Process Performance Measurement: Identifying KPI's that Link Process Performance to Company Strategy

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ABSTRACT

Business is becoming more and more complex. This requires that a company's business processes to be managed, measured and monitored accurately. However lots of organizations raise worries that they are not measuring the company's performance on the level of processes, but for the majority on the departments' performance. This paper will propose a methodology for performance measurement that supports a process-oriented vision on an organization. This is achieved through combining a top down approach, in which process goals are cascaded down to the company's core processes and a bottom-up approach where operational measurements are being collected on the level of the end-to-end customer focused processes. Aggregating both approaches is achieved through identifying cause-effect relationships between these different metrics. A combination of both viewpoints delivers valuable information about the processes, their contribution to the overall company strategy and the drivers for process performance that have a direct impact on the outcome of the processes and hence on customer satisfaction.

INTRODUCTION

The business world is changing at an ever-increasing pace. All these changes in the business context impose new challenges on the management of today's organizations. Intangible assets, such as information technology, people and internal processes have become very important sources for creating a competitive advantage. These intangible assets influence a company's performance by enhancing the internal processes most critical to creating value for customer, shareholders and other stakeholders (Kaplan and Norton, 2004). The more organizations change, the more they must concern themselves with their stakeholder relationships, and the design and management of their processes so that organizations, people and technologies have a common business purpose.

During the last decades the awareness grew that it is not longer possible to only sustain a departmental, vertically oriented organizational structure. This so-called 'island' structure can lead to several suboptimal situations in which the customer is confronted with inconsistent performance delivery: i.e. long waiting times, rework, poor quality, hidden costs, etc. These inconsistencies or breaches in performance are often referred to as the white spaces in an organization (Rummler & Brache, 1995). Process management, which emphasizes value and service to the customer, is therefore more and more replacing traditional and functional structures.

McCormack (2001) has already shown that the development of business process orientation in an organization leads to positive outcomes, both

from an internal perspective and a resultant perspective. However, in becoming a process oriented organization, one also has to be concerned with managing, measuring and controlling the organization's business processes accurately, including aspects of the process like output quality, cycle time, process cost and variability compared to the traditional accounting measures. Therefore accurate performance measurement systems are needed, to guide the organization and especially its internal processes in realizing its strategic objectives.

Scoping Process Performance Measurement

Performance Measurement is the process of quantifying the efficiency and effectiveness of purposeful action and decision making (Waggoner et al., 1999). It is the determination and control of performance indicators, adapted to strategic and operational objectives. Performance Management is the process that helps an organization to formulate, implement, and change its strategy in order to satisfy its stakeholders' needs (Verweire et al., 2004).

More specifically process performance management (as defined by Melchert et al., 2004) is the process of getting insight in the company's processes to get control on the execution of business processes with data

Figure 1. Performance Management System (adapted from Bruggeman et al., 2001, p.27)
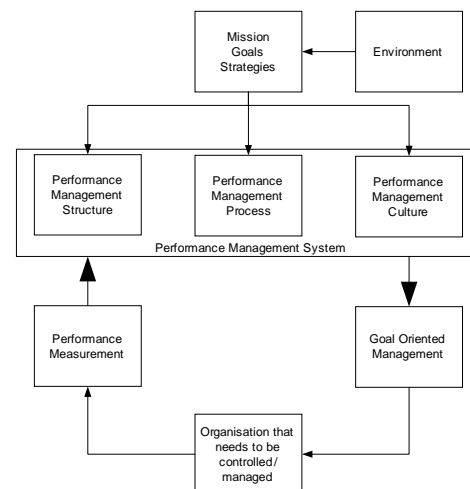
collected during the execution of the process, in order to identify potential for improving process execution and to recommend the appropriate modifications to the processes.

A performance management system (figure 1) consists of 3 major components (Bruggeman and Slagmulder, 2001). The *performance management structure* translates high and medium-level goals into operational targets and determines the entities in the organization that have to be controlled and how they are being controlled. It provides the framework to determine how the company's strategy is being translated to the right set of key performance indicators (KPI's). A second component is the *performance management process*, which consists of the planning, measurement of the results, comparison between plan (e.g. targets, budgets or benchmarks) and reality and taking corrective actions where needed. Such a process should also allow for feedback mechanisms to improve the measurement system on itself. This also entails the communication of the metrics and the results to all members of the organization, reporting lines and other feedback mechanisms. The third element is a *performance management culture* which comprises all values and beliefs that guide the behaviour of the people in the organization.

As mentioned before, a performance measurement structure should also be able to support a process-oriented vision on an organization. However, already for a long time, companies have been using financial accounting-based performance measures to track how well the organization is going, usually in a perspective of departmental responsibility accounting or similar. Critics argued that financial performance measures lack the inherent variety to give decision-makers the range of information they need to manage processes.

Research performed by Marr and Schiuma (2003), reveals that in the last few years Kaplan and Norton are certainly the most cited authors in the domain of performance measurement. This is probably the reason, and at the same time the result of the tremendous success of the Balanced Scorecard methodology used by companies to define their appropriate set of performance indicators at a multi-dimensional level. This well-known and popular methodology underlines the importance of the alignment between the strategy and the measurement system. Another advantage of the BSC's success is the growing awareness in organizations that there should not be a focus on financial measurements alone.

Kueng (2001) also observed some shortcomings of the current performance management systems. He also concluded that they are too strongly focused on financial indicators, and that the concept of cause-effect relations between metrics has not been implemented. Additionally he found that performance data was only available with considerable time lag and that the performance measurement processes are poorly defined.

Additionally lots of organizations raise worries that they are not measuring the company's performance on the level of processes, but for the majority on the departments' performance. Metrics are only being defined on the respective components of the organization chart (organogram). Another concern partially resulting from this is that these metrics are not well aligned with the company's strategy or do not reflect the 'voice of the customer'.

An accurate process performance measurement system is needed, to guide the organization in realizing its strategic objectives. The focus of this paper will therefore be on the set up of a coherent performance measurement structure or methodology in that way that it is at the one hand aligned with the overall company strategy, to meet strategic objectives on a corporate level and on the other hand with the current operations and internal processes.

Research Methodology

The research leading up to the conclusions in this paper was conducted between March 2005 and September 2005. In a first phase, relevant literature was consulted in the broad areas of performance management, business process management and strategy development and implementation. From this collection of sources, a first tentative model was drawn.

Additionally a semi-structured questionnaire was set up to perform a series of interviews.

In a second phase a series of open one-to-one interviews with several key persons in a number of selected companies was conducted. The ten selected companies consisted of a combination of research member companies within a BPM research network and a number of companies with proven interest in Business Process Management. Each of these companies had already undertaken some activities for introducing a more process-oriented vision into the company during the previous years. Suggestions, knowledge, best practices, lessons learned and other insights from this interviewing round were incorporated into the research, which resulted in a second trial model.

In a third phase, a trial validation of findings was undertaken by presenting it to academic partners and business experts during another series of one-to-one interviews. In a last phase, workshops were undertaken with the research members and other organizations in which the model was validated.

Interviewing these companies made it obvious that the most recurrent and most urgent problems concerning the build-up of a sustainable, process based and decision support performance measurement structure were situated in three main area's. The first area is about how to set and cascade corporate strategic goals into KPI's related with the processes. A second area was about identifying how metrics could be linked to the processes. The third area deals with a lack of explicit cause-effect reasoning around the different metrics. In the following we will propose a methodology which covers these areas.

### SETTING UP A PROCESS PERFORMANCE MEASUREMENT STRUCTURE

Processes in an organization can be analyzed from many viewpoints, as indicated in figure 2. The proposed combination of two main viewpoints, internally and externally, which is inspired by the systems thinking movement (Checkland, 1980), will assist in the set up of a sustainable performance measurement structure that supports decision making by evaluating processes based on strategic objectives.

On the one hand, a process can be seen externally as a black box with related characteristics that are externally important, such as the goals of the process, the beginning and end of the process, the inputs and outputs. Often this is the point view where the internal processes are often looked at by the top management and parties external to the company. This can be referred to as the strategic top-down approach for evaluating overall core processes and their strategic contribution to the corporate goals. Typical strategic questions in this top-down approach are: "Which processes are creating value?", "Which processes should we improve?", "Who are the stakeholders of this process?", "What is the goal of each process", "Who could take responsibility and/or ownership over which process?", etc.

On the other hand, the process can be seen as a composition or a sequence of different sub-processes and activities, going through several units and functionalities. This is the internal view, which is being observed as more operational and executed by managers and employees inside the business. Combining and aggregating these sub-parts and units to get a more general view on the core processes is rather a bottom-up approach. Questions that can be asked in this approach are: "How can we improve this specific process?", "Which department or function is having a role in this process?", "Where and when are customers involved in this process?", "What are the specific drivers in the process that influence the outcomes?", etc.

In the end, both approaches, top-down and bottom-up, need to be combined in that way that specific process oriented KPI's can be formalized and coherently form a link between strategic goals and internal processes. This is visualized in figure 2 in the KPI-box. This means that KPI's should be formulated in that way that on the one hand the organization measures towards strategic objectives and on the other hand that these KPI's can give detailed and valuable information of the inside of the processes to steer and manage the company's processes.

Figure 2. Internal vs. external view on processes

Figure 3. Translation of CSF's to the process goals
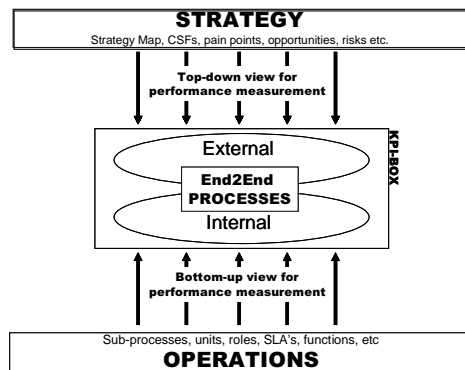
Cascade the Process Goals

Despite growing experience with balanced measurement methodologies such as the Balanced Scorecard (Kaplan and Norton, 2001), there is still much to do on further adoption and not in the least in developing its implementation at the level of internal processes. More attention should be given to linking strategic perspective into performance required from internal processes. To perform this cascade on a process level two inherent process attributes can be considered. These two attributes that should be reflected in any process-oriented performance indicator are *cross-departmental* and *end-to-end*. These two process characteristics induce specific requirements a good performance indicator needs, next to a whole range of general requirements. A KPI should capture white spaces in the process, and measure in that way its overall effectiveness compared to a strategic goal. This means that measurements should give a good representation of what happens across and between different departments. Therefore relative measurements that compare units and sub-tasks with each other and the contribution of each unit to the overall process can facilitate process management (De Toni and Tonchia, 1996).
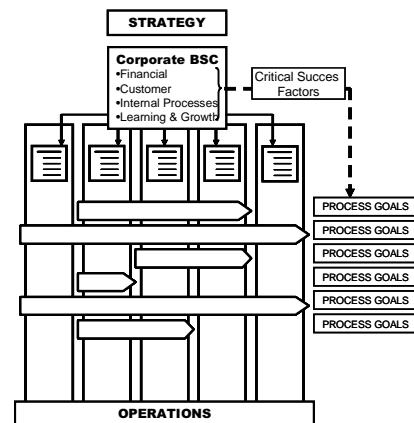
In combination with this, the common goal as backbone for the performance indicator should be generally accepted by every one involved in the process. This should be achieved to avoid 'turf protection' i.e. a situation where each department strives for the largest part in the success of the KPI (Walsh, 1996). A process oriented KPI should also be very easy to communicate and to understand. This is because different departments, with different backgrounds and structures are involved. All involved employees should know how to interpret the KPI's and its value to the company. Next to these requirements it seems more constructive to evaluate the performance of a team than of an individual, as this encourages collaboration and may enhance process focus (Nilsson, 1999).

To be sure that KPI's, deducted from the strategy, are surely process oriented, it seems valuable to formulate specific process goals for each of the identified core processes (figure 3). In a vertically structured organization it often happens that corporate strategy is cascaded across departments where each department is creating their own strategic plan resulting in departmental specific measurement points. Although such a departmental strategic exercise is necessary, it does not guarantee that process oriented KPI's are formulated. Therefore an additional strategic exercise is suggested. In a first step critical success factors (CSF) need to be formulated through a thorough analysis based on the corporate strategy. Starting from these CSF's specific and measurable goals for each of the identified core-processes can be made explicit. If these process goals are cascaded through the sub-processes, sub-units, activities, etc. process oriented KPI's are formulated using this stepwise approach.

Aggregate the Measurements

Currently in many companies a lot of measuring is done at a lower level in the different departments. These measurements concern the perfor-

mance of only parts of processes, departments, functional units, activities and even people. Similar to a Responsibility Accounting system, i.e. a methodical scheme of gathering and reporting accounting data according to the responsibilities of individuals (Sethi, 1977), process performance data can be integrated in a pragmatic way to a higher core process level. Nowadays responsibilities are often still very departmentally structured, and therefore a first aggregation of the current existing data, according to the structure of the modelled processes in the company, should give an understanding of the process performance in the organization.

Aggregating existing measurements from activities, departments, functions or other units' specific data sources has reduces the risk of overseeing or missing out the measurement of certain low value-adding activities in the organization, such as time lags in work handovers between departments, rework, and other white spaces in an organization. Aggregating these detailed measurements from different parts in the process makes it possible to discover different value streams and dependencies in these measurements. This enables to better understand, and model, the existing processes and to identify possible improvements. Moreover this way of working involves all layers in the organization by confronting people with the aggregation, in terms of feedback given and received by them.
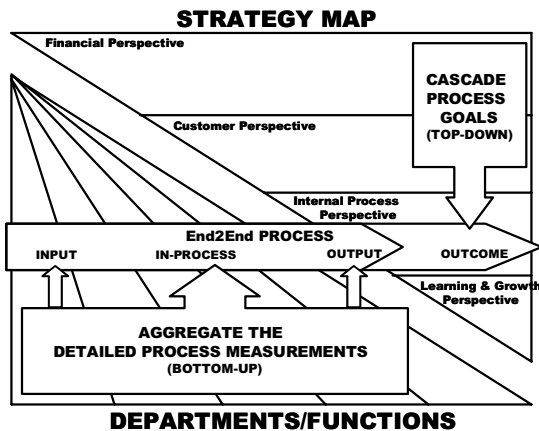
Make the Link: Top Down and Bottom-Up

Our research demonstrates that a valuable step in process measurement is making the link between a top-down strategy formulation and a bottom-up measurement aggregation. In this step aggregated measurements and the outcomes of the process need to be confronted with each other. This can be explained by the process representation in figure 4.

On the one hand the collected measurements from the previous phase are aggregated on the level of the processes and form the respective input, in-process and output parameters of the business processes. In parallel, desired outcomes of the process (process goals) are defined based on the strategic objectives.

Identifying Cause-Effect Relationships

A good performance measurement system also allows a company to trace back the causes of certain (non-) financial results or customer outcomes. A distinction has to be made between performance indicators that should give a sufficient representation of the desired process outcome, i.e. lagging indicators, and indicators that should be able to give an insight in how process outcomes are influenced by measured sub-elements, i.e. leading indicators. A well elaborated consistent system in which cause-effect relations are used to link different indicators, can make it possible to steer processes and focus improvement efforts based on leading indicators or drivers of performance (Kueng (1999), Walsh

Figure 4. Linking top-down and bottom-up

Figure 5. A process cause-and-effect diagram for ticket reservation (Walsh, 1996)

tal measurements are aggregated on the level of the end-to-end processes.

By combining both viewpoints, valuable information can be obtained about the processes and their contribution to the overall company strategy, on condition that cause-effect relationships between different metrics have been identified. This will allow a better identification of the drivers for process performance which has a direct impact on customer satisfaction.

The approach explained in this paper, assumes that the company's vision, mission and strategy have been made explicit and that the company's processes have accurately been described and documented.

An important issue that has to be mentioned as a constraint to the described methodology in this paper is the cost of measuring. This is an important barrier for extending a measurement system, especially if non-financial process-oriented metrics need to be measured and reported and is especially due to the fact that the measurements need to be carried out in a manual way, which takes lots of time and makes it very sensible to errors.

Organizations state that a well-established IT platform can avoid this inefficiency problem by automating the measurement, analysis and reporting of KPI's. However, the development of extended systems that support the definition, execution, and tracking of business processes, allowing process managers to easily monitor process performance in real-time (the so-called BPMS - systems) are still in their infancy.

(1996)). For each process, different input parameters, process parameters and output parameters can be identified, which have a direct or indirect impact on the outcome or the process goal of the process. Defining those cause-effect relations is the next step in the methodology.

Currently a large range of financial indicators can be seen as lagging indicators, sometimes strengthened with some more general indicators such as market share and overall customer satisfaction, but there is much more information available inside the business processes. Despite the fact that companies already did some efforts to define non-financial indicators, there is still often a lack of identified relations between financial and non-financial indicators. (Kueng, 1999)

To identify events that can influence desired end results and outcomes, different methods have been discussed in many domains of scientific research. Here cause-and-effect identification forms often the basis of the relational thinking, although, depending on the used methodology (graphical representation, statistically, intuitive, trial-and-error, etc.) and the domain (general problem identification, industrial processes, human resources, etc.) the focus can differ.
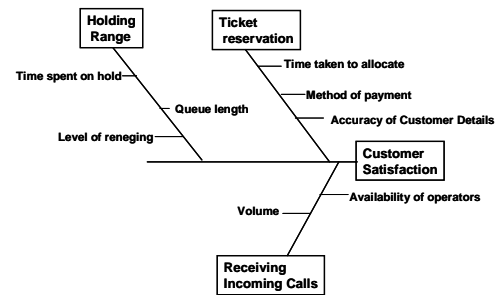
Walsh (1996) describes some examples of these techniques, which will not be explained in detail, since this is not within the scope of this paper. A first methodology is the *process map*, which allows for each end-to-end process, to identify the responsibilities or departments the process is involved in, and to relate the KPI's to the process that is being measured. A process map identifies all the drivers for a particular outcome.

Walsh (1996) also proposes some alternatives to the process map, such as the *process tree*. A process tree offers greater information on how processes and measures influence one another. Similar to the process tree an *Ishikawa fishbone* representation applied on processes can be made (example in figure 5). For each of these processes the KPI's are assessed which can influence the (process) goal. These methodologies provide guidance in building up a *KPI hierarchy*, based upon the process hierarchy and interrelation within and between the organization's processes.

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REFERENCES
Atkinson, A.A., Waterhouse, J.H. & Wells, R.B., 1997, "A stakeholder approach to strategic performance measurement', Sloan Management Review, 38 (3), pp. 25-37

Checkland, P.B., "The Systems Movement and the failure of Management Science", Cybernetics and System: an international journal, Vol.11, 1980, pp.317-324

Bruggeman W. and Slagmulder R., 2001, "Beheerscontrole, leidraad voor het doelgericht management van organisaties", Lannoo Scriptum, pp.24-27

Davenport T. and Short J., "The New Industrial Engineering: Information Technology and Business Process Redesign", Sloan Management Review, Vol. 31, No. 4., 1990, pp. 11-27

De Toni A. and Tonchia S., "Lean Organization, management by process and performance measurement", International Journal of Operations & Production Management, Vol. 16, No. 2, 1996, pp. 221-236

Dooley K., Skilton P. and Anderson J., "Process Knowledge Bases: Understanding processes through case and effect thinking",

CONCLUSIONS
Observations have shown that lots of organizations struggle with identifying and measuring the right metrics in order to get a thorough insight into the performance of the organization and more specifically in the performance of end-to-end core processes. This paper proposes a performance measurement structure or methodology that supports a process-oriented vision on a company. This is achieved through combining a top down approach, in which strategic goals are cascaded down to the company's processes and translated to process goals, complemented with bottom-up approach in which operational and departmen-

Human Systems Management, Vol.17, Issue 4, 1998, pp. 281-198

IDS Scheer AG, 2002, ARIS Process Performance Manager, white paper, http://www.ids-scheer.de/sixcms/media.php/1049/aris_ppm_whitepaper_d_v500.pdf

Kaplan R. and Norton D., 2004, "Strategy Maps – converting intangible assets into tangible outcomes", Harvard Business School Press, pp31-32

Kaplan R. and Norton D., 2001, "The strategy-focused organization, how balanced scorecard companies thrive in the new business environment", Harvard Business School Press

Kueng P. and Krahn A., "Building a process performance measurement system: some early experiences", Journal of scientific & industrial research, Vol. 58, No. ¾ (March/April) 1999, pp. 149-159

Kueng P., Meier A., and Wettstein T., "Performance Measurement Systems must be engineered", Communications of AIS, Vol. 7, Article 3, July 2001

Marr B. and Schiuma G., "Performance measurement – Past, Present and future", Management Decision, 2003, pp. 680-687

McCormack K., "Business Process Orientation: Do you have it? Placing an emphasis on processes will help organizations move forward", Quality Progress, 2001, pp. 51-58

Melchert F., Klesse M., and Winter R., "Aligning process automation and business intelligence to support corporate performance management", Proceedings of the Tenth Americas Conference on Information Systems, New York, August 2004

Munive-Hernandez E., Dewhurst F., Pritchard M., and Barber K., "Modeling the strategy management process – an initial BPM approach", Business Process Management Journal, Vol. 10, No. 6, 2004, pp. 691-711

Nilsson G., "Process Orientation, Integration of Work Teams and Management Control", 4th International Seminar on Manufacturing accounting Research in Kolding, Denmark, 10-12 June 1999

Rockart J., "Chief executives define their own data needs", Harvard Business Review, March-April 1979, pp. 81-93

Rummler G. and Brache A., 1995, "Improving Performance: How to manage the white space on the organization, a practical guide for managing organizations, processes, and jobs", San Francisco: Jossey-Bass

Sethi N., "Responsibility Accounting: a new dimension of comprehensive Planning Process", Industrial Management, Nov.-Dec. 1977, pp. 5-10

Sinclair D. and Zairi M., "Effective process management through performance measurement, part I – applications of total quality-based performance measurement", Business process re-engineering & Management Journal, Vol. 1, No. 1, 1995, pp. 75-88

Verweire K. and Van de Berghe L., 2004, "Integrated performance management, a guide to strategy implementation", Sage Publications, pp.6-7

Waggoner, D.B., Neely, A.D. & Kennerly, M.P. (1999), "The forces that shape shape organizational performance measurement systems: an interdisciplinary review", International Journal of Production Economics

Walsh P., "Finding Key Performance Drivers: Some new tools", Total Quality Management, Vol. 7, No. 5, 1996, pp. 509-519

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