation"*
Contribution to achieving business goals: • Percentage of projects focused on critical processes. • Number of critical applications. • Index of user perception of IS contribution *IS Cost control:* • IS costs distributed across innovation, growth and run activities. • IS costs per staff member. • IS costs per Sales Outlet. • Percentage of IS expenses above or within budget.	*User Satisfaction:* • Index of user satisfaction referred to IS Service. • Index of user satisfaction referred to the Help Desk. • Index of user satisfaction referred to the current SLA settled with outsourcers. *User Personal Evaluation:* • Index of the perceptual evaluation of the IS department. *Information Use:* • Amount of connect time. • Frequency of use.
"Change and Innovation"	*"IS processes"*
Organizational Climate: • Average company age of IS staff. *Age of the application portfolio:* • Number of applications per age category.	*System Quality:* • Server unavailability percentage. • Network unavailability percentage. • Response Time. *Project Management Capability:* • Percentage of projects "on time". • Percentage of projects "on budget". *IS Staff workload:* • Percentage of IS hours charged for projects.

Table 5 - HomeMarket IS Performance Management System

In this case, the project team did not remotely consider the possibility of automating the loading process of the IS Performance Management System; the investment would have been too large in relation to the benefits. Also the construction of the IS staff timesheet met some obstacles and thus it was applied only for a fixed period of time in order to have an estimate with which to calculate IS performance measures. On the contrary, big efforts were made to define the IS Services Catalogue. Observation also confirmed the good climate inside the IS department, also in relation to Top Management and the rest of the organization.

The link between variables included in the Research framework and the shape of the IS Performance Management System will be discussed in Chapter Eight.

Table 5 shows the final set of IS Performance Measures that was implemented in HomeMarket.

7.   MRI Action Research Project

MRI[8] is a big Italian Insurance Group with 770 agencies in Europe, 2800 employees and 3 billion euros worth of premiums collected in 2007.

The Group, which consists of 8 companies, provides traditional insurance services (automobile, life and other damages) but in recent years it has diversified the business towards banking and real estates services. It operates through a variety of distribution channels: traditional agents, financial advisors, broker and bank channels and the new telephone and Internet channels.

The MRI Group is not only present in Italy but also in Spain and France, and the Group's international presence is going to increase in the years to come.

Business Strategy is focused on the following points:

- Business growth through acquisitions and diversification (i.e. banking and call centres for health insurance services).
- Multichannel strategy, by strengthening and exploiting agency relationships.
- Profitability consolidation through Group re-organization and business process re-engineering.

MRI's business context complexity makes Information Systems even more strategic and relevant as far as maintaining its market share is concerned. The IS department's task therefore becomes more difficult because an increase in IS strategic value leads to an increase in the complexity of IS resources management and the need to consider IS as a service, and consequently the need to apply Service Management rules and practices.

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[8] MRI is a fictitious name. We have not used the real name of the company for the reasons explained in Chapter Two.

MRI's organizational structure is a typical mix of divisions and functions. The divisions refer to the Business Line (automobile, life, non-life, bank, etc.), whereas the functions are shared services such as Information Systems, Human Resources, Accounts and a purchase department. As is typical in their industry, MRI employees are not particularly technology-oriented and IS end-user skills are not so high but, as described before, the technology represents an opportunity, or may be the only chance, for insurance companies to innovate their product and seek a competitive advantage, even if temporary.

MRI has one IS department for all the companies that come under the umbrella of the parent company, and it reports directly to the Managing Director. Furthermore, each company has a small group which is only responsible for providing technical support on site. The IS department consists of 181 internal IS professionals and 340 external staff, with a body rental agreement.

The choice to use body rental agreements instead of outsourcing contracts is consistent with the group culture of maintaining activities in house, and consequently, the necessary competences and skills: through body rental, a portion of the human resource costs becomes variable and flexible, without losing control of IS activities and more importantly the skills and the autonomy to perform them. As a matter of fact, only the service desk activities have been outsourced, but the manager responsible for the Service Desk Unit is an MRI employee who constantly monitors and controls the jobs performed by operators. Finally, there are some external software providers that develop software applications for MRI, but this is justifiable because MRI's trend is to buy software applications available in the marketplace and eventually acquire customizations from the software provider.

The IS department consists of three staff units (Quality and Security Policies Unit, IT Infrastructure Standards and Policies, and Administration and Control) and six Units covering the various phases of a hypothetical IS services value chain (Demand Management, System Integration, Software Factory, IT Infrastructure, Application Delivery and Operations, and Service Desk).
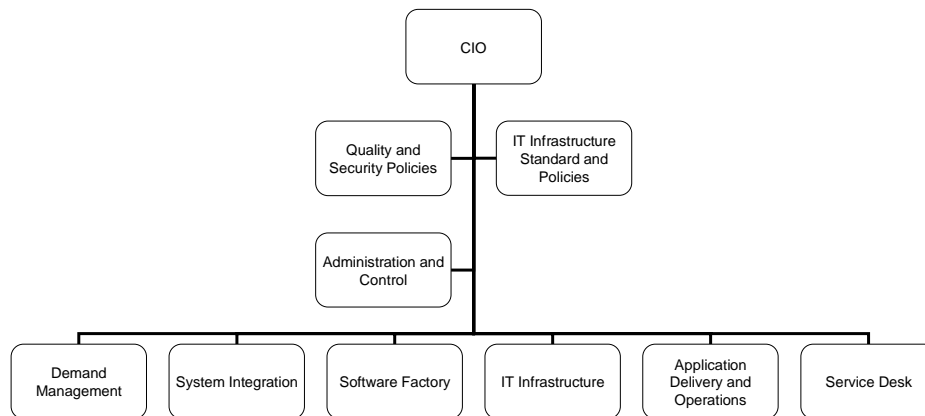
Figure 12 shows the IS department organigram.

Figure 12 - IS Department organigram

IS users are heterogeneous because they are MRI employees, agency employees and MRI clients. Thus the IS department has to answer different types of needs and even the level of knowledge of these needs differs: it is simpler to understand the requirements of internal users than of external and unknown clients.

7.1 Project Objectives and boundaries

In 2005 the IS department started to shift from product driven organization to process driven organization. Therefore IS Service Managers were introduced, being focused on business processes, so as to dispose all-round business process knowledge, to go beyond a "silos" approach and be able to provide services covering all users needs. This approach should simplify the relationship between users and IS professionals because each user essentially has just one Service Manager to refer to, and should provide the IS department with a better understanding of the business complexity and thus they will be able to provide IS services that are more aligned with user needs in terms of supported activities and performance.

Nevertheless, the IS department and MRI organization were not ready to implement this change, manage IS as a service or handle IS performance

indicators. IS people were not used to tracking their activities or guaranteeing quality levels. The IS department could not measure and, as a result, could not know much about its performances. So it would have been difficult to discuss the improvements in performance or in economic and human resources required. On the other hand, Top management and user departments were not particularly interested in analysing how the IS department performed and consequently they did not waste time attempting to understand the peculiarity of the IS environment, even though often they complained about IS services. As a matter of fact, the MRI Group was doing well and so the pressure to reach cost effectiveness and to improve level of quality was not so high, but the situation was changing. In any case, the CIO decided to implement an IS Performance Management System in order to learn how to deal with these new challenges, management practices and work methods and to be ready to answer future questions about IS performance and possible service quality improvement.

The project started in March 2007 with the goal of measuring the efficiency of the IS department and effectiveness of IS services in order to have an initial assessment of IS performance.

According to the project origin, the evaluation perspective adopted in MRI was that of the CIO, even though the final scope is to share IS performance results with Managing Directors of Group Companies so as to achieve agreement on the convenient level of performance considering the cost and benefit analysis. As a result of that, the measures should be understandable to IS users.

The evaluation would be conducted from both the department and individual perspective so as to build a complete picture of the effectiveness of IS services, and would use objective and perceptual measures, even though the internal IS perspective provides more relevant objective measures, which are the subject of eventual negotiations with users to define the quality service level threshold.

Finally, the evaluation would be conducted every year in order to assess IS performance improvement over time comparing past performance to current performance.

7.2 Diagnosing

The first step of the project was to gather information on the competition environment, Business Strategy and the organizational context. Information on the competitive environment and company positioning has already been presented in the previous section of this chapter.

Afterwards, the project team analysed the IS department's organization by studying available documents and interviewing the IS professionals responsible for the various IS units in order to verify if the procedures described in the official documents were really used in practice. Furthermore, in this project, in order to avoid bias in the researchers' interpretations of the interview results, each researcher individually analyzed the tape of each interview and coded it so as to retrieve information on variables included in the Research Framework proposed. Finally, the researchers compared their analysis and discussed the differences so as to reach a common result.

The IS department was an extremely large organization in which task specialization among IS units was well defined. Coordination among the several IS units was managed through formal procedures which should have reduced the tension among them. These formal procedures also guaranteed quality and security, and they were defined by the Quality and Security Policies Unit. As a result, the internal process were rather well-structured and corresponding Management tools were available (e.g. IT Portfolio Management, Project Management, Software Development, Application Management and IS Cost Accounting). On the contrary the maturity level of IS personnel management tools was low, for example there were no up-dated job descriptions, skills maps and skill development plans. In order to manage the complexity of the IS context, another essential part of the IS governance approach was the definition of technological standards and the monitoring of the technology market, allowing new technological opportunities to be identified.

Within this organizational model IS units were free to adopt internal procedures and tools to handle daily tasks and plan their activities, if not covered

by official procedures. Nevertheless, the interviews showed some contradictions between the descriptions made by managers in charge of the IS units and the official documents provided by the Quality and Security Policies Unit. It was impossible to find the origin of these contradictions during this phase.

Finally, the analysis of the interviews showed a good level of cooperation among IS units and also with user departments. In particular, the relationship with user departments and other companies of the Group was handled by the Demand Management Unit which consisted of Service managers who were in charge of collecting business requirements, supporting the System Integration Unit in the design of a solution, planning the activities with the Software Factory and updating users through work in progress situation reports. Once a year they also asked the directors of user departments to fill in a questionnaire so as to evaluate their satisfaction.

7.3 Action Planning

Starting with the project's primary goal, the project team initially focused on the "IS Processes" Measurement Area, in particular on System Quality, Speed in execution, Project Management Capability, IT sourcing efficiency and IS staff workload. The project team identified the following measures as relevant:

- Server unavailability percentage.
- Network unavailability percentage.
- Number and severity of incidents and malfunctions.
- Number of application bugs.
- Index of IS reliability.
- Percentage of incidents solved by first line Support Help Desk.
- Average time to answer user calls.
- Average resolution time for type of incidents.
- Percentage of projects "on time".
- Percentage of projects "on budget".
- Percentage of external FTE.

- Concentration index of IS suppliers.
- Percentage of contracts with IS suppliers including SLA.
- Percentage of IS hours per type of application (operational and managerial).
- Percentage of maintenance and evolutionary maintenance activities.
- Backlog.
- Saturation index of IS capacity.

The data necessary to calculate these measures should have been included in Help Desk Management, Application Management, Project Management, Human Resources Management and System and Network Management tools. It also required the IS staff timesheet, which was not available at the time, in order to be able to divide IS staff time over the various activities.

The second Measurement Area was "Customer Orientation". The project team started to design Customer Satisfaction measures and then the dimension and corresponding relevant measures:

- Index of user satisfaction referred to IS department activities.
- Index of respect for the Service Level Agreement settled with user departments.

The calculus of these measures would have required first of all the definition of a method with which to evaluate user satisfaction, and secondly the establishment of a Service Level Agreement which in turn required the definition of the IS Service Catalogue.

The third analysed Measurement Area was "Change and Innovation". The project team worked on the following measurement categories: the organizational climate, the permanent education of IS staff, the expertise and skill of IS staff and age of the application portfolio. In particular, it decided to use the following measures:

- IS department turnover.
- IS department Absenteeism rate.
- Average age of IS staff.

- Number of educational days per person.
- Percentage of IS budget allocated to education.
- Number of years of IS experience per staff member.
- Percentage of necessary skills covered by IS staff.
- Number of applications for age category.
- Average age of software applications.
- Average age of hardware.

Necessary data would have been included in the IS staff skills and development management tool, the Application Management tool and IS cost Accounting.

The last Area was "Business Contribution and Value". The project team identified the appropriate dimensions for this Area as being Contribution to achieving goals, Business Value of IS projects and IS Cost control. Some problems arose in the design of measures for the evaluation of IS contributions to the achievement of business goals due to the difficulty in directly linking IS investments to business outcomes. The solution reached consisted of seeking to use measures that showed how much businesses use IS in order to be competitive. Thus the project team defined the measures as:

- Number of new products based on IS services.
- Number of critical applications.
- Percentage of projects on innovative channel (e.g. bank and web).

Whereas, the following measures were defined to cover the other dimensions:

- Percentage of projects focused on critical processes.
- Percentage of projects on strategic goals.
- IS costs (investments and operating expenses) to support Success Key Factors.
- IS costs per staff member.
- IS costs distributed across innovation, growth and run activities.
- Percentage of IS expenses above or within budget.

The data necessary to calculate the measures presented above should have come from IS Costs Accounting, Application Management and Project Management Systems.

7.4 Action Taking

The action planning stage highlighted two types of actions required to feed the IS Performance Management System: data retrieval from the IS management tools identified in the previous stage and the construction of new tools i.e. the IS Service Catalogue and IS staff timesheet.

In performing these activities, as in other action research projects, some problems arose. Some data was not available in the management tools, for example the Project Management System did not include a classification of projects on the grounds of the type of business process and Success Key Factors, and information on skills was not available in the Human Resource system. Instead, other data, like IS costs data, was scattered over several spreadsheets and required manual elaborations.

In other cases, IS staff members proposed changes to highlight different aspects of the same phenomenon in order to reduce possible criticism regarding their jobs. This behaviour showed that the IS units were used to working as a black box and not giving evidence of what went on within the units, and thus they were worried about performance measures which could have highlighted inefficiency in their units.

7.5 Evaluation and further action research cycles

During this first evaluation stage, as in the other action research projects, the project team's task was to analyse the results of the previous step in order to evaluate if the identified measures were really relevant and significant, provide an in-depth analysis of problems that arose, starting a new research cycle aimed

at solving them, and evaluate new opportunities to add to the action planning if reasonable.

As in the other action research projects, this stage improved the researchers' understanding of the MRI context and collected new data on variables included within their Research framework. On the other hand, the host organization learnt more about itself, its informal practices, and the social dynamics inside the IS department and with user departments and other companies of the Group.

In subsequence action research cycles, the collection of Customer Satisfaction data, for example, proved to be a very critical point. The IS department did not wish to involve users in this project or carry out a survey which would have exposed the IS department to requests for explanations and, as a result, the sharing of measures, defined IS services and corresponding service levels with the inevitable request of change in order to consider the IS Performance Management System as a company tool through which to manage IS services and user needs.

Observation also showed that this was not due to a bad relationship between user departments and the IS department, but rather the IS department's desire to avoid sharing information with users that could have modified the power balance in favour of user departments. As a matter of fact, the IS department was not really under pressure from user departments to become faster or save money, and thus the IS department was not focused on pursuing efficiency. Sharing performance measures would have meant reducing the information asymmetry on IS subjects and allowing users to ask for more.

The preferred course was to define the IS Services Catalogue, determine the value threshold for each IS service, and finally, be ready to answer any user requests to increase the quality of IS services or establish a Service Level Agreement. The IS department was firm about not being the first to speak about performance evaluation as a tool to manage relations between the IS department and user departments.

"Business Contribution and Value"	*"Customer Orientation"*
Contribution to achieving business goals: • Number of new products based on IS services. • Number of critical applications. • Percentage of projects on innovative channels (bank, web, etc.). *Business Value of IS projects:* • Percentage of projects focused on critical processes. *IS Cost control:* • IS costs to support Success Key Factors • IS costs distributed across innovation, growth and run activities. • IS costs per staff member. • IS costs per User department and Company.	*User Satisfaction:* • Index of user satisfaction referred to IS department activities. • Index of respect for the Service Level Agreement settled with user departments. • Percentage of projects "on time" and "on budget" per type of project. *Partnership with user:* • Percentage of IS hours charge for meeting with users.
"Change and Innovation"	*"IS processes"*
Organizational Climate: • IS department Absenteeism rate. • IS department turnover. • Average age of IS staff. *Permanent Education of IS Staff:* • Number of educational days per person. • Percentage of IS budget allocated to education. *Expertise and skill of IS Staff:* • Number of years of IS experience per staff member. *Age of the application portfolio:* • Number of applications for age category. • Average age of software applications. • Average age of hardware.	*System Quality:* • Server unavailability percentage. • Network unavailability percentage. • Number and severity of incidents and malfunctions. • Number of application bugs. • Index of IS reliability. *Project Management Capability:* • Percentage of projects "on time". • Percentage of projects "on budget". *Speed in execution:* • Percentage of incidents solved by first line Support Help Desk. • Average time to answer user calls. • Average resolution time for type of incidents. *IS sourcing efficiency:* • Concentration index of IS suppliers. • Percentage of contracts with IS suppliers including the SLA. *IS Staff workload:* • Percentage of external FTE. • Percentage of IS hours allocated to maintenance and evolutionary maintenance activities • Backlog. • Saturation index of IS capacity

Table 6 - MRI IS Performance Management System

Therefore, data derived from the yearly questionnaires, which were filled in on demand by managers and the directors of user departments, was used to calculate the user satisfaction index.

The project team also made an in-depth analysis of the existing IS Management tools (e.g. IS Cost Accounting, Portfolio Management, Project Management, Application Management, and System and Network Systems) and discussed the opportunity to improve them in order to collect more data and to automatically feed the IS Performance Management System. The CIO decided not to make specific investments in it, but to include the necessary improvement in any future projects regarding IS Management tools.

The link between variables included in the Research framework and the shape of the IS Performance Management System will be discussed in Chapter Eight.

Table 6 shows the final set of IS Performance Measures that was implemented in MRI.

8. Discussion on the Action Research Projects

In order to investigate if and how the variables included in the Research Framework affect the shape of IS Performance Management Systems, we have analyzed the evidence from the four action research projects described in the previous chapters, seeking to discover if there is a link between the facts, actions and decisions, contingency, IS and relational variables.

Before showing the results of this analysis, we analyzed the Client-system infrastructure of each project in order to understand if it also contains factors that affect the choice of IS performance dimensions and corresponding measures, and the design process of IS Performance Management Systems.

8.1 Client-system infrastructure

The Client-system infrastructures of the four action research projects are rather different, especially in relation to the purpose of evaluation, project sponsor and evaluation perspective, as showed in Table 7.

The analysis of the four cases shows that the purpose of evaluation has an impact on the sequence of measurement areas.

In two cases the first measurement area to come under scrutiny was "IS Processes", the project team then looked at the "Customer Orientation" area, afterwards the focus was on the "Change and Innovation" area and finally the project finished with the design of the "Business Contribution and Value" area. AudioEntertainment and MRI are the two cases in which the purpose of the evaluation was to collect IS performance data in order to answer the internal auditing team's questions or to perform an IS self-assessment so as to understand the improvement areas and be ready to bargain with users as regards IS service levels.

		Audio Entertainment	MedicalSound	HomeMarket	MRI
Control	**Control over initiation**	by the researchers	by the researchers	by the researchers	by the researchers
	Authority	client dominant	client dominant	client dominant	client dominant
	Degree of formalization	formal contract	formal contract	formal contract	formal contract
	Use of research results	free if the company name is undisclosed	free if the company name is undisclosed	free if the company name is undisclosed	free if the company name is undisclosed
Project Boundaries	**Purpose of evaluation**	IS performance data collection for Internal Audit	IS Service Level Agreement establishment	Customer Satisfaction evaluation	IS Performance Assessment
	Project Sponsor	CIO	CIO and CEO	CEO	CIO
	Evaluation Perspective	CIO and department directors	CEO, Subsidiary Managers and CIO	CIO and CEO	CIO and Managing Directors of Group Companies
	Domain under evaluation	Italian IS department and all Italian IS Services	IS Corporate department and all IS Corporate Services	IS department and all IS services	IS department and all IS services
	Unit/level of Analysis	organizational and individual	organizational and individual	organizational and individual	organizational and individual
	Type of data	objective and perceptual	objective	objective and perceptual	more objective than perceptual
	Evaluative referent	improvement	improvement	improvement	improvement

Table 7- Client System Infrastructure of Action Research Projects

As a result, the main perspective was the CIO's and only subsequently should measures have been useful and meaningful for Top Management, consisting of Managing directors and department directors. Another analogy between these two cases is the fact that the project sponsor was the CIO.

Instead, in the other two cases, the "Business Contribution and Value" area was more relevant. As a matter of fact, for MedicalSound it was the first

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measurement area the project team focused on, whereas for HomeMarket it was the second one after the "Customer Orientation" area, which is actually more coherent with the primary goal of evaluating user satisfaction. In both cases the CEO was the project sponsor and his perspective was as relevant as the CIO's perspective.

The existence of a primary goal also affects the amount of effort made on specific measurement areas in terms of the time and willingness to find the most appropriate measures. As a matter of fact, an analysis of the results of the four action research cases reveals that the first and second measurement areas are better constructed and include more measures or more innovative and personalized measures. This leads to the conclusion that companies are interested in covering all aspects of the IS Performance Management System independently from the starting trigger (e.g. internal audit, customer satisfaction, etc.), but they are not willing to make the same effort on the four Measurement Areas because they perceive different returns. In the MedicalSound case, a second project phase was already planned in order to complete the design and implementation process of IS measurement areas that were not analyzed in depth in this first phase.

The analysis of the four action research cases also shows a connection between purpose of evaluation and project sponsor. As a matter of fact, in MedicalSound and Home Market, the purpose of evaluation implied sharing IS performance measures with users or users' involvement in the data collection necessary to calculate the measures, and the sponsor was the CEO. Instead, in the other two cases, the primary project goal was internal to the IS department and the project sponsor was the CIO. In these two cases the CIO was in charge of the decision to involve users. The CIO decided on the basis of the existing organizational climate, and thus by evaluating the critical state of each decision. This point will be analysed in-depth in the following sections.

Finally the analysis highlights a link between the purpose of evaluation and type of measures. To confirm this, in the Medical Sound case, the project team decided not to use perceptual measures only because the first goal was to

establish IS performance measures through which to regulate the Service Level Agreement between the IS Corporate department and Subsidiaries (Managing Directors and Local IS organizations), and thus quantitative and objective measures were preferable because they were subjected to fewer misunderstandings and criticism in terms of reliability.

Whereas, in the MRI case, objective measures were used more than perceptual measures due to relational factors between the IS department and user departments, as we shall describe in the subsequent sections. That choice was not linked to the project purpose.

The other factors included in the client-system infrastructure are very similar in each project and thus it is not possible to understand if they affect choices and decisions.

8.2 Contingency variables

The Research framework assumes that the shape of IS Performance Management Systems is first of all affected by contingency variables such as business strategy, organizational structure, size, environment, technology, individual and task.

The action research projects have shown that it is quite simple to collect data on these variables as there are plenty of official documents about them and managers and employees do not perceive them as critical, confidential or dangerous in terms of the exposure of personal ideas, and thus they are willing to describe these competitive and organizational aspects. In some cases company policies state that figures relating to revenues, costs and the market share (i.e. MRI and MedicalSound) must not be shared, but qualitative information is commonly free from non-disclosure rules. As a matter of fact, data collected in the first phase of the projects was not proved wrong by subsequent data collections.

The analysis of the action research results shows that contingency variables affect the choice of IS performance dimensions and measures. In the following

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paragraphs each contingency variable is analyzed in order to show its impact on decisions concerning the design process (e.g. measures, algorithm of calculus, level of accuracy of input data, etc.).

In MedicalSound the existence of a clear and precise Business Strategy with an extremely clear connection to Information Systems led to the definition of measures related to the contribution to the achievement of business goals directly connected to the Company Success Key Factors. At the same time, these Success Key Factors were the basis for the construction of the IS Service Catalogue. MedicalSound is one of the two cases in which IS strategy is extremely clear and formalized, but it is the only company among those analyzed in which the IS Performance Management System has become the official tool through which to manage the relationship between the IS Corporate department and Subsidiaries. This is also the reason for the strong motivation of the CIO and IS staff to pursue the goal.

Strategy was also clear in the MRI case and it had a strong connection to Business Strategy, and thus affected the definition of measures related to the "Business Contribution and Value" area. In particular, the IS contribution was measured in terms of the development of new technology based products (i.e. the number of new products), and the exploitation of the innovative communication channel (i.e. the percentage of projects on the innovative communication channel).

The AudioEntertainment IS Performance Management System also contains a measure included in the "Business Contribution and value" area which is strictly related to Business Strategy: the number of times IS department initiatives were promoted by magazines and public events. As a matter of fact, Brand awareness was an important point of AudioEntertainment's Strategy Agenda, and the publishing of IS initiatives (e.g. innovative software applications, the use of new communication technologies and new technological instruments to promote information sharing between AudioEntertainment and its resellers) can be an indirect way to advertise the company's innovative DNA, which not only shows in the products but also in the management style and the way managerial and

operational activities are performed. But this performance measure does not concern the IS department's core activities but rather its side activities.

Finally, the HomeMarket project team sought to highlight the link between IS decisions and the corresponding actions, and business strategy. Unfortunately problems arose because the IS strategy was more oriented towards user needs, which were not always explicitly linked to strategic goals, and it was affected by organizational decentralization and the personal characteristics of users, in terms of technological skills. As a result, the first proposal of including the distribution of IS expenses among the strategic goals in the IS Performance measures set was discarded due to the difficulty in calculating it, as described above.

To summarize, the four action research projects highlight that in all the companies the IS staff seek to address problems connected to the evaluation of the IS Business Contribution and Value, and in particular the IS contribution to business goals, but it found two types of difficulties:

- the business strategy does not give the IS department clear indications on how to define IS strategy and its priorities, and thus IS activities and projects can not be associated to business goals;
- even if it is possible to translate business strategy into IS strategy, the distance between IS investments and business outcomes (e.g. cost reduction, internationalization and an improved business network) is wide and difficulties in finding appropriate performance measures remain.

The last problem listed above is known among scholars and many of them have sought to address it, but without great success. As a matter of fact, some positive results have come from studies about specific technologies or software applications, but not as regards IS as a whole. Generally, these problems lead companies to translate "IS Business contribution and Value" into measures regarding the allocation of IS costs, software applications and IS Projects among critical processes or Success Key Factors, if stated.

In the MedicalSound case, in order to be able to link Business goals and IS activities in a more satisfactory way, especially maintenance, evolutionary maintenance activities and projects, the Project Management System was

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improved so as to collect additional information related to the business, for instance the type of activities, expected business returns, and business processes involved. AudioEntertainment also decided to make the same effort, but only as regards new projects, in order to attempt to evaluate the projects' ROI. In the other cases the only improvement was to add the type of activities (innovative, growth and run) to each IS cost item.

The "Business Contribution and Value" measurement area is also affected by the organizational structure.

In the AudioEntertainment case, measures attempting to highlight the difference between the local IS department and the EMEA IS department were introduced. In this case, the organizational structure also had an impact on the definition of the domain under evaluation, excluding the EMEA IS service. The opposite approach was adopted by MedicalSound, it being the corporate and not a subsidiary, excluding the evaluation of the IS services provided by local IS organizations from the evaluation domain. Other impacts were felt in the "IS expenses control" dimension where the measure is the index of IS budget allocation between subsidiaries, and in the "Customer Satisfaction" dimension where the defined measures are calculated taking each subsidiary into consideration, and as a result each measure is calculated for each subsidiary.

In the MRI case the organizational structure is again different from the cases shown above. There was one IS department for the whole Group, and thus the boundaries of the projects included all IS services and activities. Likewise, in the MedicalSound case, the index of IS budget allocation between group companies is included in the "IS expenses control" dimension.

Finally, in the HomeMarket project the organizational structure influenced, as in other projects, the measures for IS costs. In this case it also had an impact on measures concerning Customer Orientation, in fact as the IS department was not close to its users, it was interested in understanding the user perception of its own characteristics (e.g. the willingness to support users and ease of contacting the IS department) and highlighted the users' personal evaluation of the IS department in the IS Performance Management System. AudioEntertainment

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also introduced this measure in its IS Performance Management System, but for different reasons. As a matter of fact, the local IS department was interested in demonstrating its value to the EMEA IS department and thus a positive users' evaluation of the overall local IS department could have shown that users appreciate not only the quality of the performed activities but also IS people.

The analysis of the action research results only shows a link between company size and the choice of IS performance measures in the MedicalSound case. The size of the user population led to the CIO's decision not to carry out a customer survey because it was deemed too time consuming. In the other cases, none of the meetings or interviews with people involved in the project highlighted company size as justification of a particular decision about performance measures. On the contrary, they addressed the company size as related to the organizational structure as a factor affecting the complexity of the environment managed by the IS department, and as a consequence the IS department's structure and size, and the maturity of IS management tools.

Instead, the environment inside the company, explained as company culture and management style, clearly affects the design of the measures.

In AudioEntertainment, Human Resources Care was part of the company culture due to the fact that people were considered an important factor in the company's value and great effort had been made in order to develop the potential of each employee. As a result, the "Expertise and skill of IS staff" contains measures like the percentage of necessary skills covered by IS staff and the percentage of competence development goals reached during the year. On the contrary, in HomeMarket there are no measures on the "Expertise and skill of IS staff". This depends on the different Management styles and, in this case, the approach to Human Resources management. AudioEntertainment is an international company and in order for it to really monitor and manage phenomena structured systems must be available that can provide objective data and evidence of what occurs. HomeMarket, on the other hand, is a medium-sized family company and thus it is possible to manage phenomena through the delegation of decision rights and, should problems occur, by mutual coordination.

Another factor that determines company culture is the propensity to innovation. In AudioEntertainment it led to the introduction of a specific dimension (i.e. Research in emerging technology) in the "Change and Innovation" measurement area as a relevant element of the IS department's evaluation. On the other hand, in the MRI case, there are measures (i.e. the number of new products based on IS services and the percentage of projects on innovative channels) that highlight the innovation capacity of the IS department, but as related to its capacity to support business innovation.

The results of the four action research projects show that technology affects the shape of the IS performance Management System because there are more sophisticated technologies in use and the technological environment is complex and overall performance measures are less meaningful. As a matter of fact, when there are more than 100 software applications in a company, such as in MRI or MedicalSound, it is necessary to calculate measures regarding the System Quality for each category of software application. MRI, for example, first categorized software application into management, decision and operational support. Operational software applications were then divided on the basis of user clusters that could correspond to the user department or user sub-unit. On the other hand, MedicalSound only used the criteria based on User clusters. The same observations are relevant for measures regarding service levels and the user satisfaction index. If the IS service Catalogue is very well-structured and includes several items, it is necessary to split the SLA and User Satisfaction measures in order to provide a meaningful picture of Service Levels and really highlight the points of strength and weakness.

In the same way, the type and variety of tasks supported by IS affects the choice of IS Performance Measures because it increases the number of user clusters, and thus it becomes necessary to split IS Performance Measures representing a phenomenon. Furthermore, it requires more attention to the construction of the user survey and IS performance results to be shared with user departments. As a matter of fact, clever task specialization means that employees are only involved in a subset of tasks, and thus they only use some software applications and IS services. For example, only management is

interested in evaluating the quality of service, such as strategic consultant or new software development. As a result, it is essential to provide only the part the receiver is interested in, because the other parts become rumour or can generate bias in the measurements, requiring an evaluation of services or applications that are not used by users and thus collecting either no answers, in the best case scenario, or answers chosen at random, in the worst case scenario. HomeMarket built two different questionnaires: one for users located at the headquarters and one for Sales Outlet users. AudioEntertainment, on the other hand, obtained user satisfaction data by using two data collection techniques: interviews with management and a questionnaire for personnel in order to personalize the content of the user satisfaction survey. The use of interviews was possible because the number of management members was rather small. Finally, starting with the same set of IS Performance measures, MedicalSound provided subsidiaries with a personalized set of IS Performance measures which were included in the Service Level Agreement.

The last contingency variable considered was individual, which referred to individual differences, personality factors, social support and organizational stresses, according to Weill and Olson (1987).

The analysis of the four action research projects shows that these types of variables impact client-system infrastructures, and only consequently of the shape of the IS Performance Management System. In MRI and AudioEntertainment, organizational stresses were the trigger to start the projects and determined the primary purpose. In HomeMarket and MedicalSound the CEO's personal characteristics affected the choice of IS performance measures as he was one of the receivers of the IS Performance Management System. The personal characteristics of the CIO also affected the design of the measures. In HomeMarket a lot of measures relating to IS costs were chosen because the CIO's inclination towards a cost analysis forced this aspect to be highlighted as an essential indicator of the efficiency of the IS department . As a matter of fact, the IS Performance Management System is only successful if receivers perceive value from it, and thus measures must be meaningful according to their perspective, which reflects not only their role but also their personality.

8.3 IS Variables

The second type of variable that the Research framework identifies as affecting the choice of the IS Performance measures set is IS variables, which refer to IS departments: hierarchical placement and strategic role, size and structure, IS sourcing strategy, climate, maturity in terms of managerial expertise and capability, rules and procedures, differences between espoused practice and practice in use, management tools and skills.

In the four action research projects the hierarchical placement of the IS department does not seem to affect the shape of the IS measures set. As a matter of fact, only the IS department of AudioEntertainment reported to Chief Financial Officer, instead the others reported to the Managing Director, but the analysis of the case does not show different behaviours and the Chief Financial Officer was never cited by IS staff as a possible preferred receiver of the IS Performance Management System. Instead, as discussed in the previous section, the placement in the company organization is relevant if the IS department is a local organization or a corporate organization, and if it is the only IS department or if there are more IS organizations as well.

The role of IS, instead, appears to be extremely relevant in the design of IS performance measures. In the MedicalSound and MRI cases, IS played a strong strategic role, and as a result IS departments were able to translate Business strategy into IS strategy and link IS activities and projects to Success Key Factors. The perception of relevance and the motivation to design specific measures connected to Business Strategy were higher than in the other cases. This type of measure could be also linked to the evaluation perspective because in general they are extremely relevant to the CEO and Managing Directors who are interested in understanding to what extent IS helps in the achievement of business goals. As a matter of fact, HomeMarket made an effort to measure the IS contribution to business goals. Finally, it used users' perceptual evaluations due to the lack of a clear link between Business Strategy and IS Strategy, and consequently of data relating to saving and improvements which depended on IS investments. This choice is interesting because it shows that the IS department

preferred to use this type of measure rather than discard the measurement of this dimension completely.

The Size and Structure of the IS department directly affects measures that relate to the Organizational Climate, Permanent Education of IS staff and Expertise and skill of IS staff. As a matter of fact, in small departments, such as HomeMarket's IS department, measures such as the index of turnover and absenteeism are not meaningful as they generally equal zero; measures relating to permanent education could also be less relevant because the IS budget allocated for these activities is usually low and thus the opportunity to attend training or management courses is not so frequent; finally, in such a small department it is not so common to perform an analysis of IS staff skills and plan skill development courses. When required, HomeMarket's CIO used external suppliers to cover any lack in technical skills and at the same time these people gave on-the-job training to the internal IS staff. In confirmation of this, AudioEntertainment's CIO claimed that, in his company, Skill development management tools only existed because it was a worldwide system used by all departments throughout the world, and that its implications for the current IS staff management were rather few due to the possibility of having a wealth of IS staff skills and personal characteristics working together on a daily basis.

Size also has an indirect influence on the shape of the IS Performance Management System for two reasons. The first reason is that it affects the Maturity level of the IS department in terms of the standards and policies definition, procedures formalization and the use of management tools. The second is related to relational complexity that increases with the size of the IS department. As a result the size of the IS department also affects the climate inside the IS department.

In the AudioEntertainment and HomeMarket IS departments, which are the smallest ones, the climate inside the IS departments was rather good and relational problems were directly managed by the CIOs. The effects of a good climate on IS performance measures are shown in different measurement areas: "Change and Innovation", "IS Processes" and "Customer Orientation".

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If there is a good climate IS staff will be not against the delivery of an internal customer survey, as in the AudioEntertainment case. In the same way, a good climate avoids the likelihood of the IS staff considering the IS evaluation project as an exam, as occurred in the MedicalSound case, and the IS Performance Management System as a Control tool seeking to manipulate the design of the measure, especially referred to the efficiency of IS processes, so as to highlight only some aspects and not others, as happened in the MRI case. Finally, a good climate favours the possibility of introducing a specific section on the IS department to the user evaluation due to the fact that IS employees are ready to work together on the results without allocating the responsibility of possible negative feedback to each other.

Another IS variable which has been shown to affect the IS measures set according to the analysis of the action research projects is IS sourcing Strategy. Its effects are clear and evident in the HomeMarket and MRI cases. In the former, the outsourcing of a relevant part of the IS activities, e.g. the Help Desk and new software development, led to these activities not being considered for measurement in the "IS Processes" area; in the latter it determined the introduction of a specific dimension to the "IS Processes" area, i.e. IS sourcing efficiency with its corresponding measures (Concentration index of IS suppliers and Percentage of contracts with the IS supplier including the SLA), and again, in this area, the body rental use led to the percentage of external FTE being added as a new measure. In the other cases its effects do not seem so evident as the main activities were done in-house and the use of external IS professionals was not as high as in MRI, and thus no gaps are noticed in the IS measures.

The last IS variable is the maturity of the IS department. This variable affects the shape of the IS Performance Management System in an extremely strong way because the availability of input data necessary to calculate the measures depends on it.

Evidence of a high maturity level is first of all seen in having formal and structured rules and procedures, and management tools which provide all the data necessary to monitor and manage the IS activities. In this situation, the

effect of the IS department's maturity would be very low because all necessary data would be immediately available or after small changes to the respective systems. As a matter of fact, the analysis of the four action research projects shows that no companies had a high maturity level, and thus the data collection with which to feed the IS Performance Management System affected its shape. The sophistication of IS performance measures depends on the available data and, as a consequence, on the existence of management tools and formal procedures that require the production of reports and documents in order to collect all the data and information needed to manage IS activities. AudioEntertainment and HomeMarket were not able to link IS costs and projects to Company Success Key Factors so as they had to discarded these measures. It was not possible, in any of the four cases, to allocate IS staff time to the IS activities categories so as they used estimate but the measures reliability was lower. In AudioEntertainment the project team changed the algorithm to calculate server and network unavailability due to the lack of System and Network Management System. All companies had problems in evaluating the level of correspondence between business requirements and developed software applications so as they had to improve their Project Management tools in order to maintain this measure.

Nevertheless, all four cases show that the design of the IS performance measures was an opportunity to verify and improve the supervision and management of IS processes. For example, the definition of sophisticated performance measures for project management triggers the introduction of more precise checks on IS projects and processes. At the same time, the automatic report on help-desk activities was enhanced by the inclusion of customer satisfaction indexes or the recognition of the causes of IS malfunctions. In addition, the possibility to intervene to improve the IS accounting tool seems to be helpful (e.g. the introduction of new items to attribute IS costs directly to an IS process or to a project, to distinguish between run activities, maintenance activities and innovative activities).

In confirmation of the above, in all cases the CIOs thought of the opportunity to enhance their management tools, but in the same cases, i.e. HomeMarket and

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Audio Entertainment, the current maturity level of the IS department was considered appropriate for the overall company context and thus the effort to change would not have been justifiable. They therefore worked on the existing management tools and sought to reach the highest possible level of improvement according to their resources.

MedicalSound made the highest improvement in IS governance. This seems to be linked to the fact that it is the only case where the IS Performance Management System was implemented at corporate level, with the aim of aligning IS to the expectation of the Group's stakeholders and subsidiaries. Furthermore, in MedicalSound this effort was justifiable in terms of company and IS department size and the strategic role of IS.

Instead, in MRI, the improvements were limited in confirmation of the fact that the IS Performance Management System was designed for future needs and at the time it was not the priority.

According to the analysis of the action research projects, one of the main results of the design and development of the IS Performance Management System is not only the definition of IS measures but the development of a solid system of IS governance and systems that produce input data. The four CIOs involved in the projects did not consider it to be a by-product of the project but rather one of its main outputs. In other words, the design and development of the IS Performance Management System lead to a real diagnostic effort on IS management systems and policies, and encouraged an effort to re-engineer IS processes and IS related policies.

In all four cases, the IS Performance Management System became the decision point for the design of further IS development activities, and became an IS management cockpit for the CIO. This helped to establish an opportunity for continuous improvement that links performance measurement to analysis, and to decisions of possible actions. Improvement activities are normally tactical and not strategic, as they deal with the modification of resource allocation, for example an increase in help-desk resources or the redefinition of measures to evaluate IS

programs and projects after the evaluation of the "on time" and "on budget" metrics.

8.4 Relational Variables

The last category of variables that the Research framework proposes in order to affect the shape of the IS Performance Management System is relational.

All cases show how much this category of variables affects the choice of IS measures. The first piece of evidence is that the climate between the IS department and user departments, in general a collaborative organizational climate, has an impact on the decision to share the results of the IS evaluation with users, as in the AudioEntertainment and HomeMarket cases.

This also means involving users in a survey designed to reveal their satisfaction or perception of IS quality, IS speed, IS usefulness and so on. It therefore affects the design of IS measures because it provides the opportunity to collect perceptual data, which is generally extremely meaningful for the evaluation of "Customer Orientation".

However, the MRI case shows that an apparent good climate is not enough because power balances are also relevant in order to decide whether or not to involve users in the project. MRI's IS department decided not to involve users because doing so would have given them useful information which could have changed the power balance. At the time, IS users were not really interested in understanding IS activities and they trusted the IS department. Sharing information about IS performance would have increased the users' knowledge of the IS department, and thus made the users more powerful in a possible negotiation on project timescales and costs, evolutionary maintenance activities and the like. IS department of MRI was more powerful than user department due to the lack of interest of users, which led users to not negotiate better IS service levels with IS department. Therefore IS department wanted to maintain this advantage.

Whereas, in other cases user departments were more powerful than IS department and thus IS department sough to build trustworthy relationship with users through IS performance measures. That is evident In MedicalSound where IS department would have had objective data on which to discuss with user departments and define the quality value threshold beyond which users would have been satisfied. Also IS department of HomeMarket wished to improve relationship with users through the sharing of IS performance measures. In MedicalSound and HomeMarket the Top Management support was also important. On the one hand they considered the Top Management support to be a guarantee that this project was the starting point of a change process and they were also confident that Top Management would have helped them to manage critical situations with user departments; on the other hand this factor forced them to speed up the design of IS performance measures and enlarge the set of measures which would have been shared with user departments.

Finally in AudioEntertainment case, the power of user departments was stronger than in the other cases because user departments had an own IS budget which they could spend without involving local IS department, and thus the context was rather critical. Therefore IS department decided to introduce a new dimension, i.e. IS preferred supplier, in the "Customer Orientation" measurement area. However the relationship between EMEA IS department and local IS department affected the design of IS performance measures more than the relationship between IS department and user departments. As the matter of fact, this critical relationship appeared to be the real reason of the project and thus all the measures were built in order to highlight the value added of activities performed by local IS department and consequently to show that Italian Country could not achieve the same business outcomes without a dedicated local IS organization.

To sum up, IS Performance Management System can help the IS department to establish better its relationship, reputation and trustworthiness.

However, the analysis of the four cases highlights that IS departments were aware of the necessity of employing business measures, which are easily

understandable to users audience, rather than technical ones in order to reach this goal. This aspect is quite important because IS department had some problems to build understandable measures. They had to adopt user language and also to consider the users' technical skills and background in order to provide meaningful and understandable IS performance measures to users. That had a relevant impact on the IS measures design because the focus was more on IS service and less on IS processes. As a matter of fact, in all the four cases, the first planned action was to define an IS Service Catalogue, which was the basis of IS performance measures understandable to users. IS departments also adopted user language and considered users' technical skills during the preparation of the user satisfaction questionnaire in order to ask clear questions and avoid possible misunderstandings due to technical words. In AudioEntertainment case, Human Resources department was involved in this activities and its contributions was extremely relevant due to its experience in conducting surveys and its understanding of organizational context.

In the same way, power can also affect the choice of IS measures in order to maintain, for as long as possible, the existing information asymmetry between the IS department and User departments. Therefore, the IS department does not seek to highlight all the possible process measures so that it has not controlled part of the process that can guarantee a buffer for possible inefficiencies.

Finally, the analysis of the four cases shows that the design of the IS Performance Management System triggers the opportunity to start the communication and internal marketing of IS to internal customers. This was done by advertising a processes portfolio to internal customers and external partners (e.g. outsourcers, vendors, etc.), such as in AudioEntertainment and HomeMarket.

9.   Contributions and Conclusions

This research has attempted to improve the understanding of the variables that affect the design and implementation process of IS Performance Management Systems.

The evidence from the analysis of the four action research projects shows that some variables, e.g. Strategy, Environment and Technology, only affect one or two Measurement Areas, whereas other variables have an impact on the whole IS Performance Measures set, e.g. Maturity level of IS department, Power balance and Individual (see Figure 13). The analysis also points out that these variables affect each other, e.g. IS department size and Maturity level of IS department.

Furthermore, as discussed in Chapter Eight, contingency IS and relational variables affect the client-system infrastructure of the research projects, for example the Top Management support level is linked with the project sponsor. In addition, client-system infrastructure has an impact on the shape of IS Performance Management Systems. It defines the boundaries of the project in terms of primary goals, domain under evaluation and evaluation perspective. Therefore it affects the sequence of Measurement Areas under scrutiny and the effort made in order to design the IS performance dimensions and measures corresponding to each Measurement Area.

The results of this research can be also relevant to clarify which IS Performance Measures CIO and Top Management consider more relevant and meaningful in order to evaluate IS Contribution to Business Value and to manage the alignment between IS and Business Strategy.

As a matter of fact, the analysis of the four cases underlines the opportunity that IS Performance Management Systems provide to develop a solid system of IS governance.
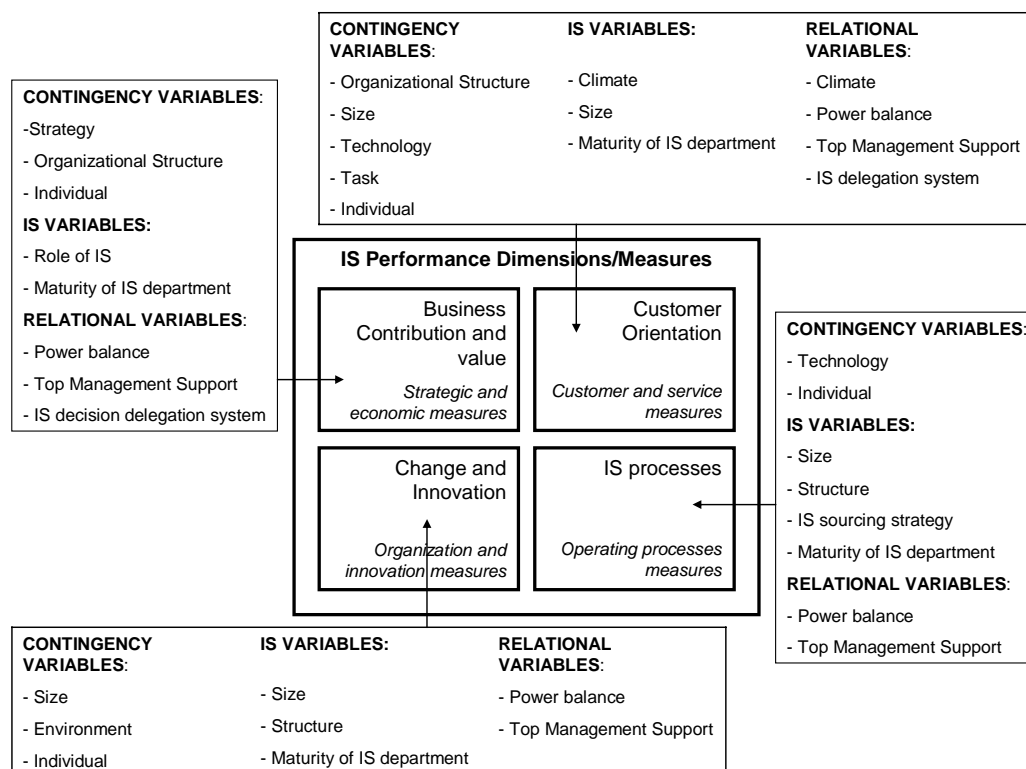

CONTINGENCY VARIABLES:
-Strategy
- Organizational Structure
- Individual

IS VARIABLES:
- Role of IS
- Maturity of IS department

RELATIONAL VARIABLES:
- Power balance
- Top Management Support
- IS decision delegation system

CONTINGENCY VARIABLES:
- Organizational Structure
- Size
- Technology
- Task
- Individual

IS VARIABLES:
- Climate
- Size
- Maturity of IS department

RELATIONAL VARIABLES:
- Climate
- Power balance
- Top Management Support
- IS delegation system

IS Performance Dimensions/Measures

Business Contribution and value

Strategic and economic measures

Customer Orientation

Customer and service measures

Change and Innovation

Organization and innovation measures

IS processes

Operating processes measures

CONTINGENCY VARIABLES:
- Technology
- Individual

IS VARIABLES:
- Size
- Structure
- IS sourcing strategy
- Maturity of IS department

RELATIONAL VARIABLES:
- Power balance
- Top Management Support

CONTINGENCY VARIABLES:
- Size
- Environment
- Individual

IS VARIABLES:
- Size
- Structure
- Maturity of IS department

RELATIONAL VARIABLES:
- Power balance
- Top Management Support

Figure 13 - Variables affecting the Measurement Areas

In all four cases, the IS Performance Management System has become the decision point for the design of further IS development activities and an IS management cockpit for the CIO.

The transferability of research results, summarized above, can occur in similar "structural configurations" according to the model proposed by Modol and Muniategui (2008) and described in Chapter Two.

We believe that this research has some managerial implications. First, it presents the experience of four companies and the difficulties that arose in terms of necessary organizational preconditions and required input data, and thus it can give some recommendations to companies which intend to launch this type of projects. Second, it proposes a set of measures which are the results of practical rather than theoretical studies. Therefore we believe that this research can

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contribute to the establishment of a robust and complete model with which to evaluate IS Business Value that practitioners can apply in their companies.

We are fairly confident about the relevance of the research results due to the high usefulness level which they continue to have in the companies involved in the action research projects. In particular the Usefulness of the research outputs has been evaluated by seeking elements and references, in the companies documents, on their perception and evaluation of the usefulness of the developed IS Performance Management Systems, and monitoring the subsequent usage of the research results by them. As a matter of fact, in all four cases the IS Performance Measurement System is still used and the project sponsor has claimed the primary goals of the project were fully achieved. In some companies the system has been improved and it has become a management tool used by CIO and Top Management.

Notwithstanding this, the research has the limit to be conducted involving only IS staff in decision making process. We believe that the users' involvement would have changed the final IS Performance measures set because the user perspective would have been more relevant and the role of power balance would have been different. As a matter of fact, the interaction between IS department and user departments would have changed relational variables evaluation continuously.

Therefore further research could involve both IS staff and users in order to investigate how the impact of variables analysed in this research changes.

In order to improve the understanding of IS Performance Management Systems, we also suggest that future research investigates the impacts of these systems on IS Management activities over time. In particular it is possible to approach the research from two perspectives: on the one hand it would be interesting to see how IS Performance Management Systems change and improve in order to become more effective and aligned with company's needs, on the other hand it would be relevant to evaluate their real contribution and support to IS improvement decisions.

As a result it would be possible to establish if IS Performance Management Systems contribute to increase the management maturity level of IS departments and consequently they help them to become an active and recognised member of Top Management.

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