

# DEPARTEMENT BEDRIJFSECONOMIE

## MONITORING THE IT PROCESS THROUGH THE BALANCED SCORE CARD

by

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**Monitoring the IT process through  
the balanced score card**

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## ABSTRACT

The balanced scorecard (BSC) technique is a recently developed strategic management system that should allow businesses to drive their strategies based on measurement and follow-up. In this article the BSC is applied to the monitoring of the IT process and a program for auditing the IT balanced scorecard from the perspective of an internal auditor is developed. In a case study this audit program is used to review the IT balanced scorecard of a Belgian company.

## INTRODUCTION

The evaluation of the IT-function is recently the subject of many academic and business discussions. In IT-issues studies - where managers are asked what they find important in corporate information technology - "Measurement of IT effectiveness and productivity" is always detected as an important issue. In a British study (Galliers et al., 1994) it was ranked 9th by IT-managers, and in a recent American publication (Brancheau et al., 1996) it was ranked 11th. The many publications in scientific journals and the much visited seminars on this subject, also suggest a continued and actual interest.

There are reasons for this extensive interest: IT is increasingly becoming crucial to achieve organisational and strategic goals. Investments in IT are also never ceasing to grow and the business managers worry about the fact that the benefits of IT investments might not be as high as initially expected. The industry likes to call this phenomenon the IT Paradox or the IT Black Hole: large sums are invested in IT that seem to be swallowed by a large black hole without rendering many returns (Brynjolfsson, 1993 and Peppard and Rowland, 1995).

Therefore, monitoring the IT process is of extreme importance. Monitoring can be defined as the control activities by line management and the independent evaluations by auditors of the ongoing effectiveness and efficiency of in casu the IT process (COBIT, 1996). There are different monitoring instruments available. The balanced scorecard is such an instrument that recently has been developed by Kaplan and Norton (1992,1993, 1996a and 1996b). Their idea was that the traditional financial measures (like the ROI, for example) should be supplemented with operational measures concerning customer satisfaction, internal processes and the ability to innovate. These three additional measures would assure future financial results and drive the organisation towards its strategic goals while keeping all four perspectives in balance. The general BSC-framework can easily be translated to the more specific needs of the evaluation of the IT-function (Gold, 1992 and 1994, Willcocks, 1995). In Van Grembergen and Van Bruggen (1997) the four translated perspectives are business contribution, user orientation, operational excellence, and future orientation. These four perspectives differ from the general ones because in most cases the IT-department is an internal service supplier: the users are its clients and the contribution is to be considered from management's point of view.

In this article, a framework is developed for controlling and auditing the IT balanced scorecard. The auditing is seen from the perspective of the internal auditor. In the audit route map the following steps are considered: definition of the scope and objective, determination of the audit team, familiarisation phase, analysis phase and finally reporting. This audit program is then applied to the IT balanced scorecard of CASUS S.A. and areas for improvement are identified. A conclusion is that the current IT balanced scorecard of CASUS S.A. is an operational management system but not a strategic management tool due to the absence of long term targets and insufficient communication of the IT strategy to employees. It is the authors' conjecture that this may be a generic shortcoming when applying the IT balanced score card technique.

## MONITORING INSTRUMENTS

Monitoring is defined by COSO (1994) as "... a process that assesses the quality of the (internal control) system's performance over time. This is accomplished through ongoing monitoring activities, separate evaluations or a combination of the two". COBIT (1996) has applied this definition to the IT process and has identified two monitoring processes:

- \* M1: "Monitoring the processes to ensure the achievement of the objectives set for the IT processes"
- \* M2: "Obtaining independent assurance to increase confidence levels and benefit from best practice advice".

The M1 process refers to the ongoing monitoring activities by line management and the M2 process to the independent evaluations by internal audit or external consultants.

### Monitoring by line management

There are different instruments for IT management to effectively monitor the IT process:

- \* IT performance measurement
- \* benchmarks
- \* control self assessments
- \* continuous monitoring.

Dickson and Wetherbe (1985) already discussed the use of IT performance measures. They called it success factors of the IT function and listed measures for the financial performance (e.g. budget compliance) and the efficiency of the IT internal processes (e.g. online response time). IT performance metrics can be established for the different IT subprocesses (Table 1):

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Table 1                      Some typical IT performance metrics per IT subprocess

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Planning IT	IT expense as a percentage of revenue Frequency of IT Steering Committee meetings Frequency of IT architecture updates
Developing IT solutions	Percentage of projects finished within time and budget Function points delivered per month Maintenance/development burden effort
Operating IT	Downtime percentage Average time for resolution of an IT problem Frequency of security policy and procedure update
Organisation IT	IT staff turnover IT personnel cost as a percentage of IT budget Non IT personnel/IT personnel

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The main drawback of the IT performance measurement is that it focuses too much on the input metrics. Spending a significant amount on IT is not a guarantee for satisfied users, an optimal support of business processes and the creation of new business opportunities. The real issue is not how many resources are spent on IT (input), but rather what is the resulting business contribution of IT (output). Moreover, measurement is not enough. Performance measurement must be linked to the company's strategy and must be used as a strategic management tool which is an approach offered by the balanced score card method.

In order to evaluate the measured IT performance results, they need to be compared to pre-determined targets. A simple way is comparing the current measures with prior period results. This may show continuous improvement but it could be that the e.g. the productivity measures of the IT organisation are significantly lagging behind these of the industry. Therefore, benchmarking (Owen, 1995) is needed: comparison with industry/country averages and/or with selected benchmarking partners (e.g. in Belgium IT benchmarks of Compass that are performed for a group of Belgian commercial banks).

Another monitoring tool is control self assessment (CSA) which currently is a very popular issue. Freidberg and Reisch (1997) define CSA as "... a formal, documented process in which management and/or work teams directly involved in a business function, judge the effectiveness of the process in place and decide if the chance of reaching some or all business objectives is reasonably assured". CSA emphasises management's responsibility for its control environment and thus supports the implementation of COSO, COBIT and the balanced scorecard.

Continuous monitoring is a process where data flowing through the system is analysed and continuously (e.g. daily) for the occurrence of certain patterns or specific pre-defined events (Kogan, et al., 1996). These occurrences will automatically trigger alarms to call the attention of management. Ernst & Young e.g. has started a Continuous Auditing project using SAS Institute as underlying software that provides powerful data extraction tools and excellent graphical analysis.

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## Independent evaluations

Independent evaluations of internal controls must be performed on a regular basis by internal audit, external audit or consultants. The ground rule is here: the greater the degree and effectiveness of ongoing monitoring through line management, the less need for separate evaluations. If management is using a combination of the above described monitoring techniques, auditors only have to review whether the techniques are properly applied and used. A recommendation of the auditors may be to implement the balanced scorecard approach as an additional monitoring tool in assisting management to achieve their strategic objectives.

## THE IT BALANCED SCORECARD

The balanced scorecard can be applied to the IT process as Gold (1992, 1994) and Willcocks (1995) have conceptually described. In Van Grembergen and Van Bruggen (1997) a more detailed IT BSC model is proposed (Table 2).

Table 2 Adapted balanced scorecard for IT

<b>USER ORIENTATION</b> How do the users view the IT department?	<b>BUSINESS CONTRIBUTION</b> How does management view the IT department?
<p><i>Mission</i> To be the preferred supplier of information systems and to exploit business opportunities maximally through information technology</p> <p><i>Strategies</i></p> <ul style="list-style-type: none"> <li>* Preferred supplier of applications</li> <li>* Preferred supplier of operations</li> <li>* Partnership with users</li> <li>* User satisfaction</li> </ul>	<p><i>Mission</i> To obtain a reasonable business contribution of investments in IT</p> <p><i>Strategies</i></p> <ul style="list-style-type: none"> <li>* Control of IT expenses</li> <li>* Sell IT products and services to third parties</li> <li>* Business value of new IT projects</li> <li>* Business value of the IT function</li> </ul>
<b>OPERATIONAL EXCELLENCE</b> How effective and efficient are the IT processes?	<b>FUTURE ORIENTATION</b> Is IT positioned to meet future needs?
<p><i>Mission</i> To deliver efficiently IT products and services</p> <p><i>Strategies</i></p> <ul style="list-style-type: none"> <li>* Efficient software development</li> <li>* Efficient operations</li> <li>* Acquisition PCs and PC software</li> <li>* Problem management</li> <li>* User education</li> <li>* Managing IT staff</li> <li>* Use of communication software</li> </ul>	<p><i>Mission</i> To develop opportunities to answer future challenges</p> <p><i>Strategies</i></p> <ul style="list-style-type: none"> <li>* Permanent training and education of IT staff</li> <li>* Expertise of IT staff</li> <li>* Age of application portfolio</li> <li>* Research into emerging information technologies</li> </ul>

Each of these perspectives have to be translated into corresponding metrics and measures that assess the current situation. These assessments have to be repeated periodically and have to be confronted with the goals that have to be set beforehand. Hereafter, an overview will be presented of some generic IT measures. These measures are generic because each organisation has its specific mission and strategies and therefore requires its own specific measures. These measures presented here are largely extracted from traditional IT literature (Hamilton and Chervany, 1981; Dickson and Wetherbe, 1985), the Information Economics publications (Parker et al., 1988 and 1989) and the BSC-literature (Gold, 1992 and 1994; Willcocks, 1985; Parker, 1996). The presented framework integrates these different approaches and adds an important dimension: the evaluation becomes more dynamic and strategic since measures are tracked and traced over time and are explicitly integrated in the strategic management of the IT department.

### Measurement business contribution

It makes sense to distinguish two kinds of evaluation: the short term financial evaluation and the long term oriented evaluation of IT projects and the IT function itself (Table 3). *Control of IT expenses* and *Selling to third parties* are definitely focused on short term evaluations. *Business value of new IT projects* and *Business value of the IT function* are measures for a broader time frame.

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Table 3 Metrics for business contribution

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#### CONTROL OF IT EXPENSES

- \* level of IT expenditures
- \* allocation of the budget to different items (development, operations, equipment, ...)
- \* IT budget as a percentage of turnover
- \* IT expenses per staff member

#### SELLING TO THIRD PARTIES

- \* financial benefits stemming from selling products and services

#### BUSINESS VALUE OF NEW IT PROJECTS

- \* financial evaluation based on return on investment, net present value, internal rate of return, payback period
- \* business contribution based on Information Economics

#### BUSINESS VALUE OF THE IT FUNCTION

- \* % of the development engaged in strategic projects
  - \* relationship between new developments/infrastructure investments/ replacement investments
- 

The traditional financial perspective is about controlling the IT budget and the possible revenues from the sales of IT products and services. Despite publications like Butler Cox Foundation (1990) where commercial activities of the IT department are encouraged, the external activities remain to be exceptional today.

A popular financial metric undoubtedly is *IT budget as a percentage of turnover*. The comparison with other companies in the industry may give useful indications. But these indications have to be interpreted with care: higher or lower IT expenses may be caused by company-specific reasons. A critical attitude towards

these figures is absolutely necessary even if the percentage is at the same level as the industry average. In addition, variations from 1% to 8 % of turnover have known to occur, depending on the IT intensity of the industry (Robson, 1994). The Butler Cox Foundation (1990) has published figures for the *IT expenses per staff member*: for the financial sector e.g. more than 4000 British pounds per employee.

IT projects must generate value for the company. Value is a much broader concept than benefits (Willcocks, 1994). When implementing a new marketing database for example, the lower amount of programmer intervention necessary to execute ad-hoc-queries will certainly generate benefits. But the real value lies within the marketing department: will the sales people integrate the database into their approach and consequently achieve higher turnover? Value therefore implicates risk.

IT benefits traditionally have been measured by quite simple financial measures like return on investment (ROI) and/or payback period. These types of financial measures are useful but limit themselves to the financial benefits and do not incorporate values. The method of Information Economics (Parker et al., 1988 and 1989) fills exactly this leap hole (Van Grembergen and Van Bruggen, 1997). Table 4 displays the Information Economics as recently adapted by Parker (1996). Elements of business process reengineering can be found in this outlook (e.g. empowerment).

Table 4 New Information Economics (Parker, 1996)

Traditional ROI (+)		
Value linking (+)		
Value acceleration (+)		
Value restructuring (+)		
Innovation (+)		
<b>= ADJUSTED ROI +</b>	<b>BUSINESS VALUE</b>	<b>+ IT VALUE</b>
	* strategic match (+)	* strategic IT architecture (+)
	* competitive advantage (+)	
	* competitive response (+)	
	* management information (+)	
	* service and quality (+)	
	* environmental quality (+)	
	* empowerment (+)	
	* cycle time (+)	
	* mass customisation (+)	
	* business strategy risk (-)	* IT strategy risk(-)
		* definitional uncertainty (-)
		* technical risk (-)
	* business organisation risk (-)	* IT service delivery risk (-)
<b>= VALUE (BUSINESS CONTRIBUTION)</b>		



In essence, the Information Economics method is a scoring technique whereby the value and risk categories are attributed scores between 0 and 5. For a value category (marked with a "+"-sign), 0 means "no positive contribution", and a 5 refers to "a large positive contribution". For a risk category (marked with a "-" sign) 0 means "no risk" and a 5 "large risk". Each of these categories is assigned a weight. By adding the weighted scores of the value categories and subtracting the weighted scores of the risk categories, one can calculate the total score of each IT project. The categories of Table 4 have an indicative, not an exhaustive meaning. When applying this method, one has to adapt these categories to its own needs and specifications. The value of Information Economics lies with the fact that the scores are assigned by all parties involved: the users primarily score business values and risks, and the IT specialists score the IT related categories. In this way, the business contribution of the project can be assessed jointly and consensus can be reached on the evaluation of a specific IT project.

Most categories of Table 4 speak for themselves. However, a few of them might require a short explanation (see also Parker, 1996). *Value linking*: incorporates the benefits and costs in other (functional) areas. *Value acceleration*: a typical example are the interest savings due to an accelerated cashing of invoices. *Value restructuring*: refers to the efficiency and effectiveness of the employees: does the new system free up more time to execute their own job? *Strategic IT architecture* assesses the degree of value to which the project fits into the IT plan. *Business strategy risk* and *IT strategy risk* respectively refer to the degree of risk in terms of how well the company/IT department succeeds in achieving its strategic objectives. *Definitional uncertainty*: indicates the degree of risk in terms of how clearly the functional requirements and specifications have been agreed upon. *Technical uncertainty* provides a measure for the risk associated with dependence on new, immature technologies. *Business organisation risk/IT service delivery risk* scores the degree of risk in terms of how well the company/the IT department will be able to adapt to the changes invoked by the project.

### Measurement user orientation

When we refer to the user, we primarily have in mind the internal end user, the internal customer of the IT department. Secondly, this user could also be the company's customer in the case of an interorganisational system. The user orientation and the measurement of the customer satisfaction are also heavily focused by the BPR-change methodologies. The balanced scorecard now hands techniques to measure this dimension and manage accordingly.

The metrics regarding user orientation have three items to focus on: to be the preferred supplier for applications and operations, partnership with the users and user satisfaction (Table 5).

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Table 5                      Metrics for user orientation

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**PREFERRED IT SUPPLIER**

- \* % of applications managed by IT
- \* % of applications delivered by IT
- \* % of in-house operations

**PARTNERSHIP WITH USERS**

- \* index of user involvement in generating new strategic applications
- \* index of user involvement in developing new applications
- \* frequency of IT Steering Committee meetings

**USER SATISFACTION**

- \* index of user friendliness of applications
  - \* index of user satisfaction
  - \* index of availability of applications and systems
  - \* index of functionality of applications
  - \* % of application development and operations within the Service Level Agreement (SLA)
- 

The percentages of the applications that are managed and delivered by the IT department are heavily dependent on the company-specific situation. Setting the ratio insourcing versus outsourcing, means making a strategic choice. In making such a choice, one has to take into account factors like keeping sufficient capacity in-house for strategic developments (Van Grembergen and Vander Borgh, 1997 a and b).

Surveying clients (users) should play an important role in the evaluation of the IT function. Especially important customers need to be involved in such surveys. When the IT department loses an important user, detailed research into the reasons behind this loss is certainly required. Hamilton and Chervany (1981) distinguish objective and subjective measures. The indexes of Table 5 resulting from surveys, are evidently subjective measures. These subjective measures must be complemented with objective measures like *% of application development and operations within the SLA*. A compliance audit reviewing the user involvement may also be valuable.

**Measurement      operational      excellence**

It concerns primarily the measurement and improvement of the two basic IT processes: development of information systems and computer operations. We also focus on specific processes like supply of personal computers, problem management, user education, management of IT staff and their usage of electronic communication channels (Table 6).

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Table 6                      Metrics for operational excellence

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### **EFFICIENT SOFTWARE DEVELOPMENT**

- \* % of changes and adjustments made throughout the different development phases
- \* number of function points per person per month
- \* number of defects per function point in the first year of production
- \* average number of days late in delivering software
- \* average unexpected budget increases
- \* % of projects performed within SLA
- \* % of code that is reused
- \* % of maintenance activities
- \* visible and invisible backlog

### **EFFICIENT OPERATIONS**

- \* % unavailability of the mainframe
- \* % unavailability of the network
- \* response times per category of users
- \* % of jobs conducted within set times
- \* % of reruns
- \* average time between system failures
- \* ratio operational costs/installed MIPS

### **ACQUISITION PCs AND PC SOFTWARE**

- \* average lead time for deliveries

### **PROBLEM MANAGEMENT**

- \* average response time of help desk
- \* % of questions answered within set time
- \* % of solutions within SLA

### **USER EDUCATION**

- \* % of users that already received education (per technology/per application)
- \* quality index of education

### **MANAGING IT STAFF**

- \* number of person hours that can be charged internally and externally
- \* % of person hours that are charged on projects
- \* turnover rate IT personnel
- \* satisfaction index of IT staff

### **USE OF COMMUNICATION SOFTWARE**

- \* % of IT personnel and users that can access groupware facilities (internet and intranet)
  - \* % of IT personnel and users that effectively use groupware facilities
-

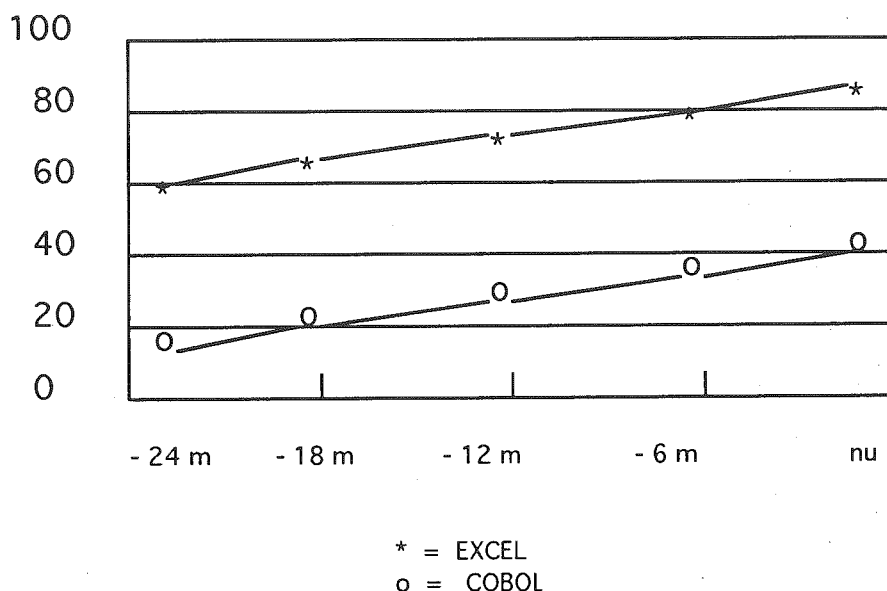
IT must deliver high quality service to its users and do this at the lowest possible costs. This can be achieved by optimally managing the process and can be improved by following up the operational measures displayed in the above Table. These measures should not only be followed through time, but should also be compared to industry standards and averages. Standardised measures like function points can be used when one is benchmarking programming productivity. In Figure 1 you can see how the evolution of a programmers' productivity can be followed. Of course, such a graphical representation can be equally well used for each other measure.

Figure 1 Graphical follow up of measures (example of programmers' productivity)

Perspective: operational excellence  
 Strategy: efficient software development  
 Measure: programmers' productivity Excel and COBOL

function points/person month

functiepunten/manmaand



## Measurement future orientation

Additional to measuring the performances of today, we also need to measure the performances of the future. The measurement of the IT department's future opportunities has to do with preparing the IT staff for the future, preparing the applications portfolio for the future and putting effort into researching new emerging technologies (Table 7).

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Table 7 Metrics for future orientation

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### PERMANENT EDUCATION OF IT STAFF

- \* number of education days per person
- \* education budget as % of total IT budget

### EXPERTISE OF IT STAFF

- \* number of years of IT experience per staff member
- \* age pyramid of the IT staff

### AGE OF APPLICATION PORTFOLIO

- \* number of applications per age category
- \* number of applications younger than 5 years

### RESEARCH INTO EMERGING INFORMATION TECHNOLOGIES

- \* % of budget spent on IT research
- 

The ability to deliver high quality IT services within 3 to 5 years has to be prepared today. IT must assess future trends and anticipate them. The fact that unanticipated evolutions can probably be solved with extensive and often high priced support, can be of some comfort. Of course, the better solution is that internal people are well educated for the future so that the right expertise can be found in-house.

## Applying the IT balanced scorecard

In building its own company-specific IT balanced scorecard, we propose the following steps:

1. presentation of the concept of the IT balanced scorecard technique to top management and IT management;
2. data-gathering phase where information is collected on the following items: corporate and IT strategy, (traditional) IT metrics already in use for performance measurement;
3. developing the company-specific IT balanced scorecard inspired on a "standardised" model as presented in this paper and based on the Kaplan and Norton (1996) principles.

In order to develop an IT balanced scorecard that is more than a group of isolated and eventually conflicting strategies and measures, three principles have to be complied with (Kaplan and Norton, 1996):

- \* build in cause-and-effect relationships
  - \* include sufficient performance drivers
  - \* linkage to financial measures.
-

As will be illustrated in our case study, these three principles are often overlooked when implementing the IT balanced scorecard (cf. infra).

A strategy is a set of assumptions about cause and effect. If cause-and-effect relationships are not adequately built in the balanced scorecard, it will not translate and communicate the company's vision and strategy. Cause-and-effect relationships can be illustrated as follows: if we guarantee "zero" defects (operational excellence perspective), then we will meet user expectations better (user orientation perceptible), and then we will enhance the support of business processes (business contribution perspective).

A well built balanced scorecard needs a good mix of outcome measures and performance drivers. Outcome measures like programmers' productivity (*number of function points per person per month*) without performance drivers like IT staff education (*number of educational days per person*) do not communicate how the outcomes are to be achieved. And performance drivers without outcome measures may enable to achieve short term operational improvements, but will fail to reveal whether the operational improvements have been translated in enhanced financial performance. An IT department may invest significantly in employee training in order to improve employee productivity. If, however, there is no outcome measure for employee productivity (e.g. function points), IT management cannot measure whether its strategy is effective. Table 8 shows some examples of outcome measures with corresponding performance drivers. Outcome measures are more or less generic (user satisfaction, productivity, employee satisfaction), whereas performance drivers are more company-specific and are revealing company strategy.

Table 8 Examples of IT outcome measures and performance drivers

<i>Outcome measures</i>	<i>Performance drivers</i>
Index of user satisfaction	Average response time of help desk
% of the development capacity engaged in strategic projects	Frequency of IT Steering Committee meetings
% of changes and adjustments made throughout different development phases	Educational budget as % of total IT budget

The IT balanced scorecard must retain a strong emphasis on financial outcomes. "A failure to convert improved operational performance into improved financial performance should send executives back to the drawing board to rethink the company's strategy or its implementation plans" (Kaplan and Norton, 1996).

Further, we must keep in mind continuously that measurements are not enough and that they must be used and acted upon by management: the balanced scorecard is not only an operational but in essence a strategic management system. The following steps to implement effectively the IT balanced scorecard as a strategic management system are (Kaplan and Norton, 1996):

- \* clarifying and translating vision and strategy, and attention to both the cause-and-effect relationships and the performance drivers;
- \* linking strategy to team and individual goals, and eventually linking employee compensation to the balanced scorecard measures;
- \* linking strategy to resource allocation, and determining stretch targets and priority setting;
- \* strategic feedback, and collecting and reviewing performance data about the strategy and defining new strategic initiatives or adjusting existing strategy.

### AUDITING THE IT BALANCED SCORECARD

In Timmerman (1997) a program for auditing the IT balanced scorecard from the perspective of an internal auditor is developed consisting of the following steps:

- \* definition of scope and objective
- \* determination of the audit team
- \* familiarisation phase
- \* analysis phase
- \* reporting.

The objective is to ensure that the IT balanced scorecard monitoring system is contributing effectively to the achievement of the strategic goals of both the IT organisation and the company. The scope can vary from performing a review resulting in a number of findings and recommendations to expressing an opinion on the effectiveness of the balanced scorecard monitoring system in achieving the company's strategic goals. The scope has a significant impact on the nature and the extent of the audit procedures. In the case of expressing an opinion, the auditor will need to test in sufficient detail the company's procedures and/or underlying data in order to gather sufficient evidential matter to enable the auditor to express an opinion.

The audit team needs to include auditors that are familiar with balanced scorecards and strategic management. If not available, internal audit will need to hire the services of an external consultant. The team members also need to have sufficient seniority as they will be interviewing both senior and middle management.

During the familiarisation phase the audit team will familiarise herself with the corporate strategic plan and the corporate balanced scorecard, the IT process and organisation, the IT strategy and the IT balanced scorecard.

The steps in the analysis phase are the definition of *What Can Go Wrong Questions*, *identification of the client control procedures*, and the *preliminary evaluation of the effectiveness of the client control procedures*. In Table 9, a template is shown for these three steps of the analysis phase. The *What Could Go Wrong Questions* can be used for most IT organisations. The client control measures are based on a hypothetical case. The test of the effectiveness of the client control procedures can be done by a combination of interviews, observations, analysis of supporting documents and testing of data.

Table 9 Audit of the IT balanced scorecard (analysis phase)

WHAT CAN GO WRONG QUESTIONS	CLIENT CONTROL PROCEDURES	TEST OF EFFECTIVENESS
<u>Clarify and translate vision and strategy</u>		
The IT strategy does not align with the company strategy	Company senior management reviews and approves the IT balanced scorecard	Interview inquiring about alignment process Review of minutes of meetings Review of company strategy and IT strategy
There is no consensus within management of the IT department about the IT strategy	Discussion of the cause-and-effect relationships in the BSc helps identifying the lack of consensus and contributes to the solution of the problem	Review of minutes of meetings Interview clarifying the cause-and-effect relationships
Insufficient expertise in building the BSC	Involvement of a BSC expert Use of BSC model as presented in this paper	Assess expertise of BSC expert
The cause-and-effect relationships are not clear, resulting in measuring the wrong things	Involvement of a BSC expert for building the IT BSC	Interview clarifying the cause-and-effect relationships
Insufficient performance drivers resulting in a BSC not visualising how the IT strategy will be achieved	Involvement of a BSC expert for building the IT BSC	Assess balance of performance drivers and outcome measures and discuss with IT management
Insufficient outcome measures resulting in a BSC insufficiently monitoring whether the strategy is successful	Involvement of a BSC expert for building the IT BSC	Assess balance of performance drives and outcome measures and discuss with IT management
No linkage to financial objectives resulting in a lack of feedback about how IT strategy is improving the financial performance of the company	Involvement of a BSC expert for building the IT BSC	Assess balance of performance drivers and outcome measures and discuss with IT management



### Link strategy to team and individual goals

The IT BSC is insufficiently communicated to the employees	Training sessions explaining the IT BSC, the underlying cause-and-effect relationships and how it contributes to achieving corporate strategy	Inquire about communication process Review supporting documents to assess effectiveness
Individual objectives of the IT employees have not been linked with the IT BSC	Action plan to align individual objectives of IT staff to IT BSC Link compensation to BSC measures	Inquire about linkage process Review supporting documents to assess effectiveness
Incentive system is linked to non IT BSC measures and works contra-productively in achieving IT strategy	Link compensation to scorecard measures or at least turn off traditional incentive systems	Inquire about incentive system Review supporting documents and assess whether it risks to work contra-productively
The primary BSC objectives are achieved in undesirable ways	Identify possibilities of sub-optimisation and ensure sufficient diagnostic monitoring measures are in place	Inquire about the process to identify for sub-optimisation Review supporting documents and assess effectiveness of the process

### Link strategy to resource allocation

Long term targets are insufficiently stretched	Benchmarking Review and approval by senior management	Inquire about benchmarking process Review supporting documents and assess effectiveness of benchmarking process
Long term targets are experienced to be unrealistic by middle management	Benchmarking Obtain consensus with middle management	Inquire about benchmarking process Review supporting documents and assess effectiveness of benchmarking process
No strategic initiatives are taken to achieve the stretch targets	Quarterly IT strategy meetings	Review minutes of IT strategy meetings Interview with manager in charge of IT strategy meetings If possible assist at a meeting
No short term milestones are set for IT BSC measures	Develop a budgeting system for BSC measures that is linked to IT strategy	Inquire about budgeting process for BSC measures Review supporting documents and assess effectiveness of budgetary process and linkage to the IT strategy

Priority settings for IT investment projects are not linked to the IT BSC

Measure impact of IT investments on the IT BSC measures

Inquire about IT investment decision process  
Review supporting documents and assess effectiveness of IT investment decision process

### Strategic feedback

Measures do not measure correctly what they are supposed to measure

Independent review

Review the results of independent reviews and assess adequacy of these reviews  
Perform an independent review to assess the design of the measures

Management information system does not include measures

A "missing measurement" program

Inquire about inclusion of BSC measures in the management information systems  
Review supporting documents and assess effectiveness of management information system

The measurement results are not used to act upon

Quarterly IT strategy meetings

Review minutes of IT strategy meetings  
Interview with manager in charge of IT strategy meetings  
If possible assist at a meeting

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The results of the analyse phase are documented in a draft report that is discussed with IT management. This report includes a description of the scope and objectives of the engagement, a description of the control weaknesses identified with indication of the potential impact on the company, and proposed solutions with a priority ranking. After discussion with IT management, their comments to the proposed solutions are added to the report and a final report is issued to the requester of the audit (e.g. audit committee) with a copy to IT management.

### CASE STUDY

CASUS S.A. is a major Belgian service company operating mainly within the European Community. It has six Strategic Business Units of which the IT department is one. The strategy of the IT department is to

- \* increase user satisfaction through the increase of effectiveness and efficiency of the IT processes;
  - \* increase IT employee satisfaction through improvement of skills;
  - \* maximise business support by the development of new applications that maximise business revenue.
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The IT department of CASUS S.A. has recently started to build an IT balanced scorecard. One of the authors has been invited by the internal audit department to perform a high level review on the IT balanced scorecard in order to identify areas for improvement.

### Description of the IT BSC of CASUS S.A.

The IT balanced scorecard of CASUS S.A. is summarised in Table 10. The typical terminology of the company is used.

Table 10

IT balanced scorecard of CASUS S.A.

#### USER VIEW

#### BUSINESS CONTRIBUTION VIEW

##### System performance

- \* availability % of mainframe applications
- \* router availability
- \* server availability
- \* transaction response time

*(no measures have been identified for this perspective)*

##### Development performance

- \* % of requests for estimation answered versus requests for estimation received
- \* backlog in person-days for implementation to be started
- \* backlog for requests for implementation started but not yet ended
- \* backlog of approved but not completed work
- \* % of requests completed on time

##### Satisfaction index

- \* monthly customer satisfaction survey *(is currently being developed)*

##### Invoicing process

- \* cycle time of monthly billing process in number of working days

#### INTERNAL PERFORMANCE VIEW

#### EMPLOYEE AND INNOVATION VIEW

##### Costs

- \* actual capital expenses versus budget
- \* actual operating expenses versus budget

##### Efficiency

- \* schedule performance index
- \* cost performance index *(both indexes are currently being developed; they measure whether the delivery of systems is within time and budget)*

##### Staffing

- \* headcount internal IT staff compared to budgeted headcount
- \* headcount external IT staff compared to budgeted headcount

##### Training

- \* monthly training costs internal staff compared to budgeted costs
- \* monthly training costs external staff compared to budgeted costs

##### Innovation

- \* % of major development projects within time and budget

## Results of the analysis

The above described audit program was used as a guideline to analyse whether the IT Balanced Scorecard of CASUS S.A. is meeting the following objectives:

- \* translate the IT strategy into performance measures to be focused on by management;
- \* communicate IT strategy to employees and link to individual objectives in order to enhance the realisation of the IT strategy;
- \* determine long term stretch targets and identify strategic initiatives to achieve these stretch target;
- \* create a feedback system to test the assumptions on which the strategy is based and monitor the gap with the long term targets.

Based on this high level review, indications were identified that the current IT balanced scorecard is not fully meeting these objectives. The main reason is that no long term (stretch) targets have been determined for the measures on the IT balanced scorecard. In addition, the scorecard is missing some performance drivers that indicate how the IT strategy will be achieved and there is insufficient communication of the IT strategy to employees. As a consequence, the current IT balanced scorecard is an operational management system rather than a strategic management information system: it gives information about where IT is today but does not put it in the perspective of where IT wants to be tomorrow.

Below are some examples illustrating the above conclusion.

### No stretch targets

Most of the system performance objectives are currently already met. This means that either the performance objectives are sub-optimal and should be further increased or that no strategic initiatives are needed to further improve system performance. In the latter case, a suggestion is to remove the system performance measures from the IT balanced scorecard. These measures would then become diagnostic measures (rather than strategic measures) that would only involve the attention of IT management in the case of deviations from expectations (management by exception).

IT costs, headcount and training costs are compared with the monthly budget. There is, however, no indication about the long term target: is the objective to decrease or increase these costs and by how much?

The development performance will be measured by a *Schedule performance index* and a *Cost performance index*. These indexes will give an indication about how well customer expectations are met in terms of time and budget, but are sub-optimal in giving information about the development efficiency. An alternative for this might be the use of function points. Through benchmarking, this would allow IT management to have an idea about where they stand today, compared with the best in class, and set long term targets. The introduction of function point is of course a project on its own.

### Insufficient cause-and-effect relationships and insufficient drives

System availability, responsiveness on development requests and timely delivery of new applications are identified as performance drivers for user satisfaction. However, there is no indication of how the above will be realised: by increasing employee skills and/or implementation of new development tools, and/or by new project management methods? The employee and innovation view do not include performance drivers that enhance the achievement of user satisfaction.

In the employee view, the actual training cost is compared with the budget, but there is no indication of whether the long term objective is to increase or decrease training costs. An alternative would be to build an employee strategic skills gap index that would enable management to ensure that the additional training effort is spent to close the gap on skills that are vital for the achievement of the IT strategy.

Another important goal of IT strategy is to increase employee satisfaction. The underlying assumption is that improvement of employee satisfaction will increase productivity and thus improve the results of the IT department. The IT balanced scorecard, however, does not include outcome measures nor performance drivers related to employee satisfaction. The employee view only measures headcount and training costs. Suggested outcome measures are employee satisfaction surveys and employee retention measures. Suggested performance drivers are training costs per employee and an employee strategic skills gap index.

### No business contribution view

The IT balanced scorecard does not have a business contribution view. On the other hand, presently actions are being taken that will ultimately enable the IT department to prepare income statements that will give a "true and fair" view of the results of their operations. It is recommended that once this is achieved, the business contribution view be completed with some traditional financial measures as proposed in our "standard" IT balanced scorecard. A further suggestion is to introduce an IT project evaluation system like Information Economics in order to have a clear view on the real business contribution of these projects. This is again a project on its own.

### Insufficient communication

The distribution of the IT balanced scorecard is restricted to senior management and IT management. Ideally, the IT balanced scorecard is communicated throughout the IT department in order to maximise employee commitment. In addition individual objectives of the IT employees should be more linked to the IT balanced scorecard.

### Need for a more standardised scorecard

In this paper a framework for the IT balanced scorecard has been developed. Comparing the scorecard of our case company with this framework, it is noticed that:

- \* the CASUS S.A. user view contains typical internal operational measures (system and development performance) and less real user view measures;
- \* the user orientation also shows a measure regarding the cycle time of the (client) billing process which is really more in place in the internal operational perspective or even in the business contribution view;
- \* the business contribution has still to be developed and as suggested earlier in this paper, traditional financial measures and project evaluation techniques have to be implemented;
- \* the internal operational perspective needs more typical measures for PC acquisition, problem management, user education, management IT staff and use of communication software;
- \* the future orientation measures should also focus on expertise of the IT staff, age of the application portfolio and the research of emerging technologies.

## CONCLUSION

In this paper we developed an evaluation framework for the IT function based on the balanced score card technique, completed with elements of information economics and business reengineering. Four "standardised" evaluation domains were identified and supplied with adequate measures: business contribution, user orientation, operational excellence and future orientation of IT.

The proposed IT balanced scorecard was then applied to the monitoring of the IT process, a program for auditing this scorecard was developed, and finally the audit program was used to review the IT balanced scorecard of a Belgian company.

Major conclusions are:

1. establishing an IT balanced scorecard is a time consuming project which needs much involvement of senior management, IT management and IT staff;
2. it is crucial is to understand that it is not merely an operational management system but that it is in essence a strategic management tool that should drive the IT department to better performances;
3. major points in building a "balanced" IT scorecard are the selection of the right measures, the building of the cause-and-effect relationships, and the inclusion of sufficient performance drivers.

From the case study and other observations we could learn that in applying the IT balanced scorecard, companies may have problems with each of the three above listed items. A major and generic shortcoming is that it is only implemented as an operational management system and not as a strategic management tool due to the absence of long term objectives and targets and insufficient communication of the IT strategy to staff.

## REFERENCES

- Brynjolfsson, E. "The productivity paradox of information technology", *Communications of the ACM*, December 1993, pp. 67-77.
- Brancheau, J., Janz, B. and Wetherbe, J. "Key issues in information systems management: 1994-95 SIM Delphi results", *MIS Quarterly*, June 1996, pp. 225-242.
- Butler Cox Foundation, *Getting value from information technology*, Research report 75, June 1990.
- COBIT, *Control objectives for information and related technology - Framework*, Information Systems Audit and Control Foundation, Rolling Meadows (IL), 1996.
- COSO, *Internal control - integrated framework*, American Institute of Certified Public Accountants, New Jersey, 1994.
- Dickson, G. and Wetherbe, J. *The management of information systems*, McGraw-Hill, New-York, 1985.
- Freidberg, A. and Reisch, J. "The value of control self-assessment", *IS Audit & Control Journal*, volume I, 1997. pp. 24-28.
- Galliers, R., Merali, Y. and Sparing, L. "Coping with information technology? How British executives perceive the key information systems management issues in the mid-1990s", *Journal of Information Technology*, 9, 1994, pp. 223-238.
- Gold, C. *Total quality management in information services - IS measures: a balancing act*, Research Note, Ernst & Young Center for Information Technology and Strategy, Boston, 1992.
- Gold, C. *IS Measures - A balancing act*, The Ernst & Young Center for Business Innovation, Boston, 1994.
- Hamilton, S. and Chervancy, N. "Evaluating information system effectiveness - Part I: Comparing evaluation approaches", *MIS Quarterly*, September 1981, pp. 55-69.
- Kaplan, R. and Norton, D. "The balanced scorecard - measures that drive performance", *Harvard Business Review*, January-February 1992, pp. 71-79.
- Kaplan, R. and Norton, D. "Putting the balanced scorecard to work", *Harvard Business Review*, September-October 1993, pp. 134-142.
- Kaplan, R. and Norton, D. "Using the balanced scorecard as a strategic management system", *Harvard Business Review*, January-February 1996a, pp. 75-85.
- Kaplan, R. and Norton, D. *The balanced scorecard: translating strategy into action*, Harvard Business School Press, Boston, 1996b.
- Kogan, A., Sudit, E. and Vasarhelyi, M. "Implications of internet technology: on-line auditing and cryptography", *IS Audit & Control Journal*, volume III, 1996, pp. 42-48.

Owen, J. *Benchmarks and best practices: network benchmarking*, Datapro Information Services Group, 1995.

Parker, M., Benson, R., and Trainor, H. *Information Economics: linking business performance to information technology*, Prentice Hall, Englewood Cliffs (NJ), 1988.

Parker, M., Trainor, E. and Benson, R. *Information strategy and economics: linking information systems strategy to business performance*, Prentice Hall, Englewood Cliffs (NJ), 1989.

Parker, M. *Strategic transformation and information technology*, Prentice Hall, Upper Saddle River (NJ), 1996.

Peppard, J. and Rowland, P. *The essence of business process re-engineering*, Prentice Hall, London, 1995.

Robson, W. *Strategic management and information systems*, Pitman Publishing, London, 1994.

Timmerman, D. *Monitoring the IT process*, unpublished paper, UFSIA Management School, Antwerp, 1997.

Van Grembergen, W. and Vander Borgh, D. "Audit guidelines for IT outsourcing", *EDP Auditing*, Auerbach 72-30-35, June 1997a, pp. 1-8.

Van Grembergen, W. and Vander Borgh, D. "An audit of IT outsourcing: a case study", *EDP Auditing*, Auerbach 72-30-36, June 1997b, pp. 1-11.

Van Grembergen, W. and Van Bruggen, R. "Measuring and improving corporate information technology through the balanced scorecard technique", *Proceedings of the fourth European conference on the evaluation of information technology*, Delft (The Netherlands), October 1997.

Willcocks, L. *Information management. The evaluation of information systems investments*, Chapman & Hall, London, 1995.