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Business Process Management and Innovation

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The improvement of corporate processes has long been recognized as a source of operational efficiency gains. As early as 1931 processes were discussed in scholarly publications (Nordsieck 1931) and the structuring of organizations among their processes was postulated in the early 1960s (Chapple et al. 1961). Business processes have been most prominently featured in the popular reengineering literature (Davenport 1993), but organizational resistance to change was frequently underestimated and led to many failed reengineering projects (Davenport 1995). As a consequence, talking about processes was often equated with reengineering and downsizing, and evoked a "we've been there before – and we're not going there again" response from affected managers (Rummler 2004). Today, our ability to measure and improve processes has increased beyond what was possible with the technology of the early 1990s, and process-aware information systems are firmly embedded in the IT infrastructure of organizations. A process management strategy will help companies maximize the benefit that can be derived from these systems. In this article we examine the components of a contemporary Business Process Management strategy, and illustrate the use of process-oriented technology for the evaluation and improvement of process performance.

Process Management: Technical or Organizational Issue?

Over the last few years we have seen organizational processes regain prominence as a source of competitive advantage. This can be attributed to a number of reasons: The conclusion of Y2K efforts, which absorbed a lot of energy and stifled innovation in other areas, new requirements for compliance with auditing and governance standards that require an analysis of current organizational practices, and the availability of a new (and increasingly mature) generation of process-aware information systems that are becoming commodities in the IT portfolio of corporations. Applications such as document management systems with routing functionality, workflow management systems, enterprise application integration platforms and other work management technologies have led to an increasing awareness of business processes in corporate IT departments. State-of-the-art application architectures are often designed around a process layer that allows for the easy adaptation and reconfiguration of applications when business needs change.

This development has shifted the process focus from organizational designers and line managers into the domain of CIOs, who are looking to deploy process-centric applications in "quick win" scenarios. As a consequence, many process improvement projects are initiated by IT staff and are treated as software development projects. This is not surprising, as the deployment of a process-aware information system at least initially looks like the deployment of any type of application system. In the long run, this perspective may lead to a one-time process performance change, an advantage that may erode over time if the competition catches up. As an alternative, organizational process management focuses on the continuous monitoring and improvement of process performance. While the first round of improvements may be significant, subsequent adaptations of the process in question will lead to incremental gains in process performance. In an ideal scenario organizations can adopt a combination of both approaches. First, stake out the "quick fixes", then deploy technology that will support the revised process, and then continuously monitor and adjust the process. Figure 1 illustrates the difference between the three approaches.

Foundations of Business Process Management

Management in general controls the use of resources and choreographs the operational activities of an enterprise. Management functions follow a lifecycle of planning, organizing, staffing, directing, controlling, and budgeting. In essence, Business Process Management is the application of this management cycle to an organization's business processes. Business Process Management has become an industry buzzword over the last few years, but its roots are clearly not new. Zairi and Sinclair state that BPM is "a structured approach to analyze and continually improve fundamental activities such as manufacturing, marketing, communications and other major elements of a company's operations" (Zairi et al. 1995). Elzinga et al. characterize BPM as a "systematic, structured approach to analyze, improve, control, and manage processes with the aim of improving the quality of products and services" (Elzinga et al. 1995). Harmon echoes this idea (Harmon 2004): "BPM refers to aligning processes with the organization's strategic goals, designing and implementing process architectures, establishing process measurement systems that align with organizational goals, and educating and organizing managers so that they will manage processes effectively."

The core task of Business Process Management is to create alignment among individual process components: Input (information and resources), Output, Structure, and Goals. If alignment between these components is achieved the overall process performance should increase both in terms of qualitative (e.g. faster adjustment to environmental changes) and quantitative factors (e.g. shorter cycle times, less waste, idle time, rework).

The BPM Life Cycle

Since Business Process Management consists of recurring activities, it is best described as a life cycle (compare figure 2). The starting point for any process improvement project is an analysis of current strategy and goals. Processes should contribute to the overall

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strategy of an organization, therefore the individual process goals should align with the strategic goals of the organization. For example, if the overall goal of the organization is to become a quality leader in its respective market, process goals such as "shortest execution time" may lead to counterproductive behavior by process participants, who receive incentives for finishing work fast, even if it does not meet the highest quality standards.

Based on these goals the analysis and design of individual processes can commence. This is typically done using (semi-)formal graphical notations, such as Event-driven Process Chains, Petri Nets, or Flowcharts. In focus groups we have also encountered organizations that use tabular process descriptions, such as RACI charts with success. Graphical process descriptions have the advantage of being easily communicated, although they may not capture all intricacies of a process, such as business rules that are invoked to make routing decisions.

The process models generated in the design phase are then transferred to the process implementation phase (Build Time). At this stage, decisions have to be made whether the activities of a given process should be carried out manually, with the help of information systems, or be completely automated. Furthermore, the process analysts need to determine whether the routing of the process (i.e. the control flow) should be controlled by a process-aware information system (e.g. a workflow management application), or whether manual processing rules and employee training are sufficient to ensure the desired process performance.

The transformation of design models into implementation models is a critical step, and the mismatch of methods and modeling perspectives can lead to a great deal of rework and re-documentation in this phase. The reason for such mismatch is the fact that the process design perspective (i.e. the purpose of the process model) determines the elements captured in the process design phase. For instance, a simulation model would contain activity execution frequencies and resource utilization, while an application integration model would contain detailed information about the invoked applications, their data format, and their invocation interfaces. If the modeling purpose during the design phase differs from the implementation phase, information will be missing from the process models and will need to be documented in the implementation phase.

Once the process implementation is completed, individual process instances can be derived and executed from the implemented process models (Run Time). At this stage process participants are informed about pending tasks via work allocation and distribution mechanisms (such as web-based task lists) and carry out their respective activities. Modern Business Process Management Systems allow for the collection of precise metrics in this phase, which can be fed to dashboard-style applications, known as Business Activity Monitoring systems.

While the purpose of Business Activity Monitoring systems is the active support of process managers during the day-to-day supervision of processes, they typically do not support higher-level decision support functions such as the display of performance trends or aggregate process information. This is the domain of process controlling applications, which are fed with data both from the process execution infrastructure and existing data warehouses that capture business data linked to individual process instances. Process controlling applications allow process managers to analyze process performance with regard to the business objects that were manipulated in the individual process instances. Questions such as "how does our process performance differ between frequent and first-time customers?" can be answered at this stage.

The insights gathered during the process controlling and review phase can then be used to analyze strategy alignment as defined in the first stage, and the appropriateness of the subsequent process design. To date, little work has been done to link process performance data to actionable process improvement activities, and this remains an interesting field of study.

The overall BPM life cycle as depicted in figure 2 is split into two distinct phases. The right side of the life cycle (strategy and process design, implementation and execution) echoes the model-driven implementation of information systems. Experience gathered from the management of software and reengineering projects is applicable in these stages, and therefore the "software-project-like" approach to BPM is understandable. As a consequence, many organizations that deploy BPM solutions are satisfied (or relieved) once these solutions are in place and do not want to touch them anymore, focusing just on the technical maintenance of the deployed application.

However, the software development analogy fails along the left side of the life cycle, which consists of process monitoring, controlling, and process and strategy revision. These tasks have less technical and more business focus, and should be conducted by a process manager with line responsibility. In the next section, we look at these tasks in more detail.

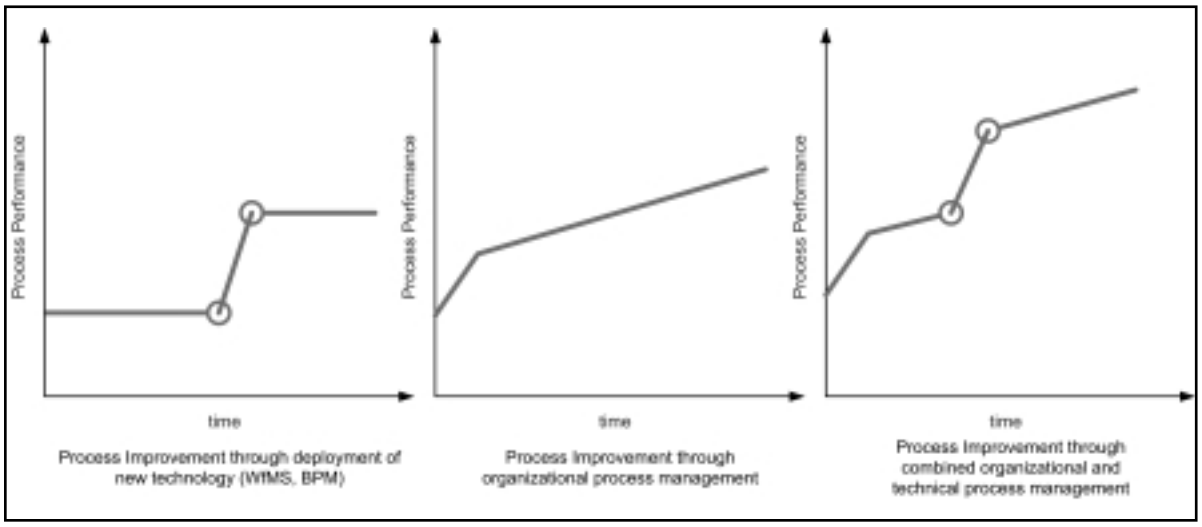

Figure 1: Organizational vs. Technical Process Improvement

Business Activity Monitoring and Controlling

One of the benefits of having a process-oriented application infrastructure in place is the ability to collect process per-

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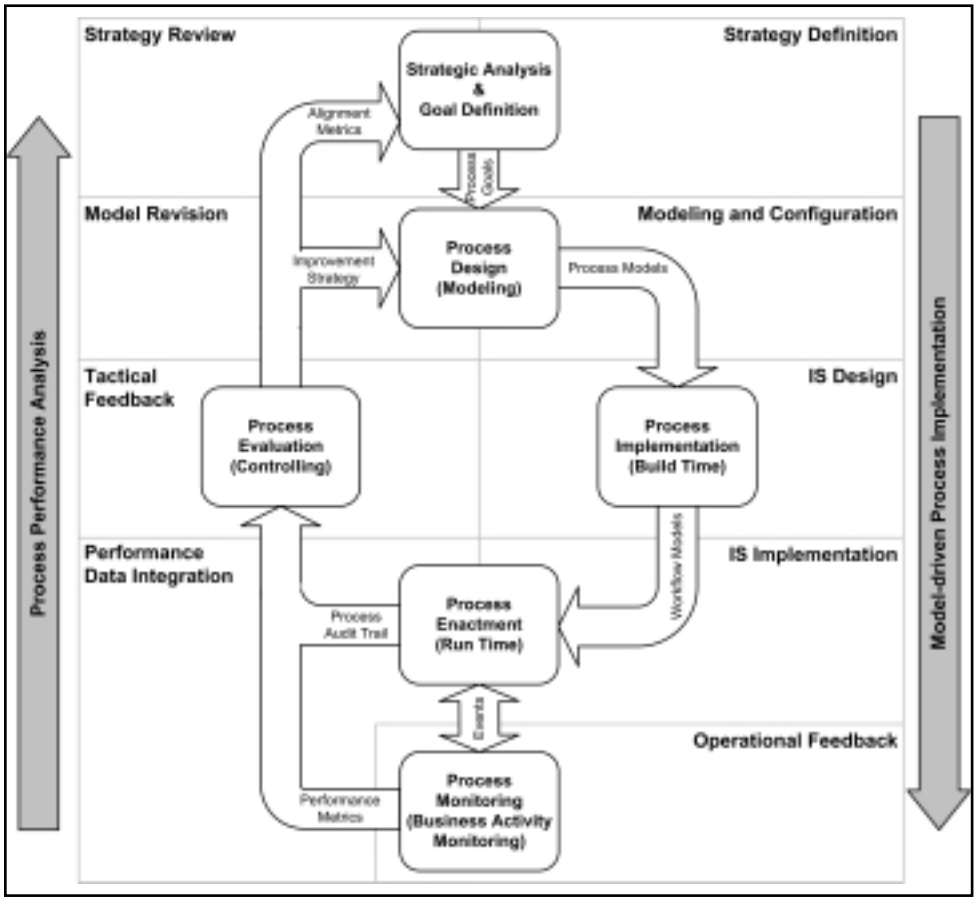

Figure 2: Business Process Management Life Cycle

formance metrics near real-time. But does this technical advantage translate into a more nimble organization in general? Figure 4 shows the breakdown of latency that affects decision making processes in general (adopted from (Hackathorn 2002)).

Once a business-relevant event occurs (such as the cancellation of a customer order, the escalation of an activity to a supervisor, or the failure of an application system), information about this event needs to be stored, processed into a format useful for decision makers, and presented. Based on the content and context of the event, a decision on if and how to act needs to be made, and this decision needs to be implemented. Between each of these activities time is lost, and with this time business value may be lost. For example, if a customer complains about a late shipment on the phone, a skilled call center operator might offer concessions to the customer while he or she is still on the line. If these concessions are offered after the customer hangs up, the risk of losing the customer is significantly higher, and the potential loss of revenue greater. Some of these latencies are caused by (the absence of) technology, while others are of organizational nature.

In the context of BPM, process-related events are generated by the Business Process Management infrastructure. They need to be transferred into a Business Activity Monitoring system in order to be visible to process managers (data latency). Within the monitoring system, the updating frequency of gauges and reports determines when analysis information concerning the event is available (analysis latency). Depending on the nature of the process fixed reporting cycles may be sufficient (which may lead to a maximum analysis latency of one reporting cycle), while in time-sensitive processes an active notification of the decision maker is desirable. Once analysis information is available it needs to be interpreted by the decision maker and its implications may be assessed. While the call center example given above would benefit from a minimal decision latency, other scenarios may require decision makers to observe general trends before jumping to conclusions based on individual processes. Decision latency is also affected by the readability of information, and the alignment of monitoring data with the decision making abilities of the individual process manager. Finally, the decision made by the process manager needs to be implemented, which is expressed in the implementation latency.

Real-time monitoring shortens decision cycles by minimizing infrastructure latency. Because the origin of monitoring information and the system displaying this information are tightly integrated, data and analysis latency can be shortened, if not eliminated. However, decision and implementation latency will continue to exist. They can only be shortened if the monitoring information is aligned with the interests and responsibilities of the process managers, and if the relationship

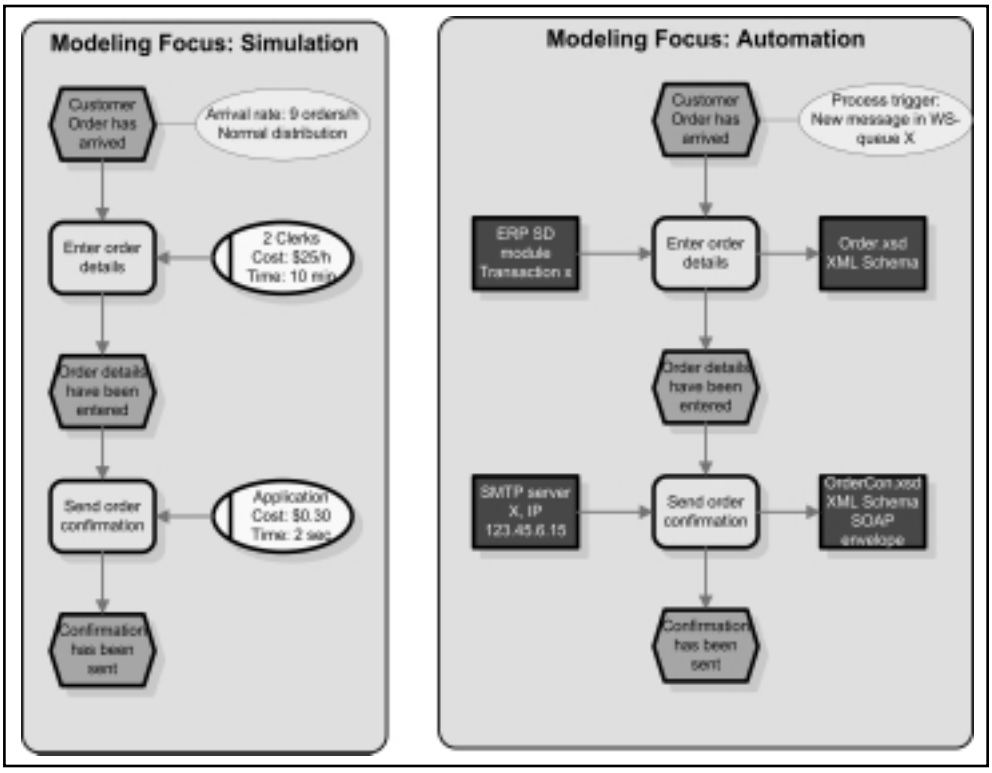

Figure 3: Results of Different Modeling Focus

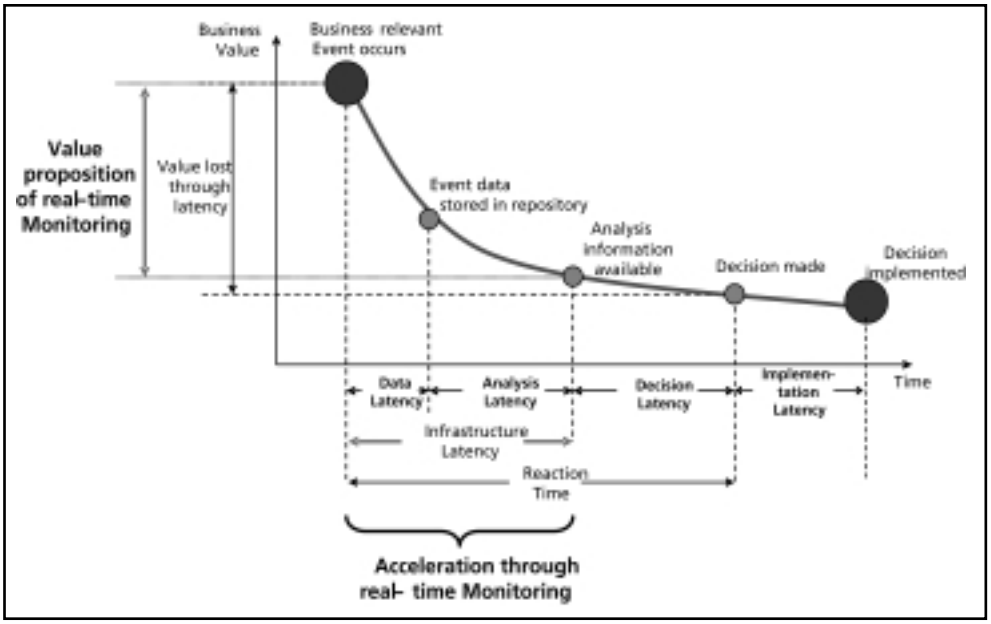

FIGURE 4. Business Process Monitoring Latency

between process design and changes in process performance is well enough understood to quickly adapt processes and their execution context. Business Process Management Systems provide the technical foundation for these activities, but their deployment requires a parallel effort in process management training. Furthermore, even if process performance can be observed in real-time a reaction in real-time may not be desirable. In supply chain management the bullwhip effect is a well-known phenomenon that occurs when demand forecasts are based exclusively on information from the immediate downstream partner in the supply chain (Lee et al. 1997). Similarly, the roles of process monitoring (fixing individual process instances that run awry) and process controlling (identifying long-term trends and revising process strategy and design) need to be separated to avoid knee-jerk reactions that may affect overall process performance in a negative way.

Summary and Outlook

This article provides an overview of the Business Process Management life cycle, and illustrates the process monitoring and controlling phases in more detail. Business Process Management is more than the deployment of workflow management technology. It encompasses strategy, design, implementation, execution, and review. While the design and implementation phases of the life cycle are well supported by technology vendors, the remaining phases of the life cycle need to be understood and implemented by the affected organization. This includes the following points:

- Process goals need to be aligned with the overall strategy of the organization, and performance incentives need to be aligned with overall process goals.

- Performance metrics need to be determined while a process is being designed and implemented. Only then are the current and future states of the process comparable.

- Just because process metrics can be obtained in real-time does not mean that an organization can (or should) react to them in real-time. Determine which activities and processes are critical to your business and design a Business Activity Monitoring framework around these. Focus on process controlling activities for the remaining processes.

It is apparent that Business Process Management is not a project. Rather, it is a continuous improvement strategy that can lead to significant performance gains.

The Center of Excellence in Business Process Innovation at the Howe School of Technology Management conducts a variety of research projects that aim at improving tools and techniques for the design, measurement, and improvement of business processes. Reports and additional information are available for download at www.stevens.edu/workflow.

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