Spring 3-23-2010

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Abstract

Enterprise Performance Management (EPM) integrates ideas from Performance Management with Business Intelligence, to make actual performance information available in real-time to the relevant stakeholders. EPM uses a separate data management level to 'harvest' data from the operational processes and supply it to Business Intelligence applications, such as planning, dashboards, scorecards, reporting and analysis. The paper shows the theoretical capabilities of EPM systems to support five different types of management control, ranging from hierarchical and centralised to more democratic and autonomous methods. Based on an analysis of a range of secondary case descriptions, including some presented at a key vendor's user group event, supplemented with conversations with some of these users, the papers gives some ideas on how these capabilities are currently used in practice. In particular it looks at whether the use of EPM Systems is related to changes in management control towards more democratic methods and empowerment.

Keywords: Enterprise Performance Management Systems, Business Intelligence, Management Control, Empowerment

1 Introduction

Information Systems (IS) and Information Technology (IT) are essential both for operating and for managing organisations. Data and information are needed in the execution of operational processes and transactions (e.g. payment details, production schedules, etc), for which many organisations apply large IT systems, such as Enterprise Resource Planning (ERP) systems. Data from operational processes is collected by the IS and stored in databases over time. This data can then used to create routine management reports that provide insights into the performance of an organisation and its constituting parts. This is typically done using so-called Management Information Systems (MIS), which could include Accounting Information Systems (AIS).

Additionally, sophisticated Business Intelligence (BI) and Datamining applications can analyse an organisation's performance in more detail and depth based on the collected data, as well as provide forecasts. However, although some BI applications provide real-time 'dashboards' displaying the performance of certain key aspects of a business (often as Key Performance Indicators, or KPIs), most performance measurement – and hence performance management – is post-hoc and reactive. It is also often fragmented, with different systems being used to store data and report on different business functions, creating difficulties in collecting and analysing all relevant performance data (Neely et al. 2008). In response to such problems, several BI vendors started developing an approach to Performance Management (PM) that both 'defragments' performance information and makes it more proactive and of strategic use. This has been branded, depending on the vendor, 'Enterprise Performance Management' (EPM), 'Business Performance Management' (BPM) or 'Corporate Performance Management' (CPM). In this paper, the term EPM will be prevalent.

The focus of this paper is on the impact that ubiquitous availability of real-time and accurate performance data through the EPM Systems would have on management control approaches in organisations. In principle, and according to explicit claims by EPM vendors, EPM application would allow for more 'democratic' or empowering control approaches to be employed. This would not just free up management time and make organisations more responsive, it would also respond to long-standing calls to curtail the use of formal, centralised management control approaches.

Section 2 of this paper contains in-depth study of EPM systems addresses. This is followed by a section on how IS in general support different management control approaches, while section 4 explores theoretical capabilities of EPM systems to support different management approaches. Section 5 then presents the findings of a preliminary study into the reality of the impact of EPM systems on management control, focussing on two key questions: 1) were the EPM systems intended to support democratisation of control, and 2) was such democratisation achieved, whether or not it was intended? Finally, section 6 contains conclusions and a brief discussion of the findings and their implications.

2   Enterprise Performance Management Systems

To put EPM in perspective, we will first explore 'regular' performance management, moving on to explaining how EPM is different. This section will also discuss the role of IS in EPM.

2.1 Performance Management

Performance management (PM) refers to the assessment of progress, at different organisational levels, toward achieving predetermined goals, as well as communication and action in response to actual progress (Bourne et al., 2003). An important part of PM is Business performance *measurement* (Franco-Santos et al 2007), but PM also includes taking appropriate *action* in response to the information. Henri (2006) considers performance measurement systems to be an aspect of management control systems.

PM looks at performance from a variety of angles, the most common being:

1) the *effectiveness* of any activity: whether wider goals are being achieved;
2) Matters of *economy*: whether value for money is being delivered from the inputs used; and
3) Issues of *efficiency*: have resources been used productively to create quality outputs? These aspects of performance are illustrated with figure 1, linking it to a process approach to work.
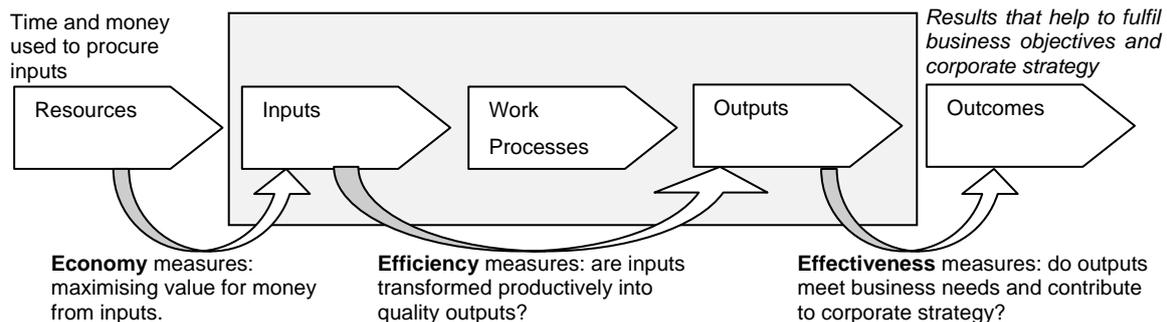
Figure 1:   **A generic performance framework**

Processes in organisations are in themselves collections of sub-processes feeding into each other, so one process' outputs may well be another process' inputs. Also, processes *share* resources and the overall outcomes reflect *emergent properties* of the collective (system), not a simple adding up of outputs of individual processes.

2.2 Performance Management across levels in the organisation

PM is not merely a tool for operational management. On the contrary, it is, at its best, an overall, integrative approach, linking operational activities to strategic outcomes. At a *strategic* management level, PM involves:

- Business goal setting (includes using historic data to analyse previous performance, forecasting, sensitivity analysis, scenarios, etc.);

- Determination of Key Performance Indicators (KPIs) for the business goals; and
- Goal evaluation, using the KPIs (possibly in the form of 'dashboards' showing actual performance on KPIs in real time).

An essential element at this level is insight into the external environment, including the market. Research by Oracle, an important EPM vendor, finds this to be a weak element for many organisations (Oracle 2009).

At the *tactical* management level PM involves the translation of business goals and KPIs into resources such as money, technology and people (e.g. number, skills, and training), structures and business processes. Deviations from targets can lead to changes in each of these, i.e. retraining of personnel, rethinking of budgets or changes in business processes.

For *operational management*, PM involves determination of individual output requirements, task distribution, monitoring, control, coordination, etc. All of this is done using KPIs and business goals as guidelines to produce more detailed performance indicators, and monitor contributions to the KPIs. At an *operational* level, i.e. for employees and teams, PM is reflected in individual and team output requirements. These will often be given by a manager, but autonomous workers and teams could base their targets directly on the KPIs, without an operational manager's directions. Figure 3, below, gives a graphical representation of these different levels, how they are linked by the business processes and the supporting IS.
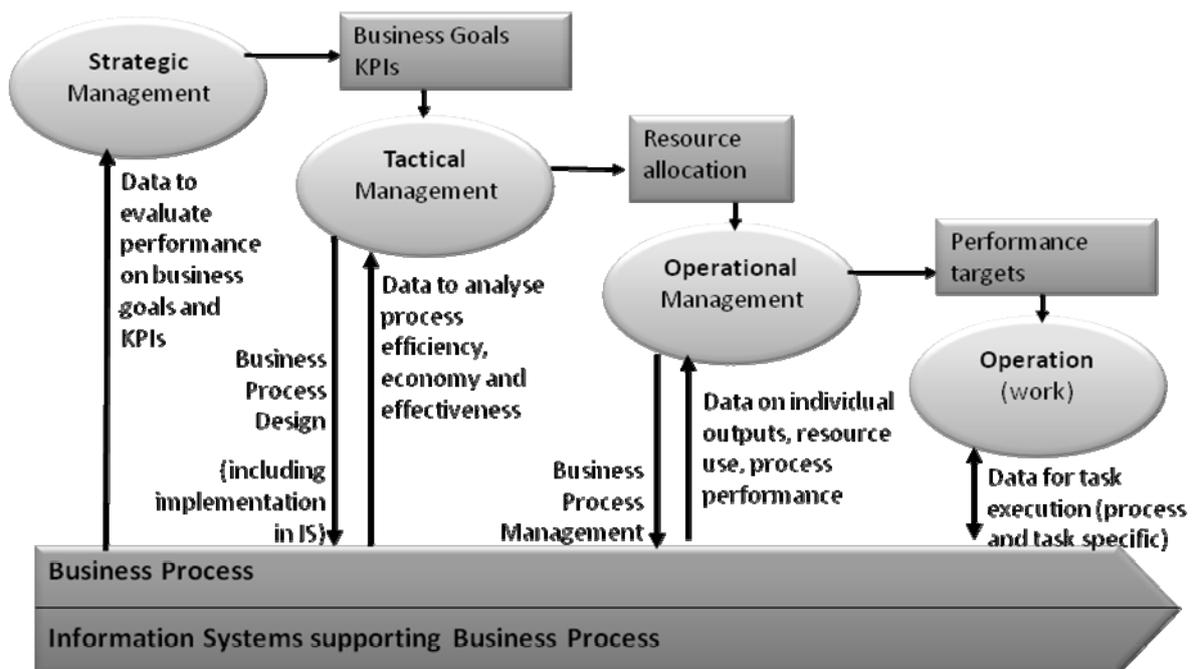
Figure 2: **Performance Management at different levels in the organisation**

2.3 Balanced Score Card

A key tool in performance management is the well-known 'Balanced Score Card' (Kaplan & Norton 1996). This is not just used in *measuring* performance, but it extends to being a strategic planning and management tool. Skærbæk and Tryggestad (2009) recognise the balanced scorecard as an important accounting technology, or 'device', that can be part of a stream of devices with strategic roles. Sometimes used as a term representing PM in itself, a balanced scorecard aims to provide a more realistic representation of an organisation's performance by not just looking at financial indicators, but including a range of other perspectives. Kaplan and Norton recommend using customer, internal business and learning and growth perspectives (Kaplan and Norton 1996), but variations on these exist, sometimes adjusted to fit specific industry sectors.

2.4 Enterprise-wide Performance Management

However appealing the above presented integrated, corporate approach to PM may seem, in practice very few organisations manage to fully benefit from it (Neely et al. 2008). Based on their survey of 633 companies in five countries, Neely et al. distinguish a series of 'gaps' that explain why organisations do not achieve the full potential of Enterprise-wide PM.; The most relevant of these gaps for this paper being:

1) A focus on financial measures;
2) A top-down perspective on PM (with senior management being the primary audience for measurement data); and
3) Problems with the (technical) infrastructure, including a lack of confidence in the accuracy of underlying data, lack of integrated technology (with spreadsheets still being the most widely used PM application, by some distance) and problems integrating operational and management systems.

According to Dresner (2008), the infrastructure issue is a result of organisations investing heavily in transactional systems (such as ERP), that by design are inflexible and optimised for handling large amounts of operational data. Such systems are, according to this author, supporting the efficient *running* of an organisation, but the data is difficult to access and use for *managing*, since relevant data is likely to be spread over multiple databases in different systems. Many organisations use operational systems, especially ERP, for integration, including integration of management control (e.g. Dechow and Mouritsen 2005). However, as these systems are operational in nature, and at best cover a large part, but not all of the relevant data, the success of such an approach would be limited. Enterprise Performance Management systems, in contrast, host the management processes in a single, interactive and

collaborative environment, independent of the (lack of) integration in operational systems and data. Dresner gives the following example of a global hotel chain to illustrate this point (2008:23). Without EPM, a report might indicate that one hotel in the chain is suffering from low occupancy rates. The significance of this information first needs to be picked up by someone, who might notify a person with the authority to act upon it. This will lead to an investigation of various systems and databases, risking loss of data integrity and focus. It may also be complicated to implement a suitable response. If the hotel chain would, however, adapt an EPM approach, a Business Intelligence system might indicate weather conditions causing low occupancy rates in a certain region. This could then automatically lead to a suggested response of seasonally adjusting prices, to be approved by the appropriate manager.

Specific academic literature on EPM is thinly spread. Bose (2006) discusses EPM from a data management perspective, focussing mainly on data warehousing and OLAP (online analytic processing, a data analysis approach). Lawrie et al (2004), who talk about *Corporate* PM, describe a case study in a UK government context, in which a new corporate management system was introduced, based on "best-practice third-generation balanced scorecard processes". The Economist Intelligence Unit (Bennett 2008) uses the term 'enterprise information governance' in a study into how companies use, share and analyse enterprise-wide information. The study confirms that organisations consider a formal information governance strategy to be very beneficial, though many struggle with sharing information across departments. EPM systems share some characteristics with 'continuous auditing' (CA) (Vasarhelyi and Harper 1991, Alles et al 2006), which aims at issuing audit reports soon after or simultaneously with events, and at continuously monitoring business process controls. Searcy and Woodroof's (2003) description of the CA process explicitly addresses the leveraging of technology and opening up of database architecture to enable real-time alerts to discrepancies between records and rules, followed up by tracing the error to the transactional level (e.g. sale) and taking appropriate action (all automated). Compared to EPM, CA is limited to financial transactions and reporting, while EPM is supposed to cover a 'balanced' view of a firm's performance, which includes non-financial measures. Also, CA appears to be geared towards compliance (e.g. following the Sarbanes/Oxley Act), rather than managing overall performance. According to Searcy and Woodroof (2003) CA, much like EPM, needs more academic underpinning.

Despite the focus in this paper on the IS and IT supporting EPM, EPM is, in its core, an approach to effectively manage larger organisations. The above mentioned case study by

Lawrie et al (2004), for example, describes a large, devolved UK governmental organisation, that used a corporate performance management approach to address challenges in aligning the activities of semi-autonomous parts with the overall aims of the organisation, as well as providing coherent and relevant external reporting. The current paper focuses on the technologies and systems that *enable* such an approach.

2.5 Enterprise Performance Management technology

EPM is a way of optimising the managerial use of data and information on what is actually happening in an organisation. Given that it is essential that data within business *processes* is handled well, EPM opts to introduce a separate 'level' of data handling, dedicated to use for management processes. Technologically, this is done by the introduction of master data management to integrate access to data from various business processes and functional applications. This is then combined with a Business Intelligence (BI) platform that presents relevant information to specific users at various management levels and functions. Typical applications within BI are aimed at (Dresner 2008):

- Financial management,
- Planning,
- Modelling,
- Dashboards (showing current and past performance),
- Scorecards (linking performance data to corporate strategy),
- Reporting and
- Analysis.

See figure 4 for an overview of the IS involved and how they relate.
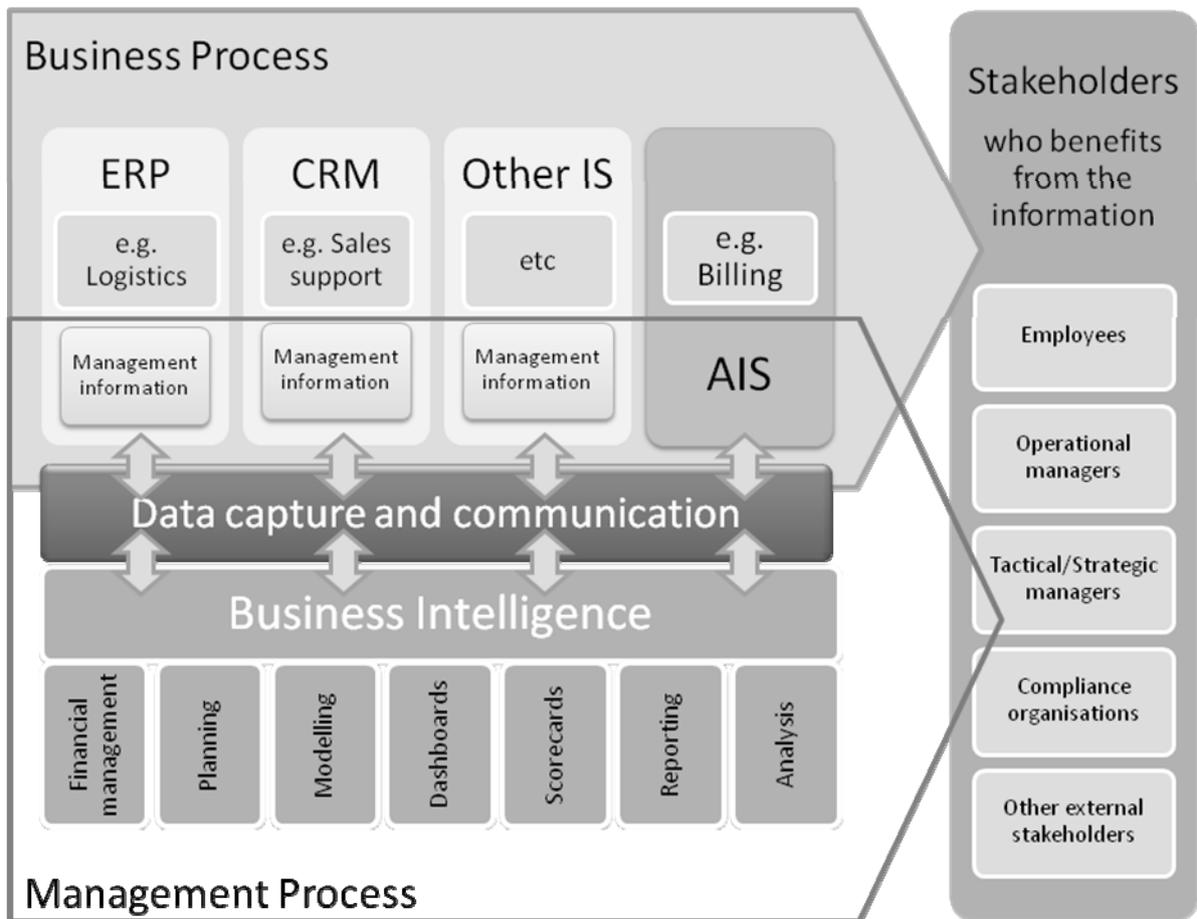
Figure 3:   **Enterprise Performance Management overview**

The figure shows several IS within the operational business process domain. This includes Accounting Information Systems (AIS), though these are optimised towards the management function, rather than to the operational processes like the other IS in the business process domain. A key aspect of an EPM approach is the availability of management information when and where it is most useful, independent of issues of hierarchy, and for both internal and external stakeholders (see for example Cormier et al 2009 on using Websites as disclosure platform). For many processes this would mean the availability of performance information directly to the employees involved, which, paired with the matching authority to act upon such information, would enable increased autonomy.

2.6   Risks and criticism

As EPM systems are both technologically challenging and organisationally complicated, they are most certainly not straightforward to implement and use. Many organisations have struggled with implementing 'regular' PM in the past. EPM will have the same risks associated with choosing the right performance measures; as "What you measure is what you

get" (Kaplan & Norton 1992:172), irrelevant KPIs (Letza 1996, Ghalayini & Noble 1996) or a narrow focus on certain KPIs that can lead to missed opportunities and sub-optimisation (Neely et al. 2002). It may be difficult to get the balance right between different performance measures, and to avoid overly flexible interpretation of 'softer' indicators (Ittner et al 2003). Further, continuous monitoring through computer systems could ultimately lead to a stifling form of electronic Panopticon (e.g. Lyon, 1993). If management doesn't handle the information well, painful miscarriages of justice could easily occur, where management just looks at the information provided by the IT, failing to take a broader view. This is, as an actual example, demonstrated by the suspension and subsequent early retirement of a local postmaster, whose attempt of helping a customer beyond the call of duty led to an error showing up in an audit (a possible example of continuous auditing). The automated report was taken as the justification for serious punishment, without regard for the postman's longstanding dedication, customer focussed attitude and local support.

3   IS capabilities and management control

This section will explore the capabilities of IS in general to support management control. It will start with a brief expose on our interpretation of management control, focussing on five different approaches to management control. This is followed by an explanation of the links between Information Systems and management control, leading to a table presenting IS capabilities to support the different control approaches.

3.1   Management Control Approaches

Management control is the organisational function that wants to ensure that individual activities in an organisation are aligned with the overall interests of the organisation (e.g. Tannenbaum, 1968 in Snell, 1992). Control also contributes to gaining customers' confidence and trust (Knights et al., 2001). Although control is managerial in nature, like, for example co-ordination and planning (cf. Henri Fayol's classic definition of management), it is not solely the domain of *managers*. Depending on organisational design decisions as well as culture (see for example Ahrens & Mollona 2007), control can be hierarchical and centralised, or more democratic and autonomous.

Spanning this range, five key approaches to management control can be distinguished. These are the three 'classic' approaches: input control, output control and behaviour control (e.g. Snell, 1992 and Ouchi and Maguire, 1975), supplemented with self-control (Henderson and Lee, 1992), also known as autonomy, and peer- or horizontal control (Adami 1999).

Behaviour control systems*,* also referred to as 'formal control' (e.g. Bijlsma-Frankema and Costa 2005), structure the transformation process of work, based on the assumption of a centralised hierarchy and initiated top-down in the form of articulated operating procedures. To ensure that subordinates adhere to procedure, superiors closely monitor and evaluate subordinates' actions over time. In *Output control* systems, targets, such as financial results, are set for subordinates. IS are often used here to support linking appraisal and rewards to results achieved. *Input control* aims to align the goals of individuals with those of the organisation, using employee selection and training to regulate the knowledge, skills, abilities, values, and motives of employees. S*elf-control* occurs when individuals exercise freedom or autonomy to determine both the actions required in a particular work situation, and their execution. *Peer control*, finally, applies where the presence of a work community influences an individual's actions. Adami labels this 'professional control', which relates to the 'image' of professionals with their peers, customers and supervisors, as well as to interaction and togetherness with colleagues (Adami, 1999).

3.2   Information Systems and Management control

Within organisational theory, control is often conceptualised as a cybernetic system (originating from Wiener 1948), revolving around (1) the establishment of superiors' (organisational) intentions, (2) an influence mechanism and (3) evaluation and feedback. Any control system will have to somehow rely on information to establish whether each employee's performance is sufficiently aligned with corporate goals and with other employees' performance. Also, as more business processes are mediated by information technology, the relationship between control and IT becomes more significant (Orlikowski, 1991). For example, IT, as used to support IS, creates an enhanced capacity for (invisible) monitoring of people (Lyon, 1993), even though in practice such capabilities are often limited (see for example Bain and Taylor, 2000).
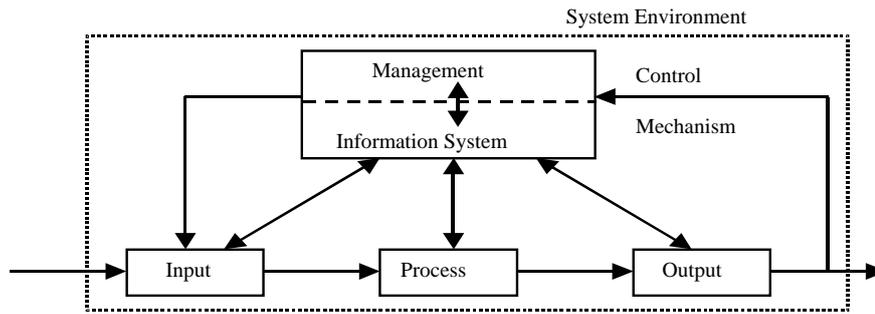
Figure 4: **Information System as an organisational control mechanism (Chaffey 2003:40)**

IS are closely linked to the management and control of work processes. For example, underlying IT enables the collection and storage of data about inputs, (work) processes and outputs (see figure 4). This allows managers to supervise and monitor these processes and the people involved, as well as support decisions about short and long term corrections when appropriate. Moreover, data can be aggregated, collated and analysed for management information. Ongoing data collection and storage creates a lot of objectified and quantifiable information that makes control at a remove in time *possible* (Zuboff, 1988). It is essential at this point to realise that none of these capabilities inherently lead to certain behaviours, though they can both limit and enhance the range of potential actions.

While they traditionally focus on *collecting* and *analysing data*, IT is increasingly also used to support *communication*, which is another essential part of control. With reference to Figure 4, this communication involves aspects such as informing employees about targets and constraints (input), providing them with access to information for executing their tasks (process), reporting progress and output to colleagues and managers (output), and delivering/receiving feedback and management information.

3.3   A framework for IS capabilities for supporting Management control

We have adapted Limburg and Jackson's (2007 and forthcoming) framework for mapping IS capabilities with different control approaches, that they developed for dispersed organisations, to apply to organisations in general.

Control approach	What an IS could provide to support management control				
	Input	**Process**	**Output**	**Feedback**	**Management Information**
Behaviour control	Access to applications and data sources.	Registration and monitoring of behaviour (by manager). Guidance of behaviour through prescription of procedures (for example a protocol for call-center employee).	Output recording and storage.	Communicate feedback based on discrepancy between actual and desired behaviour, to instigate corrective action – real time or periodically.	Provide automated information on adherence to procedure and output achievement. Analysis of effectiveness of processes. Implement changes in processes and procedures through the ISs.
Input control	Provide tools to register skills and knowledge of employees, as well as their actual application. Tools to keep up to date with changes in skills (both of the workers and those required for the work).	Support communication about task execution. Support teamwork by providing transparency of tasks, roles and processes.	Documenting outputs linked to individuals and skills.	Support feedback to managers and employees aimed at improving the match between employee skills and the tasks.	Provide information on overall skills base related to requirements (short and long term). Provide information on employee performance related to outcomes and skills.
Output control	Measure the use of resources in achieving outputs. Record and communicate output targets.	Monitor aggregate goal attainment and deviance from targets (real time).	Measure output levels. Compare actual with target output. Calculate performance rewards. Link to individual history of output.	Feedback on deviance from targets (real time) and what the possible consequences are for individual pay and reward (real time).	Information linking aggregate outputs to desired outcomes (targets). Information (and possibly models/algorithms) for target setting.
Peer control	Provide information about people's skills, knowledge and performance records that support creating an 'image' with peers. Store and communicate process and role descriptions.	Support interaction about and for task execution. Support collaborative working, including process monitoring by peers. Information on who should do which task.	Document outputs and performance records (transparent for all peers). Link the history of outputs to individuals.	Feedback is aimed at evaluating each individual's status in the process and their contribution to outcomes. Feedback on training needs based on process and output deficits.	Compare available skills base of the peer group with requirements (short and long term). Study whether performance leads to desired outcomes. Decide if roles, processes and infrastructure adequately support team working and support any changes.
Self control	Establish and communicate individual targets. Information about organisational goals/overall targets and how they are linked to individual tasks/targets.	Real time information about progress on targets and use of resources. Provide insight into the contribution of one's work to the 'bigger picture'.	Measure output levels. Analyse the contribution of an individual's output to organisational goals/overall targets. Link the history of outputs to individuals.	The feedback takes place within the individual, and is therefore closely bound up with work processes and outputs, allowing for corrective action on an ongoing basis.	Investigate whether aggregate outputs lead to desired organisational outcomes. Monitor whether roles, processes and infrastructure empower the individuals to control their own work.

Table 1:   **Evaluation framework for IS capabilities supporting management control (Adapted from Limburg & Jackson 2007 and Ibid, forthcoming)**

As is clear from the table, IS can play an important role in each of the control approaches. Which management control methods an organisation applies, or wants to apply, should therefore inform their investments in IT and IS in this respect. Moreover, existing IS/IT capabilities and parameterisation (e.g. rules on who has access to certain information) can stimulate or hinder specific control methods.

In the next section we will look in detail at what EPM systems are, followed by a mapping of their capabilities to support different control approaches in section 4.

4 Capabilities of EPM to support management control approaches

In this section, the theoretical capabilities of EPM systems to support the five control approaches that were discussed in the previous section will be investigated. To this end, the control approach-versus-capabilities table (table 1) will be completed specifically for EPM systems (table 2). A column of 'key role of EPM' was added which shows what EPM contributes overall to the management control approach. This table is followed by a brief discussion of its implications. Please note that the table focuses entirely on the EPM systems, and does not include the capabilities of the operational systems that underlie the EPM – such capabilities can be found in table 1.

Control approach	What EPM could provide to support management control					Key Role of EPM
	Input	**Process**	**Output**	**Feedback**	**Management Information**	
Behaviour control	Management adjusts the availability of input in response to performance indicators and discrepancy analysis (see final column), for example in/decrease people resources to respond to a trough/peak in demand or to a planned campaign.	Continuous monitoring of behaviour in processes. Adjustments to processes in response to monitoring (automated, real time, e.g. speed up) and analysis (longer term process designs, e.g. group items according to postcode).	Analysis of output in relation to input and process to calculate performance indicators (e.g. efficiency and effectiveness).	Management provides employees with feedback based on reported discrepancies between actual and desired behaviour, in relation to input and output – analysis to provide an insight into (internal and environmental) factors that influence or cause such discrepancies.	Reports of discrepancies and analysis of (internal/external) influences and causes, using analysis of output in relation to input and process and performance indicators. This could inform a change in prescribed behaviour (process), possibly automatically through the systems.	Establish which behaviour (captured in process design) leads to optimal performance, based on analysis of input, process and output data – collated over multiple processes to avoid sub-optimisation. Adjust behaviour prescription automatically and in real-time.
Input control	Monitoring of each employee's involvement in business processes, in relation to performance indicators and registers of employee skills and knowledge. Alerts and suggested measures when problems with skills/knowledge are leading to performance problems.	Continuous monitoring of skill and knowledge use in processes.	Analysis of output in relation to input and process to calculate performance indicators (e.g. efficiency and effectiveness).	Alerts and suggested measures to both employees and their managers when problems with skills/knowledge are leading to performance problems. Positive feedback when performance is good (for employee retention).	Reports on skills and knowledge available and applied, in relation to performance indicators. Changing 'inputs' is a relatively slow process (training or hiring/firing, redeployment), so accurate planning and forecasting are essential.	Establish which employee characteristics, skills and knowledge correlate with performance, and flag up issues regarding absent and/or redundant skills etc (individual/overall). Analyse new skills and knowledge needed in response to external developments.
Output control	Analysis of input in relation to process and output. Adjustments in resources to respond to actual (real-time) or planned output changes.	Monitor aggregate goal attainment in relation to performance indicators, flag up potential problems in achieving the output targets, suggest and implement necessary changes (done in-process to avoid actual output deficiencies), for example speed up process to be able achieve target (use dashboard).	Monitor output levels, compare with targets and flag up problems. Establish performance rewards– ideally across the organisation rather than locally (current level of reward could be indicated by a dashboard so employees can see the reward rise with their efforts).	Employees receive output-related rewards or are reprimanded for not achieving targets (operational). Current level of reward could be indicated by a dashboard so employees can see the reward rise with their efforts New targets are provided based on analysis of links between targets and performance.	Data on actual outputs and performance indicators are analysed to establish relationship between employee output (aggregately) and organisational performance. Creation and use of models and algorithms for target setting, monitoring and adjusting.	Establish output targets that lead to optimal performance – adjust targets in response to deviance (when target does not have desired effect) and external developments. Analyse link between performance rewards, outputs and performance indicators to help design an optimal reward system.
Peer control	Information about skills, knowledge and past-performance – EPM provides a more integrated, company-wide perspective than individual IS. Peers can select team members and make (project) plans based on this information – potentially using the EPM intelligence for planning etc.	Continuous monitoring of processes and individual contributions, *in relation to overall results*, making the resulting performance information widely available. Suggesting adjustments.	Continuous monitoring of outputs, making the resulting performance information widely available. Monitoring of overall, aggregate outputs and providing feedback where adjustments are needed. Employees can use performance indicators based on these to inform input decisions and process designs.	Employees receive information about each aspect of the organisation that is relevant to their own/their peers' contribution, including relevant analyses of links between skills/knowledge and performance.	Operational/team level: Linking individual and team contributions to performance indicators and longer term requirements. Management needs to monitor aggregate performance (overall) in relation to business goals and can use analytical tools for comparison and suggestions for improvements.	Make performance targets and information (local and overall) available to a wide range of employees so they can judge each other's potential and actual contribution in the context of organisational performance and targets and react to deviations. Provide management with an overall (aggregate) perspective.
Self control	Information about overall targets and performance indicators to guide employees' input – EPM can provide broader perspective and analysis of relationship between input and results.	Continuous monitoring of processes and individual contributions, *in relation to overall results*, making the resulting performance information widely available. Suggesting adjustments	Continuous monitoring of outputs, making the resulting performance information widely available. Monitoring of overall, aggregate outputs and providing feedback where adjustments are needed.	Employees receive information about each aspect of the organisation that is relevant to their contribution, including relevant analyses of links between skills/knowledge and performance so they can make adjustments when needed.	Operational/team level: Linking individual contributions to performance indicators and longer term requirements. Management needs to monitor aggregate performance (overall) in relation to business goals and can use analytical tools for comparison and suggestions for improvements.	Make performance targets and information (local and overall) available to a wide range of employees so they can judge their contribution in the context of organisational performance and targets and react to deviations. Provide management with an overall (aggregate) perspective.

Table 2:   **EPM capabilities supporting management control**

The table shows how EPM systems support operational management as well as tactical management. It is also linked into strategic management, with performance targets feeding into operational and tactical management, and, in turn, actual results informing strategic goal setting. External information could be used to inform both levels, for example when good weather is predicted a café might move the focus from soups to ice-creams, or when a company-wide response is needed to a competitor's major marketing campaign.

EPM could, according to these findings, play an important role in making the employee-driven, democratic control approaches more feasible and practical, by providing equal assistance to overall management and local autonomy, and especially to their continuous linking. A more granular level of performance information might be needed, but this should be possible without great technical issues. As generally suggested by EPM vendors, this approach would free up management time to focus on more tactical and strategic issues, as employees get on with daily processes and adjustments to these to react to – up-to-date – performance indicators. This would enhance both short-term reactive and long-term proactive management.

5 Does application of EPM lead to democratisation?

The previous section showed EPM system's theoretical ability to support democratisation of control. Our key question now is whether such a shift actually takes place in organisations that have implemented such systems, especially considering the need to configure – and use – systems accordingly, as the systems in themselves can support any of the approaches. A preliminary study was undertaken to gain a baseline view of EPM's impact on management control in practice. This study consisted of two main parts. Firstly, data was collected at an annual meeting of organisations that use one vendor's BI and EPM solutions (June 2009, referred to as 'User Event'). The researcher attended both days of this event, analysed case presentations and discussed the effects on management control of EPM implementation with several attendees (both users and vendors). The event was organised by an independent body representing the users of this supplier. No pressure was felt or indicated by the researcher or the respondents to 'please' the vendor.

Secondly, a large collection of vendor case studies was analysed, focussing on indications of use of EPM systems in relation to management control. The set contained 65 cases in total, with descriptions ranging from 1-5 pages, representing a wide range of industries and sectors. The case organisations included were generally quite large, although the smallest only had 30

employees. Obviously, as these cases were written and published in support of the vendor's sales and marketing, they cannot be considered to be an independent source. However, the content analysis gives an interesting picture of what the vendor and the client organisations deemed important when EPM was implemented.

Both sources indicate that only a limited amount of full-scale EPM implementations appear to exist. Many organisations show partial implementation, e.g. coordinated data capture form a variety of sources with some business intelligence, reporting or analysis, but very few (if any) appear to have fully rolled out EPM.

5.1 Overview: some key observations from the data

Many of the examples are essentially about providing consolidated data, for example in the shape of a data warehouse. The EPM supports:

- harmonising data from multiple sources (subsidiaries, different IT systems);
- giving access to data/reporting/analysis tools without the need for IT assistance;
- allowing users to create their own, purpose made reports;
- enhancing visibility and transparency; and
- enabling faster consolidation, reporting, and closing.

EPM was also mostly implemented in highly distributed organisations (world-wide, many business units/subsidiaries and/or acquisitions), which makes a lot of sense.

Individual users of EPM systems are generally at an executive level, though some 'local' access (ranging from entire countries to individual outlets) is reported, including a very limited number of organisations where end-users use BI tools (particularly in sales). The data consolidation seems overwhelmingly for the benefit of headquarters and executive management (reporting, budgeting, and analysis), rather than operational management, though a limited number of examples indicate that use for operational management is possible.

The EPM systems in this study were mostly used for financial reporting and analysis; access to operational systems (e.g. ERP) often was only for the general ledger data. Statutory reporting requirements and compliance were often a key reasons for implementing EPM systems. Two cases at the User Event showed some use of operational data for enterprise level performance monitoring. However, many attendees indicated they did not think access to operational data to be straightforward.

5.2   Implications for management control

EPM systems appear generally to be implemented to support and enhance *existing* management control approaches. In most of the cases there is little evidence that, apart from high-level budgeting and planning, they have currently much relevance to operational management.

Organisations that were already interested in empowerment looked at using EPM to support their policies. However, in most cases business intelligence was not considered something 'for the masses' and access to the EPM systems was limited to executives. This in confirmed by the limited number of 'users' relative to the total number of employees in most cases (less than 5% is typical). Nonetheless, there are examples of far higher usage – up to nearly 100% in some cases – especially where a CRM system is integrated into EPM (NB: not all users have the same access levels, access rights depend on functions).

The term empowerment is used several times pertaining to regional/local managers, referring to them being able to access relevant data directly, and to create their own reports. This also relates to increased autonomy of business units.

5.2.1   Input control

In one case, where there was a focus on getting the headcount numbers right, the EPM supported the worldwide management of human resources, so the organisation could make more informed staffing decisions. In another example, the organisation wanted managers to be able to monitor and assess employee workload, in order to optimise subcontractor arrangements. In a third case, dashboards were used to inform districts on where to dispatch (sales) agents. The EPM systems were also often used for high-level budgeting, forecasting and planning by head quarters; thus setting input parameters for subsidiaries.

An example of the way EPM systems can link output to input comes from a manufacturing environment:

> *"We are feeding sales information into constraint-based planning systems at our factories, enabling us to align our production more effectively with demand."*

This shows how actual sales are used to decide what and how much to produce, which will also directly effect staffing requirements. A final example highlights how using the analytics can inform input decisions:

> *"In the UK, [company X] mined [the EPM] trend data and discovered that sales for one product were slowing faster than anticipated. That knowledge spurred a decision to freeze hiring and reign in related selling costs like meetings and travel. The orderly retreat helped the UK unit avoid costly staff reductions and stay on target overall."*

There is very limited evidence on the skills and knowledge aspect of input control. The only direct reference comes from an organisation where EPM is used to provide self-service options as well as basic HR information to employees (e.g. view compensation, training and evaluation information), which in turn is said to allow HR staff to

> *"focus on initiatives aimed at attracting and retaining skilled employees, and devising training programs".*

5.2.2 Behaviour control

The most striking reference to behaviour control relates to a CRM-type application:

> *"Business Intelligence provides laser-like visibility into the performance of every sales rep. [….] We can better understand how agents are spending their time and what's not working."*

In this organisation, however, the 'associates' also use the BI to gain customer information in real time, for example to track outstanding customers. Outside the sales function there is little information that relates EPM directly to behaviour control. In some cases the way Key Performance Indicators (KPIs) are set and monitored suggests a control method closer to behaviour control than output control. Also, monitoring of performance often relates to entire brands or business units, rather than individuals.

The use of EPM has a strong influence on the work processes of employees directly involved in financial reporting. There are several references to process improvements/streamlining, including:

> *"improved workflow management and automated controls to reduce the time and cost of compliance".*

Hence, it can be seen that the systems include some aspects of behaviour control for employees involved in financial reporting.

5.2.3 Output control

Generally, the use of KPIs, mentioned in a large number of cases, would indicate a form of output control. However, as said above, some organisations appear to (also) use it more like behaviour control. A clear example of output control is found in the case where the EPM:

> *"Enabled a management-by-objectives system with associated evaluation mechanisms that serves as a basis for an effectively differentiated pay scale."*

5.2.4 Self control

There are a few examples of (near) 100% of employees somehow using the EPM system, providing employees with a level of BI in their jobs. A few of these refer to the availability of customer information to sales staff, including call centre employees who use the system to support up-selling. For example:

> *"The [CRM system] delivers integrated customer information in real time, enabling users to develop accurate customer profiles. Staff use this information to develop detailed sales offers and targeted marketing campaigns. In addition, the ability to access an accurate and complete client history has helped customer service staff provide timely, well-informed responses to queries."*

As an aside, there are also two cases where the *customers* use the intelligence.

In one case, managers in branches (outlets) are provided with

> *"interactive portal-based dashboards with daily 'traffic light' performance updates against central KPIs".*

Clearly, these dashboards could be shared across the outlet, in order to support self-control. No reference to such information sharing is made, though, and it can't be found explicitly in any of the cases.

As in the previous example, it is often difficult to establish what levels of users have access to the EPM information and functionality. In most of the organisations, access seems to be limited to executives, sometimes stretching to lower level managers. The following organisation indicates 'access for all', but it is unclear what the information is used for:

> *"The [EPM] system provides full drill-down analytics that meets the requirements of everyone from senior executives to end-users based on their access authorization profile. [...] We have much more efficient management, as everyone across the organization is looking at the same set of figures. We have a lot less ad-hoc reporting, and a lot of the intellectual property that was held by a few key individuals is now accessible across the business."*

There is certainly a hint here that providing more people with intelligence has helped to improve management processes, possibly indicating some level of employee autonomy.

5.2.5 Peer control

In only one of the cases reference is made to people collaborating:

> *"The CRM system has also encouraged collaboration between different divisions. Staff are more willing to share information as they can now see how it benefits their colleagues."*

However, this does not in itself indicate peer control taking place. In another case, it is consistently mentioned that information is provided to sales *teams* rather than individual employees. This may indicate some team-based control and management, but is more likely to be a way of referring to the sales function more generally.

6   Conclusion and Discussion

Based on these preliminary findings, EPM systems do not appear to have penetrated much into operational management, and therefore may have limited effect on management control. The first 'wave' of implementations mostly benefits the executive management of organisations, especially where the organisations are very distributed and management needs to make sense of data from a variety of sources. However, the way in which in some cases operational management is integrated with EPM (most notably in the use of CRM systems), there are some indications that businesses see this as an attractive route that can be very beneficial. Also, through planning, forecasting and budgeting, the work of employees is directly affected, especially if this is done on a continuous basis, rather than, for example, yearly. In many organisations, the implementation of EPM has come with the introduction or reinforcement of the use of KPIs in the management process. Though this often refers to the performance of entire units, they could, of course, also be used further down in the organisation, especially combined with the increased capability of monitoring the KPIs through dashboards. Both through the planning process, and the monitoring and use of performance indicators, the EPM systems do potentially provide people throughout the organisation with a better insight into how their work fits into the bigger picture; provided, of course, that this information is actually shared out. The conversations at the User Event, combined with the limited evidence of such sharing in the case studies, as well as the previously mentioned study by Neely et al. (2008) suggest that such sharing is very limited at the moment.

There are some suggestions as to what's holding organisations back in sharing EPM information more widely. Firstly, the data that is collected and analysed is still largely *financial* data, and therefore of limited direct relevance for many people in the organisation. Where more *operational* data is included, we already see a wider distribution of information. This is, for example, happening when operational systems (like CRM) are integrated into the

EPM solution, creating the desired combination of bottom-up and top-down information streams. There are several reasons that people give for organisations limiting EPM to financial data: stronger need (statutory reporting), data already collected (in various systems), and more straightforward to interpret and consolidate than other data.

Secondly, and possibly a bit more worrying, is a suggestion (in conversations) that many managers (as well as Information Technologists) doubt that end-users would be interested in Business Intelligence, or would be able to use it. Many people that were directly asked 'do you/does your solution provide direct access for employees' seemed quite baffled by the idea that such a thing could be considered, though a few agreed that EPM really should include such information 'democracy' to be fully successful. This is not an issue that is specific to EPM; employee empowerment has always met with a large degree of scepticism, despite many examples of good practice.

And, thirdly, some attendees of the User Event pointed out that working with real-time data might not be as straightforward as suggested in some vendor publications. Though, again, others were more optimistic about the potential. Either way, there is still a technical challenge in providing access to the right data, especially to do this in real-time, across multiple data sources in many different locations. Not to mention the challenges of defining meaningful KPIs and using them wisely in all management processes.

Although the preliminary study has given some first insights into the effects of EPM on management control in practice, we will need more detailed information about the use of EPM at an operational level to be able to draw stronger conclusions. Such research would also provide insights that would help to tackle some of the issues that are holding the empowerment potential of EPM back. In the next phase of the research detailed information will sought using in-depth case studies and interviews in organisations that use EPM systems, including those that already support employee empowerment.

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