

# Managing IS Development Projects Using a Generalised Set of Scorecard Perspectives

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## Abstract

*Project managers responsible for the development of Information Systems can profitably use performance measures that enable them to proactively measure attributes of the projects so as to achieve the desired outcomes. This paper defines a set of perspectives, the Generalised Scorecard Model (GSM), that can be used to define performance measures for any application. In particular, it is demonstrated how this model can be used to derive the Balanced Scorecard as envisaged by its originators, and how the framework is used to define a set of performance measures for use by IS development project managers that enable proactive project management.*

## Keywords

IS Development, IS Project Control, IS Control Methods and Tools, IS Project Management, IS Risk Management

## INTRODUCTION

With the advent of The Balanced Scorecard (Kaplan and Norton 1992, Kaplan and Norton 1996), the corporate world was introduced to a tool that enabled a link to be established between corporate strategies, and processes and their measurement. Importantly, this approach emphasized the importance of lead measures to management, alongside the more traditional lag measures. These lead measures (for example, the experience level of staff) could be used to identify potential problems and take corrective action before performance suffered. In contrast, the lag measures were based mainly on historical data, and reported on a situation that was already an issue (for example, an unfavourable return on investment result).

As formulated by the originators, the performance of an organisation was considered from four perspectives, as shown in Figure 1 for a sales-oriented business. Through a process of determining cause-and-effect relationships, the strategies of the organisation are turned into a set of measures for each of the perspectives.

The balanced scorecard concept has been applied to many situations, for example, the health industry (Rivers 1999), the banking industry (Cates 1997) and the computer industry (Wright *et al* 1999). To support users of the concept, a World Wide Web site has been established ([www.balancedscorecard.com](http://www.balancedscorecard.com)). Adopters report generally favourable results from the concept, however a lack of accepted measures for the Learning and Growth and Internal Processes perspectives has hampered widespread, consistent use. In addition, the overhead of

collecting and collating measurement data has meant that some investment in support software has been required when widespread adoption has been attempted. This software requires further development for it to be effective in a wide range of situations.

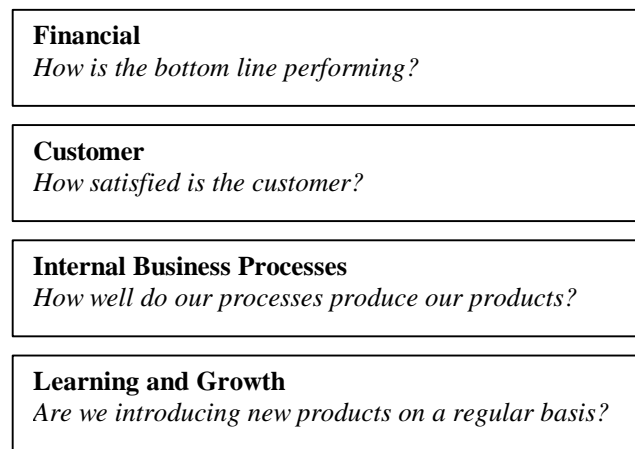


Figure 1: The perspectives for a corporate balanced scorecard

Within the information technology (IT) industry, the use of the Balanced Scorecard concept has received much attention, for example, enterprise resource planning (Roseman and Wiese 1999). Within the information systems (IS) discipline, the balanced scorecard concept has been used as a base for developing management information systems (Martinsons, Davison and Tse 1999).

In implementing the balanced scorecard, additional perspectives have been proposed so as to define a scorecard that is focused on the particular needs of the developing organisation (Olve, Roy and Wetter 1999). In making these extensions, the new or revised perspectives are particular to the application, and as such, do not generally display universality of application. The question that needs to be addressed is whether a set of general perspectives can be defined in such a way that application-specific sets can be derived. If a general set of perspectives can be defined, the opportunity exists to also have a set of general performance measures for each perspective, thereby offering the opportunity to establish a set of consistent performance measures across many applications.

The particular interest of the author is to develop a set of performance measures for IS development projects, so that project managers have tools available to them that permit proactive management. By using performance measures that are derived from a general framework, the performance measures used within project should be consistent with the performance measures used at the program and organisational levels.

## THE GENERAL SCORECARD MODEL (GSM)

This general framework has seven candidate perspectives as shown in Figure 2. In proposing these set of perspectives, the focus has been on providing a framework that can be applied to as many situations as possible. It is to be expected that alternatives will be proposed, as more insight is gained into the need and applicability of such a general set of perspectives. With each perspective is a typical question that can be posed to assist in the identification of appropriate performance measures, a subject that is addressed in more detail in a later section of this paper.

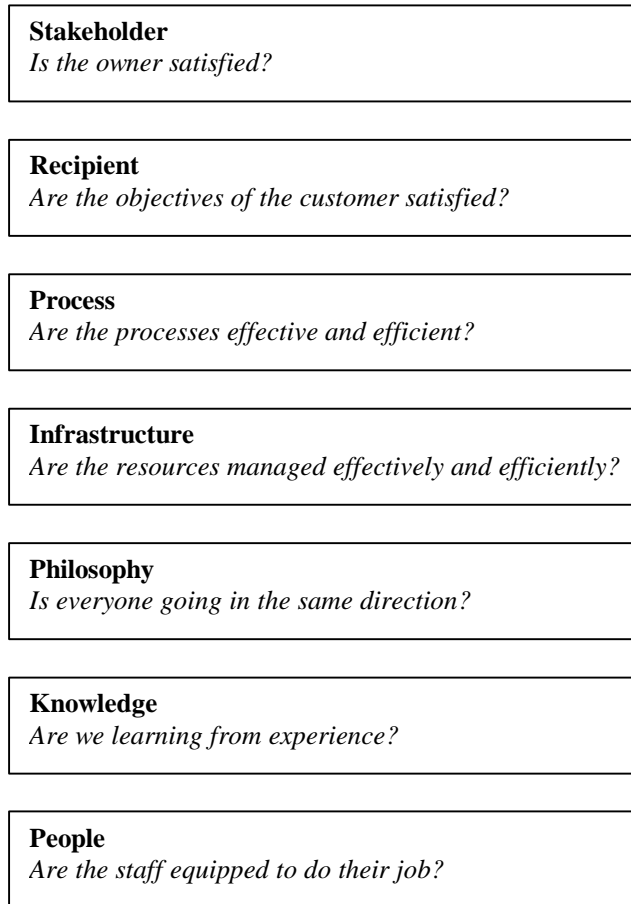


Figure 2: The General Scorecard Model (GSM)

### The Stakeholder Perspective

The stakeholder level is the highest level, in that it represents the interests of the business, project or activity owner or sponsor. In a business context, this represents the shareholders, in projects, the project owner, in government, the minister (as representing the people) and so on. Thus, it may not necessarily involve purely financial measures (as in the Kaplan and Norton model), but the more general concept of ownership. Measures derived from this perspective are related to the goals of the stakeholder(s). Investors in companies will be interested in financial measures (both short term and longer term), whilst the public at large may require feedback on the extent to which a particular government department is fulfilling its social obligations (for example, job creation, medical standards, education, protection of the environment). On the other hand, a project manager charged with construction a new information system, the measures are likely to be related to the value added to the business and the organisation overall, so will include value-related measures, market share measures and internal efficiency measures.

### The Recipient Perspective

The recipient level specifies the interests of the end recipient of the service or product, who may or may not actually pay for the product or service. In a business context, this may be those that buy the products or receive the services, in a project management environment, this

may be the end users. In government, this may be the general population. The defining characteristic of this level is that performance measures of the clients are highly correlated to the performance measures at the stakeholder level in a cause and effect relationship. For businesses (whose stakeholder measures include financial measures), a link between profit, earnings, and similar measures and customer behaviour, as indicated by metrics such as customer satisfaction, product image and brand recognition, needs to be determined. For government sector organisations, measures for this perspective include education outcomes, community health measures, and similar end-user measures. Note that there is a subtle but distinct difference (particularly for government-related organisations) between measures for the stakeholder and recipient perspectives: at the stakeholder level, it is generally the community as a whole that is concerned with the outcomes, and as such is often set by the political agenda as expressed through the ballot box, whereas the recipient perspective is focused on the sector of the community that is affected by the policy or program.

### **The Process Perspective**

The process level includes those activities that are immediately apparent or affecting the clients. In the business context, this may include the production lines, service departments, design shops, and so on, whilst in the government context, it includes services such as health care providers and social service shopfronts. In the information systems project management arena, it is the actual activities related to the project, including requirements gathering, database design, code generation, testing and implementation. Again, the defining characteristic is that activities at this level directly affect and are correlated to the client level. In the Kaplan and Norton business model (Kaplan and Norton 1992), this corresponds to the process level. Measures for this perspective derive from such considerations as effectiveness of delivery, quality, responsiveness and efficiency.

### **The Infrastructure Perspective**

The infrastructure level addresses the resources available to the organisation, business, or project to accomplish its goals. Included here are the information systems assets, plant, equipment, people and so on. While the process level looks at how the products and services are produced, the infrastructure addresses the adequacy or otherwise of the resources that are available for the processes. By separating infrastructure from process, the need for effectiveness at infrastructure provision is highlighted as an important issue. As with all of the perspectives, relationships exist between the perspectives, and the link between infrastructure and process is strong. Examples of the measures that can be applied to this perspective include measures of technological suitability, location of resources, and maintenance and replacement regimes.

### **The Philosophy Perspective**

The philosophy perspective deals with the underlying ideas, principles, procedures and rules that are used as the basis for using the infrastructure in the operations of the organisation, business or project. This perspective rests on the assumption that successful businesses, organisations and projects are the result of sound practices that are well documented, communicated and followed. Therefore, the measures at this level reflect the rigour, level of documentation and extent of understanding of the rules and procedures in place. The assumption is that effective use of the infrastructure in its operations stems from relevant rules and procedures at this level. By proposing this perspective, it is not asserted that all

organisations need a rigid methodology or set of procedures and rules. To the contrary, and as for all of the framework perspectives, a particular perspective is included for a particular application only if it can add value. Thus, whilst medical establishments will need to establish, communicate and enforce safe working practices, a small community organisation will have little need for formal procedures. However, the important point is that the importance of the perspective needs to be considered, and not assumed to be of little importance.

### **The Knowledge Perspective**

The next perspective is that of knowledge, and reflects the skills, organisational memory, expertise and information base of the organisation. In its simplest form, it represents the extent to which the organisation knows what it is doing. In its richest form, it represents the collective information available to progress the aims of the organisation. There is much current activity in the area of knowledge management, and this work is of direct relevance to this perspective. Traditionally, the measurement of the knowledge perspective has been related to data and information storage effectiveness and accessibility, and these measures are relevant. However, organisations are beginning to appreciate that a significant amount of the knowledge possessed and used by an organisation is not represented in these systems, and that new knowledge representation, storage and communication frameworks need to be developed. Therefore, an important measure for this perspective is the extent to which an organisation has progressed to becoming a knowledge-based organisation.

### **The People Perspective**

The most basic level is that of people. At this level, due recognition is given to the value of people to the organisation, and may be reflected in morale, corporate wisdom, unofficial communication networks, and so on. It is possible to combine this perspective with the knowledge perspective, yet to do so would remove the visibility that people deserve to be afforded within an organisation. Measures applicable to this perspective are focused on the individual, in the sense that changing performance figures for this perspective will involve altering individual characteristics (such as levels of training) or collective characteristics (such as morale).

### **The Cause-and-Effect Chain**

One of the key ideas in the original balanced scorecard framework is the notion of being able to trace causes and their effects through the hierarchy of perspectives (Olive, Roy and Wetter 1999). For example, having continuing education programs for staff results in effective, efficient processes that satisfy customer expectations to result in an exemplary sales result. Whilst simplistic, this example illustrates the relationship of actions (and their associated measures) from each perspective to other actions in the next level of the hierarchy.

The general perspective framework that has been described above relies heavily on establishing cause-and-effect relationships to establish measures that are appropriate to each of the perspectives chosen for a particular application.

### **Mapping the Kaplan and Norton Framework**

A mapping of the Kaplan and Norton strategic planning framework (Kaplan and Norton 1992), to the GSM is shown in Figure 3.

This exercise illustrates the importance of understanding the purpose behind the measurement framework as shown by the chosen set of perspectives. If the objective of the set of measures is to enable a closer alignment between organisational objectives and strategies, then the set of perspectives illustrated here is appropriate. However, if the purpose of the performance measures is different, then quite a different set of perspectives may be appropriate.

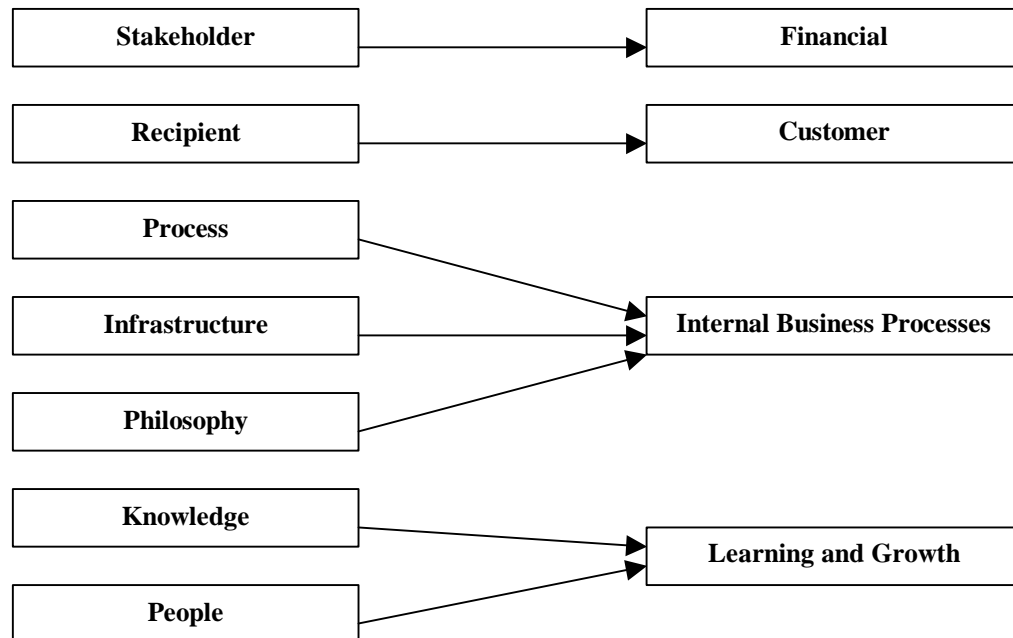


Figure 3: Mapping the Kaplan and Norton perspectives to the GSM

## PERSPECTIVES FOR MANAGING IS DEVELOPMENT PROJECTS

As discussed above, the first question that needs to be answered when considering the use of a set of performance measures is the goal of the measurement system. For IS development projects, the goal defined for the purposes of this discussion is as follows: “To allow project managers to proactively manage the projects so as to achieve the project aims.” The key phrase in this goal is ‘proactively manage’, implying that the project manager has available a set of measures that enable potential problems to be detected well before they impact cost, scope, time or quality.

The perspectives chosen to satisfy this goal are illustrated in Figure 4. In developing this set of perspectives, two assumptions are made. Firstly, in standard IS development projects, the process, infrastructure and philosophy perspectives are closely related to the extent that they can be combined into one perspective (although this may not be appropriate if there is a high technological risk, or a new development methodology is being used). This combined perspective has been termed the ‘project execution’ perspective. Secondly, the knowledge applied in such projects is commonly derived from personal knowledge, so that the knowledge and people perspectives can be combined (although a corporate knowledge base that contains past experience is certainly desirable). This perspective has been termed the ‘staff’ perspective.

For each of the perspectives, a series of performance measurement areas are suggested. These are not intended to be taken as prescriptive for all projects, but suggestive of the type

of measure that is appropriate to each perspective. Each project and organisation will have its own unique needs, so the measures needed will vary from project to project. Similarly, the number of measures can vary from project to project, and will be affected by such considerations as the level of technology involved, staffing profile, deliverables and time constraints. The questions posed in Figure 4 can be used to develop specific measures. For example, in the 'Training' question of the 'End User' perspective, the question can be operationalised by having each piece of training material assessed by the end-users (minimal) or assessed independently against specific criteria (better). One formal approach to this is the Goal-Question-Metric (GQM) framework (see, for example, Fuggetta *et al*).

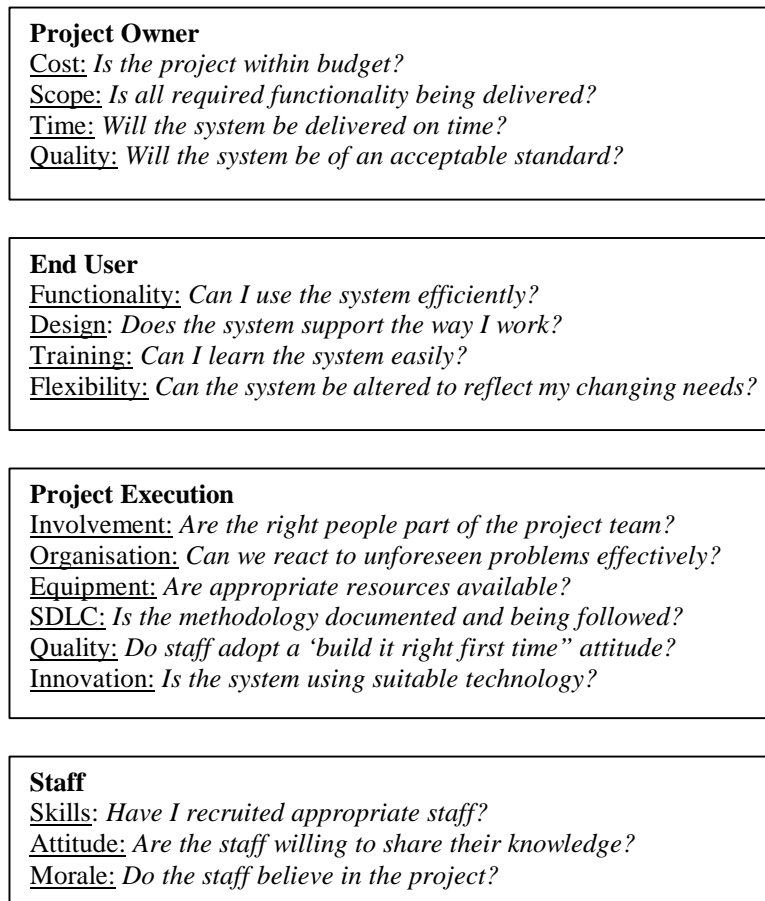


Figure 4: IS development project performance measures

As described above, there is a cause-and-effect relationship between the measures for each perspective, and this relationship requires careful analysis as part of the design of the performance measurement scheme. One approach is to start with the top level perspective (here, the project owner), and determine the measures that are used to ascertain ultimate success. Traditional measures used are cost and time; scope is sometimes added to the list; quality is a suggested addition. It is then possible to work backwards to define measures for each perspective that support the higher level perspective. For example, with a scope measure defined for the 'Project Owner' perspective, an appropriate measure for the 'End-User' perspective may be the extent to which the user perceives that the system supports work practices. For the 'Project Execution' perspective, the related measure may be the extent of end-user involvement in the requirements gathering process. Finally, for the 'Staff' perspective, the measure may relate to having experienced business analysts as part of the project team.

## CONCLUSION

Effective management requires appropriate information. An important component of this information relates to what is actually happening at all stages of a process. Many of the performance measures currently supplied to managers relate to end results (such as end of year profits), rather than internal activities (such as how effectively the infrastructure is being managed). By establishing a set of performance measures that not only permit, but actually encourage, focus on internal activities, the manager has the ability to proactively affect the outcome.

The General Scorecard Model described in this paper can be used as a framework for establishing a set of performance measures that satisfy both the need to measures outcomes and the need to manage proactively. Further work needs to be undertaken to refine this general set of perspectives, especially through application to a diverse set of management scenarios.

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